Light, Vitality, and Dynamism:
An Introduction Of Time And Movement Into Theatre Lighting

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A Thesis
in
Individualized Program

Presented for the Partial Fulfillment of the Requirements
For the Degree of Master of Arts (Individualized Program) at
Concordia University
Montreal, Quebec, Canada

March 2018

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

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Entitled: LIGHT, VITALITY, AND DYNAMISM
             An Introduction Of Time and Movement Into Theatre Lighting Design

and submitted in partial fulfillment of the requirements for the degree of

Master of Arts

complies with the regulations of the University and meets the accepted standards
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Foreword

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As a stage lighting designer, I have worked over the years in various environments such as theatre, dance, opera, circus, and installation art. However, my primary expertise lies in the theatre, and throughout the last decade, I tried to endow light with meaning to complete the narrative of the spectacle. I began to build lighting scenarios based on a symbolic use of light and then shifted to a spacial use of it *in situ* and finally to kinetic use of light. The last step proved to be the most difficult. I was no longer working with any extrinsic effect of light (e.g., the formation of culturally relatable and constructed images), but with an inherent component of it: its quality made visible by movement (and thus independent of the process of signs, symbols, image, or text and grounded in temporal experience).

Working with movement proved difficult for the lack of "lighting vocabulary" in writing and communicating the light scenario—it was challenging to put light into action as a core material of the creation—and for the lack of malleability of the conceptual and technical tools. Independent of the performance context (theatre, dance, opera, etc.) and place (traditional venue, black box venue, in situ, etc.), I could feel a conceptual limitation when implementing light during staging. I observed a technical limitation when programming and performing the shows (rigid cues, sequences, and playback). This limitation seemed less present in the few installation art pieces I had made before as well as in the light artworks from media artists I had discovered: in both cases, meaning making differed. It appeared that Light Art processes through a different

frame of mind than the theatre and that it may allow light to gain autonomy and agency. At this point, I understood that theatre lighting design was, somehow, ossified, and I wondered how to disentangle it from its bonds.

The present thesis tries to understand what is at stake in the limitation observed from a practice-based point of view. It aims at dissecting the constituent elements and undertakes a journey to their root, gathering the knowledge to improve and imagine the next research steps towards a dynamic light implementation.

Abstract

This thesis explores the dynamic possibilities of composing with light in the theatre as an autonomous medium. Through an archaeology of concept, it identifies the non-dynamic elements inherent to traditional theatre lighting, such as the need for illumination, linearity, the emphasis on spacial thinking over temporal thinking and the focus on visual images over in-depth experience. These elements shaped lighting practice as a predefined technical tool activating other mediums - culminating in a non-dynamic and rigid practice - instead of considering it as a performative and active element in itself. A comparison with Light Art, complemented with insight from psychology, unveils that time and movement are missing to the feeling of vitality triggered by a dynamic light. The thesis therefore speculates on how to conceptually and technically reintroduce these fundamental elements of dynamism into stage lighting design, promoting a polyphonic and polyrhythmic temporal model over a linear and spacial one, as well as a performative approach over a predefined one. In this view, the creative process, the creation tools and the performance model are revised.

Keywords

Light; lighting design; theatre; time; movement; Light Art; dynamism; temporal dynamism

Acknowledgments

To my loving family and close friends, those that inspire and don't even know it.

You make any journey worth it.

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Introduction

To disentangle lighting implies to understand in what it is enmeshed. From practice-based observations, I argue that traditional occidental theatre lighting design mostly uses a set of thoughts and practices that restrict it to a circumscribed path, resulting in a dormant dynamism, incomplete artistic expression or, in other words, in the ossification of light as a medium. This state of numbness defines itself by the very possibility of freedom and vitality—qualities that are observed in Light Art.

Moreover, if the nature of light is still unknown—and vary according to the cultural, social and religious ideology in which it is embedded (Zajonc, 1993)—its property changes according to the conceptual frame that examines it. As an example, the scientist Günter Leising[1] advocates two properties to light—direction and intensity—whereas lighting designers state that colour, movement, and form are to be added to the above properties. As different paradigms, it is no surprise to observe a radically different use of the same medium in theatrical lighting and Light Art, unveiling different properties of light.

From practice-based research and field review, I observed a lack of dynamism in the use of light in the theatre. For example, if light appears more autonomous and dynamic in Light Art; and if light properties might change according to the chosen paradigm; then the following question arises:

What makes theatrical stage lighting design static and how to perform dynamically with light as a fully autonomous and dynamic medium in the theatre?

To answer this question, I intend to compare the use of light in theatre and Light Art. I will identify the similarities and differences in composing with light, or, to put it differently, I will

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[1] See (Leising, 2006)

examine when, why and how did the use of light in Light Art diverge—or not—from the use of light in theatre. The comparison will unveil some characteristics of light that should not have been forgotten and yet were lost: the use of time and movement. Then I will speculate on a path towards the implementation of dynamic light into the theatre.

Chapter Summaries

Chapter One: Core Concepts

The primary divergence in the use of light between Light Art and theatre, which will be developed in chapters two and three, is the complete exclusion of two elements: time (thus movement) and performance. This short chapter is concerned with the first one. Indeed, after defining the notion of autonomy in the theatrical context, {this chapter} will draw from psychologist Daniel Stern's concept of vitality to understand dynamism. In Stern's view, time (and movement, space, force, and direction) is the constituent of what he names *dynamic forms of vitality*. His thinking will be transposed to theatrical lighting, as time seems to be the missing component. Autonomy, dynamism, and vitality will be tracked all along the thesis and juxtaposed to both theatrical and Light Art practice and history, therefore providing a thorough understanding of composing with light.

Chapter Two: Light in the Theatre

The dormant dynamism seems to be the result of hundreds of years of practice, always building on previous methods and needs. Practices are rooted in tradition and carry with them habits. Over the years, these habits cease to be questioned and become constituent, sometimes to the extent that they significantly influence the practice's development without even noticing. In philosophy, Foucault's archaeology of concept is used to understand the full range and layers of elements at stake in a practice or ideology. It seems relevant to apply this method to the

emergence and evolution of theatrical lighting in order to expose the layers of ideas, wills, and needs behind today's granted practices as well as the reasons for disregarding certain elements. The aim is to reach a state of full lucidity on the practice and ascertain the web of relation between stage lighting design and other theatrical elements from a historical, technical and conceptual point of view. In other words, the idea is to understand what this art is enmeshed in, to capture how the theatre created light (and vice versa) and to uncover the unnecessary restrictions or rigid conventions imposed upon stage lighting design.

Thus, inspired by Foucault's archaeology of concept, an archaeology of practice will be undertaken to look at the history of the practice from different points of view as to extract its most rigid historical constituents—the layers of sediments. The reasons why theatre denied lighting design the elements of time, movement, and performance shall appear, once identified, easily challenged.   Literature review and fieldwork review will be the ground for the archaeology of practice.

Chapter Three: Light in Light Art

To further accentuate the specific characteristics of the use of light in the theatre, it is relevant to consider another art form using light as a medium. This chapter studies Light Art and will be devoted to its historical and contemporary review in order to discern the vital principles and uses of light.   It observes its emergence, development, lineage, and intents, and examines how it differs, in its use of time, space, and movement, from theatrical use. As constituents of dynamic forms of vitality, these are qualities that need to be developed on the fertile ground of

the theatre. A historical review of Light Art complemented by a significant fieldwork review[2] will be the basis to identify when the use of light diverged and how light is used differently. This chapter, therefore, underlies the variable properties and multiple paradigms of light, and consequently addresses the question of modes of knowledge.

Chapter Four: Possible Vitality

This chapter is a speculative attempt to imagine a dynamic lighting implementation in the theatre. Starting from a comparison between both fields, it opens a broader set of thoughts for theatrical lighting design. It pinpoints and digs into the main layers of ossification (illumination, linearity, the removal of time, modes of meaning-making, and creative tools) and questions how to rethink these concepts towards new performing opportunities. It speculates the possible paths to reintroduce time (next to space and movement) in composing with light as an autonomous and dynamic medium, embodying Stern's view on vitality. This chapter, by speculating on what could be done to achieve a dynamic light performance, lays the ground and orients further research.

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[2] There is very little literature on Light Art so I engaged in considerable fieldwork review (2016-2017) by attending multiple light art festivals (Berlin, Prague, Amsterdam, Helsinki, Reykjavik, Aberdeen, Copenhagen) and exhibitions (Berlin, Unna, Stockholm, Copenhagen, Aarhus).

Chapter One

Core Concepts

1. Introduction To Stage Lighting Design

Contemporary theatre lighting design is usually considered as the methodical use of several light sources to artificially produce light according to artistic and technical considerations. It is concerned with the way light is distributed in a theatre so that it fits within a dramatic language (Valentin, 1988; Gervais, 1984). In other words, a lighting designer imagines a dramatically coherent design (usually semantically or atmospherically based), translates it in technical terms and, with great art, arranges the lighting instruments according to the space and the staging. His language is as much technical as poetic, and his task usually materializes only at the very end of the global creative process. Here is a generalization of a lighting design's journey in a medium-size institutional theatre[3].

The lighting designer receives the text and identifies its implicit demands. Then, production meetings start where the team settles down on the major concepts, especially for set and costumes. Meanwhile, the lighting designer attends rehearsals in order to be immersed in the director's artistic vision and sketches what will become, in the end, a storyboard. He will poetically discuss the storyboard with the director and present it in one of the last creative meetings. The final step is the translation of the artistic vision into the technical realm: a light plot, technical rider, and lighting console programming. Existing methodologies are most often in use to plan the lighting of both the set and actors properly.

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[3] Here I am sketching the textocentric practice traditionally observed in most institutional creative processes because their habit always influences, at one point or another, on alternative practices.

When the team enters the presentation venue, the technical work begins. It is hard work condensed at the very end of the process. The lighting designer directs the technical team during the setup and, once the set is in place, he directs the focus—a time-consuming task. Only then can he sit at the production table with the director for an intense period of lighting sessions. For about eight hours, they will meticulously create (program) every light state of the show, chronologically. They paint the set and shape the actor with light (stand-ins for the actors are hired to figure in space, emotionless). Based on the script, during the runs, the stage manager will call the shots for an immutable, linear, and predefined playback. The light operator presses the *go* button, and the light-state is precisely restituted. There are usually from one to three full run-throughs before the opening.

In this description, it is evident that light is conceived as a technical element and tool. It comes last in the production process and thus must accommodate the other mediums, and has very little time to act/interact with the performer or other media such as sound or projections. In that context, it is hardly an equal medium in the writing of the show and is neither autonomous nor dynamic.

2. Introduction To Light Art

Light Art, a new art form belonging to the 20th and 21st centuries, operates dramatically differently applying light as a medium of expression. The focus is on pure light, as opposed to text-based dramaturgy, which leads to completely different spectra of explorations for producing and manipulating light. The art of light now takes on many forms: light sculptures, light boxes, laser beams, light-objects, neon signage, light projections, projection mapping, light walls, light

installations, light photographs, video, light rooms, fields of light and so on, presented in a wide range of spaces, from galleries to festivals. It addresses the pure perception of light as an autonomous and creative medium. The goal here is not to do an exhaustive survey of all of these forms but to understand what conceptually distinguishes such work from the manner that light is used in theatrical thinking. For this reason, Light Art that does not deal with similar light tools as theatrical lighting design will not be considered—for example, video and photography— as they are in my view, mediums in themselves that would summon a whole different expertise.

3. Introduction To Autonomy And Dynamism

3.1 Autonomy

We shall take a moment to accurately define the term autonomy in line with the specifics of light in the arts. If the word is described as being able to self-govern, its etymology relates to the freedom to impose one's own law.[4] Here shines the references to freedom and independence. The idea of independence strives towards completeness, separation, and collaboration. An interesting formulation comes from the artist, curator and theorist Peter Weibel who, when speaking of *pure light*, refers to light as an autonomous medium.

The stage director Robert Wilson, credited for increasing theatrical light's autonomy, considers every theatrical element (set, costume, text, lighting, actors, props, etc.) as whole but separate entities capable of producing meaning in their own specific way and thus, of equal importance. By doing so, he avoids having one element illustrating or dominating another. Here

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[4] "Autonomy," *Definitions* dictionary, *Antidote 9* (software, version 4). (Druide Informatique, Montreal, 2017)

autonomy does not mean sovereignty but rather, to go back to the word's definition, the freedom or the capacity to lead at will—a kind of ephemeral reign existing in a collaborative polyphony of elements. Shuffling such hierarchies is part of a compositional dynamism that I will later address.

Concerning light, autonomy would thus mean the capacity to differ from its sadly established yet supportive role in regards to other mediums higher in theatrical hierarchy, and a move towards a more effective one. The lighting designer and scholar Yaron Abulafia notes, "light, among the other media, is used as a means to generate an artistic experience and not as the medium of a message" (Abulafia, 2016, p. 195). This comment suggests that if light can create explicit meaning as advocated by the semiologist André Helbo (Helbo, 2001), it can more interestingly create implicit meaning by providing unique and immediate sensorial experiences that go beyond the text.

> Light takes a step to the fore and no longer merely illuminates or supports another medium that is prior in the hierarchy. Ambiguous and open with regard to meaning, and keeping a high degree of autonomy, it gives rise to imaginative uncertainty. (…) There is no one single final meaning to discover but, rather, an endless series of perspectives through which our experience of things can be examined. (Abulafia, 2016, p. 189)

This consequent completeness inherent to meaning calls for an all-encompassing view of light, that is, following the artist James Turrell, considering it as a "primary physical presence rather than a tool through which to see or render other phenomena" (Govan in Govan & Kim, 2013, p. 14). The self-determined light, therefore, moves from a tool to a performance of its own (Grondhäl, 2014) and fully acts as a collaborative and performative art form.

Too often lighting design is regarded as a primarily technological skill and expressive tool utilized to serve the overall poetics of a production, rather than a collaborative and performative art form in its own right: capable of challenging spaciotemporal conventions, not only of the stage but also of the real world. (Crisafulli, 2013, p. 11)

In the theatre we need to distinguish between the autonomy of the element in itself (light), of the operator (light artist), and of expression (contrapuntal composition). To summarize: in the current thesis, the fostered idea of autonomy when it comes to the art of light is related to independence, freedom, integrity, collaboration, and meaning-making. When coupled with dynamism (individual and collaborative), it shuffles hierarchies, creates relations and relates to immediacy and performance.

3.2 Dynamism

The long-lived, pictorial tradition has influenced the professional identity and teaching of scenography far into the modernist era by constituting it as a primarily visual art rather than dynamic part of a performance.

(Gröndhal, 2014, p. 22)

Dynamism is a multi-faceted term whose meaning changes according to the domain of expertise that appropriates it[5]. These various definitions all imply, more or less directly, multiple orientations or connotations: change, movement, action, performance, encounter, etc. There is a sense of in motion, active and forceful phenomenon often associated with other characteristics such as vitality, energy, vigour, progress, or process. What, in this vague outline of dynamism, can cohere as to the nature of the artistic dynamism sought for creative lighting and how?

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[5] To the scientist, dynamics refers to any science in which forces or changes are considered. To the physicist, a dynamic process relates to the forces producing motion, as opposed to a static state. To the linguist, it expresses an action, event, or process, or denotes a person full of energy and new ideas. To the musician, dynamics refers to the varying levels of sound in different parts of a musical performance. Dynamics also denotes the forces or properties, which stimulate growth, development, or change within a system or process. (Thanks to the Oxford Dictionary 2017 for the definitions) In psychoanalysis, it refers to the creation of emotions from interacting input forces (Stern, 2010, p. 7).

When describing research-creation, the artist and scholar Christopher Salter provides the overarching idea when he defines experimentation material: "Experimentation takes its materials or entities as active, dynamic, and changeable, rather than passive, inert, and immutable" (Salter, 2015). This is how light should be envisioned in the theatre, and the present thesis follows this general view in seeking how to infuse vitality into the multiple levels of composing with light, be it the dynamism of light itself, the compositional dynamism of light in relation to other elements or the spectator's perception of dynamism and dynamic participation.

If in the manifold definitions of dynamism movement is central, it is as well for artists. One of the most salient examples might be the avant-garde filmmaker Viking Eggeling who discussed the notion eidodyanmik (visual dynamics) based on the idea of forms in movement in the 1920s. Less explicitly, James Turrell's work is also dynamic as pointed out by Tim Edensor, professor in Cultural Geography at Manchester Metropolitan University. In his analysis of Turrell's installation *Cat Cairn Skyspace* (2003) he qualifies as dynamic the movement in qualities of light (here changes in colour, saturation, and contrast) along time, and he summons the philosopher and art historian Georges Didi-Huberman to infuse movement as a component into the dynamic spectators' active reception: movement in proprioception and mutation—or aliveness—through the unexpected. Hence immediacy is also part of it.

> The sky is no longer the neutral background of things to be seen, but the active field of an unforeseeable visual experience … [T]he sky is no longer vaguely "around" or "above" us, but exactly there, on top of us and against us, present because it is changing, obliging us to inhabit it, if not to rise to meet it. (Didi-Huberman in Edensor, 2015, p. 142)

There is thus a sense of action as opposed to activation of other elements; of movement as mutating qualities in space and time; of immediacy in bodily perception; of aliveness in the continuously revised performance; of meaning in its relationships; all of it infusing vitality to the art of light.

4. Introduction To Time

The psychiatrist Daniel N. Stern's view on dynamism and vitality is essential in understanding how light could become more dynamic. Using it as a magnifying glass through which lighting design in the theatre and Light Art is examined, we will lay the ground for further development in composing with light. Stern's dynamic form of vitality is about time (which he will later situate as an element derived from movement) or reintroducing time in the present moment.

4.1 Chronos And Kairos: From Narrative Linearity To Polyphonic Episode

Starting from the idea that the present moment has a temporal thickness, Stern insists on reintroducing time into it for it is generally—and wrongly—considered only under the overarching concept of *Chronos,* thereby having no room to unfold. Stern argues:

Present moment does not whiz by and becomes observable just after it is gone.

Rather, it crosses the mental stage more slowly taking several seconds to unfold.

And during this crossing, the present moment plays out a lived emotional drama.

As the drama unfolds, it traces a temporal shape like a passing musical phrase. As

we shall see, this is of great importance because it puts time back into the experience. (Stern, 2004, Chapter 1)

Under *Chronos*, the present moment is a moving point on a line (no matter straight, curved, or spiraled) fleeting towards a future. The time of occurrence is so short that it almost does not exist, therefore leaving no room for direct experience. In that view, life is a series of separated events, and making sense of it requires a narrative—and linear—action, that is putting the pieces back together afterward. The outcome of narration is a selection of episodes by the narrator sequenced in a non-necessarily chronological order to transmit at best how life was felt. Stern insists that it promotes verisimilitude over historical truth to give back to *Chronos* a feeling of continuity, a linear timeline. Moreover, the narrative reduces the experience to words. Narrative, a derivative of *Chronos*, has no more now, no more direct experience than C*hronos,* except for the time of storytelling. *Chronos*, an ancient Greek conceptualization of time, represents a linear, clock-related, objective and intellectualized view of time.

However, notes Stern, the Greeks had also devised the concept of *Kairos*—the subjective time of the now. It is *Kairos* that Stern invokes as the experience-related time that allows us to grasp the many happenings occurring during a temporally thick present moment and make sense out of it in real time, consciously or not.

Kairos is the passing moment in which something happens as the time unfolds. It is the coming into being of a new state of things. It has its boundaries and escapes or transcends the passage of linear time. Yet it also contains a past. It is a subjective parenthesis set off from Chronos. Kairos is a moment of opportunity when events demand action or are propitious for action. Events have come together in this moment and the meeting enters awareness such that action must

be taken, now, to alter one's destiny—be it for the next minute or a lifetime. (…)

All present moments are also moments of Kairos, regardless of magnitude.

(Stern, 2004, Chapter 1)

Kairos could be brought to theatre lighting design as an alternative paradigm to the linear and reflective Chronos, thus offering an alternative to the narrative. There, the lighting could become non-linear, a polyphonic event opening the immediacy of perception.

4.2 Polyrhythm And Temporal Dynamics

Figure 1: Stern's schematic representation of episodes of consciousness and present moments. (Stern, 2004)

If duration is commonly considered as a length of time in which something is happening or continuing[6], Stern (2004) is interested in the polyphony and polyrhythm of the manifold temporally contoured events occurring in this length of time, as exemplified by figure 1. These ideas will be useful in understanding light as dynamic. The duration he is interested in is the one of the present moment, which he advocates as being temporally dynamic. To him, the present moment is "the span of time in which psychological processes group very small units of perception into the smallest global unit (a gestalt) that has a sense or meaning in the context of a relationship. (…) Subjectively, they are what we experience as an uninterrupted now. The present moment is structured as a micro-lived story with a minimal plot, and a line of dramatic tension made up of

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[6] Duration. 2017. In oxforddictionaries.com. Retrieved 2017 , from https://en.oxforddictionaries.com/definition/duration

vitality affects. It is thus temporally dynamic. It is a conscious phenomenon, but need not be reflectively conscious, verbalized or narrated*"* (Stern, 2004, Glossary).

In other words, it is a meaningful moment of consciousness (over awareness) that has some duration (average 3–4 seconds, the time of a breath) within which unfolds a polyphonic play of vitality affects, or dynamic forms of vitality (see figure 1). The present moment is thus a gestalt, a grouping of multiple small and meaningless in themselves events that has a more complex meaning than its separated parts. He compares it to listening to a musical phrase: one can make sense of it but not of separated notes. Its duration is marked in time with a beginning— triggered with the unexpected—and an end—or resolution. I propose to transpose this view to composing with light, and to consider a light score as a polyphony of temporally contoured events.

As Stern describes, vitality affects are a subjective experience of the temporally dynamic changes in feeling occurring as the present moment unfolds. "Temporal dynamics are changes in time or over time, particularly shifts in the force, intensity, quality, form, or rhythm of an experience over time" (Stern, 2004, Glossary). Stern points out that they are best captured with terms such as accelerating, fading, exploding, and so on. These temporal dynamics couple themselves with a phenomenal reality; that is everything that is on the mind as the present moment unfolds—including affects, thoughts, sensations, mental or physical activity, etc.— infuse a feeling of aliveness to the present moment as implicitly known. In theatrical lighting terms, this suggests that temporal dynamics could participate in the co-creation of meaning.

Thus, the polyphonic event occurs during a present moment that unfolds through a polyrhythmic gestalt of temporal dynamics. It is this very polyrhythmic polyphony that gives the sense of aliveness, of vitality. As a matter of fact, the temporal shape molds the content and gives it its

precise feeling. If Stern uses the arts to illustrate his ideas, here his ideas mainly contribute, metaphorically, to introduce time—or temporal dynamics—into creative lighting thinking and design.

4.3 Temporal Consciousness

Stern distinguishes implicit and explicit knowing since he advocates two types of complementary consciousness: a knowing consciousness to know the object and a temporal consciousness to temporalize it (Stern, 2004). His point is that in concentrating ourselves on explicit knowledge, we focus on a narrative form of time that occurs after the felt experience. The meaning is induced afterward, with words—a form of codification that already reduces the felt experience.

Knowing the present moment "cannot be verbal, symbolic, or explicit" because the present moment is "mentally grasped as it unfolds," not afterwards (Stern, 2004). He, therefore, calls for implicit knowledge. "Implicit knowledge is non-symbolic, nonverbal, procedural, and unconscious in the sense of not being reflectively conscious" (Stern, 2004). In these qualities, it is the very opposite of explicit knowledge. It is the in-real-time analysis of the temporal dynamics. It is "an extremely rich (knowing) including affects, expectations, shifts in activation and motivation, and styles of thought" (Stern, 2004). Implicit knowing is created by the immediacy of vitality affects and their temporal dynamics over symbolism and narrative.

This concept echoes the ideas of immediacy in composing with light and stresses the importance of temporal shape in art. For Stern, art is all about the fine-tuning of temporal shapes to communicate, way beyond the content and explicit knowing, a precise feeling to the spectator.

It is what differentiates art from technique. Consequently, dynamic light should be temporally dynamic.

5. Introduction To Stern's Vitality

Vitality affects act like a temporal backbone on which the plot is hung. They also help the chunking process by containing the phrase within one envelope. They give the present moment the dramatic feel of a lived story.

(Stern, 2004)

5.1 Dynamism And Vitality

Stern, a psychiatrist, provides the most insightful account of dynamism regarding lighting composition in his attempt to grasp the nature of the present moment as a coherent theoretical concept and practice-based model. He advocates the existence of *vitality affects* (Stern, 2004), which he later expands to what he terms *dynamic forms of vitality* (Stern, 2010). His understanding of vitality—based on dynamic forms—as the sine qua non-condition for the feeling of aliveness (distinct from emotion) resonates with the arts and plays an important role in understanding the elusive character of the possible dynamism of light.

Stern considers vitality as sensual, grounded in the body and brain, a "gestalt that emerges from the theoretically separate experiences of movement, force, time, space and intention*"* (Stern, 2010, p. 5). In their study on Stern's vitality, Ammantini and Ferrari summarize his view as follows:

> By emphasizing the primary role of movement in creating forms of vitality, it is clear that the physical aspects and mechanics of the movement in time are the building blocks for the creation of a mind that is shaped to capture the dynamics

of forces and sensations linked to movement, either self-produced or produced by others. (Ammantini & Ferrari, 2013, p. 8)

It appears that dynamism generates the sense of vitality through the gestalt of five elements. Hence, when referring to light, I will use the term dynamism in reference to the physical and mechanical aspect of lighting (e.g., dynamism of light and compositional dynamism) —or, to put it differently, to the spatio-temporal form of creative lighting— and the term vitality in reference to the instance of the felt experience of dynamism with its inherent sense of aliveness.

5.2 Dynamic Forms Of Vitality: A Dynamic Pentad

If the former vitality affect was the subjective experience of the temporally dynamic element of time and intensity, Stern expands the concept to *dynamic forms of vitality* as to include other elements: what he calls the *dynamic pentad* (Stern, 2010). Here, the fundamental element is movement, which itself carries along with it the sensation of force underlying it, of time and space as the movement unfolds, and of directionality (or intentionality) as it seems when going somewhere.

Stern makes it clear that dynamic forms of vitality are not emotions, motivational states, perceptions, sensations, modality, directs cognition, acts or means: these are vitality content—the *what*— whereas vitality dynamics are concerned with the shape—the *how*. On the one hand, the brain encodes the content (content representation), that is the "modality, the qualia of the experience, the means and goals, the meaning" (Stern, 2010, p. 25). On the other hand, dynamic representation "encodes the speed and its changes, the intensity and force, the duration, the

temporal stresses, the rhythm and directionality" (Stern, 2010, p. 25). I will later argue that it is this latter encoding that is missing in theatrical lighting design. For Stern, the dynamic forms of vitality create implicit meaning and are the most fundamental element of vitality—would it be missing, there would be no sense of aliveness.

In other words, the mind was designed to make sense of the world by grasping dynamic happenings through the dynamic pentad of movement, time, space, force and direction (or intention). Dynamic vitality is "the felt experience of force—in movement—with a temporal contour, and a sense of aliveness, of going somewhere" (Stern, 2010, p. 8). Coupled with content vitality and independent of modality, it creates the subjective experience; that is, non-verbal meaning.

5.3 Movement

Stern's dynamism, or dynamic forms of vitality, is based on movement, be it physical or mental. "The experience of vitality is inherent in the act of movement. Movement and its proprioception is the primary manifestation of being animate and provides the primary sense of aliveness" (Stern, 2010, p. 9). He demonstrates through theories on movement how it has a foundational role "in feeling, thinking, language, cognition and thoughts as emerging from bodily experiences" (Stern, 2010, p. 20). Here dynamics are concerned with how movement is deployed and how movement can arise from different modalities. Consequently, light can be movement and create meaning in its modal perception. As an example, for Stern, music is sound in motion and dance generates virtual motion in our bodies through mirror neurons.

5.4 Stern's Dynamic Forms Of Vitality In The Art: Modality And Dynamic Markers

A musical phrase consists of multiple events, each with temporal contour which the mind comprehends as unity. As it unfolds, the subjective perception is continuously shaped and reshaped by the subject's phenomenal reality as well as what was heard and the expectations it generates for the development of the phrase. All along this unfolding, a symphony of temporally dynamic changes in feeling occurs: the work of art prompts the spectator's vitality affect. Stern argues, "vitality affects also underlie the appreciation of most abstract art forms that are formally devoid of "content," such as most music and much dance" (Stern, 2004). The vitality affect is not the content of the performance (movement in dance for example, or partition in music) but the interpretation itself. The how is the movement precisely shaped with its elastic rhythm, to express an exact feeling.

In a non-time based art such as painting, Stern argues that the painting itself, as a static image, is devoid of temporal contours and the vitality affect lies in the act of looking. The painter structures the image such as to induce a looking path taken on by the viewer[7]. In turn, he constitutes the image in his mind through a dynamic looking path (playing on immediate perception and memory) to finally imagine a temporal narrative line out of the suggested image, the painting usually representing a decisive moment (suggesting past and a future action). In abstract painting, the vitality affect of looking is sufficient for the appreciation. In this view, as we will argue later, theatre lighting design restricts its dynamism to the act of looking as in non-time-based art and should move to a rehearsed performance of dynamic vitality.

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[7] It is interesting to note that everyone has a different way of looking at an image as demonstrated by *The Eye Catcher* exhibited at ARoS Museum, Denmark, using eye-tracking technology. Viewing an image is a personal act of scanning, extracting information point by point out of the picture and reconstituting the whole in the mind after a sufficient scan. This scanning includes both past and present moments.

Stern uses the notation systems of music and dance as evidence to demonstrate how the arts deal with dynamics. They translate vitality forms into dynamic markers for the purpose of notated transmission. They are not the content but the way the content is to be played. For example, there are signs for intensity (or change in intensity) such as fortissimo or crescendo; for the flow, speed (tempo), and for the spirit of speed there are terms such as andante or allegro. The same goes for dance, the content being the positions, gestures and movement, and the dynamic forms being the performing indications. These dynamic markers help to capture the vitality forces. Stern insists on the critical research on dynamics in arts (especially music and dance) out of necessity. "The arts have paid far more attention to this aspect [vitality forms] of experience than psychology. They have had to do so, as they want to express the aliveness and vitality of human movement and sound*"* (Stern, 2010, p. 89). Now light should start the journey and develop its dynamic markers.

Dynamic forms of vitality are meta-modal, which explains the growing interest of collaboration between art forms. As a consequence, this collaboration allows intermodal correspondences, fostering the idea of equality in partnership between the elements and stimulating the desire for shuffling hierarchies. "Dynamics of experience are revealed in all art forms because they speak the same meta-modal language of vitality forms with or without identifiable emotions" (Stern, 2010, p. 81). In other words, lighting could collaborate in a contrapuntal dramaturgy or *écriture plurielle*. Moreover, dynamic forms are the foundation of time-based art: they allow contemporary artists to break with linearity and narrative to work only with active vitality forms.

5.5 Dynamic Forms Of Vitality, Movement, Time, And Light

What I first identified as a lack of dynamism in theatrical lighting design is in Stern's view a lack of vitality: "Vitality is the subjective experience of temporally dynamic changes in feeling as the present moment unfolds" (Stern, 2004). As we will see, such temporality in theatre lighting design is widely overlooked. The process of reintroducing time in theater is thus essential to offer a dynamic representation, a feeling of aliveness.

If theatre now recognizes light as a medium able to communicate content (mostly through illustration, symbolism and the creation of atmospheres), light is not considered as temporal in itself. Light is used as a linear succession of pre-defined and non-reactive light cues as opposed to dynamic events endowed with behaviour. If light was a performance rather than a pre-determined story, it could be temporally dynamic, interactive, surprising and emanating a sense of vitality.

Accordingly, I retain from Stern the following ideas:

- Introducing time into the experience of light not only as duration and intervallic changes but as temporal dynamics;

- Emphasizing movement as the most important element of dynamic forms of vitality;

- Composing light as polyphonic and polyrhythmic events;

- Establishing dynamic markers and an associated vocabulary;

- Understanding dynamic form of vitality as meaningful in composing with light, thus acknowledging implicit knowing, immediacy and embodied thinking as alternatives to narrative.

But, how to work with dynamic light? Salter's thinking on dynamism and perception provides a good meditation starting point. He situates perception as not only centered in the organs (eyes, nose, ears, etc.) but also emerging from affect and he advocates that the task of the artist is

> less a question of how we use materials than of making possible, enabling the noticing and arrangement of assemblages of dynamic conditions, the atmospheres that make possible the production and emanation of affects—ones that are certainly beyond any singular point of control.
>
> (Salter, 2015, Chapter 1: Resonance, Section 8)

Chapter Two

Light In Theatre, The Conceptual And Technical Layers of Ossification

The contribution that light makes to the theatrical 'spectacle', and the recognition of the creative role of the lighting designer, have only gradually been acknowledged in the twentieth century and many would argue that the role of light in performance still remains to be fully acknowledged.

(Palmer, 2013, p. 21)

Over time, theatrical lighting slowly gained in autonomy. However, it disregarded some properties of dynamic light (such as time and movement), restrained it to explicit meaning, and situated it in the realm of the visual, thus considerably losing immediacy and vitality. Theatrical lighting design is not completely static, yet the practice constrains its potential. It appears as the more immutable and unlively element of theatre in its exact repetition and succession of predetermined looks. As new technical tools have emerged so too did the potential for increased autonomy and dynamism; something that has not fully developed due to lighting design's set of practices. Indeed this paradox grew inversely proportional: the more the technique evolved, the more the use of light seemed restricted, as if with the passing of years, layers of sediment settled and ossified the practice. The aim of this chapter is to identify these layers as to unfetter the use of light in theatre.

1. **The Serlian Legacy**

In spite of the debates on whether the Italian theatrical lighting of the Renaissance is considered as an art form or just mere illumination, I concur with Palmer's (2013) argument that despite the creativity demonstrated by Renaissance architects and artists and their endless efforts

for the implementation of new techniques, lighting still existed in primitive form. The work of these artists, however, laid the basis for a standardized and enduring approach of lighting the stage, and the interest here is to understand the lighting principles they established and identify the extent to which they have persisted up to now. I will argue in favour of the conceptual use of light over detailed technology, position, or technique[8].

1.1 Indoor Theatre And Artificial Lighting: Visibility And Illusion

During the early Renaissance, Italian theatrical performances moved indoors, thus for the first time the venue needed to be artificially lit with torches, candles and oil lamps. Basically, the generic[9] set was displayed behind the proscenium arch (the stage) and consisted of a series of flat painted frames (carefully positioned as legs), complemented by a flat painted backdrop, all of which created an illusion of linear perspective.

In front of the proscenium arch (on the apron) the actor performed. The lighting revealed both the audience (who needs to see where they go) and the stage with no delineation. Visibility, using low output light sources along vast distances, was uneasily achieved, and in 1545 the architect Sebastiano Serlio[10] provided the first written methodology towards lighting the stage. It was not until the mid 17th century, however, that his work would be formalized and advanced by the architects Niccolo Sabbattini and Joseph Furttenbach, providing the standardization of the Serlian based lighting technique. This would become the plan in use throughout the 20th century, outliving technical evolution in lighting (with no conceptual turn) and only presenting minor modifications or variations (Gervais, 1984; Palmer, 2013).

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[8] For this kind of information, the work of Bergman (1977) and Gervais (1984) are insightful.
[9] The painted set was not play-specific but genre-specific. Serlio informs us that three sets were in use, one for each type of play: comedy, tragedy and satirical.
[10] In his book *Architettura, Il secondo libro di Perspettiva*

Linear perspective brought a peculiar mindset in which the Renaissance Man created a theatre that reflected his newly empowered, rational, and distant way of seeing. The visual spectacle[11] consisted of the perfectly painted illusion[12] of a 3D world. There would be an increasing quantity of stage machinery to animate the imaginary world with changeable scenery. The use of colour in lighting was minimal since tri-chromic vision was not yet discovered and lighting sources were not bright enough to be coloured. Therefore, in the broadest Aristotelian tradition, the actor declaimed the drama in front of—and separated from—the visual spectacle, that is the changeable set. The drama communicated by the actor reigns as indisputably supreme, strengthened by the (independent and almost decorative) illusion box.

The Serlian technique, developed to fit any generic settings, encompassed three objectives for the lighting of the theatre, surprisingly similar to today's techniques. First, the central candelabrum, counterbalanced with footlights, fulfilled the need to see the entire stage picture and venue, and is associated with what we now know as Front of House (FOH)[13] and house lights. Second, sources of light were placed behind each painted panels to better illuminate the next one. This can be associated with backlights or sidelights, although they differ in function (here, the goal was to make the set visible, not to sculpt the body).

Finally, visible sources (named mobile lights) were used for special effects such as lightning, or when a symbolic element was necessary (sun, moon, etc.). This symbolic element might be important since dramatic temporal unity was necessary.[14] Here, the lighting illuminated

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[11] The Greek poet Aristotle deeply influenced the theatrical practice by dividing the drama from the visual spectacle, prioritizing the former. *The spectacle has, indeed, an emotional attraction of its own, but, of all the parts, it is the least artistic, and connected least with the art of poetry. For the power of tragedy, we may be sure, is felt even apart from representation and actors. Besides, the production of spectacular effects depends more on the art of the stage machinist than on that of the poet.* (Aristotle, Poetic VI, Palmer, 2013, p. 21). Thereby, he establishes hierarchies in the theatrical elements.

[12] The illusion works from a very limited point of view.

[13] A lighting position located in the house – that is above the audience – and used to light the actor's face in a proper angle (usually 30 to 45 degrees angle)

[14] We may see here an affiliation to the Ancient Greek theatre, which occurred outdoor from sunrise to sunset. Poets used natural light phenomenon to empower and conceal the drama in temporal unity. Even if light was foremost a tool for visibility, the play could benefit on time of light as an atmospheric or symbolic device. As an example, Palmer (2013) cites the beginning of Aeschylus' *Agamemnon* where in the drama

the trinity of drama, set, and the actors while the dramatic atmospheric light was painted and belonged in the illusory world. Real light was thus seen as a mere tool for visibility, or at best a symbol doubling the text. The only dynamic of light that existed was painted (non-time-based) as it referred to the eye path or viewing path[15].

Moreover, Serlio's mobile lights were used at times for symbolizing celestial objects moving across the sky, or gaiety with torches on stage (it was a current city practice to light torches during festival days) and so on. This symbolic use goes along with the desire for verisimilitude in the illusion box. On this matter, Serlio noticed the conflicting relationship between the painted light—particularly directional in chiaroscuro aesthetic—and the real light illuminating the overall picture.[16] However, in tacit convention, the audience ignored the discrepancy. Whenever artistic light was real, it mainly illustrated (or symbolized) what was already named in the text or shown in the set.

The architect Leone Di Somi, followed by Ingegneri, Sabbattini, and Furttenbach, endeavoured to find ways to mechanically dim the candle flame without extinguishing it[17] since it was understood that the darker the audience, the better the visibility on stage and the higher the degree of illusion. The central chandelier's role was consequently narrowed to illuminate—and darken— the house, so Furttenbach invented a valence on which candles stood to provide (and increase) the overall stage illumination. Here then were the earliest ancestors of the Front Of House (FOH) as lighting instruments[18] and as key lights[19]. He implemented Ingegneri's border to hide the valence: it allowed a better masking of the light sources and prevented the light from

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a watchman awaits a beacon signal. Played at sunrise, it is easy, on the one hand, to see the beacon's flame that symbolically marks the beginning of the play and the victory over Troy; on the other hand, the sunrise symbolically marks the end of darkened times of war. However the play did not *need* the visual since these elements are literally part of the text (and there is no evidence that a real beacon was lit). This hierarchy of theatrical medium will take long to dismantle.

[15] I am referring to Stern's dynamic viewing path in non time-based art. (Stern, 2010)

[16] Sabbattini, among others, insisted on the importance of key light and its relation with painted set but lacked the means to achieve it.

[17] Di Somi even introduced the idea still in use today that comedy is to be bright and tragedy darker.

[18] Limelight and carbon arc light will be placed in the FOH to better illuminate the actor (19th century).

[19] Key light is a term used to describe the main directional light used that is the one that shapes the image.

blinding and spilling onto the audience. Two new conventions were thus born: the actor's face could be illuminated from the FOH and the lighting instruments were hidden. This is important because these conventions established the architecture of the Italian-style theatre and impacted lighting positions: as every lighting designer knows, the architecture of the venue is of great influence in any lighting design.

This quest for illusion brought about lighting conventions that became tacit, calling for a darkened audience to forget the reality of the venue while restricting in its architecture the number of lighting positions. Moreover, the lighting equipment was hidden, to satisfy both the need to diminish the blinding effect and making room for the more important visual medium—the set.

1.2 Change In Intensity And Aesthetic Wonder: The Ground For The Emergence Of Movement

Sabbattini et al. noted the emotional changes that occurred when darkening the lights, most likely during the *Tenebrae* religious services when the church's candles were extinguished one by one (Palmer, 2013). By so doing, they identified the ability of light to create a specific atmosphere and induce emotional shifts through movement. I will argue later that the emotional power of light in its current tradition is at its climax when one lighting state morphs into another (transition between two cues), for movement creates expectations, an invitation to immediacy and engagement. This movement might be perceived as unexpected and trigger a heightened sense of presence or a (basic) sense of vitality. Changes in light intensity – or in other words the

emergence of movement - will thus be rehearsed, triggering emotional shifts and primitively establishing atmospheres.

The construction of atmosphere in the Renaissance theatre through light also builds on the phenomenon of rarity. Witness, for example, the impressiveness produced by a large amount of illuminated coloured glass on stage or real candle halos above dozens of children costumed as angels on stage in an epoch where darkness was common and light, after sunset, was a luxury. Being in an aesthetic state of wonder creates a particular emotional response, maybe one of vitality (the heightened sense of presence). As advocated by Jules Fisher, one of Broadway's most awarded light designers, this technique is still in use today: he teaches his students that great lighting design should above all amaze the audience[20].   In this context, light's impact is associated with visual aesthetic wonder and shift (movement) in intensity, ideas that can be tracked up to contemporary lighting design. We will develop later on the light-image emphasis.

1.3 Late Implementation: The Superimposed Light

Renaissance artists and architects standardized a functional stage lighting design methodology that slowly spread to France and Britain's public playhouses, and was convincingly implemented, despite the piecemealness of approaches [21]. Artificial light long suffered from a lack of proper technology impeding its full potential as a medium, and its exorbitant cost made it a luxury in scenographic contexts, only being fully implemented in the final rehearsals. Given these factors, the tradition of rehearsing without light and implementing it only at the end was born. In that context, light can hardly be active and consequently the theatre had to rely on other

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[20] Broadway Lighting Master Class, 2009
[21] On the partial and incoherent importation of techniques see (Gervais, 1984)

elements—namely text, set, and the actor—to convey dramatic meaning. Furthermore, lighting should not visually or functionally interfere in its positioning with stage machinery and illusion, an everlasting tradition dating back to Sabbattini.

1.4 Ways Of Seeing

In dominating theatre practice until the 20th century, the ideal of linear perspective powerfully influenced the developing art form of theatrical lighting design, by shaping the way one thinks of both light and lighting[22]. Associated with the artist and architect Leon Battista Alberti (1404–1472), linear perspective promoted in theatre the aesthetic illusion of a three-dimensional space on a flat canvas for a well-centred observer[23]. John Berger, in his book *Ways of Seeing*, describes it as follows:

> The convention of perspective, which is unique to European Art and which was first established in the early Renaissance, centers everything on the eye of the beholder. It is like a beam from a lighthouse—only instead of light travelling outward, appearances travel in. The conventions called those appearances reality. Perspective makes the single eye the center of the visible world. Everything converges onto the eye as to the vanishing point of infinity. The visible world is arranged for the spectator as the universe was once thought to be arranged for God. (Berger, 1972, p. 16)

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[22] Some productions still propose perspectival sets, sometimes reinvigorated with technological skills, as was Serge Postigo's scenic adaptation of *Footloose* (2017) in which lighting only complements the illusion of the perspectival set.

[23] The central place in the venue, slightly above the stage and at a distance equal to stage width, was named *l'œil du prince* by Sabbattini because it is the focal point where the illusion created by calculated perspective is at its best. It is now most often used by the sound engineer during concerts.

Perspective infused the modern era with a way of seeing that was distant because observation did not depend on physical proximity. It was thus empowering and rational because distance implied control over what was viewed and the world could be measured (or known) strictly through the eye[24]. Thus vision was placed on an altar and seeing became the mode of irrefutable, rational knowing, resonating with Stern's concept of implicit and explicit knowing.

> The "hyper-visual esthetic" of modernity identified by [anthropologist] David Howes is traceable to the invention and subsequent dissemination of linear visual perspective (…). Alberti in effect placed a grid over space and fixed the eye, training it to "see" in a perspectival, balanced and "rational' manner. This way of seeing helped establish a notion of "self", a spectator viewing the world, supposedly detached and observing. (Smith, 2007, p. 23)

Building on sensory anthropologist David Howes' argument, historian Mark Michael Smith suggests that by removing the other modes of sensory perception (smell, taste, hearing, and touch), sight "offered the illusion of order but because it went no further than the surface, it did not infuse or "feel" (…). (Smith, 2007, pp. 22–23) Similarly, the architect Juhani Pallasma advocates that the ocular bias, emphasizing on striking visual images, lead to the loss of experiential depth[25] (Pallasmaa, 2012). Sight became distinct of feeling as its association with reason grew. According to Howes, this association was particularly strong in the Age of Reason (significantly, also known as the Enlightenment) and remains so to this day[26]. Therefore if we perceive the world objectively, by illuminating the tool of seeing with pure reason, without going

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[24] Thanks to David Howes' teachings on perspective and measurement. Conference in undergraduate class, UQAM.
[25] See chapter four of the current thesis for further development.
[26] Howes http://spectator.centreforsensorystudies.org/occasional-papers/the-craft-of-the-senses/

into subjective analysis (processing our thoughts, feelings, and emotions), then maybe we look at the light-object instead of experiencing it[27].

Director and theorist Richard Schechner (2007) has tried to dismantle this view when he calls for an art of theatre that values immediacy over distance, savouring over judgment. Doing so would allow light to transcend the realms of the visual[28] and the rational. However, as embedded in illusion and linear perspective (and technical insufficiency) as it was, theatrical lighting up to the 20th century still concentrated on the illumination of meaning-making elements (set and actor) as to facilitate looking (knowing) and evolved toward explicit meaning (illustration, symbolism, depiction, and so on). This conceptual and cultural ideal grew stronger into lighting practice.

Furthermore, perspective considers the observer as passive behind a window. In other words, the third level of dynamism identified – related to the spectator's reception - is in its most basic form, the dynamism of the eye's path wandering on a non-time-based art—painted light. Moreover, *l'oeil du prince* (prince eye's view) suggests only one rightful point of view, as opposed to the plurality of meanings that could reinvigorate the experience. Consequently, the idea of *écriture plurielle* and multi-modality, taking advantage of the plurality of mediums offering multiple points of view from which the spectator implicitly constructs the meaning (as opposed to using every medium to impose a single point of view), would only develop in the 21st century. Light would thus have to wait for a form of theatre acknowledging its meaning potential and integrating it as a distinct point of view in a contrapuntal dramaturgy.

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[27] Again, see chapter four of the current thesis.
[28] As an example, James Turrell has demonstrated the multidimensional power of light and the impressive adaptability of the body by training anyone to recognize a coloured light without seeing it.

1.5 The Legacy: Illumination, Convention, And Explicit Meaning

From the Serlian methodology and linear perspective's way of seeing, lighting retained the necessity of illumination – that is making visible meaningful elements within a dramatic context. Lighting, considered as a tool for visibility, was therefore restricted to the realm of the visual. Thus, whenever real light was integrated, the explicit meaning was the key (illustration, depiction, symbolism, narrative and so on). From set changes, which emphasized the visual spectacle; lighting retained the temporally linear idea of succession - the *tableaux de lumière* (light-images as termed by Abulafia).

These factors contributed to the lack of vitality observable in today's lighting practice. Real light in the Renaissance was evidently neither autonomous nor considered as an active medium. It disassociated itself from its dynamic and vital form, and was seen as a supportive tool to enhance painting, illusion, convention, and text despite its potential to generate emotion. As such, it was constrained to fill the need of illumination achieved from predefined lighting positions. Moreover, in the 20th century, when real light comes into play, it will reproduce the established codification and light positions by miming the illusionistic painted light. The conventions would prove persistent:

> Precedents for most of the major lighting conventions in positioning, coloring,
> dimming, floodlighting, translucencies, and auditorium darkening were established
> by the early seventeenth-century. The inspiration and creativity of the Renaissance
> stage artists is indisputable: the basics of stage lighting were created with only the
> most rudimentary means. The technology would be two centuries in coming, but
> the Renaissance genius for viewing in terms of light and perspective would provide

the guiding principles. (Penzel in Palmer, 2013, p. 19)

2. Gas, Electricity And Linear Creation Tools

Following the Renaissance, the stage space grew deeper and the task to light it properly became harder in regards to luminance[29]. In the purest Serlian tradition, the Baroque multiplied the overhead chandelier, introduced vertical battens hidden in the wings and generalized the use of footlights, all to increase visibility of the set and the actor. These innovations duplicated the existing lighting ideologies without the benefit of a conceptual renewal.

During the 18th century, the invention of Lavoisier's lantern, the réverbère (street or lamp light) significantly increased the level of light in the streets due to the addition of a parabolic mirror and lens to the light source. Later, the invention of the Argan burner augmented lighting's colour temperature and output. These new technologies, when implemented in the theatre, increased the quality and brightness of illumination (and even allowed for a (limited) beam orientation) as public expectation grew to find in the theatre a lighting as bright as on the streets. These innovations may have had considerable impact on other stage element possibilities[30], however, they entailed no change in lighting positions or concepts. The methodology in place— which would witness the rise of gas—had conceptually barely evolved from the Serlian ideal.

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[29] According to the physical laws of light, intensity decreases inversely proportionally to distance.
[30] The performer's declamatory style, facial expressions and make up were revised, costumes could be historically more accurate and darker (instead of having to reflect light) and special effects could be projected.

2.1 Gas

In the 19th century, the development of gas lighting and its integration into the theatre (followed shortly by electricity), the invention of the first specific lighting instrument, namely lime light and carbon arc light[31], as well as the discoveries on chromaticity all combined to dramatically impact the visual aspect of the performance. Offering control on the levels of light, direction and colour, these technical innovations underpinned the revolutionary thinking of early lighting "designers" such as Adolphe Appia and Gordon Craig. But if such new technologies provided unequalled luminous intensity, the associated luminance revealed the falseness of the painted illusion, cruelly snatching it from a Chiascuro gloom and exposing it to cold white light. Real light must be taken into consideration and the painting techniques revised. According to the Finnish researcher Laura Gröndhal, these new and powerful light sources initiated a change of focus from mere illumination to aesthetic issues, offering ground breaking possibilities for an increased participation of real light which were sadly not explored to their full potential. The overall methodologies developed conversely settled a linear thinking of light composition in time—a reminiscence of which still ossifies lighting practice. As we will see, no radical conceptual turn came along with the introduction of gas and electricity[32].

The introduction of gas lighting in the theatre (widely used by the 1840's) also followed the Serlian methodology: oil lamps were replaced with gas burners and the permanent lighting positions—now fed by pipes—remained identical. However, the brighter, whiter and evenly diffused light casted deeper shadows whenever three-dimensional objects were built onstage and it was good practice to erase it with counterbalancing light since the real shadows did not match

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[31] It was the first powerful light sources to provide specific illumination instead of general illumination. They were invented respectively in 1826 and 1846 (Gröndhal, 2014).
[32] On that matter see Gervais (1984).

the painted ones[33]. Thus, the artistic light is still painted and illusory, whereas real light remains an illumination tool.

To some extent, the dominating innovation of gas lighting lies in the central control of the gas pipes—that is sections of light—from a jeu d'orgue (gas plate) located under the stage. A single gas pipe feeds several gas burners on a batten, and each gas pipe can be individually dimmed, extinguished and reignited. In other words, there is individual control over groups of lighting sources. This suggests that even though the lighting is still not designed specifically for a spectacle, different levels of light can be established for different sections of the play, doubling, of course, dramatic changes in the text.[34] In fact there are so many actions a person or a team of people can do at the same time, and therefore, one has to order the sequence of actions. Here, cross fades between light-images become the linear foundation of the work with real light.

Indeed, setting the levels of light required several specialized operators, especially in regards to the explosive tendencies (literally) of gas lighting technology. This entailed the need for technical rehearsals and the establishment of the first cue sheets. To operate the lighting, there were three types of technicians: the gas-table operator (under the stage); the onstage technicians (in the wings) responsible for changing silks and gelatines, or moving the "portable" light; and the limelight or carbon-arc operator in the fly[35]. Their coordination needed rehearsals and, as they did not see the effect of their actions, they used cue sheets. "Operators therefore began to follow and rely upon sequences of cues recorded on paper in order to reproduce the correct lighting on stage" (Palmer, 2013, p. 228). Here arises the idea of a succession of predetermined, chronological cues. Being predefined, the lighting enmeshes itself in a culture of

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[33] The battens will be duplicated along with a mechanisation of the stage ongoing from the 19th century.

[34] Later, light changes will also occur between the scene when machinery movement needs to be hidden (darkening the stage instead of lowering the curtain), emphasizing again the idea of *tableaux de lumière.*

[35] These sources surpassed in quantity of light and color temperature every other known lighting source. As floodlights they were first used from the fly to create atmosphere, for example moonlight effects. It will have to wait until the end of the 19th century to become the first follow spots as we know them today – high power light source operated from the FOH and used to make whatever it lights (usually a performer) the center of attention by highlighting its presence and following it.

repetitive exactitude (as opposed to live action/reaction). The question of repeating the performance accurately each time leads, in the computer era, to the development of an extremely time-precise linear cue playback, framing the play in a fixed environment.

Moreover, the notation system had to mirror this linearity. Building on the Serlian methodology, this new technique would, despite its linearity and lack of dynamism, persist up to the 21st century. Palmer summarizes it as follows:

> The emerging techniques established ways of working, cueing and lighting conventions that still remain in use today. Technical and lighting rehearsals were established where levels between individual lights and large banks of light were balanced relative to each other. The increasing complexity of the lighting meant that scenes now needed to be planned in advance and cue sheets developed so that the lighting could be repeated accurately in each performance. Levels of light on the stage were modulated in response to dramatic moments and were plotted on cue sheets using terms such as "quarter", "half", "three-quarters" and "full", which were particularly important where colour mixing between banks of lights was required. (Palmer, 2013, p. 179)

2.2 Electricity

Electricity quickly replaced gas[36] as a safer way to light the theatre[37]. However, the electric light bulb replaced gas burners in the same way as the latter once replaced oil lamps. In other words, the Serlian conceptual and architectural dynasty continued apace.

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[36] Henry Irving experiments with electric footlight at the Lyceum Theatre as soon as 1885.
[37] Many theatres burned because of gas explosions and the footlight's flames, up to 30 cm long, were a constant threat to the actor's costumes.

The electric bulb[38] offered a flexibility that the light positions and lighting instruments had previously prevented from fully developing up to mid 20th century. As a matter of fact, it became flexible because it could be dimmed, coloured with paper bags (for footlights, for example) and, combined with the lens and mirror, oriented and adjusted in space[39]. However, the new flexibility was kept limited: electric lighting was considered a semi-permanent installation because moving a lighting instrument was highly time consuming. In fact, the lighting instruments were big and heavy, the incandescent filament needed to be re-centered at each focus[40], plugs were unstandardized and the voltage inconsistent between circuits. More importantly, the instruments were bolted to the light positions —that is semi-permanent. The invention of the C clamp by Strand Electric in 1959, combined with control advancement in the same period, facilitated the shift from general lighting of the spectacle to specific lighting.

Interestingly, the electric light bulb represents a radical shift in the very nature of light. Bram Stoker explained the variation in colour temperature according to the level of intensity as follows: "This is perhaps due to the fact that it is not in the ordinary sense a light at all, but a heat visible in vacuo" (Stoker in Palmer, 2013, p. 193). This replacement of the dancing flame of candles or gas— namely the *living light* in the Danish concept of *hygge's[41]* —for a stable and visible heat reduced the dynamic movement of light. As the anthropologists Mikkel Bille and Tim Flohr Sørensen put it when describing *hygge*: "The living light is often opposed to the electrical light and defined by its ability to move by itself, create soft shadows as well as soft light as the wax melts and the candle gradually burns down" (Bille & Sørensen, 2007, p. 276). The poet Junichirô Tanizaki also denounced both the fixity of the luminous flux and over

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[38] Invented simultaneously by Swan (1878) in Britain and Edison (1879) in US. See Gervais (2017).
[39] Louis Hartmann invented the first floodlight electrical projector in 1915, allowing for full orientation possibility, and the German company Kliegl Bros launched the first ellipsoidal projector in 1930 allowing for shaping the light beam.
[40] It lasted until the invention of the pre-focus cap in 1951.
[41] The Danish term *hygge* knows no exact translation. It implies coziness in invoking hospitality. See (Bille & Sørensen, 2007).

illumination tendency of the more powerful electric sources, which eroded the beauty of materials and the atmosphere that could be lit with candles (Tanizaki, 1977). Light thus seems to lose its flittering vitality, yet it gained a new form of movement in colour shifts and controlled intensities.

It is clear that the implementation of the light bulb mimicked the established practice. The rise of modern methodologies clearly adapted the Serlian one to the new instruments and more appropriate rigging positions, such as ladders and lighting bridges, are imagined to accommodate it. New venues incorporated both the new positions and the Serlian legacy.

Of course, the lighting control boards did not escape the Serlian tradition. Mimicking the gas table, they stuck with linearity and exact repetition of predefined light-states.   According to Schivelbush (2006), even the most generic light switch builds on the gas system's concept, so one can only imagine how much lighting control boards still rely on it[42]. The first analogue lighting desks were no different than the gas-tables regarding chronology. To change a light state, a new one was blindly prepared according to a cue sheet and, at the right time, a cross-fade switched from the previous state to the upcoming one. Even if each electrical source could be controlled independently, lighting desks did not make a conceptual turn. Perhaps they could have evolved toward the idea of assigning to light sources individual behaviour (temporal dynamics) yet they kept treating them as lighting positions instead of lighting instruments (as with gas lines)[43] and as a succession of cross-faded light-images. In this view, there is no possibility for lively sequences or last-moment decisions: everything is predefined and articulated along a narrative (linear succession). Theatrical lighting still bears the chronology of these past

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[42] Wolfgang Schivelbush (2006) demonstrates, through the passage from gas to electricity, how technological development often reproduces concepts inherited from the technology they replace. According to him sources, energy distribution systems and control (even the domestic switch) are built on the same principles in use in the gas era.
[43] This mindset will spread in Stanley McCandless' influential lighting methodology.

technologies and ideas since the vast majority of contemporary lighting consoles still operate the same way.[44]

2.3 Steps Towards Autonomy And Layers Of Sediments

With these powerful new light sources, real light gained a new property, that of colour, as they could stand a coloured glass or coloured silk without losing too much brightness and intensity [45]. The independent control of lighting instruments allowed for colour mixing, especially by breaking the footlights into coloured sections, and for breaking (and isolating) the stage into smaller areas. Colour also gained an increased importance in the control of darkness. Colour and individual control can thus be considered as a step towards autonomy as they now could create a mood (although unlike in Light Art, lighting was still predominantly aimed at visually activating the scenery).

As a result of central control, new lighting conventions arose, drawing attention to lighting as a set of signals – a code. The darkening of the auditorium marked the beginning of the play and replaced the rise of the curtain; darkness onstage replaced a curtain coming down for a scene change, and so on. Colour was also codified: yellow and pink represented sunlight, blue and green-blue represented night and moonlight as the greenish colour temperature of lime light and the bluish one of carbon-arc light became associated to moonlight effects and ghosts because of their brightness, colour and mobile attributes. As light gained new properties (colour,

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[44] Except for more flexible (yet linear) light boards revised for the need of major musical concerts. These boards now have multiple cue lists and features; the most popular is the Grand Ma. It is based on a user-preference interface allowing more flexibility and alternatives to the traditional cue list playback.
See Red Hot Chili Peppers' behind the scene video (2016 tour) for a glimpse in programming technique of their light sculpture. https://spectator.youtube.com/watch?v=uDBtPiO2T78
[45] Yet even if Newton proved in its *Opticks* (1704) that the sum of all spectral colors is white light, color mixing had to wait both for the theory of tri-chromic vision (with primary colors) and powerful enough light sources. The coloured medium holds every wavelength except the desired one, for example a red filter will block blue and green, thus considerably reducing the power output.

darkness, and space) and expanded its effect, it paradoxically was narrowed to explicit meaning (codification) and thus moved further away from immediacy. However, it is important to note that light was acknowledged with its ability to communicate, even though explicitly.

Central control also introduced a linear form of time in the lighting. Moreover, as Grödhal advocates, the succession of cues infuses a certain rhythm to the performance, adding a temporal layer to the spacio-visual solid environment. "The rhythm of changing lighting cues create a visual dramaturgy which has turned visual design from solid constructions to a score of temporal events" (Gröndhal, 2014, p. 20). Cues, however, draw more from tempo and succession than from a temporal score of events: what is perceived is the duration between changes and not sequences of polyphonic events. Lighting changes are a visible temporal pacing of the text, activating the space. Stage lighting design has thus inherited a linear thinking of time as opposed to a polyphonic or multi-event one.

Such linearity is embodied in text-based and linear notation methodology, still in use today, aiming at the play back of the lighting show as accurately as possible. Technically it allows the orchestration of multiple operators; visually, it prevents the *sabotage* of the scenery painter's art with wrong light levels; conceptually, it mimics the scenery changes and the narrative. Increased brightness revealed the illusion, the orientation and dimming of the light sources offered the possibility to replace the painted light with real light, and at last, the shaping of the light beam allowed for diffusion control and geometrical lighting. Directors such as Appia and Craig, to name the most prominent, took the opportunity. In other words, after painters and authors, directors would enable light to act as a medium and not only operate as a mere technical necessity. However, the key advancement of the early 20th century is that light stopped being

represented by painting: it actually began to represent itself (sunset, sunrise, artificial light, and so on).

3. Visual Theatre: Language Of Light And Light As Space

As technology evolved, light became increasingly considered as a creative medium in the theatre. At the turn of the 20th century, dramatists started to implement lighting cues in their works as stage directions or even parts of the action. As an example, if the naturalists used real light to accentuate the external truth and even symbolize central themes of the play, the expressionist would use light's ability to create distorted shadows as the representation of inner feeling. Following Appia and Craig, stage directors became aware of light, implementing it in their productions. Light thus came to be understood as space. All of this culminated in what we now term visual theatre, a theatre where the visual dramaturgy is equally important as the textual dramaturgy and whose most renowned figurehead is undoubtedly the director/designer Robert Wilson. Thus there is a language of light, but what is it? It seems that lighting was taught by painting and text, so we shall examine these two approaches.

3.1 Language Of Light: Narrative And Space

Light is both nothing and everything.
Light is nothing: it is untouchable, it moves, it travels, it is but a fleeting stroke in the immaterial world. Light is everything: it alone brings space into reality, limited or unlimited, visible or simply intuited.

(Dubuisson in Descottes, 2011, p. 124)

3.1.1 Narrative

A lighting design whose function is tied to illustrate the text is what I call narrative light. It is, as demonstrated earlier, the most ancient lighting approach. Drawing from Daniel Stern's idea of the narrative, it can only feature a linear conception of time. It is no surprise, then, that it influenced the development of lighting control toward linearity.

Abulafia considers light as a medium and lighting as a sign and suggests a methodology for analyzing stage lighting design mainly grounded in a semiotic approach, without disregarding phenomenological and cognitive ones (Abulafia, 2016). On this basis, he advocated six grounds of representation in order to grasp the corporeal and semiotic functions of light. I will briefly summarize and comment on his thinking in order to better define how can light be narrative, and how to overcome it.

In Abulafia's method, a narrative light (first ground) is rooted in the narrative text and its aesthetic features illustrating the strength of the illusion of fictive time and space, doubling the text. The second ground, character, depicts the inner world of the character as present in the text, requiring a slightly deeper subjective analysis from the lighting designer. The third ground, theme or (dramatic) action, reflects the central theme of the play and mediates it into the medium of light. The lighting acts as a metaphor, stimulating the spectator to identify its significance. Here, we (barely) gain a ground of dynamism, as there is an implication from the spectator.

Nevertheless there is no negotiation of the meaning. The lighting is metaphorically illustrative. These first three grounds are what I consider narrative light and to which I associate linearity and a low-level of dynamism. Moreover, I suggest that this narrative and fixed-in-time approach prevents light from being experienced as a phenomenon by emphasizing the communicative, informative, and symbolic use of it.

The fourth ground, atmosphere, triggers emotive experience of the spectator—that is, it offers something more than what is in the text based on the designer's subjectivity. Atmosphere directs attention emotionally, as opposed to visually. The *régime d'attention*[46] (Perrin, 2012) is not directed by explicit meaning but by the direct—and mostly unconscious—impact of the lighting. There is a sense of proximity between the spectator and the atmospheric medium. In this view, light begins to gain a level of autonomy by loosening itself from intellectualized illustration. It introduces space, an element of vitality, as immediate meaning making (we will later see how atmosphere, in the theatre, is considered an expression of space), but is still tied to text, as its function is to communicate a particular vision, or impression of the text. In the production of atmosphere, however, light's autonomy is still negligible as it lacks proper specific dynamic markers and temporal content: it still supports the text (and space) and behaves only by mimicking it.

The fifth ground, sensation of light itself, presents light as a means to trigger the spectator's corporeal experience and imaginative representation. Its very technology is exposed as an active presence, and its effect draws attention to itself and triggers direct aesthetic pleasure. Here, Abulafia qualifies light's aesthetic features as specularity and hypermediacy. Specularity,

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[46] I purposefully chose the term *régime d'attention* because it is fundamentally related to space, as is atmosphere in the theatre. *Dans un essai sur la spatialité en danse, [Perrin] analyse les conditions scénographiques de cinq propositions chorégraphiques dans le but de comprendre les trajets possibles du regard. Elle observe les éléments spatiaux, plastiques et techniques qui établissent un rapport spécifique entre le spectateur et l'œuvre. Cette approche positionne le spectateur au centre du processus d'intelligibilité de l'œuvre en tentant de comprendre comment l'espace scénique influence sa perception. C'est alors définir l'ensemble des dispositions scénographiques qui organise et module son intérêt et sa concentration. Le régime d'attention du spectateur dépend ainsi du contexte de représentation.* (Dalphond, 2016, p. 10)

in Abulafia's view, is the aesthetic pleasure of light. He broadens the definition to include the admiration of virtuosity in creating the light-image. Thus, the appreciation of the technological craftsmanship behind the production of light comes into play in the aesthetic experience. Hypermediacy refers to media technology (in this context the medium of light), openly exposed, self-referential and active in the artwork. Lighting triggers the consciousness of the act of seeing by exhibiting its elements, thus leaving no filter between the spectator and the audience. It is an expression of our fascination with the medium itself. The sixth ground, open meaning completely negotiates the significance with the spectator through a web of associations. It works on direct perception and implies the spectator's past and present experiences in triggering embodied feeling and imagination. There is no available codification or unilateral meaning. It is, somehow, a semantic view of what I name dynamic light, embracing time, space and the immediacy of perception. I consider the last two grounds (especially open meaning) as active light, offering autonomy by way of their self-referential nature and asking for active instead of activating light in a multimodal point of view. Active light has the autonomy to create meaning of its own and act within the performance - in other words it performs - whereas the activating light only supports other mediums, enhancing their dynamism and improving their meaning. Hypermediacy fosters animism over animation and allows for polyphonic and polyrhythmic openings for composing with light.

3.1.2 Space

The Renaissance idea extolling the visibility of every detail of the actor's performance, costume and environment, combined with the technological advances of the 19th and early 20th

centuries offers an overall increase of luminous flux [47], thereby making it very trendy to powerfully deploy light output in the theatre; a trend contributing to the fall of the illusionistic painted set by accentuating its falsity. At the turn of the century, a paradigm shift operates from illusion to reality. With Adolphe Appia (1862–1928) and Edward Gordon Craig (1872–1966) as figureheads, the painted illusion materializes in real three-dimensional scenery and painted light transforms into real light. The stage is acknowledged as a mechanical box with full potential. The newly real[48] light, developed during the 20th century, is the result of stage directors who embraced the paradigm shift and endeavoured to heighten the vitality of their productions. Functioning as early set designers, stage directors began to reject the illusionist stage and started to enhance the real stage's plasticity through directions of light and shadows, developing a spatial thinking around light; literally, a spatial light[49]. On the one hand, light activated the space, the whole becoming a livelier environment for the actor, and on the other hand it offered a flexibility that would slowly replace elements of the set. The spatial dramaturgy of light, along with other visual elements, leads us to consider light as the object of viewing[50]; a practice that was raised to an art form, for example, in the visually based "theatre of images" of Robert Wilson.

This spatial thinking created a further step towards the autonomy of light. Independent of the desired narrative involvement, it could construct the space. For example, in Appia's work the light shapes the space and can be—or not—illustrative. For others, like the Austrian born theater director Max Reinhardt, the spatial light is the metaphorical illustration of the mind. While Joseph Svoboda's three-dimensional beams constructs the space in the most abstract way, Bertolt

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[47] Luminous flux is the measure of intensity of light emitted by a source.

[48] I refer to real light as to designate the artistic use of the medium of light on stage instead of an illusionistic representation of light achieved by painting.

[49] Spatial light here refers to the paradigm of light as space. It was not, however, named as such during the 20th century.

[50] Formulation from Crisafulli, 2013. See chapter four.

Brecht's concrete use of light to un-codify the space sets the theatre with a sharper mind set. Narrative or not, spatial light does not deal with time, and in all of the previous examples, it still maintained a temporally linear development.

Furthermore, as pointed out by Grödhal and the light designer Peter Mumford[51], cinema with its cuts and zooms brought forward an improved spatial vision. Within the theatrical context this resulted in a light that sectioned the space and acted like a camera. Technically, cinema is also structured along linearity: the illusion of movement is created in perception out of a succession of still images.[52] The spatial use of camera-like light thus also emphasized linearity.

3.2 Painterly Composition: A Spatio-Linear Dramaturgy

Real artistic light came onto the stage almost like a three-dimensional extrusion of the ancient painted light, borrowing from a non-time-based art's technique: it would create the space, architect the path of vision for the eye and direct one's attention, visually or emotionally, as painting once did. Real light learned pictorial codes and used them to create the (supposedly) lively environment that Appia called for. In this way, light became an object of vision. In other words, it mimicked non-living art's thinking and dynamic markers rather than inventing its own, thus forgetting the idea of temporal dynamics.

Indeed, Appia's light would dynamize the stage as living actors needed a lively plastic space unimaginable in the illusionist tradition. The plasticity demanded by this active space could only be achieved through the missing element: light. On top of general lighting, directional light (lime-light or carbon-arc light) grouped, enhanced or isolated elements on stage, as the

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[51] In (Palmer, 2013, p.253)

[52] Yet new approaches to cinema moves beyond linearity and narrative by removing the succession of frames (hologram), or by exploding the linearity in time and space through generative and/or arbitrary movie installations. See respectively Beth & Müller-Quade (2006) and the work of Collective Vivier 48

overall illumination decreased, thus directing the gaze. Appia created dissimilarity in lighting colour temperatures and different conflicting qualities between light sources. His active light[53]—or spatial light—drew attention to cast shadows, constructed the space and emphasized its rhythm. These lighting changes would activate the set and provide it with different atmospheres (considered as another spatial element) as did painted light on painted scenery. Besides, the enduring stage frame (proscenium arch) contributed to promote the idea of painting the space with light (and foster a distant way of looking).

Painting with light thus became an ideal, as exemplified by Max Reinhardt (1873–1943) and his collaborator Ernst Stern: "[We] paint with light, only emphasizing that which is essential" (Stern in Bergman, 1977, p. 345). Reinhardt's lighting acts narratively as a metaphor of stages of the mind, an explicit representation of the elusive. "[The lighting apparatus] behaves like the mind. It drowns in darkness what it wishes to forget and bathes in light what it wishes to recall. Thus the entire stage becomes a universe of mind and the individual scenes are not replicas of three-dimensional reality but visualized stages of thought" (Palmer, 2013, p. 127). Through directional light, colour and distorted forms, light could represent the themes of the drama, accentuating characters' inner states and suggesting as well specific ambiances. Light and shadows painted the space, covering up temporal dynamic with obscurity. Together with colour, light and shadows created a (metaphorical) atmosphere.

In regards to time, painterly-inspired lighting developed along with linear changes aiming to provide a variety of set activation, a spatial dramaturgy. Lighting design thus became structured as a linear series of non-time-based painting that is light-images.

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[53] *Active light* has a different meaning for Appia than I do in the current thesis. For Appia, it is real light enfolding space and actor, powerful enough to be directional, and specific enough to cast interesting shadows. It creates atmosphere and generates a (new) form of movement when the actor moves in it.

3.3 Activating The Set, Constructing The Space

> *[Appia and Craig] both made roughly the same conclusions in the early 1900s:*
> *the stage must consist of simple, abstract elements, whose looks can be varied by*
> *means of light.*
> (Gröndhal, 2014, p. 24)

These abstract light-images and the entailed spatial light dramaturgy can activate the set by shaping or transcending its art material, constructing it visually by means of creating shadows, a rhythm of shadows, directions and colours, or, more recently, by sculpting a 3D space with light beams in fog. The artistic goal is to shape space and change its appearance. Light becomes a key material for scenography, like wood or paint, except that it has the spectacular power to change its quality over time; that is, to change the perception of the scenery and it's meaning over time. Light's intangibility sublimates the hard material of space, thus becoming a tool for space to gain an immaterial flexibility: it is the invisible material of a flexible space.

The renowned stage director, set and light designer Robert Wilson considers light and space as primary as text shuffles the standard theater hierarchy of textual drama, actor, and scenery. For Wilson, "theatre doesn't live through words but rather in space" (Palmer, 2013, p. 117). His theatre of images is the climax of pictorial codification and the activation of theatrical space activation with light. According to Palmer, "light in Wilson's work activates the stage space, animates objects, guides the audience's gaze and creates striking images" (Palmer, 2013, p. 115).

Wilson himself advocates painting, building and composing with light. He paints as he organizes the stage picture and hierarchical structure; he builds as light constructs the space, and he composes as the lighting induces a rhythmic element through perceptual change. Here, and for

most theatre, the temporal element is the cue frequency and not that of a polyphony of events (the individual or group behaviours of light). Wilson's scenery is dynamically activated by beautifully striking light-images, and the profusion of light cues creates a form of movement through these intervallic changes from cue to cue, but not through the behavior (dimming, pulsing, sequencing) of individual lights or constellations of light. Wilson's atmosphere creates, in his words, emotions that language cannot speak. "These emotions can never be heaved into the mouth; language cannot speak them. Light whispers them" (Wilson in Palmer, 2013, p. 117). Notwithstanding how sculptural is his light and the extent to which it depends on space to unfold its potential, Wilson gives it a unique spatial language fundamentally integrated in the global writing of the spectacle, and sort of architectural autonomy. He liberates light from the text that it structures without doubling it and organizes the set and actor to amplify his light.

3.4 External Dynamism Over Temporal Dynamics

Like light's earlier history of being a slave to dramatic texts, the focus on the architectural and spatial structure of light also overshadowed its potential temporal dynamics. Indeed, Appia understood space and light as musical rhythm, and creates his rhythmic space with light, as opposed to rhythmic light. As Bergman explains: "Appia's solution of the problem is, as we know, the use of practicables, i.e. real, plastic volumes, and architecture that designs the room and, by differently coloured lighting that may change its appearance, a light that enfolds the actor and is not imaginary. (…) Hence the volumes of the stage architecture and the light are, ultimately, the result of music. It is music projected on the room" (Bergman, 1977, p. 324). In Appia's view, rhythm emerges from a space constructed through the juxtaposition of light and

shadows, highlighting elements as opposed to areas, and generates movement as the actor moves in it. Rhythm, in this case, belongs to the activated medium of space and actor, and not properly to light in itself.

Lighting changes animates the space, creating different atmospheres. Consequently, for Appia, as the hearing of the drama and music developed in time, so is the space thanks to real light. Light induces a linear time in space as time is created by the intervallic changes between cues (as opposed to dimming, pulsing, sequencing, and so on). If he establishes an important relationship between light and space, and uses the inherent atmosphere to create meaning, then his concept of rhythm belongs to space and time and to linear intervals. Similarly, Svoboda's movement is a linear evolution of light-spaces where the only temporally dynamic elements are the actor performing in the light-space and the passing of time. Consequently, traditional theatre lighting design can be summarized as linear succession of *tableaux de lumière*, or "light-images". Its dynamics come from external elements, the actor's movement or correspondences with sound[54].

Although the Czech scenographer Josef Svoboda (1920–2002) aimed at generating dynamism through movement, space, time and an active spectator (audience member), his dedication to creating a flexible and dynamic stage led him to use light as a flexible (immaterial) element of space. Time does not pertain to light as much as space does: the light-space is made alive by the performer, not by the light itself whose behavior remains relatively fixed in time, except during changes of cue. For example, Svoboda's sculptural architectures of light —three-dimensional shapes or "curtains" produced by custom developed low voltage instruments utilizing parabolic reflectors— makes evident that the movement belongs to the actor in the lighted space and not to the actions of the light itself.

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[54] See Basanta (2013)

Despite Svoboda's focus on light's dynamics through architectural techniques, his research on the effect (as opposed to the look) of light on stage is among the most relevant. "I don't want a static picture, but something that evolves, that has movement, not necessarily physical movement, of course, but a setting that is dynamic, capable of expressing changing relationships, feelings, moods, perhaps only by lighting, during the course of action" (Svoboda in Bergman, 1977, pp. 384-385).

3.5 Light As Atmosphere—Atmosphere As Space

It [the task of the artist] is the less a question of how we use materials than of making possible, enabling the noticing and arrangement of assemblages of dynamic conditions, the atmospheres that make possible the production and emanation of affects - ones that are certainly beyond any singular point of control.

(Salter, 2015, Chapter 1, Resonance).

The creation of atmosphere in the theater seems to function as an element of space. Its first step, the darkening, partial or full[55] of the auditorium, helped the spectator to forget the real space and create a propitious atmosphere to better concentrate on the imagined space. This darkening of the auditorium, which is the father of atmosphere, is thus historically a spatial practice. Not surprisingly, atmospheric light in the theatre developed mostly through the chiaroscuro techniques, the seamless blend of darkness and light, since the colour palette of light was very limited up to the 1950s[56] (Bergman, 1977). Chiascuro emphasizes the atmospheric values of space (as opposed to time), as seen through light and shadow, in order to generate mood and select what is to be seen or hidden, architecting the viewing path. Yet atmosphere also

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[55] The partial Italian opera darkening practice of the parterre slowly spread through Europe, especially during the romantic period where the renewed illusion asked for it. It culminated in the full darkening of the house (as a result of a lovely technical error) in 1876 at Bayreuth, mesmerizing the audience.

[56] Color lacquer was replaced by gelatin in the 1910s. At that time there were 13 colors in the Rosco gelatin catalog. A more consistent catalog, Roscolene, came out in 1955.

directs the spectator's attention emotionally as noted by Abulafia, as perception not only takes place in the eye but also emerges affectively from and in the body.

Atmosphere, essentially ungraspable with words, enables affect – this implicit awareness or perception coupled with imagination that impacts the subject's emotion. Atmosphere is a sensation from nowhere yet everywhere (Salter, 2017). It links the human to his environment, as observed by theatre makers, through a direct perception of its qualities, an awareness of its particular presence, a triggering of imagination. For *The Steps*, Craig wanted each of the moods (or act) to speak for themselves as the constituent of the dramaturgy, replacing the text. Stanislavski used atmosphere to impact the actor's affective memory. Brecht used the absence of shadow to sharpen the critical mindset. According to Salter, atmosphere was only examined through space, and temporal dynamics were, once again, forgotten. In his essay on the atmosphere and affect (2017), Salter highlights the influence of spacial modes of thinking[57], which have framed atmosphere using spacio-ocular descriptors such as "aura", "distance", "halo", "appearance", "borders" and "location" (…). As he argues, these modes of thinking tend to situate atmosphere as a mainly spatial concept, ignoring the temporal dynamics, which gives atmosphere its unique quality as an emergent property when referring to changes in density, thickness, and opacity over time. In other words, atmosphere has been traditionally framed as spatial whereas its movement and temporal shape has been ignored.

3.6 Distant Space Over Immediacy

According to the academic and curator Daniela Zyman (2006), light is a perceptual medium and therefore can create different spaces according to the relationship between light-

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[57] For a review of this thinking see (Bille, Bjerregaard, and Sørensen, 2014)

space-perception. Consequently, her idea of seeing goes with the viewer's eyes, their whole body (oddly she doesn't refer to multi-modal interactions), and their experience and point of view in space (space being physical, phenomenological, and psychological). It seems therefore that the ability of the viewer to experience the space with their body is fundamental. In theatre, the sense of proprioception, the feeling of one's body in space, is radically reduced in an audience that is installed on a numbered or chosen seat and anonymously immersed in darkness (emphasizing the loss in space) in front of the space. The spectators thus observe the space-based light atmosphere at a distance rather than experiencing it directly with their own bodies. Perception therefore becomes impoverished.

3.7 Light In Visual Theatre: Painterly Composition, Spatiality, And Atmosphere

If spectators once gazed at a painted image on canvas, they now look at a light-image on "*screen*" (the frame being the proscenium arch). Gröndhal compares contemporary theater lighting to a camera: light has the same function the camera has in films: they focus and create the rhythm and atmosphere. Due to light's fluidity, the space becomes supple and flexible, expandable and shrinkable, and can bear successions of plans and simultaneity of situations. Light gains autonomy as an activating agent. Its importance in quantity, quality and techniques leads to developing a language of light in theatre, essentially narrative and/or spatial (even in the creation of atmospheres). Pictorially articulated, this language is predominantly non-temporal, disregarding temporal dynamics like rhythm, counterpoint and acceleration, and instead concentrating on the linear succession of fixed light-images. As a consequence, one could argue

that text and scenery maintain their hegemony, as illustrated by the following quote from the Tony Award winning American lighting designer Natasha Katz:

> We tell the audience where to look, we give them a sense of mood, of atmosphere, of time of day, we help establish an emotional undercurrent and we're also storytellers. Its really trying to dig deep into the heart of what the characters are doing, it's trying to dig deep into what the story that's being told is…I must say the actor is the most important thing on the stage. Very often as lighting designer we want kind of pop them out from the set so that we have a foreground and a background because the actor is the one that is telling the story and we want to help telling that story. *[58]*

(Tony Award-winning LDs Natasha Katz[59], 2017)

This example alone embodies every layer of sediment. Light has to illuminate the actor (pictorially direct the gaze) and is tied to support and illustrate the drama (storytelling), essentially spatially through the use of atmosphere (and not temporally). It is illuminating, activating, but not acting. More importantly, it stresses that theatre is enmeshed with conventions and its practice is to maintain those conventions, whereas autonomous and dynamic light would call for challenging them (which is, as we will see, not easily done).

However, the paradigm shift from painted to real light provided the first degree of autonomy, as light was allowed the right to represent itself on its own and to activate space. Moving from illumination to activation gave light a new function: that of modeling and space. Through the creation of (distant) atmospheres, light provided a low level of immediacy, addressing (and imposing) implicit meaning to direct the spectator's attention. This emphasis on

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[58] Here I cited Katz, but it could have been so many others.
[59] Video from American Theatre Wing: Working in the Theatre: Lighting Design
http://livedesignonline.com/theatre/what-does-lighting-designer-do-theatre

space paradoxically contributed to ossifying the lighting: it gives enough autonomy to light to be used as a (narrative or spatial) language and yet it disregards the other elements of dynamism and vitality – time and movement.

4. Embodying Tradition: Modern Lighting Design Methodology

The techniques and methodologies of 20th century lighting emerged together with the profession of the lighting designer and reinforced the conventions - the need for illumination of the actor and set, linearity and narrative, and spatiality over temporal dynamics.

The first and most influential of them, *A Method for Lighting the Stage[60]* (1932) written by professor Stanley McCandless in the 1930s at the Yale School of Drama clearly articulates these theatrical rules and conventions for the proper use of lighting in theater. The principle is to subdivide the stage into a grid and to fully light each of the extruded squares individually with three sources, two front lights from the ceiling (FOH) in the "ideal angle" of 45 degrees, and a third source coming straight from the back and operating as rim light. McCandless' method creates perfect visibility of the actor's face as well as some plasticity, and allows for spatial isolation. The scheme fits multiple contexts and stage spaces, allowing a certain range of composition through variations in key lighting—mostly used for the naturalistic reconstruction of sun like effects according to dramaturgical time. His lighting is thus narrative and, as he himself articulates: "the fundamental lighting of a production is outlined by the playwright manuscript" (Palmer, 2013, p. 204).

Although still taught within theater graduate training programs like Yale's, McCandless's methods are not without criticism. For example, the British light designer Howard Bay criticizes

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[60] First published in1932 but re-edited four times up to 1958.

McCandless' method, arguing that the superimposed grid is static and provides only symmetrical inflexibility (Bay, 1974). Rick Fisher, still active, reveals in a conversation with Professor Nick Hunt (Hunt in Palmer, 2013, pp. 256–265) the inadequacy of the McCandless approach in contemporary theatre as the actors changed the use of space: they now face themselves and not the audience. He proposes that side lighting illuminates the actor instead of the set[61]. However, theatrical lighting would soon move forward and become show-specific.

A shift soon occurred towards production-centric lighting with the appearance of Jean Rosenthal, considered a pioneer in stage lighting design. Rosenthal provides an insightful account in regards to the autonomy of light in the '60s (Rosenthal, 1972). Light is used as a unifying tool to blend all elements of stage production together more than expressing itself. Indeed, the lighting designer receives two distinct artistic projects from his two bosses, the director and the set designer, themselves serving the text. His role is to unite them in an almost invisible, supportive lighting. The lighting design has to accommodate three boundaries, that is the "degree of reality" wanted by the director, the placement of actors in the set and other restrictions such as money, time, and so forth. Yet these boundaries mixed with the perceived hierarchy can only lead to a partial expression of light on stage, precluding it from autonomous action: the light is subdued to other dramatic elements and can only be a process of compromise, given its late implementation as a technical element at the tail end of the rehearsal/production process.

These historically specific methods and conventions dismissed the performative and temporal aspect of light. But there are exceptions, for example, Frederik Bentham's (1911–2001) interest in colour music, and his rejection of the Aristotelian hierarchy led to a significant

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[61] Side lighting was first used to illuminate the set, then to soften the shadows on the actor, and then to sculpt the bodies on the dancers. Only lately is it used to light the actor's face.

invention—the Light Console, a remote performative lighting desk (as opposed to linear lighting control). To Bentham, performing light doesn't mean upstaging with light – Bentham worked subtly with this concept. It does mean, however, that the actors and the light perform with each other rather than separately.

Similarly, the director and theorist Richard Schechner considers sight as dissociative and calls for an environmental theatre where the space of the performance is shared by both audience and performers, including the technicians who are implicated along the whole creation process and performance.

> The technicians themselves must become an active part of the performance. This does not necessarily mean the use of more sophisticated equipment, but rather the more sophisticated use of the human beings who run whatever equipment is available. (…) And during performances the technicians should be as free to improvise as the performers, modulating the uses of their equipment night-to-night. Light boards locked into pre-sets do not foster the kind of experimentation I'm talking about.[62] (Palmer, 2013, p. 241)

Yet these ideas are hard to implement in the creation process for many reasons, the agreed hierarchy between the mediums and the financial aspect not being the least (as theatre lighting design needs technical time in the venue, which is expensive)[63]. If the creative team benefits from creative residency, then the light might be created live with actors rehearsing. Light is thus more organically introduced into the spectacle. However, very few lighting designers create live and even if they do, the cues end recorded and thus keep in line with the linear playback.

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[62] Schechner, here, follows the thinking of Piscator and Brecht who, in the 1920s, already advocated the idea of integrating the technician.
[63] See section five of the current thesis.

4.1 Methods Of Analysis

In addition to forms of practice, which reinstate lighting design conventions, performance theorists (even those who attempt to discuss performance practices) also reaffirm these spatial and symbolic conventions. For example, in placing emphasis on the symbolic meaning of the lighting within the realm of visible and distant knowing (Schechner, 2007), it is not surprising that a significant emphasis is placed on semiotic analysis, even in the case of non linguistic elements (references here include Keir Elam, Martin Esslin and others). Performance studies theorist Erika Fisher-Lichte acknowledges two functions of light that are of its practical purpose –making things visible – and its symbolic one – signs of light, space, time or character. These analyses are often focussed on illustrative and spatial light, thus strengthening the idea of light as a tool on the one hand, and, on the other, as a distant meaning-making element addressing the realm of the visual and reducing potential for immediacy.

 In contrast, scholar and practitioner Barbara Bolt draws from the theoretical framework of phenomenology to revisit the relation between light and matter, advocating signification as the relationship between vision and embodiment (Bolt, 2004). Thus, the phenomenological approach considers embodiment as a mode of knowledge and in that context promotes immediacy of perception and more likely considers the felt temporal shapes. Of course these theories aren't practice-based, yet they reflect a certain impression of what is expected from light. Lighting historian Scott Palmer tries to walk a middle ground arguing for a mediation between the two approaches. "The phenomenological impact of light therefore needs to be recognised as central

in the formation of theatrical meaning and our embodied responses to light acknowledged alongside potential semiotic readings on stage" (Palmer, 2013, p. 76).

The artist Olafur Eliasson argues that when removing time from any experience, it is the very possibility to engage with it that is being removed as it fosters intellectual shortcuts: when we assume we possess the knowledge of what we experience we stop engaging with it (Eliasson, 2006). I wish to use Eliasson's thinking as a metaphor for light when used as an illustrative medium on stage: we stop engaging with it, we receive it from a distance and the perspectival inherited point of view and the co-creation of the meaning cannot happen. Light, in this context has no vitality.

5.   The Problem Of Creative Tools And Creation Process

The architecture of the control interface alters the very nature of lighting practice.
(Christine White in Palmer, 2013, p. 246)

5.1 Control

The intertwined threads of technology and conceptual models of theatre lighting design mutually reinforce and shape each other. Consequently, the control systems that orchestrate the actions of light directly influence creation and production processes. Here, I argue that the control model for lighting from a technological perspective is another key factor in stage lighting design's rigidity given that such control paradigms have conceptually barely evolved since the gas era. I support professor and academic, Nick Hunt's description of the current programming ideology as a non-dynamic state/cue model. "Lighting designers define a series of static lighting "states" which are then replayed in performance with transitions ("cues") created largely

automatically by the lighting control system. This model privileges the static over the dynamic, and the pre-designed over the immediacy of the moment in the performance" (Hunt, 2013, p. 4). This automated playback model leaves little room for creative performance in a *spectacle vivant*. Why should light fit in an exact, temporally linear, and reproducible frame while the performer lives and performs anew each time?

It appears that the perceived needs of earlier times are once again the origin of tradition. Hunt presents a very interesting point of view on the reasons for pursuing gas-like control instead of developing new control concepts alongside the new electrical possibilities. According to him, the denial of flexibility in control tools was the cost of the lighting designer's [64] recognition as an equal member of the production team, next to set and costume designers. In *The Virtuosity Of The Lighting Artist—Designer or Performer*—he demonstrates that during the flowering of electrical lighting control there were two technologies available [65] based on diametric ideologies— a performative one and a reproductive one— and articulates how the latter, economically and socially, won the industry.

The first, Bentham's Lighting Console, offered the possibility to improve 'lighting in the moment' in response to stage action*,* as Hunt puts it. Indeed, Bentham was unhappy with the existing Grand Master control[66] (gas-like control), and he came up with a model that suited his colour organ dream, comparable to a musical instrument. The playability (his term) of the device was achieved through the use of relays that were complex to operate but allowed for real-time performance and decision-making with light, based on the virtuosity of the light artist (as

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[64] 1930s in the United States (Jean Rosenthal) and 1950s in France (Jean Vilar)
[65] In the 1950s the British company Strand Lighting produced both the Lighting Console – originally designed by Frederik Bentham – and the Present Electronic.
[66] The Grand Master is a Strand Lighting control system based grand master cross control. It provides *independent masters, switching for mastering groups of blackouts, switching to render any or all spot and special circuits independent of the master blackout.* (In Strand Lighting 1945 catalog). http://spectator.theatrecrafts.com/archive/albumviewer.php?id=4&page=78&type=a

opposed to the lighting operator). Unfortunately, the use of relays precluded the exact reproduction or recalling of already designed lighting states.

The second, the Pre-set Electronic, developed thanks to new dimming technologies invented in the late 1940s that provided precise and easy control with a set of faders. Drawing from the Grand Master ideology, light states were easily reproduced and, as Hunt argues, asked for no specific dexterity from the operator. Central dimmers soon became cost-efficient and the Preset Electronic won the industry: the development of lighting control pursued the idea of predefined and automated playback. This exactitude was well suited for the theatre where, historically, light was seen to support stage action and its linear temporality was regulated narratively. Moreover, minimizing the much-feared sabotage potential of the operator must have been somehow reassuring. A live lighting performance implies a methodology similar to the actor's one: that is rehearsing already developed material. Furthermore, improvisation has become an important ground for contemporary writing and creation, and the literature on that matter is voluminous whereas improvisation in technological theatre is barely discussed. Following Schechner, the lighting designer's (or artist) work in rehearsal is to prepare his tools and palette with the other performing elements. It also implies, as Hunt puts it, to "defer certain design decisions until the moment of performance" (Hunt, 2013, p. 3). The refusal to grant a performative autonomy to the lighting operator constitutes another challenge against (temporal) innovation in design.

Moreover, Hunt argues that the victory of the acute reproduction by a technician over a light artist took place also for social reasons. The lighting board operator is historically associated as a backstage hand and not an artist. Take, for example, the despised work of the candle-snuffer or the specialized yet non-artistic expertise of gas operators. Contemporarily, or

concurrently, the emergence of the lighting designer took place - one whose aim was to be equally part of the creative team[67]. Hunt argues that this equality could only be achieved by separating the artist from the operator and reducing the latter's impact to the lowest—in other words to use the Preset Electronic. I wish to emphasize on the idea of "predefined relationship" as another layer of ossification. It seems like the role of the lighting designer defined itself by mimicking the role of the set designer, as the lighting methodology mimicked the language of paint and the purpose of set. Hunt synthesizes this relation between the control board designs and professional practice as mutually reinforcing the lighting tradition (Hunt, 2013).

With the advance of light palettes, CMY colour systems, LED colour mixing, commercially available moving lights and digital lighting a single fixture's operation might require up to 250 DMX channels[68]. Consequently, highly sophisticated interfaces control the endless parameters. If the Preset Electronic model started from a live analogical mapping[69], it evolved into a numerical data world. This data space, as Hunt names it, still mirrors real space but is nevertheless so complex that one person can hardly work in both spaces at the same time, not to mention the big monitors and their cold luminescence constantly overwhelming the eye. The great difficulty is to spontaneously respond or react to performance events while the eye must be kept analyzing the data-world and the brain constantly translating it into artistic desires. The state-cue ideology does not offer the flexibility to playfully work with that many parameters in real time[70]. A light-artist will need new, flexible and playful control as opposed to the state-cue lighting boards. This is something that visual and media-based artists working with light

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[67] Jean Rosenthal writes about how discreet she had to be in order to integrate the artistic team.

[68] While a traditional halogen spotlight uses only 1 DMX channel to control its intensity, most moving lights are operated with 20 to 35 DMX channels or, to put it differently with 20 to 35 parameters comprising 255 option each.

[69] Only one parameter – intensity – was controlled via a fader. The fader is the analogic image of the light state.

[70] Concert lighting developed more flexible state-cue light boards with multiple cue-lists and palettes allowing certain flexibility during the live events and implying a huge pre-programming preparation.

outside of the constructs and conventions of the theater and performing arts in general have intrinsically understood.

Gröndhal argues that the central control paradigm induced the notion of time in lighting practice, as the succession of looks created a certain rhythm, adding a temporal layer to the spatio-visual solid environment. "The rhythm of changing lighting cues creates a visual dramaturgy which has turned visual design from solid constructions to a score of temporal events." (Gröndhal, 2014, p. 20) As stated earlier, both the control instruments and perception of the role of the lighting designer fosters a linear and clocklike approach to lighting design, and I suggest the temporal score of events draws more from tempo than from temporally dynamic behaviour. What is perceived is the duration between changes. There might be fluctuations of tempo, yet once again history comes into play: light changes punctuate or signify scene changes, or highlight a specific dramatic moment. They are a visible temporal pacing of the text.

5.2 The Imaginative Act And Communication Issues: The Impact Of Storyboards

Hunt very accurately summarizes the current role of the lighting designer as follows: The lighting designer is "someone who makes a prior imaginary act before the moment of the performance, which is subsequently realized in performance through an essentially procedural, non-creative process" (Hunt, 2013, p. 1).

This is due, in part, to a tradition of integrating the light into the performance as late as possible for financial reasons[71]. The prior imaginary act is also embedded in the functional idea of light as a tool to activate the scenery or to unite the stage elements: it can be added at the end.

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[71] As already noted, before gas and electricity, candles and oil lamps were so expensive that light is implemented in the last rehearsal. The habit continues with gas and electricity, as human resources are expensive.

However, even today with the fully recognized role of the stage lighting designer (around 1990s), does the lighting still arrive mostly at the end. Thus, the imaginary act follows the creative process and we speak of light in creative meetings but materially never have it before the production hits the stage and the technical rehearsal period.

Of course, communicating about light is a challenging task, so the lighting designer relies on images and visualization software. But images foster a non-temporal composition method; they provide no information on temporal shapes and force the lighting to remain a strictly visual element. Images are mounted into storyboards, a tool to represent show-specific lighting along its linear development. Storyboards present themselves as a succession of light-images fixed in time and unfolding linearly. They embody light as a non-time-based art.

Communicating with words and images instead of rehearsing with light forces the lighting design to remain narrative and spatial. Gröndhal reminds us that lighting cues are "bound to performance action" (Gröndhal, 2014, p. 26), which is embodied in the notational system of the cue sheet. Conversely, an extrapolation of Schechner's thinking on the technician would suggest including light in the performance action by working with both light and the lighting operator during the whole creation process (as avant-garde performance practitioners – like the Wooster Group – have long done). The light artist can express himself with his medium, and the light could become active and gain the autonomy to create the action and perform dynamically.

Visualization software is helpful in communicating ideas and saving precious and expensive time before the production team enters the venue. Gröndhal argues, however, that the 3D modeling processes "undermines the three-dimensionality of the space and creates a more pictorial scenery since the stage is depicted as a geometric projection instead of tangible

particles" (Gröndhal, 2014, p. 26). It is true that 3D modelling processes creates striking visual images over sensations of light. Nevertheless, the opportunity to pre-program complex data information and test the operator's autonomy is an important advancement coming from the concert industry where the operator needs to interact with the music and respond in real time to the conditions of the performance and atmosphere in the venue. Thus, these tools are important, yet must evolve. First, a better accuracy of dimming curves and temporal dynamics in general is crucial, and second the visualization software should definitely become three-dimensional, borrowing from virtual reality techniques[72].

5.3 The Financial Aspect: Cost-Effective Designs, Objectification, And Reproducibility

At the same time, we cannot neglect the financial context. Being in a venue is expensive and so is technical staff. Above all other mediums, lighting design is time-consuming and thus, should be executed as quickly as possible. No matter how one does it, focussing two hundred lighting instruments one by one is a time consuming process, and there is little room for starting over due to conceptual mistakes. The hundred light states have to be set in eight hours with non-performing replicas of the actors, usually immediately followed by the press opening.

Moreover, it has to be tour-friendly. The lighting design, an original intellectual property, has become a product, an object as opposed to a process, a performance. Hunt names it the ready-made role of designers. This idea of commodification of stage lighting design might be part of the ossification as it implies financial boundaries— it has to tour, to be easily reproducible by any quality technician, and fit in any venue. As a consequence, not only does the

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[72] See chapter four

focus need to be quick and simple, but the number of instruments should be minimized and the playback easy – these are the financial conventions of theatre.

Overall, the creative tools and traditional processes calcify the use of light by condemning it to a chronological, linear, and immutable reproduction of fixed cues and repeatable sequences. Furthermore, I argue that the FOH positioning of the light designer/operator —as well as the director during lighting rehearsals—condemns light to be used as paint in the composition of an image as opposed to the performing and embodied possibilities to composing and improvising with it.

6. Contrapuntal Dramaturgy (Or *Écritures Plurielles)*

"Theatre has been characterized as a hypermedium that has always been able to assimilate other media into itself without annihilating their special character" [73] This statement suggests that the theatre is formed of multiple mediums each with specific properties and language. Lighting is one of them, and it has to work together with other mediums. Influenced by what Hans-Thies Lehmann has called the "post-dramatic" theatre, the possible multimodal writing of the contemporary theatrical performance is often referred to as *écritures plurielles*. I will rather speak of contrapuntal dramaturgy since the musical analogy implicitly evokes collaboration, time, space, and movement.

In music, counterpoint is the relationship between voices that are harmonically interdependent (polyphony) yet independent in rhythm and contour[74]. Translated into theatre, counterpoint implies that each element is autonomous as described in chapter one, thus acts

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[73] Intermediality in Theatre and Performance, Freda Chapple,Chiel Kattenbelt,eds. in (Gröndhal, 2014, p. 29)
[74] Laitz, Steven G. (2008). The Complete Musician (2 ed.). New York, NY: Oxford University Press, Inc. p. 96. ISBN 978-0-19-530108-3. Retrieved on March 03, 2018 from Wikipedia: https://en.wikipedia.org/wiki/Counterpoint

freely in regards to time, space and movement. However, its meaning is interdependent—and not dependent—with other mediums, as embedded in a equal relationship and not a hierarchical one. This relationship, this conversation is the heart of the theatre and if every medium as well as every partaker (Schechner's word) should be active, none would dominate too long as to avoid immutable hierarchy, dominance, and restriction of one's autonomy. This conversation between the medium is, as already stated, part of the dynamism for it infuses movement into the very writing of the theatrical event, a movement of the melody jumping from one voice to another, hopefully triggering the present moment. In that context, because of each medium's specific language, the spectator has to participate in the meaning making, perceiving all modalities and making sense of it. His reaction will, of course, influence other mediums' action and thus the performance is completely, dynamically unique (Schechner, 2007). Contrapuntal dramaturgy is the key to the three levels of dynamism: each voice is dynamic in itself, the score is dynamic in the movement between the modalities and the spectator is engaged in the creation of the meaning.

The problem of traditional visual dramaturgy is the hegemony of action or drama, text and set over other voices. The light is comparable to the viola line: rarely does it sing the melody, too busy to support other voices and tint them with harmonies. Following Svoboda's complaint on the decorative function of light as a background to other mediums, Crisafulli advocates light as dynamically active. "Its fundamental functions are to shape time and space, to become a dramatic structure and to serve as a means of unfolding or producing "actions" (Crisafulli in Hannah & Harslof eds, 2008, p. 93).

As opposed to the Brechtian thinking where the elements should not blend together, here autonomy is distinct yet not dissociated from other elements. Autonomy is the ability to converse

and exchange with other mediums, to shape them and be shaped in return, to act and to receive, to be dynamically active. It means that sometimes a medium takes the lead, sometimes it retires and valorizes another; sometimes it sings in parallel harmony, sometimes it opposes in dissonance or rhythm. In any case, it has a proper voice to speak of itself and integrate the score. As the post-dramatic theatre researcher Hans-Thies Lehmann puts it:

> I am interested in inventing a theatre where all the means that makeup theatre does not just illustrate and duplicate each other but instead all maintain their power but act together, and where one does not just rely on the conventional hierarchy of means. (Lehman 2006 in Abulafia, 2016, p. 195)

This ideal of multimodal dramaturgy implies autonomy, integrity and the gestalt of the coming together of the mediums. It is not a drama of action but a drama created in-between media. It is awareness, and an opening to immediacy. It is a drama that "invites us to pay more attention to the nature of things and to look at details we habitually tend to disregard in the traditional theatre, where they become an illustrative support to the narrative" (Abulafia, 2016, p. 181). The autonomous light here is emergent.

Chapter Three

Light Art: Towards The Autonomy of Light

This century belongs to light.

(Moholy-Nagy)

A paradigm shift from representation to reality occurred in the early 20th century in both theatre and applied art. In this context, light, unlike in theatre, became the medium, without the need to support another medium, and developed into a wide range of practices that were to be called, by the end of the century, Light Art. Peter Weibel (2006), in his insightful historical review, depicts in detail the artists who accompany light in this journey. Here, I will mainly focus on the salient facts relevant for contrasting the emergence, concepts and practice of light between Light Art and theatrical lighting. The idea is to understand the distinction between light, which is used to support another art form (the dramatic theater) and light which functions as an art form, in and of itself.

The first and most interesting fact is that light in Light Art seems to be born almost autonomous and uncodified, whereas in theatre, the burden of tradition still inhibits its development, even in regards to recent technologies. Codification and habits have spread into methodology, literally shaping the technical control tools, which in turn reinforce linear and spatial thinking, emphasizing fixity (intervallic changes), over sequenced dynamics to cue structures, and temporal shapes. On the contrary, Light Art has a very different intent and way of working as it freely discovers light for itself—pure light.

1. Light As Colour, The Cradle Of An Art Of Light

Artists of the 19th century sought for absolute colour. In their artwork, natural light, and eventually artificial light, was represented by the medium of colour. These scientific discoveries had a major impact on modernist artistic practice. The colour-mixing theory and tri-chromatic vision theory explained visual perception and the sum of additive tricolour mixing; hence white light could be divided into colours. Therefore, colour became an element of light.

Moreover, wave theory presented light as electromagnetic waves, such that every colour belonged to a different wavelength. Consequently, colour and light became understood as a form of energy, one that could be substituted to paint. "The view of colour as a form of energy, as radiant energy, as electromagnetic waves, made it easier for artists to substitute light for paint/colour, as light is nothing other than energy and electromagnetic waves. In this way, colour becomes a phenomenon of light, light the overreaching concept, and thus the way was clear for an art of light" (Weibel, 2006, p. 90). From then on, unfettered from its usual task to represent light, colour was freed and light could replace it. The liberation of colour thus gave rise to a new autonomy of light as a concrete medium standing for itself. "Thanks to this paradigm shift, the art of pure colour became the art of pure light" (Weibel, 2006, p. 95).

Another key facet in the development of light as an independent medium in regards to colour is the long-standing idea of synaesthesia[75] and colour music. Anchored in the scientific discoveries of the 18th century on the sensorium[76] as well as in the romantic idea of the fusion of the arts, 19th century artists explored the manifold correspondences between sound and colour.

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[75] Weibel explains synaesthesia as a constituent element in the birth of Light Art. Indeed, the idea is openly advocated by the artist Adrian B. Klein in his 1926 book *Colour Music. The Art of Light.*

[76] Weibel recalls the important experiments of the physicist Johann Wilhelm Ritter (1776-1810) who explored the physiological correspondences of the sensory organs and of the physicist Ernst Florenz Friedrich Chladni (1756-1826) who developed the Chladni figures – visual figures of sound.

The quest for simultaneity—a trend revived with the use of pure colour and simultaneous contrast—would develop with the avant-garde and greatly influence the autonomy of light. Indeed, it would shift "from coloured light to light interplay, from coloured music to the playful use of coloured light" (Weibel, 2006, p. 139).

The similarity with Frederik Bentham's quest for performing theatrical light is evident, as well as the desire for a performance of light. Colour music also infused movement—and time—into the use of light thanks to the formal research on light's expression modes and the structural relations between light and sound. In fact, artists at the turn of the 20th century devised a wide variety of instruments to play colour music, generally referred to as colour organs. Colour music is a visual symphony that uses musical composition as a model in which timber and tone are replaced with colour, and, where both the linear development of the colour presentation and the synchrony of contrast create melodic (horizontal) and harmonic notions (vertical notion) of rhythm into Light Art. Already in the 1930s, the artist Thomas Wilfred claims the independence and full autonomy of both music and light. He concentrates his work on projecting coloured light (instead of working with reflected light from pigment) and devised a special instrument, the Clavicus, to perform his art.

However, I suspect that similarly to Bentham's relays and today's lighting desks, the Clavicus operated with automated dimming temporal shapes, preventing a play of temporal dynamics. A contemporary example of a more flexible and direct temporal shape is obvious in David Vrbik's *Laser Strings* presented Praha's Signal Festival in 2016[77]. In his work, light rays are the strings of a musical instrument, which is played by the attendee. His or (her) movement is mimicked and translated into sound. In other words, the movement's temporal contour becomes audible.

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[77] https://spectator.signalfestival.com/en/installations/strings-2016/

2. Light As Energy Or The New Medium: From Representation To Real Matter

The paradigm shift from representation techniques to concrete reality[78] operated in art during the 20th century starting with the use of real materials in painting. Weibel (2006) retraces three major steps. First, artists analyzed, extracted and scrutinized the formal elements of painting. For example, the impressionists dissected colour into adjacent brushstrokes. Second, they isolated the dissected elements and accentuated them up to absolutization at the expense of other elements, as did abstract painting. Finally, artists withdrew some formal elements and replaced them with new ones. Accordingly, light became an autonomous medium: first isolated, then absolutized, and finally considered capable of replacing other elements, such as the core medium in painting: colour. Weibel insists that this process transformed the concept of image: it split apart the old image and reconstructed a new one by including material, movement, and light. Light thus shapes the image, as it did in the theatre. The difference lies in the granted autonomy of light: if the same process occurred in theatre, the light remained a supportive tool unlike in Light Art where it became an active medium. For example, the constructivist Vladimir Tatlin pushed the paradigm shift in the Cubist collages to such an extent, that he deprived the materials of their very reference to objects, introducing the notion of pure material over representation. Extrapolating from the constructivist view, light gains potential qualities such as thickness, vibration, shapes, density, etc.

This is the breaking point—or more precisely the breaking concept— where the use of light in art diverged from theatre. On that conceptual side, the uselessness of an explicit reference to object, light could grow independent of representation as in (some) light artworks,

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[78] Weibel notes this *turn away from strategies of representation to reality programs* was not specific to light but rather part of a larger movement, as exemplified by the shift from the representation of movement (Futurism, Cubism) to the reality of movement (Constructivism and Kinetic Art).

whereas light in theatre remained intertwined with illustration or narrative, and space activation. Light Art has the potential to develop artworks grounded on the very nature of light whereas theatre lighting design continued to negotiate its position in relationship to the other medium it activates. One responds neither to solar, sidereal or chronological time; the other is tied to linearity. Free of reference and soon considered as immersive brightness[79], light in Light Art is an invitation to experience matter, to immediacy.

This detour into materials was fundamental to the development of an art of light: a variety of artworks including light as a medium was created, from luminodynamic sculptures to light ballets, light reliefs, light boxes, and neon objects. The experiments of artists like Moholy-Nagy and Pesanek laid the ground to transform "material boxes into light boxes, material reliefs into light reliefs" (Weibel, 2006, p. 109). Indeed in the 1960s, these box-shaped images became a treasure chest for light. Filled with lamps, filters, lenses and mirrors, light stopped being restrained to colour and instead was and became used in conjunction with reflective or transparent materials, as in the work of the Zero Group, GRAV, François Morellet, and others. Slowly, light "emerged with an absolute status instead of being a side effect of the material, becoming an independent image in which the material parts were merely auxiliary for the generation of light spectacles, and finally with lights becoming the loose material for creative art" (Weibel, 2006, p. 111). After pure colour and pure material, pure light became the artistic medium. Starting with artists such as Dan Flavin and James Turrell in the '60s, the medium of light ceased to be contained in a box, liberated from its bond to the material and instead, became (and produced) environments that spread to the walls, the room, and eventually formed

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[79] From a phenomenological point of view, the philosopher and academic Gernot Böhme describes brightness as the primary and fundamental quality of light perceived before shape, color and objects. (Böhme, 2009, Geometry of Light)

lightscapes shaping both outer space and inner perception. Thereby, pure colour and pure material became pure light art and a fully autonomous medium had arisen.

3. Light As Movement: Introducing Time, Space, And Environment

Movement underwent the same shift from representation to reality, for example from Futurism and Cubism to Constructivism and Kinetic art. Accordingly, kinetics demonstrates that the introduction of space in Light Art has an impact on movement, hence time, whereas in the theatre, light as space was developed visually according to the non-time-based painterly composition.

3.1 The Rise Of Space From Movement

In Tatlin's Constructivist view, space is movement. Similarly, in Moholy-Nagy's kinetic art, light and space are both materials and movements. Moholy-Nagy advocates two types of volumes, a measurable one in three dimensions and a virtual one arising from movement. Indeed light has the power to sublimate the material, and movement to sublimate the mass, hence movement dynamizes the material by creating virtual volumes. Besides, Moholy-Nagy had a performative conception of light in space, as exemplified by his *Light Prop for an Electric Stage* (1930), a Bauhaus staged interplay of movement, materials and light - 116 coloured light bulbs flashing along sequences. Light, here, is acting, as opposed to activating the space (as in the theatre). In other words, light's movement performs the space.

In their quest for real space and time, the Bauhaus artists attempted to stage the relationship between space, form, light, and movement - found in their kinetic sculptural work. According to the academic Johannes Birringer, the theatre of the Bauhaus endowed a design-in-motion concept largely forgotten today. The performative ground on which the Bauhaus played with form, colour, light, sound, movement, and bodies in space, pushed light experiments towards an autonomous abstraction. However, the issues highlighted in chapter two confronted these ideas: pure light and movement ran head on into historical tradition, codification, and architecture of theatrical lighting. Despite their ideals, they were restricted to pictorially resize the stage space and the light projected forms in movement. Consequently, it appears that in regards to light, space is a property flowing from movement as in Stern's view on dynamic forms of vitality.

3.2 The Rise Of Time From Movement

Inherent to movement, time also became a key player in the emergence of light as a medium in Light Art. For example, the filmmaker Hans Richter tried to visually articulate time into different rhythms. The artists of the Bauhaus tried to transcend the synchrony between light (colour) and music, such that artists like Ludwig Hirschfeld-Mack tried to merge the idea of movement and rhythm with the colour-light relation present in the synchronist work, and expand it to real space and time. It is evident in Hirshfiedk-Mack's *Farbensonatine (Ultramarin-Grün)* (1925), a temporally non-linear and polyrhythmic work with light, where:

> The individual sources of light were switched on and off either simultaneously or
>
> one after another to a specific beat. The form and brightness of the light sources

were varied, using stencils and fading. Switching the light sources on and off at specific intervals caused areas of light to overlap and to appear alongside each other. The temporal structure that thus arises is the musical element in the Color/Light Variations. (Weibel, 2006, p. 161)

If the temporal shape remains the same, the light sources act along autonomous tracks, creating a polyrhythmic work. Independent groups of light collaborate together, and create early sequencing of light.

The multiple electronic technologies developed in the second half of the 20th century onward represent a major turn in the temporal dynamic thinking of light and sound, offering consequent modes of complex and generative control. What was mechanically achieved before is now computerized. Light, thus, can be temporally modulated at will, offering behavioural possibilities such as dimming, pulsing, and the sequencing of individual light sources or groups. Moreover, the computer offers a centralized and simultaneous control for sound and light (and other mediums) thereby triggering a new quest for autonomous relations between media. The limitless possibilities of computerized control lay the ground for fully autonomous light sequences and collaborations.

Light in Light Art developed proper tools to work with movement, time, and space. I suggest that these tools were artist-driven, as opposed to industry-driven theatrical controls, since no overall methodology existed, only projects with specific needs[80]. To flesh out Weibel's expression: the path becomes clear for a temporally dynamic and autonomous art of light.

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[80] On industry driven tools, see Hunt.

3.3 From Canvas To Environments

The paradigm shift from representation to reality combined with the new understanding of light as colour reshaped the very nature of the image. Unfettered from representation, and newly including concrete material, time, space, and even perception, it is liberated from canvas. Light, accordingly unfolds in time and spreads in space, creating a new image[81] unrestricted in the realm of the visual. Along with technical innovations, real light became an art that took multiple spatial forms (light panels, light objects, light ambiance, light signs, lightscapes, etc.) up to environments. Indeed in the 1960s, the minimalist artist Dan Flavin continued the work of Moholy-Nagy in integrating space, or more precisely environment, in his work. His compositions with industrial fluorescent light tubes managed both to free the medium of light from any figurative element and to invade the gallery space—the environment being the new canvas for lighting.

3.4 Environmental Light: Immediacy And Perception Over Representation

Thus light moves to the realm of the experiential. Indeed, a shift ongoing since the 1960s, from the spatial possibilities of light to the subjective experience of light is emphasized by the spectator's experiential engagement. As artists such as the Zero Group endeavoured to use the new qualities of light - that is light as color and light as energy - alongside the emergence of installation art, performance art, and happenings, light started to irradiate and dynamize the space. As Abulafia notes, this process culminates in light installations that "incorporates some of

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[81] To meditate on the question of representation in Light Art compared to theatre, I wish to follow Selwood and pinpoint two insightful art forms *Color Music* and *Abstract film*. Their fundamental principle was light and color as being more important than narrative and representation. (Selwood, 2006)

the most fundamental ideas regarding (the instable nature of) visual perception and reception of art, materiality of the medium and the increasingly complex relation with the piece as negotiated by the addressee*"* (Abulafia, 2016, p. 52).

James Turrell uses both natural and artificial light to create environments as well, however it differs from Flavin's because of his focus on perception. The whole point of his work is about "seeing yourself seeing", a process occurring in both space and duration. If the knowledge of space is challenged by our perception, the duration of the experience plays a fundamental role. Here Turrell introduces time in the artwork, a time that dramatically differs from the one present in Kinetic Art. If the latter used time as an intrinsic constituent of motion, Turrell's time is unique to each spectator - an internal time with unique temporal shapes associated with both individual perception and the natural or artificial movement of light and body in the artwork. It focuses on the visual and emotional effect of light on the body as time passes.

Moreover, Turrell moves further by renouncing not only figuration but also image making: "First of all, I am not dealing with an object. The object is perception itself. Secondly, I am not dealing with an image, because I want to avoid any associative symbolic thought. Thirdly, I'm not dealing with a special purpose of focal point either…You are looking at yourself looking*"* (Turrell in Abulafia, 2016, p.55).

Here the use of light as a medium takes a major turn and is set apart from the use of light in theatre: no image, no focal point, no representation, but only perception and embodied feeling creates the meaning. Turrell, thus works with what the physicist Arthur Zajonc names the *inner eye,* cultivating immediacy over distance: "I am interested in the point where imaginative seeing and outside seeing meet, where it becomes difficult to differentiate between seeing from the

inside and seeing from the outside" (Turrell in Abulafia, 2016, p.55). His light shapes space in the visual realm and negotiates meaning in the holistic experience of the senses as light embraces other senses (touch, proprioception, hapticity).

> When I work with light it is important to me that I create an experience of wordless thought, shaping the quality and sensation of light as something tangible. The quality of the substance of light cannot be touched, but it can be rendered physically visible. (…) I form light to the extent that this material allows me to do so – and in a manner that allows you not only visually but also physically to experience the substance of the light that fills a room. (Turrell in Abulafia, 2016, p.55)

Turrell's light is material and has qualities of its own. It doesn't activate space: it co-creates it with the spectator. The space is active, "in the process of becoming, first in perception and later as representation", as Böhme qualifies it (Böhme 1996 in Abulafia, 2016, p. 58).

> Light artists such as Turrell, Nordman, and Verjux are aiming at a space, which is in the first instance brought forth by light. Light is, after all, a sculptor of space, the space sculptor par excellence. Further, light is a medium, a medium of perception (even before it becomes a medium of representation). It is right that the expression light-space exists. (Böhme 1996 in Abulafia, 2016, p. 58)

The perception of light - or brightness precisely follows Böhme's phenomenological thinking – it precedes the representation, and much of theatre lighting omits it in its distant observation of light-image. I argue that the power of light lies in immediacy, its full range of action existing before its analysis, before the organisation of information that representation demands.

By acting directly on perception, Turrell reintroduces time into the artwork. The time of experience (a time of Kairos), individual perceived duration, (with the polyphonic score of temporal dynamics), and even impaired time perception (in the same manner as disorientation). Time becomes inherent to perception, even if Turrell's work doesn't focus directly on temporal shapes of light.

The same relationship between perception and representation occurs in Olafur Eliasson's work such as *Your Black Horizon* where the inability to calibrate the space is central. The viewer struggles with their perception to decide whether the light comes from the inside or the outside of the room. It is about the calibration of the inner and outer space (Zyman, 2006) through perception of the inner and outer eye (to use Zajonc's term). Again, this work on perception as opposed to representation has the potential to distort both space and time. "[Light Art] manipulates our perception in non-conventional spaces, calibrated under carefully organized shifts, disorientations and resolutions*"* (Abulafia, 2013, p. 55).

Eliasson understands time as the fourth dimension and denounces its removal from our society by capitalism and entertainment. To him, we can only perceive through time and thus are part of it—it is personal, not universal (Eliasson, 2006). Following this, he suggests that museums cease to stage a specific experience but just exhibit the work and leave to the observer the task of engaging with themselves, space, time, and meaning. Eliasson's work always stimulates imagination and relates to time as the sine qua non condition of engagement (or active spectator). The feeling of constructing both time and space through immediacy of perception is strong.

According to Zyman (2006), light is a perceptual medium and therefore can create different spaces according to the relationship of light-space-perception. Consequently, her idea

of seeing goes with the viewer's eyes, their whole body, experience, and their point of view in space as a constituent part of it (space being physical, phenomenological, and psychological). It seems therefore that the ability of the viewer to experience the space with his body is fundamental. In most theatre, the darkened audience fosters a feeling of being in no space, a loss of proprioception: the apperception of light[82].

4. Bifurcations And Confluence

During the step leading to absolutization, light in theatre diverged from light in Light Art. In the latter, it would become purely material while in the former it hasn't freed itself of the model it represents.

However, both visual arts and theatre fostered the spectator's experiential engagement over verisimilitude, and the boundaries between disciplines became increasingly porous. The relationship between the artwork and the spectator moves towards their engagement as a part of the artwork's meaning. This turn was influential in theatre, it manifested through performance art and happenings. Installation art was influential too, as scenic design endeavoured to develop an autonomous meaning beyond the text. Consequently, post-dramatic theatre is based on *écriture plurielles* and presents itself either with holes, theorized as minoration (Deleuze; Chevalier) or with too much writing layers. Both opens on a multimodal co-construction of the meaning, and there is no doubt light can be part of it.

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[82] Of course the theatrical frontal relation is not the only one: in some cases, the audience is on two sides like in *Dans la Solitude des Champs de Coton* staged by Brigitte Haentjens (2018), on three or even four sides like in Robert Lepages' *Jeux de Cartes* (2014). However, the audience remains in darkness even if reflected light allows seeing other spectators. Other forms of theatre like immersive theatre try to enfold the audience in an experience. Josephine Machon' survey on immersive theories and practice (Machon, 2013) is insightful but demonstrates, by excluding it, that lighting is not considered a constituent part of the current immersive theatrical practice. It might be because most immersive theatre is also *in situ* which makes it financially and technically hard to really work with light.

5. Different Times—Field Review

Time is an essential component of light in the visual arts, Light Art, and the theatre. Yet, the two art forms answer to different understandings of time. Adam Basanta (2013), points to the existence of a linear time—close to storytelling, and a random time. Both are in relation to the observer's perception and distinguish themselves by the ability of the observer to understand a cycle or not. Linear time, in Basanta's argument, marks the completion of a whole, and the beginning of a cycle. A good example is the artist Nicole Anona Banowetz's *Rotifer*[83] very close to storytelling or Teemu Määttänen's *Red Chair*[84].

On the other hand, random time could be illustrated by Liubov Moskvina's *Travelling Light*[85], or Olafur Eliasson's *Reflective Corridor*[86]. Often time is linked to complex interactivity (and thus implying erratic behaviour, polyrhythmy and even temporal shapes) yet, in some cases it is perceived without even a change in the intensity of the light source—only its movement or colour allows it. For example, Mateus Manninen's *Tasaaja*[87] slowly shapes the space by the ascending or descending movement of a fluorescent tube and the eye's reaction. Even if he works with light, sound, and temporal shapes, Basanta's linear and random times differ from Stern's conception of Chronos and Kairos. Time is not about unfolding a present moment, it is about the understanding—or not—of a whole as marked with a beginning and an end. The viewer understands when the narrative —the cycle— is over. I suggest that random time fosters a "coming into being" experience: an enhanced co-creation state of dynamic participation.

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[83] https://amsterdamlightfestival.com/nl/routes/illuminade/rotifers/
[84] http://spectator.luxhelsinki.fi/en/lux-in/
[85] http://spectator.luxhelsinki.fi/en/lux-in/
[86] http://spectator.lichtkunst-unna.de/en/collection/eliasson-olafur.html
[87] http://spectator.luxhelsinki.fi/en/lux-in/

Multiple temporal purposes arise: to stretch time through a meditative form as in Manninen's *Tasaaja* or James Turrell's *Memorial Chapel*[88], to lose reference to time and blur its perception as in Chris Salter's *Displace*[89] or Eliasson's *Your Black Horizon*[90], and so on. In all these examples, time is always becoming. All of these ways of playing with time highlight by contrasting it with the chronological nature of time in theatre.

As we have seen, light in the theatre is temporally linear and unfolds along intervallic duration, bound to the time of the play and the control apparatus. For theatrical lighting, time is teleological: a point on a line directed towards a future with no present unfolding. Here, images of light are paused, still, and the performance unfolds during that pause. Movement occurs at the beginning or end of an interval, forming a cue. The cue occurs when the drama commands it. Morphing itself through a very sophisticated transition to another paused image. The feeling of starting from one state and moving towards the other, the other being the finality of the previous and the beginning of the next, is obvious.

From experience I argue that it is during these transitions that emotional power and interest of lighting lies. When light is at its dynamic peak: there it acts on the inner eye, co-creating an ephemeral moment with the audience. In these transitions, theatrical lighting momentarily surrenders its codification. It acts for itself, it is in movement. It is in a state of becoming, and it becomes only with the inner perception of the audience. Yet, in the theatrical context, this notion of transition implies the very notion of an in-between (in-between static images where light is only spatial or supportive), and as we have seen, the transition is mostly

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[88] http://thecreatorsproject.vice.com/blog/james-turrell-illuminates-a-memorial-chapel-in-a-berlin-cemetery
[89] http://chrissalter.com/projects/displace-v-2-0/
[90] https://spectator.google.ca/search?q=your+black+horizon&ie=utf-8&oe=utf-8&client=firefox-b-ab&gfe_rd=cr&dcr=0&ei=lZ-BWsuGA-XVuALB46OwDw

automated along fixed dimming curves (temporal shapes are very limited). Light supports other elements at the cost of its dynamism, energy, and vitality[91].

Furthermore, time is a complicated issue when it comes to lighting control systems. The lighting cues can be controlled only in relation to the previous one and next one, forcing the chronology, and individual timing or movement, which becomes highly complicated to create and modify, thus the creation of complex polyrhythms or temporal polyphony is most often out of reach.

In contrast to Light Art's potential for polyrhythms (sequenced constellations of light sources) and polyphony (Morellet's *Néon-Éclairage avec 3 rhythmes superposés,* Timo A. Aalto*'s Light Noise,* Meri Ekola and Marc Melià's *Cycles*), theatre presents itself with a form, a rhythm referring to the cue's frequency. At what rate do they occur, how will different sequenced cues create some breathing in the performance? Is the light accelerating, constant, or slowing (multiple blackouts)? Rhythm is related to the performance's dramatic curve and the very notion of time is complex since time moves both in real and in an imaginary world. Real time continues, but fiction (and lighting) makes it change. Lighting design is often bonded to the necessity of time change in the play, as well as to the frequency of cues in relation to both the play and the clock time. The audience accepts this double time and is willing, through lighting and codification, to make the imaginative journey (if not, clock-time can be unexpectedly long…)[92]. In Light Art, light is free to behave—that is to embrace temporal shape autonomously. Light Art plays with real time opening portals into other perceived timeframes.[93] However, few Light Art really work with temporal shapes.

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[91] For insight on how living can be a candle flame in the context of *hygge* context, see (Bille & Sorensen, 2007). Also see (Tanizaki,1933) for his idea on how a candle's flame through movement and intensity variation, is informative of the very nature of matter.

[92] Some contemporary artists work in real time, refusing the dramaturgical time. See the work of *L'Eau du Bain* as an example.

[93]Eliasson's work is a good example as well as *Under Influence*, a work of Van Dijk.
https://amsterdamlightfestival.com/nl/routes/illuminade/under-influence/

A manifest example of dynamic, lively light composition in Light Art is Chris Salter's *N-Polytope: Behaviours in Light and Sound After Iannis Xenakis*, developed in 2012 and presented in 2017 at the Musée d'Art Contemporain. He creates a light and sound environment continually swinging between order and disorder, echoing Xenakis's original fascination with the behaviours of natural systems. The installation is steered by means of a sensor network that uses machine-learning techniques to "learn" different rhythmic and temporal patterns produced by light and sound, and influences the overall compositional action over time[94]. Always reinventing itself, the work is kept alive. There is no linearity, only temporal shape assemblages.

Light in theatre and in Light Art is the same medium, only underpinned with different visions. The same concept, such as time, can be polarized to its extremes. Theatre works with imaginative time and chronology as light art works with clock time and our perception of it. Both use rhythm but only to refer to different things. The same applies to the concept of space. Light art uses space, a necessity for movement. It is an inherent component of its very being, of it being perceived by the audience, as opposed to theatrical lighting making intelligible and sensible, through the atmosphere, a space in a frame. If it can be breathtaking with beauty, it doesn't refer to light itself or, more interestingly, to the act of perception. One is seen, and the other is experienced.

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[94] http://cinemaexpo67.ca/expo-salter/

Chapter Four

Possible Vitality In Stage Lighting Design

Insubstantial light is substantially effective and affective.
(Hannah, 2013, p. 13)

1. Layers Of Ossification

The comparison between theatre lighting design and Light Art makes evident different conceptual approaches, and by presenting light with the potential for autonomy and dynamism, it unveils the weight of tradition inlaid in the theatrical lighting practice.

1.1 Fossil #1: Illumination

Among the numerous fossils, or layers of ossification, the most ancient, salient and inhibitive is the need for illumination. This tendency constrains light to the status of technical tools (for visibility), a mere support for the actor and the scenery—the visual meaning—thus impeding any attempt at autonomous expression. The insatiable desire to see came to the extent of belief that what one does not see is not heard. In other words, not lighting the actor's facial expression is tantamount to obstructing the representation.

Nowadays, light can express itself through spatial composition and the creation of atmospheres, always keeping in mind its crucial role: illuminating the actor. Nevertheless, according to the light designer and academic Fabrizio Crisafulli, illumination can be synonymous with active light, using a neutral light to better outline the theatrical script, as was the tendency with theatre directors such as Brecht and Peter Brook. However, the aim was not illumination: it was the active participation of the spectator (which was identified in chapter one as the third level of dynamism).

An interesting example of traditional lighting design released from the imperative of face lighting, yet embedded in an Italian-style venue and issued from a traditional creative process, is *1984*, staged by Edith Patenaude and presented at Théâtre Denise-Pelletier (2016). The onstage camera took on the role of the actor's visibility. Jean-François Labbé's light design, essentially architectural and atmospheric, infused the audience in the first act with a sense of dizziness (one could not understand the stage's architecture before act 2) as unnatural light directions and saturated colours were used to create repressive architecture. Also, the cueing was close to rock concert practice and as such infused with more movement. An expanded play of saturated colours, direction, low light, and (linear) rhythm arose as the camera took charge of the visibility. This demonstrates the immediate gain of an extensive palette (even in a traditional set), only by removing the illumination layer.

1.2 Fossil #2: Linearity

The second major fossil identified is the linearity impinged on by way of the paradigms of lighting control and the thinking that arises from such technical contexts. On the one hand, as soon as it gained a bit of spatial flexibility thanks to the gas-table central control, lighting - in the texto-centric tradition - learned from the narrative when to change (intervallic cue changes). Its rhythm was a visual materialization of the drama's structure: a light change would always support the drama. In other words, it operated linearly along the narrative, usually marking scene changes. A concrete example includes the development of cue sheets (thanks to Reinhard but most importantly to McCandless) that demonstrated the state of light intensity along the text.

On the other hand, gas technology could only be handled linearly, in a succession of light-states. What is curious is the fact that the subsequent electrical lighting control, from switchboards to the current lighting control systems, mimicked this linear mindset despite the numerous possibilities of computerization. This, in itself, expresses the magnitude of linear thinking. The emphasis on linearity, of course, disregarded any attempt at light unfolding during a scene along temporal shapes and prevented the easy programming of polyrhythmic structures. Consequently, Stern's dynamic vocabulary of temporal shape or time profiles such as exploding, surging, fleeting, halting, bounding, rushing, bursting, swinging, rarely applies to light, except for the automated *fading*, the same curve exactly reproduced by a light board no matter the cue's duration[95].

Similarly, we also rarely hear about the temporal score of a lighting scenario. Behavioural composition with light needs a vocabulary, a notation system, dynamic markers and adequate tools. Most importantly, it needs to be taught in schools as a valid composition method. Moreover, improvising with technical mediums should be further developed as a methodology and a habit in order to fully uncover the potential of performing with light.

1.3 Fossil #3: Space Over Time

The third fossil is the almost exclusive emphasis on space (over time), preventing a fully dynamic use of light, that is, a light in possession of its properties of movement, time and space, as well as force, and intentionality. Light in the theatre spreads throughout space, essentially activating the set, as opposed to behaving in space—including the spectator's body (and

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[95] Jennifer Tipton and William Forsythe complained about the newly regulated dimmer curves invading the market to accommodate the powerful halogen profile ETC Source Four. Together, the lamp and the dimming system prevent from meticulously working and appreciating low levels of light. (A conversation in Denver, 2000)

thinking). We are not looking at light but rather at light-painted space: a dematerialized space. Again, light is supportive and lacks a proper ethos for its appreciation (this matter will be developed in the next section). Light based its articulation on other mediums, each unique in their quality instead of creating its own methods, its own vocabulary and dynamic markers.

From the non-temporal art of painting, light learned to paint space, to activate it, but more importantly to create distant images. From the text it learned to illustrate. Overall, this spatial conception of light disregarded any other temporal expression other than linearity. Temporal shapes and thus temporal dynamics of light were largely ignored, both conceptually and technically. As an illustration, the extent to which time has been conceptually ignored, one might notice that the tools of lighting design, cue sheets, lighting desks, and instruments, are not focused on the programming or design of complex temporal behaviours. The emphasis on space has been at the expense of Kairos. As scenographer Dorita Hannah points out, an ongoing perceptual shift moves us from a spatialization of time to a temporalization of space. In doing so, objects move from being materials situated in perceptual time to active and mobile events. "As a forceful temporal phenomenon, light itself can also be considered an event, or even a series of multiple events" (Crisafulli, 2013, p. 13). Events happen at different scales and along different temporal shapes, as in Stern's thinking.

1.4 Fossil #4: Meaning Making—Visual Image Over In-Depth Experience Or The Removal Of Time

The last fossil is the restriction in the methods for conveying meaning. As a stepchild of both dramatic and painting traditions, light repeatedly has been seen as an illustrative tool, trying

to create meaning through depiction, atmosphere, or symbolism. The architect Juhani Pallasmaa meditates on the de-sensualization of sight (the isolation of sight from the other senses and from feeling) as well as the consequent image-based architecture prevailing over experiential-based architecture. Pallasmaa's thought can be equally valid for theatre lighting—which developed as an art of space. He links symbolic form to the perspectival representation: *"The invention of perspectival representation made the eye the centre point of the perceptual world as well as of the concept of the self. Perspectival representation itself turned into a symbolic form, one which not only describes but also conditions perception"* (Pallasmaa, 2012, p. 18).

Moreover, according to Roland Barthes, the informational and symbolic forms of meaning are the basic and stable ones. A third one – the third meaning - is linked to a meaning ungraspable by words. Pallasmaa and Barthes both highlight the explicit aspect of informational and symbolic meaning, as opposed to the engagement of the viewer: the immediacy of perception, the in becoming of meaning. In theatrical lighting terms, this suggests that light became associated with what David Michael Levin calls frontal ontology, a frontal, fixated, and focused vision[96]. It suggests the creation of *light as object-image*—as Crisafulli names it— that is, light as the object of vision.

In this context, the light-image can be qualified as retinal art (termed coined by Pallasmaa)—an art endeavouring to create striking visual images projected on the screen of the retina (Pallasmaa, 2012). The eye is separated from the other senses, the body isolated in the realm of vision. It somehow creates a disembodied form of meaning, thus distant image making is glamorized over immediacy. *"The ocular bias has never been more apparent in the art of architecture than in the past half-century, as a type of architecture aimed at a striking and memorable visual image, has predominated. (…) David Harvey relates 'the loss of temporality*

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[96] For more details see (Pallasmaa, 2012, p. 33)

and the search for instantaneous impact' in contemporary expression to the loss of experiential depth" (Pallasmaa, 2012, p. 33).

Here, Pallasmaa and Eliasson both agree on the negative impact of the removal of time from experience as it prevents from engagement (Eliasson, 2006), a removal occurring in theatre too. Light-as-image[97] creates non-temporal un-negotiated spaces and thus, explicit meaning and leads to objective perception. The removal of time limits the experience of light. The loosening on the all-controlling eye and image-based meaning, and endeavouring to create space for immediacy of light needs to be integrated into research-creation[98].

> Perhaps, freed of the implicit desire of the eye for control and power, it is
> precisely the unfocused vision of our time that is again capable of opening up new
> realms of vision and thought. The loss of focus brought about by the stream of
> images may emancipate the eye from its patriarchal domination and give rise to a
> participatory and empathetic gaze. (Pallasmaa, 2012, p. 40)

2. Steps Towards Autonomy

2.1 Counterpuntal Dramaturgy

From Light Art it is evident that a dynamic light has to be considered for itself—pure light in full possession of all of its dynamic constituents. Possession is one thing, but having the latitude to use its feature is another. Hence, dynamic light is necessarily autonomous.

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[97] Other sensory models exist, and the lighting design should be conceptually inspired by it. As a matter of fact, the anthropologist Constance Classen points the occular centric model as a modern consequence of the proliferation of visual imagery and compares it to the *thermal dynamics* of the Totzil from the Ciapas highlands of Mexico. In their view, the morning is not a sunrise, but a heat rise. (Classen in Howes, ed..,2005, pp. 147-152)

[98] This idea implies smaller audiences, which is always a major issue for broadcasters.

First of all, as already stated, light should have the ability to move from animation to animism, hence to be unbound from the above layers. However, since it must apply to theatre, it needs to meet (and disregard) codification and to be part of a contrapuntal dramaturgy, or *écriture plurielle*[99]. Perhaps it sometimes takes place in holes left by *minoration*—as theorized by Gilles Deleuze and Jean-Frederic Chevallier—or it writes a fully independent track settled in an overabundance of the reading tracks. The idea is to keep a level of dynamism by switching from one medium to another in a dynamic overall score. Although well established in semiotic thinking, Abulafia describes it as follows:

> Dramatic action is absent and a new "drama" is created in-between media. It may result from media standing in counterpointed relations of contradiction, from the accumulative reflection of media upon each other, supporting each other's sign, or from media taking separate direction, thus establishing their autonomy. Both the absence of dramatic plot and the lack of characters increase our awareness of the aesthetics of the experience we gain while watching and listening. (…) [It] invites us to pay more attention to the nature of things and to look at details we habitually tend to disregard in the traditional theatre, where they become an illustrative support to the narrative. (Abulafia, 2016, p. 181)

Moreover, Crisafulli (2013) calls for a collaborative, performative, and experiential medium, emphasizing the relationship between – actions and reaction – and between the different mediums.

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[99] *Écriture plurielle* refers to distributed agencies among manifold mediums.

2.2 Ethics Of Appreciation Of Light

However, this autonomy first and foremost requires an ethos of light in theatre – that is de-codification moving towards a habit of producing and receiving light in such way that it can fully deploy its properties. Light in the theatre has become a tool to make light-images. We stopped experiencing light as a phenomenon and started to look at it as a communicative element in a pictorial construction.   In Light Art, the spectator is more aware of the qualities of light (hypermediacy and specularity). For example the Center for International Light Art (Unna, Germany), the only museum in the world dedicated to Light Art, cautiously separates one work from another with a short, low-lighted walk. Darkness is part of the preparatory journey to better appreciate the exhibited qualities of light. Artists such as James Turrell go further by including preparatory spaces to adjust to darkness in many of his works. Eliasson works slightly differently by demonstrating techniques so that viewers can concentrate on their perception more quickly.

These examples demonstrate the need for an ethos of light that has not been demonstrated in theatre, where light is too often regarded as a tool (Grönthal, Crisafulli, Hunt) supporting other forms and not as a pure creative medium. Proof of this ideology is the curriculum of numerous theatre schools, where the scenography program is separated between the set and costume design on the one side, and production design and technical arts on the other - in other words, the artists and the technicians. I do not know the solution to create such an ethos, yet I am sure it begins by considering light as autonomous and a performative medium within the creative team. I follow Crisafulli in advocating that the creative observation of what light (and shadow) is, what it produces and how it relates to other mediums, space and time are fundamental. Hopefully in the

future, we will generate creative opportunities requiring a proper ethos for the appreciation of light.

2.3 De-Hierarchisation Of The Mediums And Immediacy Over Images

When it comes to theatre, the autonomy of light is contingent on a de-hierarchisation of other media – in other words, light can no longer take a back seat to other elements but must be conceived as playing a central role or character in and of itself. Light has unique properties, as any medium does, and as such is able to express itself in a unique way that no other medium can achieve. Perhaps then the artist's task is to identify, in a contrapuntal dramaturgy, which medium shall take the lead to better express the feeling.

Furthermore, in order to fully appreciate light's complexity and fineness, time (temporal dynamics) must be reintroduced in it as to foster a dynamic experience exceeding the realm of the visual in demarcating spatial contexts—in other words the immediacy brought about by complex temporal variations should work hand in hand with the image. This statement in itself questions the physical architecture of the Italian-style theatre (illusion box) and the spatial situation of the lighting control console and production table. It is well known that Robert Wilson, credited for giving light an increased sculptural spatial autonomy, prefers Italian-style theatre and as Crisafulli has argued, his virtuous light designs can be described as object-image (light as object of vision) (Crisafulli, 2013). Italian-style architecture and light positions allow for a distant image making but not an immediate experience of light.

Moreover, the long distance between the lighting team and its equipment (situated usually at the back of the theater) and the stage impedes with the very idea of the operator's immediacy

and immersion. By contrast, most Light Art suggests an immersive environment as exemplified by the Center for International Light Art's permanent collection among which are Sonnier's *Tunnel of Tears* (2002), Eliasson's *Reflecting Corridor* (2002) and Turrell's *Floater 99* (1999). Such immersive environments, which might be translated into the theatrical context of the black box, are a starting point for an experience of autonomous and dynamic light by the spectator. Both deconstruct the pictorial, the distant image of a lit scene, and at the same time, foster immediacy as part of the ethos of appreciation of light as material and the environment. In this context, the light artist should be situated in the light during the creation process and presentations.

3. Steps Towards Dynamism

3.1 Reintroduction Of Time

Time is essential to dynamism (Stern, 2010) and must be reintroduced into experience. As stated earlier, linear time already exists in theatrical lighting design as light changes its function towards the illustration of stage representations. But what would such a different concept of temporality be?

First of all, the turning on of a lighting instrument should not be taken for granted in regards to its temporal shape. Lighting control consoles and dimmer packs offer a choice of preset dimming curves mostly used in regards to lamp type. Once the curve is chosen, it does not change and every light cue, no matter its duration, will apply it homogeneously. This standardization has nothing to do with the emergence of brightness, but with "the felt experience

of force—in movement—with a temporal contour, and a sense of aliveness, of going somewhere" (Stern, 2010, p. 8).

Our encounter with a dynamic happening of light could most likely result in a feeling of vitality, this "subjective phenomenon that emerges from the encounter with dynamic events" (Stern, 2010, p. 9), even if only one light is performing dynamically and in collaboration with other performing elements. As Crisafulli argues, "it is not the quantity of sources that creates opportunities but rather the quality of their relationships" (Crisafulli, 2013, p. 217).

Considering that theatrical lighting uses more than one source, the question becomes how they act temporally amongst each other. A selection of lighting instruments can act as one, thus creating groups of sources temporally correlated. Different instruments can also have certain temporal behaviours inside a group, for example, creating polyrhythms, or interacting dynamically with other elements such as the set, audience, or performer's movement. Concerning the latter, the work of Memo Akten on *Pattern Recognition*[100] (2016) is an explicit example using artificial intelligence where light temporality and movement are correlated to temporal dynamics of the performer's movement. Notwithstanding the individuality or grouping of the lighting instruments, the core interest is in composing with time itself as the material. Moreover, these temporal shapes could possibly be decided during the performance, in response to the dynamics of the relationship with other elements, including how the audience reacts.

Furthermore, if the previous description was concerned with light's intensity (brightness), temporal dynamics have to be thought through for every one of light's properties, including colour and movement, thus giving rise to a complex partition of temporal shapes. It should also be evident that a temporal script must be devised, as much as the spatial (storyboard) and narrative (cue sheet), and that this script is polyphonic and polyrhythmic. Indeed, a notation

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[100] http://www.memo.tv/pattern-recognition/

mirroring temporality is necessary, as much as the establishment of a proper temporal vocabulary for light. Moreover, a score of relations between the mediums will become helpful in a contrapuntal dramaturgy.

3.2 Performance

An evident key to such a proposal for dynamic light is its performance over fixed pre-definition and the ability to recall such dynamics. Following Bentham and Hunt, deferring certain lighting decisions to the moment of the performance, would enable light to act and react with the other elements, thus fine-tuning the emotion to convey in regards to the uniqueness of the present moment. Moreover, grounded in the *now* of the living performance, such a spontaneous approach would co-create different qualities of emotion. In his thinking on vitality affects, Stern insists on the rehearsed vitality forms as the core of art where the temporal contour infuses a sense of a live performance, distinguishing art from technique. Without a dynamic representation to shape the content representation[101], there is no flow, no vitality, no sense of aliveness (Stern, 2010). One should thus be able to perform light as temporally dynamic events happening in the effervescence of the performance and co-creating it. Performing light means reintroducing spontaneity, time, and vitality. Theatre is a living art, and the lighting should live with it.

Deferring decisions means the fall of the predefined, in other words, a revolution in the creative tools and process as well as in performing the shows. What, in the creation process, enhances the reign of the predefined?

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[101] **Dynamic representation**: encode speed and its changes, intensity/force, duration, temporal stresses, rhythm, directionality.
Content representation: encode modality, qualia of the experience (redness, harmonious, etc.), means and goals, meaning. (Stern, 2010, p. 25)

4. Composing With Dynamic Light, A Speculative Path

4.1 From Creative Meeting To Collective Performance

In the context of *écriture plurielle*, I argue that every designer should be in rehearsal with the actors with the necessary tools to write with their own medium. In the case of the lighting artist/designer, it suggests that the rehearsal happens in an equipped space and the light artist is present with his or her tools and a technical team from the very first day. Following Richard Schechner's methodology, the light artist would come prepared to the rehearsals with their toolbox and the lighting would develop the performance together with other elements. It is no accident that artists like Robert Lepage[102] or Les Deux Mondes[103] insisted on having their own theatre where they create at will.

Thus the creative meeting would morph into a set of rehearsals giving place to autonomous light and its relation to other elements, and the consequences of actions in these relations[104]. An ethos of appreciation of light would rise, as well as a collaborative use of the different mediums performing, a contrapuntal dramaturgy. This differs in its very essence from layering the light at the very end to unite other mediums. Even Rick Fisher's organic lighting[105] ideal arrives at the very end, superimposed, in a context where it is stuck with the already built set and where actors and directors have very little time to adjust. In fact, light must adjust to the other elements.[106]

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[102] Actually *La Caserne*, but soon *Le Diamant*

[103] The former *Théâtre les Deux Mondes,* under the artistic direction of Michel Robidoux and Daniel Meilleur.

[104] On that matter see the work of Crisafulli (p. 215) and Jean-Paul Quennec (UQAC).

[105] Fisher does not create his lighting in advance: he comes prepared to the technical rehearsals with a toolbox and creates his light with the actors rehearsing. He himself qualifies this method as organic.

[106] The set is decided early in the creative process because it needs time to be constructed. Thus, even if the needs change, the set is built and the team must deal with it.

4.2 From Storyboard To Virtual Reality Temporal Model

The very idea of the storyboard becomes, on the one hand, useless as a communication tool. As already stated, it objectifies the experience, emphasizing distant image-object as opposed to an in-depth experience of light. It also fosters a linear way of thinking about light and completely removes time from the lighting script. This kind of storyboard ossifies the lighting composition. However, one might imagine an enhanced storyboard that would primarily act as a creative tool for the light artist, and maybe a light-specific notation tool. By doing so, it could be used as a communication tool if needed. The communication tool would be based on an existing (and improved) pre-visualization tool[107] and coupled with virtual reality, used as a flexible control tool.

Existing pre-visualization software normally reinforces the frontal ontology already discussed. However, such a tool is still useful when programming lighting control, a time-consuming task that does not necessarily require real space as it is mostly about architecting within a simulated world. By transforming the software from a perspectival 2D screen to an immersive 3D location-based[108] virtual reality experience[109] in which the light instruments would be allowed temporal shapes, we would have created a powerful preparation tool for the light artist.

The advantage is that modeling in simulated 3D space would reintroduce time and immediacy into the creative genesis and would also allow the light artist that does not own a theatre space to have quality time to prepare his performance, thus partly solving the financial convention problem within the theatrical. It would explode the stage frame from the very

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[107] Here I am especially referring to WYSIWYG software.
[108] An example of a location based artwork is David Lobster's *Flock*, presented in *Lucid Realities* exhibition, 2017
[109] For example: Tom Burton's *Home: Immersive Spacewalk Experience*, presented in *Lucid Realities* exhibition, 2017

beginning of the thinking, opening thinking to issues such as periphery vision, hapticity, and sensation of light without seeing it. The tool could also facilitate research on the manifold possibilities of spreading temporal shapes across spatio-temporal distances, introducing multi-temporality and polyrhythms from the first moment of the process. Moreover, it would allow the light artist to rehearse alone with a virtual toolkit (same as an actor rehearsing his text).[110]

4.3 Flexible Control

The memory-state light control console—that is the current industry produced lightdesk—creates linear cue lists, inflexible timing, exact recall, and reduces the light operator's intervention to the lowest impact possible. On the one hand, such systems make performing with light, or deferring decisions to the moment of the performance, hostile and risky. On the other, they pass-over any attempt at creating complex temporal dynamics. More recent (and expensive) concert-based models[111], which integrate multiple cue lists that can be triggered simultaneously, offer a plurality of preprogramed successions. They manage to play simultaneously and independently in multiple effects but cannot generate behaviours[112].

While the idea of a central control is powerful, it has long restricted light to linearity and monophony. But what if the lighting artist was in charge of orchestrating multiple brains, each dealing with independent issues? Each of these brains would become data sources with qualities—structured, generative, interactive, learning (…) interconnected in this web of relations through the light artist. It would be more of a hyper-launchpad interface allowing the

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[110] This is also important as I have seen – and made – explorations on performing with light with the current and inappropriate light boards, and the result, if not virtuous, doesn't serve the show: its bumpy side becomes rather disturbing.
[111] For example the Grand MA
[112] See Red Hot Chili Pepper's behind the scene video (2016 tour) for a glimpse in programming technique of their light sculpture. The Grand MA (light desk) was now able to provide control over the sculpture, so it had to trigger other control tools. http://livedesignonline.com/concerts/chili-peppers-get-away-largest-touring-kinetic-lighting-installation

light artist to easily jump, intervene, modify, or group light sources during the performance. Thus evading the data world in favour of their full bodily presence, performing in real time.

Now the question of adaptation over prediction arises. How could a structural module—similar to the current lighting software with presets—be improved to allow flexible responses to change? How could a system develop that would still provide control over capturing and recording every lighting state, but also be easily modified by live user input. Generative modules would feed self-produced modulations in the form of algorithms created by lighting artists that would generate new output constantly by themselves. The lighting artist would thus control the parameters of the algorithm, or the rules of the game, but could not predict the precise look at a chosen moment.

Such a system has been articulated by Ben Peoples Industries (a firm which builds control systems for the entertainment industry), and commenting on their generative architectural lighting design they say: "By controlling the parameters of the algorithm, the designer can control what the lighting effect looks like, but they're not able to directly control what the output looks like at any given moment."[113] This is interesting in regards to the relationship between light and other performing mediums, especially if the rules are interactive with those other mediums. The idea of behaviour, movement, and time are also evident, and most importantly possible (which is not the case with memory-state lighting desks). Examples of polyrhythms in generative light are provided by Timm Wimmers' showcases (2016)[114].

Coupling generative modules with interactive ones may then result in integrating real-time information into the algorithm by continuously responding to it. An obvious example is the Lighting Design Collective's *Wind Wall*, an algorithm-based wind wall driven by external

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[113] http://benpeoples.com/portfolio/generative-lighting-design-antigone/
[114] http://www.generative-light.com

triggers (here wind and temperature). Tapio Rosenius, the company's director, describes it as follows: It is soft ambient light but it has this amazing ability to be alive.[115] Again, the idea of movement, temporal shapes, and vitality become evident, however the feeling of aliveness may be caused by the flatness and resolution of the screen, which quickly becomes associated with an image. According to Salter, these smart-material based walls or architectures represent a move from performative space to architecture of performance originating at the intelligent, image-changing surface (Salter, 2010). It functions by creating surfaces (seen from distance) instead of space – exactly in the same way as theatre develops surfaces for light instead of spatiotemporal lighting. The composer and architect Yannis Xenakis radically avoided the image in the benefit of space as exampled by his *Polytope de Cluny*[116] , a 600 white light flashes artwork installation combined with 400 mirrors: there, light behaves autonomously like an organic entity and the resolution isn't high enough to create an image. Thus, it is purely about the behaviour of light in space. The previously discussed work of Salter *N-Polytope* also follows Xenakis' thinking. Generative, it acts autonomously in relation to its environment. One could think of manifold external triggers to be linked to the lighting in a performance: density (of light, of performers, of the audience, of sound…), movement (of performers, of light artist…) etc. This performative architecture's ability to respond could be transposed into a theatrical context, where it might entail other mediums to respond to it, initiating a conversation; a form of polyphonic writing of the show.

Artificial intelligence—that is its ability to learn and take action—would be central to dealing with the data world problem identified by Hunt. These computational approaches, of which there are many, seem to be potential tools to deal with the unlimited parameters of moving

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[115] https://lucept.com/2014/10/09/philips-lighting-design-collective-launch-generative-content-control-system/
[116] https://www.youtube.com/watch?v=iklDWi1-HLA

light simultaneously. From there, A.I modules could powerfully take part in the performance. Plural modules could be in charge of different aspects of the lighting and could be triggered at will by the light artist. For an example, the creative potential regarding the relationship with the performer, Memo Akten's *Pattern Recognition*[117], demonstrates the power and relevance of A.I. in performing dynamically with light. Furthermore, A.I. can help with movement through learning patterns but also location-based actions or reactions.

The flexible, multi-input hyper-launchpad interface (or multi brain) would allow for user inputs at any time, either preset or live, as well as external inputs that would shape behaviour. It would evidently allow a control on temporal dynamics of light based on any input—the lighting artist's movement, performer's voice dynamic, external inputs such wind, noise level, etc. As dynamic movement can arise from any modality (Stern, 2010), the light artist could choose the proper behaviour and thus, intertwine light by way of contrapuntal dramaturgy. Such a system would not allow multiple linear cue lists, but rather multiple behaviour sources for the lights, all responding to change from the light artist and/or external triggers. "The light artist could chose the path to follow in regards to the unfolding performance, working with a range of dynamic forms such as persistence, excitement, tension, relaxation, surging, dragging, stability, instability, balance, imbalance, harmony, discord, and so on" (Stern, 2010, p. 45).

4.4 Ideal Creation Process

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[117] http://www.memo.tv/pattern-recognition/

The work on autonomous and dynamic lighting in the theatre has begun but is far from being achieved. Creation tools and processes must take a major turn, one in favour of an ethos of light as an active medium with unique qualities. This turn is about introducing a fundamental constituent of dynamism—time—into the concept of light, hence allowing for movement and co-created space (as opposed to activated space). The second identified step toward dynamism in composing light for the theatre is a dynamic relationship between the mediums; that is movement between the leading mediums, which can only be achieved by working with every element in rehearsal. The last step is about the co-creation with the spectator for which I plead for immediacy of light over retinal art.

The development of accurate working tools (pre-visualization and control) is fundamental to dynamically perform with light. The implementation of the tools and thinking will collide with the reality (and codification) of the practice, from where a whole new set of questions might arise. As we try to establish light's language and potential, we must keep in mind Stern's question: What are the dynamic forms used by every art form and what are the codes for marking them? These dynamic markers will be the dynamic light's vocabulary. It is important for light to operate as an autonomous medium rather than a tool.

In fact, one can only hope, this time, for a conceptual turn in theatrical lighting design and practice as we enter a technological era that truly has the potential to unveil light's vitality.

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1. See (Leising, 2006)

2. There is very little literature on Light Art so I engaged in considerable fieldwork review (2016-2017) by attending multiple Light Art festivals (Berlin, Prague, Amsterdam, Helsinki, Reykjavik, Aberdeen, Copenhagen) and exhibitions (Berlin, Unna, Stockholm, Copenhagen, Aarhus).

3. Here I am sketching the textocentric practice traditionally observed in most institutional creative processes because their habit always influences, at one point or another, on alternative practices.

4. "Autonomy," *Definitions* dictionary, *Antidote 9* (software, version 4). Druide Informatique, Montreal, 2017

5. To the scientist, dynamics refers to any science in which forces or changes are considered. To the physicist, a dynamic process relates to the forces producing motion, as opposed to a static state. To the linguist, it expresses an action, event, or process, or denotes a person full of energy and new ideas. To the musician, dynamics refers to the varying levels of sound in different parts of a musical performance. Dynamics also denotes the forces or properties, which stimulate growth, development, or change within a system or process. (Thanks to the Oxford Dictionary 2017 for the definitions) In psychoanalysis, it refers to the creation of emotions from interacting input forces (Stern, 2010, p. 7).

6. Duration. 2017. In oxforddictionaries.com. Retrieved 2017, from https://en.oxforddictionaries.com/definition/duration

7. It is interesting to note that everyone has a different way of looking at an image as demonstrated by *The Eye Catcher* exhibited at ARoS Museum, Denmark, using eye-tracking technology. Viewing an image is a personal act of scanning, extracting information point by point out of the picture and reconstituting the whole in the mind after a sufficient scan. This scanning includes both past and present moments.

8. For this kind of information, the work of Bergman (1977) and Gervais (1984) are insightful.

9. The painted set was not play-specific but genre-specific. Serlio informs us that three sets were in use, one for each type of play: comedy, tragedy and satirical.

10. In his book *Architettura, Il secondo libro di Perspettiva*

11. The Greek poet Aristotle deeply influenced the theatrical practice by dividing the drama from the visual spectacle, prioritizing the former. *The spectacle has, indeed, an emotional*

attraction of its own, but, of all the parts, it is the least artistic, and connected least with the art of poetry. For the power of tragedy, we may be sure, is felt even apart from representation and actors. Besides, the production of spectacular effects depends more on the art of the stage machinist than on that of the poet. (Aristotle, Poetic VI, Palmer, 2013, p. 21). Thereby, he establishes hierarchies in the theatrical elements.

12. The illusion works from a very limited point of view.

13. A lighting position located in the house – that is above the audience – and used to light the actor's face in a proper angle (usually 30 to 45 degrees angle).

14. We may see here an affiliation to the Ancient Greek theatre, which occurred outdoor from sunrise to sunset. Poets used natural light phenomenon to empower and conceal the drama in temporal unity. Even if light was foremost a tool for visibility, the play could benefit on time of light as an atmospheric or symbolic device. As an example, Palmer (2013) cites the beginning of Aeschylus' *Agamemnon* where in the drama a watchman awaits a beacon signal. Played at sunrise, it is easy, on the one hand, to see the beacon's flame that symbolically marks the beginning of the play and the victory over Troy; on the other hand, the sunrise symbolically marks the end of darkened times of war.   However the play did not *need* the visual since these elements are literally part of the text (and there is no evidence that a real beacon was lit). This hierarchy of theatrical medium will take long to dismantle.

15. I am referring to Stern's dynamic viewing path in non time-based art (Stern, 2010).

16. Sabbattini, among others, insisted on the importance of key light and its relation with painted set but lacked the means to achieve it.

17. Di Somi even introduced the idea still in use today that comedy is to be bright and tragedy darker.

18. Limelight and carbon arc light will be placed in the FOH to better illuminate the actor (19th century).

19. Key light is a term used to describe the main directional light used that is the one that shapes the image.

20. Broadway Lighting Master Class, 2009.

21. On the partial and incoherent importation of techniques see (Gervais, 1984)

22. Some productions still propose perspectival sets, sometime reinvigorated with technological skills, as was Serge Postigo's scenic adaptation of *Footloose* (2017) in which lighting only complements the illusion of the perspectival set.

23. The central place in the venue, slightly above the stage and at a distance equal to stage width, was named *l'œil du prince* by Sabbattini because it is the focal point where the illusion created by calculated perspective is at its best. The sound engineer now most often uses it during concerts.

24. Thanks to David Howes' teachings on perspective and measurement. Conference in undergraduate class, UQAM.

25. See chapter four of the current thesis for further development.

26. Howes   http://spectator.centreforsensorystudies.org/occasional-papers/the-craft-of-the-senses/

27. Again, see chapter four of the current thesis.

28. As an example, James Turrell has demonstrated the multidimensional power of light and the impressive adaptability of the body by training anyone to recognize a coloured light without seeing it.

29. According to the physical laws of light, intensity decreases inversely proportionally to distance.

30. The performer's declamatory style, facial expressions and make up were revised, costumes could be historically more accurate and darker (instead of having to reflect light) and special effects could be projected.

31. It was the first powerful light sources to provide specific illumination instead of general illumination. They were invented respectively in 1826 and 1846 (Gröndhal, 2014).

32. On that matter see Gervais (1984).

33. The battens will be duplicated along with a mechanisation of the stage ongoing from the 19th century.

34. Later, light changes will also occur between the scene when machinery movement needs to be hidden (darkening the stage instead of lowering the curtain), emphasizing again the idea of *tableaux de lumière.*

35. These sources surpassed in quantity of light and color temperature every other known lighting source. As floodlights they were first used from the fly to create atmosphere, for example moonlight effects. It will have to wait until the end of the 19th century to become the first follow spots as we know them today – high power light source operated from the FOH and used to make whatever it lights (usually a performer) the center of attention by highlighting its presence and following it.

36. Henry Irving experiments with electric footlight at the Lyceum Theatre as soon as 1885.

37. Many theatres burned because of gas explosions and the footlight's flames, up to 30 cm long, were a constant threat to the actor's costumes.

38. Invented simultaneously by Swan (1878) in Britain and Edison (1879) in US. See Gervais (2017).

39. Louis Hartmann invented the first floodlight electrical projector in 1915, allowing for full orientation possibility, and the German company Kliegl Bros launched the first ellipsoidal projector in 1930 allowing for shaping the light beam.

40. It lasted until the invention of the pre-focus cap in 1951.

41. The Danish term *hygge* knows no exact translation. It implies coziness in invoking hospitality. See (Bille & Sørensen, 2007).

42. Wolfgang Schivelbush (2006) demonstrates, through the passage from gas to electricity, how technological development often reproduces concepts inherited from the technology they replace. According to him sources, energy distribution systems and control (even the domestic switch) are built on the same principles in use in the gas era.

43. This mindset will spread in Stanley McCandless influential lighting methodology.

44. Except for more flexible (yet linear) light boards revised for the need of major musical concerts. These boards now have multiple cue lists and features, the most popular Grand Ma. It is based on a user-preference interface allowing more flexibility and alternatives to the traditional cue list playback. See Red Hot Chili Peppers' behind the scene video (2016 tour) for a glimpse in programming technique of their light sculpture. https://spectator.youtube.com/watch?v=uDBtPiO2T78

45. Yet even if Newton proved in its *Opticks* (1704) that the sum of all spectral colors is white light, color mixing had to wait both for the theory of tri-chromic vision (with primary colors) and powerful enough light sources. The coloured medium holds every wavelength except the desired one, for example a red filter will block blue and green, thus considerably reducing the power output.

46. I purposefully chose the term *régime d'attention* because it is fundamentally related to space, as is atmosphere in the theatre. *Dans un essai sur la spatialité en danse, [Perrin] analyse les conditions scénographiques de cinq propositions chorégraphiques dans le but de comprendre les trajets possibles du regard. Elle observe les éléments spatiaux, plastiques et techniques qui établissent un rapport spécifique entre le spectateur et l'œuvre. Cette approche positionne le spectateur au centre du processus d'intelligibilité de l'œuvre en tentant de comprendre comment l'espace scénique influence sa perception. C'est alors définir l'ensemble des dispositions scénographiques qui organise et module*

son intérêt et sa concentration. Le régime d'attention du spectateur dépend ainsi du contexte de représentation. (Dalphond, 2016, p. 10)

47. Luminous flux is the measure of intensity of light emitted by a source.

48. I refer to real light as to designate the artistic use of the medium of light on stage instead of an illusionistic representation of light achieved by painting.

49. Spatial light here refers to the paradigm of light as space. It was not, however, named as such during the 20th century.

50. Formulation from Crisafulli, 2013. See chapter four.

51. In (Palmer, 2013, p. 253)

52. Yet new approaches to cinema moves beyond linearity and narrative by removing the succession of frames (hologram), or by exploding the linearity in time and space though generative and/or arbitrary movie installations. See respectively Beth & Müller-Quade (2006) and the work of Collective Vivier 48.

53. *Active light* has a different meaning for Appia than I do in the current thesis. For Appia, it is real light enfolding space and actor, powerful enough to be directional, and specific enough to cast interesting shadows. It creates atmosphere and generates a (new) form of movement when the actor moves in it.

54. See Basanta (2013).

55. The partial Italian opera darkening practice of the parterre slowly spread through Europe, especially during the romantic period where the renewed illusion asked for it. It culminated in the full darkening of the house (as a result of a lovely technical error) in 1876 at Bayreuth, mesmerizing the audience.

56. Color lacquer was replaced by gelatin in the 1910s. At that time there were 13 colors in the Rosco gelatin catalog. A more consistent catalog, Roscolene, came out in 1955.

57. For a review of this thinking see (Bille, Bjerregaard, and Sørensen, 2014).

58. Here I cited Katz, but it could have been so many others.

59. Video from American Theatre Wing: Working in the Theatre: Lighting Design - http://livedesignonline.com/theatre/what-does-lighting-designer-do-theatre

60. First published in1932 but reedited four times up to 1958.

61. Side lighting was first used to illuminate the set, then to soften the shadows on the actor, and then to sculpt the bodies on the dancers. Only lately is it used to light the actor's face.

62. Schechner, here, follow the thinking of Piscator and Brecht who, in the 1920s, already advocated the idea of integrating the technician.

63. See section five of the current thesis.

64. 1930s in the United States (Jean Rosenthal) and 1950s in France (Jean Vilar).

65. In the 1950s the British company Strand Lighting produced both the Lighting Console – originally designed by Frederik Bentham – and the Present Electronic.

66. The Grand Master is a Strand Lighting control system based grand master cross control. It provides *independent masters, switching for mastering groups of blackouts, switching to render any or all spot and special circuits independent of the master blackout.* (In Strand Lighting 1945 catalog. http://spectator.theatrecrafts.com/archive/albumviewer.php?id=4&page=78&type=a

67. Jean Rosenthal writes about how discreet she had to be in order to integrate the artistic team

68. While a traditional halogen spotlight uses only 1 DMX channel to control its intensity, most moving lights are operated with 20 to 35 DMX channels or, to put it differently with 20 to 35 parameters comprising 255 options each.

69. Only one parameter – intensity – was controlled via a fader. The fader is the analogic image of the light state.

70. Concert lighting developed more flexible state-cue light boards with multiple cue-lists and palettes allowing certain flexibility during the live events and implying a huge pre-programming preparation.

71. As already noted, before gas and electricity, candles and oil lamps were so expensive that light is implemented in the last rehearsal. The habit continues with gas and electricity, as the human resources are expensive.

72. See chapter four

73. Intermediality in Theatre and Performance, Freda Chapple, Chiel Kattenbelt, Eds., in (Gröndhal, 2014, p 29)

74. Laitz, Steven G. (2008). *The Complete Musician* (2 ed.). New York, NY: Oxford University Press, Inc. p. 96. ISBN 978-0-19-530108-3. Retrieved March 03, 2018 from Wikipedia: https://en.wikipedia.org/wiki/Counterpoint

75. Weibel explains synaesthesia as a constituent element in the birth of Light Art. Indeed, the idea is openly advocated by the artist Adrian B. Klein in his 1926 book *Colour Music. The Art of Light.*

76. Weibel recall the important experiments of the physicist Johann Wilhelm Ritter (1776-1810) who explored the physiological correspondences of the sensory organs and of the physicist Ernst Florenz Friedrich Chladni (1756-1826) who developed the Chladni figures – visual figures of sound.

77. https://spectator.signalfestival.com/en/installations/strings-2016/

78. Weibel notes this *turn away from strategies of representation to reality programs* was not specific to light but rather part of a larger movement, as exemplified by the shift from the representation of movement (Futurism, Cubism) to the reality of movement (Constructivism and Kinetic Art).

79. From a phenomenological point of view, the philosopher and academic Gernot Böhme describes brightness as the primary and fundamental quality of light perceived before shape, color and objects. (Böhme, 2009, Geometry of Light)

80. On industry driven tools, see Hunt.

81. To meditate on the question of representation in Light Art compared to theatre, I wish to follow Selwood and pinpoint two insightful art forms *Color Music* and *Abstract film*. Their fundamental principle was light and color as being more important than narrative and representation (Selwood, 2006).

82. Of course the theatrical frontal relation is not the only one: in some cases, the audience is on two sides like in *Dans la Solitude des Champs de Coton* staged by Brigitte Haentjens (2018), on three or even four sides like in Robert Lepages' *Jeux de Cartes* (2014). However, the audience remains in darkness even if reflected light allows seeing other spectators. Other forms of theatre like immersive theatre try to enfold the audience in an experience. Josephine Machon' survey on immersive theories and practice (Machon, 2013) is insightful but demonstrates, by excluding it, that lighting is not considered a constituent part of the current immersive theatrical practice. It might be because most immersive theatre is also *in situ* which makes it financially and technically hard to really work with light.

83. https://amsterdamlightfestival.com/nl/routes/illuminade/rotifers/

84. http://spectator.luxhelsinki.fi/en/lux-in/

85. http://spectator.luxhelsinki.fi/en/lux-in/

86. http://spectator.lichtkunst-unna.de/en/collection/eliasson-olafur.html
87. http://spectator.luxhelsinki.fi/en/lux-in/

88. http://thecreatorsproject.vice.com/blog/james-turrell-illuminates-a-memorial-chapel-in-a-berlin-cemetery

89. http://chrissalter.com/projects/displace-v-2-0/

90. https://spectator.google.ca/search?q=your+black+horizon&ie=utf-8&oe=utf-8&client=firefox-b-ab&gfe_rd=cr&dcr=0&ei=lZ-BWsuGA-XVuALB46OwDw

91. For insight on how living can be a candle flame in the context of *hygge* context, see (Bille & Sorensen, 2007). Also see (Tanizaki, 1933) for his idea on how a candle's flame through movement and intensity variation, is informative of the very nature of matter.

92. Some contemporary artists work in real time, refusing the dramaturgical time. See the work of *L'Eau du Bain* as an example.

93. Eliasson's work is a good example as well as *Under Influence*, a work of Van Dijk https://amsterdamlightfestival.com/nl/routes/illuminade/under-influence/

94. http://cinemaexpo67.ca/expo-salter/

95. Jennifer Tipton and William Forsythe complained about the newly regulated dimmer curves invading the market to accommodate the powerful halogen profile ETC Source Four. Together, the lamp and the dimming system prevent from meticulously working and appreciating low levels of light. (A conversation in Denver, 2000)

96. For more details see (Pallasmaa, 2012, p. 33).

97. Other sensory models exist, and the lighting design should be conceptually inspired by it. As a matter of fact, the anthropologist Constance Classen points the ocular centric model as a modern consequence of the proliferation of visual imagery and compares it to the *thermal dynamics* of the Totzil from the Ciapas highlands of Mexico. In their view, the morning is not a sunrise, but a heat rise. (Classen in Howes, ed., 2005, pp. 147-152)

98. This idea implies smaller audiences, which is always a major issue for broadcasters.

99. Écriture plurielle refers to distributed agencies among manifold mediums

100. http://www.memo.tv/pattern-recognition/

101. **Dynamic representation**: encode speed and its changes, intensity/force, duration, temporal stresses, rhythm, directionality.

    Content representation: encode modality, qualia of the experience (redness, harmonious, etc.), means and goals, meaning. (Stern, 2010, p. 25)

102. Actually La Caserne, but soon Le Diamant

103. The former *Théâtre les Deux Mondes,* under the artistic direction of Michel Robidoux and Daniel Meilleur.

104. On that matter see the work of Crisafulli (p. 215) and Jean-Paul Quennec (UQAC).

105. Fisher does not create his lighting in advance: he comes prepared to the technical rehearsals with toolbox and creates his light with the actors rehearsing. He himself qualifies this method as organic.

106. The set is decided early in the creative process because it needs time to be constructed. Thus, even if the needs change, the set is built and the team must deal with it.

107. Here I am especially referring to WYSIWYG software.

108. An example of a location based artwork is David Lobster's *Flock*, presented in *Lucid Realities* exhibition, 2017

109. For example: Tom Burton's Home*: Immersive Spacewalk Experience*, presented in *Lucid Realities* exhibition, 2017

110. This is also important as I have seen – and made – explorations on performing with light with the current and inappropriate light boards, and the result, if not virtuous, doesn't serve the show: its bumpy side becomes rather disturbing.

111. For example the Grand MA

112. See Red Hot Chili Pepper's behind the scene video (2016 tour) for a glimpse in programming technique of their light sculpture. The Grand MA (light desk) was now able to provide control over the sculpture, so it had to trigger other control tools. http://livedesignonline.com/concerts/chili-peppers-get-away-largest-touring-kinetic-lighting-installation

113. http://benpeoples.com/portfolio/generative-lighting-design-antigone/

114. http://www.generative-light.com

115. https://lucept.com/2014/10/09/philips-lighting-design-collective-launch-generative-content-control-system/

116. https://www.youtube.com/watch?v=iklDWi1-HLA

117. http://www.memo.tv/pattern-recognition/