

**A Medium to Transform the Power of the Sun:
Light, Space, and the Technological Apparatus**

BY

GEORGINA E. RUFF

B.S., Penn State University, 1997

B.A., University of Maryland, 2002

B.A., Portland State University, 2007

THESIS

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Defense Committee:

Hannah Higgins, Chair and Advisor

S. Elise Archias

Tiffany Funk

Blake Stimson

Daniel Sauter, Parsons School of Design, The New School

Sjoukje van der Meulen, Utrecht University

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SUMMARY

This dissertation considers the implications of luminary technology used by artists László Moholy-Nagy, Otto Piene, and Olafur Eliasson during the twentieth century. The immersive installations of light discussed foreground the use of various apparatuses to illuminate space and engage the viewer, often through the use of visible and familiar technology such as exposed light bulbs, LED projectors, or contraptions powered by conspicuous machinery. Each chapter focuses on works of a single artist, analyzed through the lens of contemporary apparatus theories, with the goal of clarifying the relation between the viewer and artwork.

The study is framed by a discussion of Walter Benjamin's aura, asserting that the reproducible technologies overtly deployed in these works hinder the destruction of the aura that Benjamin theorized. Instead, as viewers are actively engaged with the apparatus, the works forge a social and/or ideological connection which reinforces the "strange web of space and time" that Benjamin contended to be central to the uniqueness of an object.

Chapter one finds congruences between Bertolt Brecht's evolving theories concerning the social potential of the new radio apparatus and László Moholy-Nagy's intentions for his *Lichtrequisit einer elektrischen Bühne* (*Light Prop for an Electric Stage*, 1930) to enlarge the human sensorium and thus facilitate societal advances. Chapter two uses the apparatus theories of Jean-Louis Baudry and Jean-Louis Comolli to analyze the changing ways in which the *Lichtballette* of Otto Piene activated and engaged viewers. Chapter three identifies the differentiated functions of Michel Foucault's *dispositif* and apparatus in works of Olafur Eliasson and applies theories of the technological sublime to differentiate Eliasson's installations from those of Light and Space artists.

Recognizing the multi-valent role of the technological apparatus has particular relevance for the conservation and re-installation of these works, especially given the rapid obsolescence of technologies. This dissertation demonstrates the importance of specific apparatuses, arguing that perception of such works will necessarily shift in the direction of the apparatus as artifact while maintaining auratic presence.

INTRODUCTION

The authenticity of a thing is the quintessence of all that is transmissible in it from its origin on, ranging from its physical duration to the historical testimony relating to it...what withers in the age of technological reproducibility of the work of art is the latter's aura.¹

But if aura, also designated by Benjamin as the 'unique appearance of a distance, however close it may be,' is inseparable from a certain separation, this can also help to explain something that Benjamin himself at times seems to have had difficulties coming to terms with: the fact that the aura, despite all of its withering away, dilapidation and decline, never fully disappears...The aura would be able to return in the age of technological reproducibility because, as the appearance or apparition of an irreducible separation, it was never uniquely itself, but always constituted in a process of self-detachment: detachment from the self as demarcation of a self.²

The apparatus as anchor of the aura is the easiest way to summarize the arguments contained within this study. According to Walter Benjamin, technologically reproducible works of art, such as those created by common lamps and lighting equipment, would lack the aura of singular works of painting or sculpture – they are detached from “the sphere of tradition.” There is no doubt that the photograph of a Rembrandt can never hope to convey the presence of the original. However, the *technological* apparatuses of Moholy-Nagy's *Lichtrequisit einer elektrischen Bühne* (1930), Otto Piene's *Please Turn* (1961), or Olafur Eliasson's *Room for one colour* (1997), as conceived and constructed by the artists, are both part of the original work and a reproducible technology: and as such, present the aura in a tense balance that Benjamin did explicitly foresee, as construct between the viewer and technology. This argument for a technological aura is through an analysis of such apparatuses: as manifestations of artistic intentions, objects which activate and integrate the viewer into a work, and key physical clues to larger systems of relations. In determining the varied agendas of luminary apparatuses, this study

¹ “The Work of Art in the Age of its Technological Reproducibility, second version,” in Walter Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media* (Cambridge, MA: Belknap Press of Harvard University Press, 2008), 22–23.

² Samuel Weber, *Mass Mediauras : Form, Technics, Media* (Stanford: Stanford University Press, 1996), 87.

concludes that physical technologies function beyond the simple capacities of their switches and bulbs, that the choice of what bulb, how it is contained, where it is directed, who controls its' switch, and its overall visibility *qua* bulb are also quintessential and auratic elements of a work.

The art works in this study are a combination of luminary effects and technological apparatus: without electricity, without lightbulbs, the works would simply not exist. The artists discussed in the next three chapters, László Moholy-Nagy, Otto Piene, and Olafur Eliasson, also foreground the technological means by which the works are created, a situation which irrevocably changes the viewer's experience. Examining a selection of light and technology-based artworks through the apparatus-related theories of Bertolt Brecht, Jean-Louis Baudry, Jean-Louis Comolli, and Michel Foucault demonstrates at least three distinct deployments of a visible lighting apparatus: as a site for social change, an ideological machine which positions the viewer within the work, or a node within an encompassing *dispositif*. Each of these strategies underscores the separation between the apparatus and the viewer (the self that Samuel Weber describes in the above epigraph), and in this process reinforces the technologically-auratic nature of the work. To these ends, Brecht posited a social agency for a productive radio apparatus which would aid the class struggle, while Moholy-Nagy simultaneously created an "experimental apparatus" of light, motion, and sound which would act to train and hone the totalized human sensorium. Piene constructed *Lichtballett* apparatuses which sought to progressively rehabilitate the relationship between viewers and light in the post-war era. In his construction of inclusive *dispositifs*, Eliasson elucidates the positioning and power relations of the viewer and the apparatus within this larger set of variables, demonstrating both the separation and relations of the self. Determining the consequence of the technological apparatuses in the terms of both the artist and the viewer, what exactly constitutes the apparatus as such, and how the apparatus functions within the totality of the artworks is the aim of this study.

The works discussed in the following pages are also prime candidates for the complicated conservation issues surrounding the use of rapidly obsolescing technologies: questions such as whether to replace lamps and bulbs no longer in production, or whether simulation through other means is a viable and legitimate option. Speaking to curators, conservators, collectors, artist's estates, and studios during this research process it is apparent that these questions are necessarily being approached on a case-by-case basis. An analysis of a particular technological apparatus can assist with this knotty task by offering a more nuanced perspective of the importance of both particular physical elements and the larger scope of a work or installation. The benefits, both historical and conservatorial, of identifying the role of the apparatus as both object and quasi-subject is a topic that underlies the following three specific studies, and a discussion which will be specifically returned to in the conclusion.

What are the consequences of using a visible lighting technology to create a work of art? This question has been theoretically approached by scholars analyzing works, such as those of Dan Flavin, which obviously use commercial, off-the-rack fixtures. It has also been addressed by curators, interested in the meanings of a particular technology for the artist, and by conservators, anxious to ensure the continued function of technologically based works. These approaches are valuable, as they document the artist's specific intentions and instructions for a work, and analyze the importance of historical technologies, such as fluorescent light fixtures, in economic and sociological terms. What these perspectives lack is the integration of the viewer.

Taking the object-centric perspective as a starting point, this study proposes that it is not only the specific technological equipment that is important, but also the relation between that lamp, the artist, and the viewer. Each case study in this dissertation argues for a different definition of the apparatus: as a malleable concept based not on the concrete technology of the lamps used, but rather as a technological axis around which a particular artwork functions. As technologically based artworks

become increasingly difficult to preserve in their original form, due to obsolescing parts, deteriorating structures, advances in energy efficiency, or other conservation concerns, it is of paramount importance to consider the entire aura that apparatus encompasses.

Using works produced during the 20th and 21st centuries in Western Europe, where lighting technologies have been common and generally accepted, this study does not engage with spectacular apparatuses which might be focal points in and of themselves. In general, the works discussed use commercially extant lighting technologies in unique manners and incorporate the physical technology as a part of the work which is visible to the viewer. Several of the works have been altered from their original forms – either by the artist or by conservators, as noted. The functionality of the apparatus has changed in several of these instances, which further proves the importance of particular technologies and their deployment.

“An immersive work may be described as a mixture of sensory and narcissistic pleasure offered to the viewer,” writes Nicolas de Oliveira, arguing for immersive installations as those which engender body-mediated experience.³ All of the works discussed in this study center on the sensory experience of the viewer, certainly visual, but also auditory – the clinks and clanks of moving parts, olfactory – the faint damp scent of manufactured fog, and tactile – as viewers are on occasion invited to physically interact with the mechanics of the work or the architecture of its installation. Olafur Eliasson is consistently explicit concerning his focus on the sensory, and the viewer’s experience not only of the artwork, but of “the ways in which the visitors may experience themselves experiencing the artwork.”⁴ Otto Piene’s installations of *Lichtballette* and László Moholy-Nagy’s *Lichtrequisit einer elektrischen Bühne*

³ Nicolas de Oliveira, Nicola Oxley, and Michael Petry, *Installation Art in the New Millenium: The Empire of the Senses* (London: Thames & Hudson, 2003), 49.

⁴ Olafur Eliasson, Ismail Soyugenc, and Richard Torchia, *Olafur Eliasson : Your Colour Memory* (Glenside, PA: Arcadia University Art Gallery, 2006), 81.

were less overtly theorized in this sense, yet both created systems of sensory encounter which required the physical presence of the viewer.

Chapter one correlates the experimental radio works and written theories of Bertolt Brecht with the experimental *Lichtrequisit einer elektrischen Bühne* (1930) and related writings of László Moholy-Nagy. Brecht and Moholy-Nagy shared many similarities, including their participation in the Berlin art scene of the 1920s and 1930s, their interest in the potential of new apparatuses to involve the public in social change, and their willingness to create experimental works to test their hypotheses.

Set against the context of the history of early broadcast radio in Germany, Brecht's production of *Lindberghflug: ein Hörspiel* (1929) at the Baden-Baden music festival sought to reposition the radio apparatus as a collaborator with the listener rather than as a "wonderful distribution apparatus."⁵ Brecht's emphasized participation and intellectual involvement, much like his simultaneously developing ideas of Epic Theater, with a goal of fostering interaction between citizens and their government.

In Berlin during the early 1920s, László Moholy-Nagy wrote his most overtly political manifestos and artistic statements, calling for art forms to "heighten the faculties of man [sic]" through a "dynamic-constructive system of forces" which would create a "constructive partnership" between the viewer and the artwork.⁶ Moholy-Nagy and Brecht both identified with certain Marxist ideas, particularly the agency of the proletariat and the potential of new technologies to aid in social change, ideas concurrently addressed by their mutual associate Walter Benjamin, whose theories of technology are woven throughout this study.

⁵ "Suggestions for the Director of Radio Broadcasting," 1927 in Bertolt Brecht, *Brecht on Film and Radio*, ed. Marc Silberman (New York: Bloomsbury Methuen Drama, 2000), 35.

⁶ László Moholy-Nagy and Alfred Kemény, "Dynamisch-konstruktives Kraftsystem," 1922 translated in Krisztina Passuth, *Moholy-Nagy* (London: Thames and Hudson, 1985), 290.

As a manifestation of Moholy-Nagy's principle of continuous experimentation, *Lichtrequisit einer elektrischen Bühne* was presented in three distinct forms – a different manner each time the work was shown during Moholy-Nagy's life, with each form having a unique function. The flexible presentation of the *Lichtrequisit* proves that the work was never considered to be a finished sculpture, but rather an experimental apparatus in pursuit of Moholy-Nagy's goal of "...the formation of motion without the support of any direct formal development."⁷ For later curators and conservators, the short and varied display history of the *Lichtrequisit* necessitates a deep interrogation of the work prior to its display or conservation, as it is not solely an object nor the luminary effects it produces. In creating an indeterminate apparatus which produced new effects that could then be the basis for further experimentation, Moholy-Nagy succeeded in expanding the human sensorium in a manner similar to that explored by Brecht's avant-garde radio production of *Der Lindberghflug: ein Hörspiel*.

Otto Piene's creation of *Lichtballette* spanned fifty-five years and originated in his experience of WWII, in which darkness meant safety and light gave the enemy the ability to aim.⁸ The works began simply and pragmatically, with Piene shining flashlights through hand-perforated metal screens and grew into gallery-scale immersive installations which include multiple obvious technologies. This chapter addresses the early *Lichtballette*, created between 1959 and 1963, during which time Piene experimented with different technologies and installation strategies. During this formative period, the appearance and role of the technological apparatus radically shifted, reflecting first Piene's inclination toward and later rejection of viewer interaction.

Piene was not a filmmaker, but the set-up of the *Lichtballette*, with technological equipment in the center of the gallery space and resulting projections on the walls and ceiling, is similar to that of

⁷ Moholy-Nagy, "Produktion-Reproduktion," 1922 in Passuth, 296.

⁸ *Lichtballett* denotes one work in the greater oeuvre of Piene's *Lichtballette*.

film-based works. Theorizing the impact of cinematic technology was a goal of both Jean-Louis Baudry and Jean-Louis Comolli. Baudry emphasized the ideological impact of the technological apparatus acting upon the viewer, supplying an externalization of their own subconscious: the apparatus acts as a tether, reminding the viewer of their situation within the dispositif.

Piène intentionally deployed the technological apparatuses of the *Lichtballette*, which were initially constructed from the “poor” materials of the German post-war period. Covering the walls and ceilings of darkened gallery spaces with moving points and “spiders” of light, the *Lichtballette* intentionally created “...a dynamic sensation of space in which the force of gravity has lost its might.”⁹ Chapter two uses specific early installations of the *Lichtballette* to demonstrate how these dark oceans of gallery space striated by friendly lights – which Baudry would label an outward manifestation of the viewer’s unconscious – were anchored by the physical construction of the apparatus, which reminded the viewer of their historical moment.

In contrast to the subjectifying potential of the *Lichtballette*, Comolli suggests more agency on the part of the viewer, positing that the “social machine” of the dispositif incorporates both the physical apparatus and its’ motivation.¹⁰ The concept of a “social machine” contextualizes the greater experience of the *Lichtballette*, in which the apparatus, simply constructed, centrally placed, requires viewer interaction to complete the work.

The “activated viewer,” a concept codified by Claire Bishop, which draws on the emancipated spectator of Jacques Rancière, describes a viewer “surrounded by and given a role within the work, as opposed to ‘just looking’ at painting or sculpture,” – expanding upon Bishop’s definition includes ‘just moving’ through an environment/installation – in either instance, passive consumption of the work is

⁹ Otto Piène, “Lichtballett,” in *Piène: Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960* (Berlin: Galerie Diogenes, 1960), np.

¹⁰ Jean-Louis Comolli, “Machines of the Visible,” in *The Cinematic Apparatus* (St. Martin’s Press, 1980), 122.

intentionally denied.¹¹ The concept is helpful to understand the unique nature of the early *Lichtballette* which were set in motion, turned on, or turned off by a viewer located in the midst of *Lichtballett* apparatuses – circumstances which were initiated at the *Ninth Abendausstellung (Ninth Evening Exhibition, 1960)* at Piene’s studio in Düsseldorf and culminated with the 1962 *nul* show at the Stedelijk in Amsterdam.

Olafur Eliasson’s luminary installations explicitly focus on the presence of the viewer – which he underscores in many titles by utilizing pronouns *you/your*. *Your museum primer* (2014), an installation of a single LED spotlight and turning plexiglass ring in a darkened cavernous gallery is a paradigmatic example of Eliasson’s use of a familiar and comprehensible apparatus to create immersive lighting effects. Chapter three concretizes the multiple presences: of the apparatus, the museum, and the viewer that are intrinsic to Eliasson’s installations of light, and frames such works as examples of Michel Foucault’s *dispositif*.¹² Olafur Eliasson’s *The Weather Project* (2003) and *Your museum primer* (2014) are dissected through Foucault’s conception of a *dispositif* as an aggregation of thoughts and practices, born of a need, responsive to the changing positions of mostly incorporeal anchors. Within these responsive *dispositifs*, the works’ visibility, marketing, the foregrounding of the technological apparatus, and the power trajectories (as further explained by Gilles Deleuze) acted between the viewer, the institution, the gallery attendants, the artist, and the critics.¹³ Changes to any of these variables necessarily changed the *dispositifs*, and re-installations of such works must consider this larger set of relationships in addition to the particular technology of the central apparatus.

¹¹ Claire Bishop, *Installation Art: A Critical History* (New York: Routledge, 2005), 102.

¹² “The Confession of the Flesh,” in Michel Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, ed. Gordon, Colin (New York: Pantheon Books, 1980), 194.

¹³ Gilles Deleuze and Claire Parnet, *Dialogues II*, trans. Hugh Tomlinson and Barbara Habberjam (New York: Columbia University Press, 2007).

Chapter three contrasts Eliasson's immersive works with those of artists such as James Turrell, who create objectless spaces of immersive light suggestive of the sublime. Despite superficial similarities, the visible centrality of the apparatuses necessary for Eliasson's works become an example of what David Nye terms the "technological sublime."¹⁴ In *Room for one colour* (1997), Eliasson's seemingly straightforward installation of Low Pressure Sodium (LPS) lamps and requisite control gear heightens particular aspects of viewers' visual perception and impacts visual apprehension of surrounding works. As the central element of Eliasson's *dispositif* which eliminates the possibility of the viewer's immersion in the representational, the LPS lamps are undertheorized in scholarship and criticism, despite similarities to the well-known fluorescents of Dan Flavin. Furthermore, Eliasson's use of visible lighting apparatuses insists on an embodied reality, in contrast to James Turrell, whose obfuscation of the apparatus emphasizes the sculptural and illusory qualities of light. Chapter three clarifies this distinction through a comparison of the sublimities intended by Eliasson's *The Weather Project* (2003) with Turrell's *Aten Reign* (2013): both of which were large site-specific installations of immersive light which interacted with museum infrastructure and architecture with the explicit intention of creating a particular viewer experience.

Eliasson and his Berlin studio currently produce new works and collaborate with museums and collectors to conserve the artist's older pieces. As the only living artist in this study, Eliasson is in the unique position to assist in determining how his works are preserved and re-installed, and to this end this study attends to the differences manifest through various installations of *Room for one colour*. Such adaptations of the work to a variety of gallery spaces point to the importance of specific, immutable aspect of the apparatus, and to those which may vary.

¹⁴ David E. Nye, *American Technological Sublime* (Cambridge: MIT Press, 1994), xiii.

The artworks in this study incorporate specific and visible technological apparatuses which become archaic and obsolete, yet without which the works would irrevocably change. In building a case by case analysis of the role of the apparatus over the course of the 20th century, Benjamin's conception of diminishing aura is refuted in a manner which simultaneously concurs with his estimation that "...the entire mode of human collectives changes over historical periods, [and] so too does their mode of perception...[it] is conditioned not only by nature but by history."¹⁵ In a 1938 letter to Theodore Adorno, Benjamin acknowledged overlooking the potential shifting of the aura, and suggested that there was a "historical plasticity" when analyzed through the lens of production, a perspective which Benjamin surmised, would benefit from further dialectical analysis.¹⁶ This study offers a close examination of the role of the apparatus in the production of the included artworks, extrapolating from Benjamin's assessment concerning the plasticity of the aura.

Research for this dissertation was both textual and experiential. For chapter one, documents were located at the Bauhaus Archive in Berlin and the Harvard Busch-Reisinger Museum; these were fleshed out by correspondence with curators, scholars, conversations with conservators, and first-hand observation of exhibition copies of the *Lichtrequisit einer elektrischen Bühne* (1930). Chapter two relies on extensive research performed at the ZERO Archive in Düsseldorf, supplemented by documents from the Amsterdam Stedelijk library, the archive of the Van Abbemuseum in Eindhoven, the Technikumuseum in Berlin, the Northwestern University archive, the Museum of Science and Industry in Chicago, and regional German archives. Additionally, chapter two benefitted from conversations with collectors, conservators, scholars, archivists, and curators, and the experience of seeing many of the *Lichtballette* in person. Research for Chapter three came from visits, emails, and conversations with Studio Eliasson, curators, archivists, and museum staff, and extensive travel to experience works in-situ.

¹⁵ Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media*, 23.

¹⁶ Ernst Bloch et al., *Aesthetics and Politics* (London: Verso Editions, 1977), 140.

CHAPTER I: Distribution vs. Communication: The Apparatus of Brecht and Moholy-Nagy

The questions of how art can be utilized for the radio and how the radio can be utilized for art – two very different questions – must at some point be subordinated to the much more important questions of how art and the radio can be utilized at all.¹

The mobile was so startling in its coordinated motions and space articulations of light and shadow sequences that I almost believed in magic. I learned much from this mobile for my later painting, photography, and motion pictures, as well as for architecture and industrial design.²

Bertolt Brecht made his first radio broadcast live on the Berliner Rundfunk in 1925, just two years after public radio broadcasting was introduced in Germany. His interest in the nascent media of radio and film is documented in his extensive writings: he is critical of the uses of both, often suggesting new directions for film and radio which would both differentiate them from the theatre and elaborate on their strengths. In the case of radio, his written work (both published and private) dates only between 1926 and 1932, during which time both his written opinion and artistic production for the medium changed significantly. As Weimar Republic broadcast radio rapidly progressed, Brecht's aspirations for the medium evolved with it: he saw the possibility of radio to be "...the finest possible communications apparatus in public life, a vast system of channels."³

Simultaneous with Brecht's evolving theory of the radio was László Moholy-Nagy's conception of an apparatus to investigate new phenomena of light and movement. Prescribed in his strategic manifestos of the early 1920s and informed by Moholy-Nagy's experiences in the Bauhaus and Berlin theater, the creation of the *Lichtrequisit einer elektrischen Bühne* (1930) was an experiment in the production of new visual effects and the expansion of viewer's sensory functions.

This chapter examines the congruency between Brecht's evolving theories of the radio as a communications apparatus and Moholy-Nagy's conception and realization of a multi-purpose light prop.

¹ Bertolt Brecht, "On Utilizations," 1927 in Brecht, *Brecht on Film and Radio*, 38.

² László Moholy-Nagy, "Abstract of an Artist," in László Moholy-Nagy, *The New Vision and Abstract of an Artist* (New York: Winterborn Schultz, 1947), 80.

³ Bertolt Brecht, "The Radio as a Communications Apparatus," 1932, in Brecht, *Brecht on Film and Radio*, 42.

Berlin/Babylon

Both Brecht and Moholy-Nagy were active in the Berlin arts scene during the 1920s – a decade of post-war recovery, poverty, and intemperance during which the largest metropolis in Germany exhibited a liberal façade concurrent with its role as the seat of political and administrative affairs. Café society was, and still is, a staple of Berlin intellectual life. Prior to WWI, German Expressionist artists, poets, authors, and others of similar mindset had experienced their often narcissistic “delusions of grandeur” at the Café des Westens, which closed in 1915.⁴ By 1920, when the Café attempted to reopen, its clientele had moved on to the Romanische Café just down the street, and were themselves in a state of flux, as the Dada and Expressionists ceded their tables to growing numbers of Communists, Surrealists, and the practitioners of die Neue Sachlichkeit (the New Objectivity).

The Romanische Café was the center of all things avant-garde and literary, and a natural fit for Brecht, although he also spent a great deal of time in working class parts of the city: at gritty proletariat bars and boxing matches – cultivating a reputation as a “worker's poet” while wearing a truck-driver's leather jacket and a perpetual two-day stubble (Figure 1).⁵

The popular image of Berlin's 'Golden Twenties' is so well-known that it almost needs no description. The Berlin of Bertolt Brecht and George Grosz, of Josephine Baker and Christopher Isherwood's Sally Bowles, has been enshrined in countless books, plays, films, musicals: a wild city of sexual license and perversion, of alcohol and cocaine, Babylon-on-the-Spree. The image has become a cliché but like most clichés it is largely

⁴ The Café des Westens was nicknamed Café Größenwahn: “delusions of grandeur.” The Romanische Café was the preferred gathering place for Berlin intellectuals: artists, authors, entertainers, psychiatrists, lawyers, journalists, and everything in-between gossiped, worked, and networked in its two smoke filled rooms (the “swimming pool” and “non-swimmers pool.”) For a brilliant contemporary description, see Matheo Quinz, “Das Romanische Café,” 1926, Iain Boyd Whyte and David Frisby, eds., *Metropolis Berlin: 1880-1940* (Berkeley: University of California Press, 2012), <http://ebookcentral.proquest.com/lib/uic/detail.action?docID=1144789>.

Otto Friedrich describes this watershed of humanities history in greater detail in *Before the Deluge*, citing Breton's Surrealist Manifesto of 1924 as the nail in the Dada coffin. He uses George Grosz's defection from the movement as paradigmatic of the artistic shift from political demonstration to political mobilization. *Before the Deluge*, 181. Another description, with great attention paid to the specific guests of the Romanische Café, is Matheo Quinz, “The Romanic Café,” *Der Querschnitt* 6, no. 8 1926, reproduced in *The Weimar Republic Sourcebook*, 1994, 415-417.

⁵ Taylor, *Berlin and Its Culture*, 249.

true. Released from the oppressive rule of the Kaisers, deprived of its social standards and restraints, eager to drown the memory of the horrors of the great war, many of the survivors plunged blindly into the frantic quest for pleasure.⁶

Brecht was briefly the dramaturg for Max Reinhardt's Deutsches Theater, and lived in a cold fifth floor garret in Kurfurstendamm while collecting characters and friends, writing poems and plays, and finally making his own name in the vibrant Berlin theater scene with *Die Dreigroschenoper* (*The Three Penny Opera*, 1928).

Between the horror of war and his employment at the Bauhaus, Moholy-Nagy struggled as an unknown in Berlin (Figure 2). Arriving penniless and anonymous in 1920 he photographed, painted, collaged, and (with considerable influence from friend Kurt Schwitters) began to photo-collage and experiment with typography.⁷ In the metropolis he was a denizen of the Romanische Café and an influential member of the Berlin literati that Brecht was destined to join when he arrived in 1924. But Moholy-Nagy's experience of Berlin in the early 1920s was not the hedonistic working class Babylon that Brecht found; rather, it was an often meager and spiritual time, sometimes without heat or substantial meals, "we lived in the spirit of self-sacrifice, obsessed with the desire to submerge our egos into the collective whole," he recalled.⁸

Wife Lucia and Moholy-Nagy were active participants in the Freideutsche Jugend (Free German Youth), an environmentally conscious utopian movement which emphasized bodily awareness, alternative health practices, and connections (both physical and spiritual) to the natural world. With his first show in the winter of 1922 (at the avant-garde "Der Sturm" gallery), Moholy-Nagy's name became

⁶ Anthony Read and David Fisher, *Berlin Rising: Biography of a City* (New York: W. W. Norton and Company, 1994), 174.

⁷ Specific dates for Moholy-Nagy's biography are contentious - often by a year or two. For the period of the 1920s I am deferring to the account written by Lucia Moholy-Nagy, first wife of László Moholy-Nagy, whom he met in Berlin in 1921. She accompanied him to Weimar, Dessau, and back to Berlin in 1928. In her focused 1972 work she attempts to correct many of the errors made concerning Moholy-Nagy throughout the twentieth century, and as her research fills the gaps when memory fails, I find her to be the authoritative source for this period. Lucia Moholy, *Marginalien zu Moholy-Nagy / Moholy-Nagy Marginal Notes* (Krefeld: Scherpe Verlag, 1972).

⁸ Moholy-Nagy, quoted in Sibyl Moholy-Nagy, *Moholy-Nagy: Experiment in Totality* (New York: Harper and Brothers, 1950), 30.

increasingly recognized, as did the experimental nature of his work. His writing during this time (1921-early 1923), published in *Der Sturm*, *De Stijl*, *MA*, *Aktivist Folyóirat*, and *Broom*, demonstrated his soon-to-be renowned variety of interests and rapidly expanded his social and professional circles.

This artistic binary – both making and theorizing – would prove to be the parallel tracks for the train of Moholy-Nagy's life. His engine – his mind – which both propelled and directed that train, was greatly influenced by what Friedrich Kittler would later term the “discourse networks” of Moholy-Nagy's short time in Berlin.⁹ In Kittler's theory, the feedback systems of senders, channels, and receivers active in Berlin during the early 1920s, in combination with new technological media, influenced the content of communication.¹⁰ The discourse network of the Hungarian Activist circle, which incorporated both art and political rhetoric, included Moholy-Nagy even prior to his arrival in Berlin. Once in Germany, Moholy-Nagy contributed art and political perspectives to journals such as *De Stijl*, *Der Sturm*, *Akasztott Ember*, and *MA*, interacting with various artistic styles, and publicly corresponding with differing political positions in this process. In doing so, he nurtured his growing professional network in multiple directions, which led to exhibition opportunities, publishing alliances, design commissions, and eventually his job at the Bauhaus.

There is no evidence that Brecht ever met Moholy-Nagy, despite the overlaps of their Berlin social and professional circles. Brecht does mention Moholy-Nagy in his posthumously published papers, referencing Moholy-Nagy's stage-set designs for the Piscator Theater in Berlin in the late 1920s. In particular, Brecht recalls that Moholy-Nagy used a “nickel and glass construction” for the set of “an inflation-piece,” [*Der Kaufmann von Berlin*, 1929] which had the unwanted effect of evoking surgical

⁹ Both Frans Peterse and Matthew Witkovsky have written about the impact of this 1921-1923 Berlin period. Peterse compares the intellectual network of journals to the Internet, while Witkovsky specifically invokes Friedrich Kittler. Frans Peterse, “László Moholy-Nagy and the Netherlands,” in Oliva María Rubio et al., *László Moholy-Nagy: The Art of Light* (Madrid: La Fábrica, 2010), 97. Matthew S. Witkovsky, Carol S. Eliel, and Karole P. B. Vail, eds., *Moholy-Nagy: Future Present* (New Haven: Yale University Press, 2016), 22.

¹⁰ This is a paraphrasing of Friedrich Kittler, *Discourse Networks 1800/1900*, trans. Michael Metteer and Chris Cullens (Stanford: Stanford University Press, 1990).

instruments.¹¹ Yet Moholy-Nagy's written thoughts concerning the potential for new technologies and the experiments/artworks/apparatuses that he created during the 1920s indicate remarkable philosophical similarities to those of Brecht. "I have already suggested that the phonograph be transformed from an instrument of reproduction into one of production," wrote Moholy-Nagy in 1923, nine years before Brecht would publish the same charge: "...[the radio] must be transformed from a distribution apparatus into a communications apparatus."¹² Ideologically, Brecht advocated for class struggle, while Moholy-Nagy held a more totalizing vision of the human-machine interaction, and these divergent positions were evident in both their theories and productions. Yet Brecht and Moholy-Nagy were in agreement concerning the potential of evolving apparatuses to increasingly engage the public with the intention of social change: Brecht would test his hypothesis first with *Lindberghflug: Ein Hörspiel* (1929), and Moholy-Nagy, with technical assistance, would conceive of and construct a physical technology, the *Lichtrequisit* (1922-1930, Figure 3).

Brecht's Baden-Baden Experiment

Brecht explored radio's potential for interactivity in his radio play, *Lindberghflug: Ein Hörspiel*, written for the 1929 Baden-Baden music festival.¹³ The work was in the basic format of the evolving radio *Hörspiel* ("radio play" – more on this later), with one of the parts meant to be read aloud by the

¹¹ Bertolt Brecht, *Bertolt Brecht: Große Kommentierte Berliner Und Frankfurter Ausgabe*, ed. Werner Hecht, vol. Band 22 (Frankfurt am Main: Suhrkamp Verlag, 1993), 233.

¹² Moholy-Nagy, "Neue Gestaltung in der Musik," 1923, translated in Passuth, *Moholy-Nagy*, 291. Bertolt Brecht, "The Radio as an Apparatus of Communication," 1932 in Brecht, *Brecht on Film and Radio*, 42. Moholy-Nagy is referring to his 1922 essay in *De Stijl*, "Production Reproduction," discussed shortly in this chapter.

¹³ Stuart Hood, "Brecht on Radio," *Screen* 20, no. 3–4 (1979): 16–23. The article includes a lengthy description of the performance with a few accompanying pictures. There are two versions and three titles of *Lindberghflug*. The first version, presented at Baden-Baden in 1929 with the music of Kurt Weill and Paul Hindemith, was *Lindberghflug: Ein Hörspiel (Lindbergh's Flight: A Radio Play)*. After both composers withdrew their music, Brecht reworked the text as *Der Flug der Lindberghs: Radiolehrstück (The Flight of Lindbergh: a didactic play for the radio)* for publication in 1930. Kurt Weill's musical work *Lindberghflug*, a 35 minute avant-garde piece written for two piccolos, two clarinets, two bassoons, two trumpets, two trombones, banjo, piano, tympani, percussion, and strings is occasionally still performed.

radio listener. The performance of the work at the Baden-Baden Festival provided a visual aspect to what would otherwise be a solely auditory work, which was particularly helpful in understanding Brecht's intentions concerning how the various parts interacted. For the Festival, Brecht positioned the chorus and the orchestra on the left of the stage and a single "listener" on the right (Figure 4). Brecht's theoretical goal for the performance was projected on the screen behind the stage.¹⁴ The lone "listener" sang scripted parts along with the music of the radio orchestra, demonstrating the prescribed role of the active home listener; the speaking sections of the same script were to be read by the "listener" as a recitation exercise between the music of the chorus.¹⁵ "In this way," wrote Brecht in 1929, "a collaboration develops between apparatus and participant in which accuracy is more important than expression."¹⁶ This emphasis on the participation and intellectual (rather than emotional) involvement of the listener mirrored Brecht's simultaneous development of an "Epic Theater." The work was performed both at the festival and for live radio broadcast without much documented response concerning its unique arrangement of speaking parts. It is suggested that the 1931 Deutsche Welle program "Musizieren mit unsichtbaren Partnern" ("Making music with invisible partners") was modeled on *Lindberghflug*, which seems to be the only legacy of Brecht's early experiment with participatory radio; *Lindberghflug* became most notable for the music composed by Kurt Weill.¹⁷

¹⁴ "Explanations," 1929 in Brecht, *Brecht on Film and Radio*, 39. The projected texts read: "In obedience to the principles: the state shall be rich, man shall be poor, the state shall be obliged to have many skills, man shall be permitted to have few, where music is concerned the state shall provide whatever requires special apparatuses and special skills, but the individual shall provide an exercise. Unchecked feelings aroused by music, special thoughts that may be conceived when listening to music, physical exhaustion that easily arises just from listening to music, these are all distractions from music. To avoid these distractions, the individual participates in the music, thus obeying the principle: doing is better than feeling, by following the printed music with his eyes and adding the passages and voices reserved for him, by singing to himself or in conjunction with others (school class)."

¹⁵ "Explanations," 1929 in Brecht, 38.

¹⁶ "Explanations," 1929 in Brecht, 39.

¹⁷ Golo Föllmer, "Brecht: Lindberghflug," Bertolt Brecht: "Lindberghflug," accessed December 6, 2017, medienkunstnetz.de/works/bertold-brecht. The Deutsche Welle program invited listeners to play musical instruments along with the broadcast music.

Brecht's aspiration was that *Lindberghflug* would redeploy the listener as “producer” (“...call for a kind of *rebellion* by the listener, for his [sic] mobilization and redeployment as producer,”) which would have been completely attainable using the radio as a two-way technology.¹⁸ Listeners could have broadcast their parts back over the airwaves: imagine a chorus of “Lindberghs” from all over the listening area contributing their parts to the interactive radio play in a manner similar to using a walkie-talkie.¹⁹ Of course it would have been chaotic, but perhaps no more so that some of the techniques Brecht would later employ in his theater productions, and certainly not as disorderly as the internet of today.²⁰ Brecht believed that the value of *Lindberghflug* was pedagogical, not artistic; much as he would later assert that the value of the *Verfremdungseffekt* was heightened understanding rather than the aesthetic appeal of illusion and the comfort of timeless characters and situations.²¹

The Flight of the Lindberghs has no value if it does not train. It has no artistic value that would justify a performance not intended for this training. It is an object of instruction and falls into two parts. One part (songs of the elements, choruses, sounds of water and motors, etc.) is meant to enable the exercise, that is, to introduce and interrupt it, which is best achieved by an apparatus. The other, pedagogical part (the Lindbergh role) is the text for the exercise: the participant listens to the one part and speaks the other part. In this way a collaboration develops between apparatus and participant in which accuracy is more important than expression.²²

Clearly, Brecht sought to create a situation in which the listener would learn from their interaction with the radio apparatus – but learn what?

¹⁸ “Explanations,” 1929 in Brecht, 39. Daniel Gilfillan, *Pieces of Sound: German Experimental Radio* (Minneapolis: University of Minnesota Press, 2009), 38, <http://ebookcentral.proquest.com/lib/uic/detail.action?docID=496592>. Gilfillan notes this resonance particularly with Brecht's later ideas, in his discussion of the evolution of active/passive listeners in the post-war, pre-broadcast era in Weimar. The idea of an interactive radio program demonstrates Brecht's thoughts concerning the use of radio in 1929. His “Explanations,” focuses on the actors and listeners rather than broadcast technology.

¹⁹ Brecht's idea of interactivity was later realized by Nam June Paik's *Participation TV* series, begun in 1963. In these television based works, viewers made sounds into a microphone which were translated into color television signals shown on monitors.

²⁰ The *Verfremdungseffekt*, designed to alienate or distance the audience from the illusion and narrative happening on the stage, was a term first used by Brecht in 1936. His goal in deploying this “alienation effect” was to encourage the audience to critically approach the production rather than be subsumed into the illusion.

²¹ “The *Verfremdungseffekt* in the Other Arts,” 1936? in Brecht, *Brecht on Film and Radio*, 10. Brecht first used the term “*Verfremdungseffekt*” in 1936's “On Chinese Theater, *Verfremdung* and *Gestus*.” (183)

²² “Explanations,” 1929 in Brecht, 39.

In addition to *Lindberghflug*, Brecht and Paul Hindemith wrote the *Badener Lehrstück vom Einverständnis* (*The Baden-Baden Learning-Play of Consent*) for the 1929 Festival – using the avant-garde form of the Lehrstück (didactic play) to situate the authors and active participants in “theories of a musical, dramatic and political nature aim[ed] at the collective practice of the arts.”²³ Brecht scholar, friend, and translator John Willett describes the Lehrstück as a method of furthering arts education by direct involvement, rather than through theoretical study during a historical moment in which rapidly advancing technologies such as radio and film were supplementing, and in some cases replacing, traditional cultural outlets such as theaters and opera houses.²⁴ Appreciation of theater, especially in its most modern forms, was a primary pedagogical goal of the Lehrstück; although the Baden-Baden presentation of *Lindberghflug* did not include the subtitle, Brecht's 1930 revision of the work, retitled *Der Flug der Lindberghs: Ein Radiolehrstück*, indicates his educational objective.²⁵

Moholy-Nagy's Light Prop

This Lichtrequisit is an apparatus for the demonstration of light and movement phenomena. The model consists of a cubic box, 120x120 cm, with a circular opening (stage opening) on the front. Around the opening, on the back of the plate, a number of yellow, green, blue, red, and white electric bulbs are mounted (about 70 luminescent bulbs of 15 watts each and 5 headlamp bulbs of 100 watts). Inside the box, parallel to the front, there is a second plate, also with a circular opening, whereupon the different colored electric bulbs are again mounted around the opening. Individual bulbs light up at different positions on the basis of a predetermined plan. They illuminate a continuously moving mechanism, which consists of partly translucent, partly transparent, partly openwork materials, in order to maximize linear shadow formations on the back wall of the closed box. (If the demonstration is in a darkened room, the back wall of the box can be removed and the color and shadow projections can be made on a screen of any size behind the box.)

The carrier of the mechanism is a circular plate on which a three-part frame is built. The dividing walls consist of transparent Zellon and a metal wall formed by vertical bars.

²³ “About the Lehrstück,” 1929 in Bertolt Brecht, *Brecht Collected Plays: 3*, ed. John Willett (Bloomsbury Methuen Drama, 2015), 385, Google Play Books EPUB. Originally printed in the Baden-Baden program.

²⁴ Brecht, 14.

²⁵ To confirm this, Brecht's text “Explanations,” also from 1929, cites the pedagogical goal of the work multiple times.

Each of the three sections of the frame contains a moving picture that occurs when the rotating base plate faces the stage opening.²⁶

The *Lichtrequisit* (1922-1930) was only displayed twice during Moholy-Nagy's lifetime, first for 9 weeks at the 1930 Paris Werkbund, where the work of moving light and shadow was contained within a stage-like box, offering a view only through a "stage opening" (Figures 5-6). Its' second display, at the London Gallery (UK) in 1936, is notable for the absent box and lack of contemporary accounts (Figure 7).²⁷ Whether it was the first inkling of an idea or the first sketch that occurred in 1922 is murky, however the seeds of Moholy-Nagy's oeuvre of kinetic art are written in "Dynamisch-konstruktives Kraftsystem" published that year (see later discussion of this article co-authored with Alfred Kemény):

...instead of static *material* construction (material and form relations), dynamic construction (vital construction and *force relations*) must be evolved in which the material is employed only as *the carrier of forces*...The first projects looking towards the dynamic-constructive system of forces can be only experimental demonstration devices for testing the connections between man, material forces and space. Next come the use of the experimental results for the creation of freely moving (free from mechanical and technical movement) works of art.²⁸

The *Lichtrequisit* fulfilled the first part of this prescription: an "experimental demonstration device" which was meant to "test connections" and to provide data to facilitate subsequent "freely moving works of art."²⁹ The methodology for the realization of this goal, generally outlined in Moholy-Nagy's

²⁶ László Moholy-Nagy, "Lichtrequisit Einer Elektrischen Bühne," *Die Form* V (1930): 11.

²⁷ The anglophonic translation of *Lichtrequisit einer elektrischen Bühne* (*Light Prop for an Electric Stage*) into *Light Space Modulator* is particularly difficult as it has no relation to the original title of the work, and instead establishes a link with *Space Modulator* works that Moholy-Nagy made in the later 1930s and 40s. For that reason, I refer to the work as the *Lichtrequisit* which is a truncation of its original complete title. *Light Space Modulator* was a title that Sybil Moholy-Nagy eschewed even in the 1969 edition of Moholy-Nagy's biography. Here the work is referenced either as the *Lichtrequisit* (particularly when displayed at the 1930 Werkbund) or as "Light machine." Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 66–68.

Lucia Moholy uses either *Lichtrequisit*, *Light Prop*, or *Light Display Machine* in her 1972 corrective biography *Marginal Notes*. She also notes that the work has "...lately been renamed *Light Space Modulator* to fit with current ideological usage." She authoritatively dates the *Lichtrequisit* as 1922-1930. Moholy, *Marginalien zu Moholy-Nagy / Moholy-Nagy Marginal Notes*, 84.

²⁸ Moholy-Nagy and Kemény, "Dynamisch-konstruktives Kraftsystem," 1922, translated in Passuth, *Moholy-Nagy*, 290.

²⁹ Oliver A. I. Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts* (Zürich: Lars Müller Publishers, 2014), 101. Additionally, see Botar's discussion of "Dynamisch-konstruktives Kraftsystem" in *Sensing the Future*, 86. Botar includes several sketches and montages that Moholy-Nagy made in the 1920s under the titles of *Kinetic*

essay/manifesto “Produktion-Reproduktion” (1922), mandated the evaluation and re-conception of existing apparatuses from the ground up in order to achieve new relations receivable by a totalized human’s “functional apparatuses.”³⁰ Brecht similarly proclaimed “...for innovations, against renovation!” ten years later, arguing for the “shaking up” and redeployment of the radio apparatus in the “interest of the many;” similar goals which simultaneously underscore Brecht’s emphasis on class struggle.³¹

Moholy-Nagy’s interest in the design of physical objects – in 1922 he stated “I myself paint and make spatial constructions” – meant that his role in the creation of the apparatus was markedly different than Brecht’s ideas of innovation for an existent apparatus: Moholy-Nagy conceived of a new physical-technological medium which then produced content.³² Whereas Brecht thought of the radio apparatus as “a technical invention...[that] is a grand, productive opportunity *for our plays*”, Moholy-Nagy’s *Lichtrequisit* was considered, in 1930, to be “an apparatus for the demonstration of special lighting and motion phenomena.”³³ Although there are no extant diagrams of the *Lichtrequisit* per se before 1927, the 1922 collage, *Kinetisch-konstruktives System*, foreshadows the final form of the *Lichtrequisit*, with two spirals, and a tilted central axis around which arrows connote three directions of motion (Figure 8).³⁴

Constructive System which have strong visual and theoretical correspondences to the final form of the *Lichtrequisit*.

³⁰ Moholy-Nagy, “Produktion-Reproduktion,” 1922 translated in Passuth, *Moholy-Nagy*, 289. The essay was originally published in the journal *De Stijl*.

³¹ Brecht, “The Radio as an Apparatus of Communication,” 1932 in Brecht, *Brecht on Film and Radio*, 45.

³² Moholy-Nagy, “On the Problem of New Content and New Form,” 1922, translated in Passuth, *Moholy-Nagy*, 287. In 1964 Marshall McLuhan would assert that the content of one medium is always another medium. In the comparison of Moholy-Nagy and Brecht, I am specifically referring to the production of the technological medium.

³³ “Young Drama and the Radio,” 1927, Brecht, *Brecht on Film and Radio*, 33. Emphasis mine. Moholy-Nagy, “*Lichtrequisit* Einer Elektrischen Bühne,” 11. My translation. The original translation, included in the same issue, is abridged.

³⁴ Alexandra Käss, “Knoten, Relationen und der seltsame Fall des ‘Licht-Raum-Modulators’ von László Moholy-Nagy,” in Jan Broch, Markus Rassiller, and Daniel Scholl, eds., *Netzwerke Der Moderne: Erkundungen Und Strategien* (Würzburg: Königshausen und Neumann, 2007), 128. Käss comments that Moholy-Nagy did not meet engineer Stefan Sebök, who drafted the technical drawings for the *Lichtrequisit*, until 1928 when the two met at the architectural offices of Walter Gropius. Sebök also drafted *Kinetisch Konstruktives System: Bau mit Bewegungsbahnen für Spiel und Beförderung* (*Kinetic Constructive System with Moving Parts for Play and*

This early work confirms that Moholy-Nagy contemplated both the form – through artworks, and intention – in written works, of the *Lichtrequisit* throughout the 1920s. Allusions to the apparatus appear in various theoretical texts, including *Malerie Fotografie Film* (1925), in which he suggested a continuously rotating mechanical apparatus (possibly operated by a crank) which would produce abstract light effects for abstract films.³⁵ However the physical appearance was finally motivated by the financial backing of the Allgemeine Elektrizitäts-Gesellschaft (AEG), in concert with the technical expertise and diagrams of Stefan Sebök (whom Moholy-Nagy met in 1928 at the architecture firm of Walter Gropius) and the practical construction abilities of engineer Otto Ball.

The physical appearance and exhibition staging of the *Lichtrequisit* changed dramatically since it was first shown in 1930 at the Werkbund Exhibition in Paris, where it was described as a “prototype for further industrial development.”³⁶ At that moment, it was a machine designed to produce light effects before an audience in a stage-like setting and was shown in the “theater” section of the Werkbund show (Figures 9-10).³⁷ The photograph published in *Die Form* of that year shows this arrangement being constructed. The “stage opening” is clearly visible, presented to the viewer at the center of the photograph, but before display at the Werkbund it was covered by “flashed glass,” which, as scholar Oliver A. I. Botar deduces, would have rendered the interior invisible without the lights on – controlling the viewer's visual access to what is now, 90 years later, considered to be the totality of the *Lichtrequisit*. Instead, argues Botar, in 1930 “the device itself [and here he is referring to the rotating

Conveyance), 1928, a photomontage which repeats the themes of a tilted central axis supporting multi-directional spirals.

³⁵ László Moholy-Nagy, *Malerei, Fotografie, Film*, vol. 8, Bauhaus Bücher (München: Albert Langen Verlag, 1925), 36. My translation. Interestingly, given the influence of Kurt Schwerdtfeger and Ludwig Hirschfeld-Mack, Moholy-Nagy mentions that Licht-Schattenspielen (light-shadow plays) to this point have been diffuse or difficult to read.

³⁶ Joyce Tsai, “Excavating Surface,” in Jeffrey Sautnik and Robin Schuldenfrei, eds., *Bauhaus Construct: Fashioning Identity, Discourse, and Modernism* (New York: Routledge, 2009), 151. The Exhibition of the Association of French Interior Designers (Société des Artistes décorateurs) was held at the Grand Palais in Paris, 14 May - 13 July 1930.

³⁷ Tsai discusses these points in more detail in Joyce Tsai, “The Sorcerer’s Apprentice: László Moholy-Nagy and His Light Prop for an Electrical Stage,” in Finger Anke and Follett Danielle eds., *The Aesthetics of the Total Artwork: On Borders and Fragments*, (Baltimore: Johns Hopkins University Press, 2011), 289–90.

metal and glass assemblage] was not meant to be seen.”³⁸ In his 1947 recollection of the *Lichtrequisit* in *Vision in Motion*, Moholy-Nagy described that

this moving sculpture had 140 light bulbs connected with a drum contact. This was arranged so that within a two-minute turning period, various colored and colorless spotlights were switched on, creating a light display *on the inside walls of a cube*.³⁹

Underneath, the machinery – chains, cogs, the electrical motor and its cord – were visible, and at the Werkbund show the entire boxy ensemble was placed in an unobtrusive corner of Room 2 (Figure 10).

This is not to say that this first exhibition of the *Lichtrequisit* demonstrated Moholy-Nagy's complete vision for the work: the *Lichtrequisit* instead evolved both physically and theoretically through the rest of his life – being, as Alexandra Käss explains, “both a prop and a producer, an electrically powered apparatus and a kinetic sculpture, a film and the dialectical opponent of such, with no single ‘essence.’”⁴⁰ Moholy-Nagy proposed to use the *Lichtrequisit* in the unrealized “Raum der Gegenwart”

(1930) exhibit at the Provincial Museum of Hannover, it was the subject of the film *Ein Lichtspiel:*

schwarz weiss grau (1930), it was shipped (with difficulty) and repaired (as necessary) when the family

³⁸ Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 116. “Careful examination of the working drawings for the Light Prop [sic] reveals that ‘überfangglas’ (‘flashed’ glass) is specified on a plan detail of a corner of the display box on the side marked ‘seite n.d. zuschauer’ (side toward the viewer)...Flashing would have rendered the base glass darkly translucent, making it blend in with the dark, evenly colored Trolit. The light effects produced within the box, produced behind the dark flashed glass, would only have been visible when the lighting array on the interior of the box was switched on. The ‘poste d’illumination’ would have appeared when the device and its lighting was engaged, a circular swirl of colored light, reflection and shadow playing through the semi-opaque material, anticipating Frank Malina’s Lumidyne System for ‘kinetic painting’ by a couple of decades, as well as Otto Piene’s Moholy-Nagy inspired work of the 1960s. This is the ‘installation lumineuse’ seen by visitors to the Paris show: an abstract ‘film,’ a ‘Flächenfilm’ constituted in real time while the visitor was watching.” (122)

³⁹ László Moholy-Nagy, *Vision in Motion*, ID Book (Chicago: P. Theobald, 1947), 238. Emphasis mine. His comment, written as a note to the illustration, continues to refer to the LSM as a “mobile” - a direct link to the preceding subsection of the chapter, in which Moholy-Nagy defines mobiles as the fifth phase of sculpture, that which demonstrates “a weightless poising of volume relationships and interpenetrations.” (237) In 1930, Moholy-Nagy mentioned that the rear panel could be removed from the *Lichtrequisit*, allowing projections “of any size” on a screen in a darkened room. This configuration was never exhibited. Moholy-Nagy, “Lichtrequisit Einer Elektrischen Bühne,” 297.

⁴⁰ Alexandra Käss, “Knoten, Relationen und der seltsame Fall des ‘Licht-Raum-Modulators’ von László Moholy-Nagy,” in Broch, Rassiller, and Scholl, *Netzwerke Der Moderne: Erkundungen Und Strategien*, 132. The repositioning, reconstruction, re-presentation, and conservation of the *Lichtrequisit* are the subject of several articles, perhaps the most comprehensive being Joyce Tsai et al., “László Moholy-Nagy’s Light Prop as Design Fiction: Perspectives on Conservation and Replication,” *Leonardo* 50, no. 3 (2017): 311–15.

relocated to London and then Chicago, it was included (without the box) in Moholy-Nagy's show at the London Gallery (1936), and was still a focus of his thought in 1946 as he wrote *Vision in Motion*, published posthumously in 1947.

The first showing of the *Lichtrequisit* at the Werkbund exhibition represented the culmination of Moholy-Nagy's theories, experience, and the influences of Berlin and the Bauhaus during 1920s – just as *Lindberghflug* was Brecht's experimental response to the possibilities of the new medium of broadcast radio.

Early Weimar Radio

In Brecht's opinion, the challenge initially facing the new medium of radio broadcast was to create a public demand for itself: "a technical invention that must still create for itself a mass need rather than subordinating itself to an antiquated, exhausted need" he wrote in 1926, his first published text on the subject.⁴¹ Media scholar Kate Lacey agrees, arguing that early German radio was not even as simple as a new technology (public radio) being introduced to a [un]ready audience (radio public), but that the different socio-economic-political-gendered listeners were not a mass ear that could be wooed by a broadcast of musical entertainment.⁴² Germany had strictly controlled radio access during WWI, and officially rejected the development of secular (non-military) broadcasting in the post war period. A demonstration of the medium in 1919 by Hans Bredow and sponsored by the Reichspost (German Post Office) broadcast voice and music to an audience assembled in a Berlin auditorium, but it would still take four years for the Weimar government to be convinced of the merits of the medium for the general public.⁴³ Instead, radio was subjected to strict bureaucratic control between 1919 and 1923 with the

⁴¹ Brecht, *Brecht on Film and Radio*, 33.

⁴² Kate Lacey, "The Invention of a Listening Public: Radio and Its Audiences," in *Mass Media, Culture and Society in Twentieth Century Germany*, 2006, 62. The bracketed addition of "un-" is my own, to emphasize the connection between Brecht and Lacey's arguments.

⁴³ Wolf von Eckardt and Sander L. Gilman, *Bertolt Brecht's Berlin* (Garden City, NY: Anchor Press, 1975), 57.

intention of limiting the subversive potential of the medium: expensive receiver licenses were required and limited in number, receivers could only be obtained from the Reichspost and were constructed to receive only one station, and the broadcast content was limited to business information and weather.⁴⁴ In contrast to the freely accessible airwaves that are ubiquitous in every western automobile of the 21st century, early Weimar radio was for business rather than pleasure.

In July of 1923, just a scant 4 months before that first “public” broadcast, a crucial agreement was reached between the Weimar government/military and the German telecommunications industry: that radios would be manufactured as receivers *only* and sold without the ability to transmit.⁴⁵ “Unlike our contemporary consumer notion of radio being purely a passive reception device, up until 1923 the equipment used by both amateur and military radio operators alike was capable of receiving and transmitting signals,” writes Gilfillan, in a quick statement that belies the importance of the 1923 government ordinance.⁴⁶ Since the end of the WWI (and of course during the Great War itself), radio *meant* interactive communication. Listeners could reply to broadcasting stations, initially in Morse code and later verbally, which was feasible because most of these radio operators had learned and honed their skills while enlisted.⁴⁷ Hans Bredow, the Director of the Department of Wireless Telegraphy in 1919, who would become Chair of the Reichs-Rundfunk-Gesellschaft (RRG or National Broadcasting Corporation) in 1926, described the truncation of radio’s abilities in his 1954 memoir:

During the war the use of a transmitter or receiver by private citizens was banned in the warring nations with regards to national defense... In Germany the radio ban was reinforced by its connection to the telegraphy law, and exceptions to the ban were made only to franchised and state-monitored, private sector telegraph companies in

⁴⁴ “German Broadcasting Service,” *The Wireless Age*, September 1923, 40. Accordingly, 2000 radio licenses were issued in 1922, each license accompanied a radio receiver supplied by the Reichspost. Radios received only one station with a 2% wavelength adjustment which eliminated the ability of the receiver to intercept other messages. As a result of such a limited audience and regulated market, German radio manufacturers suffered low demand. *The Wireless Age* also reported that the lack of amateur radio operators and the low numbers of private German radio stations was due in large part to the prohibitive cost of radio equipment and licenses. It was not until the advent of public radio intended for the general population that this would change.

⁴⁵ Gilfillan, *Pieces of Sound: German Experimental Radio*, 40.

⁴⁶ Gilfillan, 40.

⁴⁷ Gilfillan, 40. 190,000 members of the of German Army signal corps were discharged at the end of WWI.

maritime and international communications, as well as for purposes of industry and research. On the surface the perpetuation of this constraint after the war was justified solely on the necessity for secrecy of public radio communications, but in reality political reasons were the decisive factor.⁴⁸

This central control by the Reichspost, instituted in 1919, was in large part a reaction to the renegade Zentralfunkleitung (ZFL, Central Radio Administration), formed in 1918 by former members of the German military which controlled of the nascent airwaves for five months. The ZFL centered their operations in Berlin around the long-range transmitter at Königswusterhausen and proceeded to broadcast content sympathetic to Labor Groups throughout Germany. Given the dearth of (legal) radios operating in Germany at the time, the ZFL broadcasts were most often heard by *Funkbastlers* – amateur radio enthusiasts who constructed their own receivers. Whether Brecht, still living in Bayern, was aware of this early communist-sympathizing group of veterans is unknown.

Brecht's opinion of the interactive function of the radio evolved from 1927 to 1932. Publishing in the 1927 *Berlin Börsen-Courier*, Brecht wrote of the radio as a “wonderful distribution apparatus,” with the potential to provide real-time broadcast of public events such as the parliamentary sessions of the Reichstag.⁴⁹ But his conclusion concerning the medium in 1932's “The Radio as a Communications Apparatus” is that the one-sided distribution apparatus only dispenses, when it should be two-sided, communicating, receiving, and transmitting, bringing the listener into a network rather than isolating them – allowing them to speak as well as hear.⁵⁰

Brecht was seemingly not aware of the 1923 legal decision that led to the technological amputation of the radio, despite his participation and deep engagement with the events of World War I in his hometown of Augsburg. His *Augsburg War Letters*, written throughout the conflict and published in the *Augsburger Neuesten Nachrichten* and other local papers, described the situation of the home

⁴⁸ Hans Bredow, *Im Banne der Ätherwellen*, 1954 Translated in Gilfillan, 33.

⁴⁹ “Suggestions for the Director of Radio Broadcasting,” 1927 in Brecht, *Brecht on Film and Radio*, 35.

⁵⁰ “The Radio as a Communications Apparatus,” 1932 in Brecht, 42.

front becoming “more and more fixed on the victims and the price of the war, on both sides, and in their juxtaposition of rhetoric and report.”⁵¹ Brecht included a description of telegrams from the trenches being read publicly in Augsburg to the cheers of the crowd, but his focus was on the *Volk*, not the transmission technology that delivered the message. Brecht “avoided” combat, instead serving in the auxiliary army hospital in Augsburg, where it is doubtful that as an orderly he had any interaction with communications equipment.⁵² His course load at medical school veered unusually toward literature and drama: indeed there is very little indication that Brecht had any exposure whatsoever to radio before its state sanctioned introduction to the general public.⁵³

From 8 to 9 PM on October 29, 1923, the first public radio program was broadcast to 467 licensed (and many more un-licensed) German listeners in the area of the Weimar capital, Berlin.⁵⁴ Emanating from the Vox record company on Potsdammer Strasse, the sixty minute long-range broadcast was almost entirely classical music, with a spoken introduction – “Achtung, Achtung, Hier ist Berlin, Vox-Haus!” and a culminating live military band rendition of the national anthem. Historian Peter Jelavich concludes that the broadcast was an accurate reflection both of those in control of Weimar broadcasting (the cultural elite and career bureaucrats) and the strategy of cultural inculcation that early Weimar radio was to attempt.⁵⁵ The broadcast initiated the rapid growth of German radio from those

⁵¹ Philip Glahn, *Bertolt Brecht* (Reaktion, 2014), 34, ProQuest Ebook Central, <https://ebookcentral-proquest-com.proxy.cc.uic.edu/lib/uic/detail.action?docID=1693637>.

⁵² Glahn, 33. Glahn's discussion of Brecht's comportment as an orderly: wearing yellow shoes, carrying a riding crop, and casually referring to doctors as “colleagues,” in addition to his short four months of service, indicate that he was not dedicated to the job.

⁵³ “Radio - An Antediluvian Invention?” 1927 in Brecht, *Brecht on Film and Radio*, 37. In an unpublished typescript Brecht writes that he remembers the first time he heard of radio: “a virtual radio hurricane was in the process of devastating America.” The anti-bourgeoisie polemic that follows this opening sentence includes the judgment that the radio is a “very bad thing” and the estimation that the work of artists is to produce justification for unnecessary innovation.

⁵⁴ This statement requires qualification: there were plenty of radio broadcasts (both legal and otherwise) before this. However, this broadcast, transmitted on a long wavelength, was capable of being received by an exceptionally large listening audience. Additionally, it was considered the first “public radio broadcast” by the Reichspost, which was the bureaucratic overseer of all (sanctioned) early German radio.

⁵⁵ Peter Jelavich, *Berlin Alexanderplatz: Radio, Film, and the Death of Weimar Culture*, vol. Volume 37 of *Weimar and Now: German Cultural Criticism* (University of California Press, 2006), 67.

467 known receivers in 1923: by 1925, when Brecht made his radio debut, there were at least a million listeners, by 1927 there were 24 medium wave radio stations organised within the 9 *Länder* (provincial) agencies in addition to the long wave Deutsche Welle International Broadcasting Station in Berlin.⁵⁶ All of the stations operated under the umbrella of the Reichs-Rundfunk-Gesellschaft mbH (RRG) and its chair Hans Bredow.⁵⁷ The Reichspost maintained a 51% interest in each new station to insure state control at a local level, even though the RRG itself was also a subsidiary of the national postal service. Production of programming for the radio likewise required a strictly controlled license: no foreigners, no politicians, and no companies involved in the production of radio sets were permitted as shareholders of a radio production company.⁵⁸ The importance of state control of the radio was mandated in 1922 by the Secretary of the Interior, on the heels of political unrest that included the murder of State Secretary Walter Rathenau:

The state revolution has made it more and more obvious that the Reich Government does not have the necessary apparatus to express its opinion in public ... Under these circumstances, I must absolutely insist that all ... Possibilities to create an alternative are exploited first and foremost for the Reich and its influence, not by any private companies, whose attitude to the respective Reich government is doubtful and wavering.⁵⁹

⁵⁶ Lacey, "The Invention of a Listening Public: Radio and Its Audiences," 61.

⁵⁷ Hood, "Brecht on Radio," 18. Many areas of the country were still without radio reception as late as 1930. Bredow himself is a fascinating persona: an electrical engineer who worked within the sphere of German broadcast media from 1904 until the Nazi party took control of the RRG in 1933. After WWII Bredow was elected Oberpräsident of a province in Wiesbaden and returned to the radio industry as the Chairman of the Board of Hessischer Rundfunk. Introducing public radio in 1923, Bredow opined: "In a time of difficult economic hardship and political adversity the radio has been deregulated for the general public. No longer will it serve only economic purposes, but rather an attempt will be made to use this cultural advance to bring the German people some encouragement and joy to their lives..." Bredow, quoted in Gilfillan, *Pieces of Sound: German Experimental Radio*, 45..

⁵⁸ Karl Christian Führer, "A Medium of Modernity? Broadcasting in Weimar Germany, 1923-1932," *The Journal of Modern History* 69, no. 4 (December 1997): 724. "Weimar broadcasting was also big business: in 1930 audiences paid RM75 million in fees; the German radio industry did RM 200 million worth of business; and the sales of radio retailers and of the radio press were RM 120 million and RM 30 million, respectively." Führer, 723.

⁵⁹ Quoted in Konrad Dussel, *Hörfunk in Deutschland: Politik, Programm, Publikum (1923-1960)* (Potsdam: Verlag für Berlin-Brandenburg, 2002), 44.

“Radio must make exchange possible,” wrote Brecht in 1932, in an essay repudiating not only the intentions, but by that time the codified model of Weimar broadcast programming, “It alone can organize the major discussions between business sectors and consumers about the norms for consumer goods, the debates about raising the price of bread, the disputes in municipalities.”⁶⁰ This position was antithetical to the Reichpost’s isolationist view: Brecht envisioned a medium which not only reported on the activities of the government, but also fostered discussion between consumers/listeners and the administration.

Weimar Radio Programming

In contrast to the privatized, commercial American model of radio then and now, the tenets of Weimar broadcasting were avowedly non-political, educational, supportive of family life, and stabilizing to a society still in recovery from the effects of WWI.⁶¹ The political secularization, in which radio programming eschewed any overt political content, was an attempt to resolve the apparent conflict of interest between state control of broadcast media and independent views, with the result being complete state censorship.⁶² These paternalistic goals and the economic structure of the German radio industry indicated that “the eminent executives of Weimar broadcasting regarded listeners less as customers than as objects of educational efforts.”⁶³ Educational, supportive, and stabilizing programming was written to follow the arc of a “normal family day,” with a mix of information, entertainment, and (both educational and entertaining) cultural content, similar to contemporary American NPR programming.⁶⁴ A programming schedule for Friday, September 25, 1925 included

⁶⁰ Brecht, “The Radio as an Apparatus of Communication,” in Brecht, *Brecht on Film and Radio*, 43.

⁶¹ Of course, Weimar radio broadcasts were actually political in their support of the state. Adelheid von Saldern, “Volk and Heimat Culture in Radio Broadcasting during the Period of Transition from Weimar to Nazi Germany,” *The Journal of Modern History* 76, no. 2 (June 2004): 316–17.

⁶² However, state censorship is inherently political in itself.

⁶³ Führer, “A Medium of Modernity? Broadcasting in Weimar Germany, 1923-1932,” 727.

⁶⁴ Lacey, “The Invention of a Listening Public: Radio and Its Audiences,” 62.

“homemaking tips on storing eggs, a lecture on gardening as a means to uplift the young, a lecture on ancient Indian religions, and a live Mozart concert.”⁶⁵ Music, which by 1930 comprised at least half of the broadcast hours of most days, remained a bone of contention, as programming directors pressed forward with classical aesthetic education (some more enthusiastically than others), believing that “serious music” was the best path to moral, intellectual, and spiritual uplift.⁶⁶ Despite the interest of the German public in contemporary jazz and dance music, popular music was rarely broadcast during prime times. Instead, it was relegated to hours after 10pm, the odd Saturday, or appearing as an infrequent “special show” produced by a record company or radio retailer to advertise their products.⁶⁷ But in general, the musical programs of both the *Länder* stations and the Deutsche Welle were classical in nature and often interspersed with lectures on classical musical appreciation.

Occasionally, German radio was willing to take a small risk by broadcasting material other than music, news, or information. Five days after the initial broadcast from Potsdammer Strasse, the same Berlin station broadcast a reading of Heinrich Heine's “Seegespenst” (Sea Apparition), a short poem selected from Heine's cycle devoted to the North Sea.⁶⁸ In the immediately following years, authors including Brecht adapted previously written theatrical works for radio broadcast, creating the genre of *Sendespiele* (broadcast plays): Brecht edited classics including *Macbeth* (broadcast in 1927), *Hamlet* (broadcast in 1931), and his own play *Mann ist Mann* (1927).⁶⁹

⁶⁵ von Eckardt and Gilman, *Bertolt Brecht's Berlin*, 57.

⁶⁶ Brian Currid, *National Acoustics: Music and Mass Publicity in Weimar and Nazi Germany* (Minneapolis: University of Minnesota Press, 2006), 20. The author notes that by WWII, music comprised almost 70% of the broadcast day.

⁶⁷ Führer, “A Medium of Modernity? Broadcasting in Weimar Germany, 1923-1932,” 745–46. In contrast to the American/commercial model of broadcast radio, these infrequent special advertisements were not the main source of financial support for the German broadcast system, and were usually only available to radio related industries such as record companies of radio manufacturers.

⁶⁸ Gilfillan, *Pieces of Sound: German Experimental Radio*, 22. The author devotes several pages to this interesting selection, its symbolism, and political commentary. As one of the most beloved of German authors, the choice of Heine was not particularly risky, however the choice to broadcast literary material was a new direction for German broadcasting.

⁶⁹ Hood, “Brecht on Radio,” 19. *Mann ist Mann* (1926) tells the story of Galy Gay, an impressionable Irish dock worker who is remade into a soldier and eventually delivers his own eulogy.

But how would one write specifically for the new medium? This question inspired radio director Hans Flesch, who, after meditations on the physical nature and capabilities of the radio, developed an entirely new form of program: the *Hörspiel*.⁷⁰

At one point I undertook an experiment to create a characteristically radiophonic *Hörspiel*, wrote the play *Zauberei auf dem Sender*, -- not as an author, as a theorist, actually -- in order to put forward an artistic genre peculiar to the radio through the harmony of noises; this grotesque [sic] would never be transferable to the stage or concert hall, and this is the decisive point.⁷¹

Das Hörspiel, literally “the audio/radio play/drama,” would be recognized by fans of Garrison Keillor’s “A Prairie Home Companion” – a work, often dramatic or comedic in narrative, written expressly for radio performance. Utilizing studio sound effects, multiple actors, and capitalizing on the public’s inability to see how the work is created, *Hörspiele* attempted to answer the question of radio’s intrinsic and unique properties. Exemplified by Flesch’s *Zauberei auf dem Sender* (*Magic on the Air*), Gilfillan describes *Hörspiele* as

...in one sense a self-referential genre, one that explores its key connections to the medium that produces it, and in another sense, it is a form that delights in its own intermediality by drawing on the dramaturgical techniques of stage drama, the journalistic techniques of reportage and interview, and the compositional techniques of new music, while being aurally bound to the technologies of the broadcast studio.⁷²

The *Hörspiel* directly addressed the role of the radio: its technological innovation, new aesthetics, and medium specificity.⁷³ The cacophony of *Zauberei* was anchored in its reference to the concrete reality in which the work was created: the radio station and its staff. The scenario of the play,

⁷⁰ Gilfillan, *Pieces of Sound: German Experimental Radio*, 48. Flesch wrote an interesting series of articles on early public broadcast potential and pitfalls between 1924 and 25. Topics included the necessity of varying broadcast content, advertising, tonal fidelity, and the potential for radio specific art forms.

⁷¹ Flesch, “Mein Bekenntniss zum Rundfunk (My Commitment to Radio),” 1925, trans. in Gilfillan, 70. The German *Groteske* is here translated as “grotesque,” which works if read in the OED manner of “that which is comically or repulsively ugly or distorted.” *Groteske* can also be translated as “antics,” which might be easier. Sadly, the technology of the time did not allow the broadcast of *Zauberei* to be recorded. Gilfillan references several re-stagings in the 1960s, and a complete translation is available: “Magic on the Air: An Attempt at a Radio Grotesque” in *Cultural Critique*, Fall 2015. It is well worth a read.

⁷² Gilfillan, 70.

⁷³ Hans Flesch, “Magic on the Air: Attempt at a Radio Grotesque,” trans. Lisa Harries Schumann, *Cultural Critique* 91 (Fall 2015): 15. Lecia Rosenthal brings up these goals in her excellent introduction.

the broadcast “interruptions” by a list of characters, some ostensibly from the radio staff, others purely imaginative, sought to locate the true source of radio. As translator Lisa Harries Schumann notes, the Magician (a purely imagined character) contrasts actions in the radio transmitter with the results on the air, and this subtle shifting of in/on underscores the necessity of the equipment itself.⁷⁴ Brecht’s *Lindberghflug*, particularly as demonstrated at Baden-Baden, similarly underscored the difference between the in-studio production and the transmitted on-air version of the work. The multi-faceted staging, including the chorus, the orchestra, and the projected statement of goals would have been compressed into a single audio stream by the broadcast equipment – as if to be unpacked and reactivated by the interaction of the listener.

Moholy-Nagy similarly emphasized the in/on contrast by shifting the viewer’s focus between the moving apparatus of the *Lichtrequisit* in its enclosure and the light patterns resulting from its movement on the walls. “This *Lichtrequisit* is an apparatus for the demonstration of light and movement phenomena,” explained Moholy-Nagy in 1930, confirming that the work generated two distinct outputs.⁷⁵ The description of the construction of the *Lichtrequisit*, previously discussed, detailed the manner in which these phenomena were manifested – the movement of the mostly metal surfaces reflecting light away from the rotating object itself, transmitting a two dimensional shadow made by a complex apparatus (Figure 11). Flesch’s *Magic of the Air* and Moholy-Nagy’s *Lichtrequisit*, his relationship to which he described as that of “the sorcerer’s apprentice,” demonstrated the magical powers of their requisite apparatuses to transform artistic input via technological means.⁷⁶

⁷⁴ Flesch, 28. See translator’s notes.

⁷⁵ Moholy-Nagy, “Lichtrequisit Einer Elektrischen Bühne,” 297.

⁷⁶ Moholy-Nagy, *The New Vision and Abstract of an Artist*, 80. Joyce Tsai connects Moholy-Nagy’s description to the contemporary release of Disney’s *Fantasia* (1944) and Mickey Mouse as the Sorcerer’s Apprentice. Tsai, “The Sorcerer’s Apprentice: László Moholy-Nagy and His Light Prop for an Electrical Stage,” 301.

The transmitted *Hörspiel* could *only* exist in the radio: it required a broadcast studio for creation and the auditory limitation of the receiver for reception.⁷⁷ In contrast, *Sendespiele* were usually adapted theatrical versions of old masters like Goethe, Schiller, Shakespeare, and were occasionally performed in full costume in a purpose constructed broadcast studio.⁷⁸ Since Weimar radio was broadcast live, *Hörspiele* productions were always unique and often ephemeral.⁷⁹ The few recordings of early *Hörspiele* that do exist are seldom (if ever) of the work's debut, a shame, as *Hörspiele* were an intrinsic part of the balancing act that Gilfillan suggests made German radio successful.⁸⁰ As a result of technological experimentation broadcast over state controlled airwaves, the *Hörspiel* married the two poles of German radio history in a manner which supported one of the goals of RRG programming directors: to position Weimar radio as an antidote to the unsettling effects of modernization.

Not only did broadcast radio educate and entertain the public, it did so at home – emphasizing an important facet of what the Nazi Party would later market as *Heimat*, the place where one feels safe, secure, and understood. Von Saldern makes a brief mention of this, suggesting that broadcasts targeted at specific groups such as housewives, young people, and farmers were intended to help listeners “cope with the challenges of modernity,” from the security of the home.⁸¹ Führer explains this further:

...listeners should feel released from the “exhausting restlessness” of modern life [and]

⁷⁷ Mark E. Cory differentiates between Weimar *Hörspiele* that retained a literary model, despite utilizing various radio technologies to symbolic or emotive ends, and those that began outside the box of conventional literature, sometimes invoking the terms acoustical portrait or acoustic film. Mark Ensign Cory, *The Emergence of an Acoustical Art Form: An Analysis of the German Experimental Hörspiel of the 1960's* (Lincoln: University of Nebraska Press, 1974), 11.

⁷⁸ Joachim-Felix Leonhardt et al., eds., *Medienwissenschaft, 2. Teilband : Ein Handbuch Zur Entwicklung der Medien und Kommunikationsformen* (De Gruyter, Inc., 2001), 1490, <http://ebookcentral.proquest.com.proxy.cc.uic.edu/lib/uic/detail.action?docID=453779>. Costumes were worn to heighten the suggestive power of the performance, despite the fact that the audience had no way of knowing (short the clinking of a sword) that they were actually there. This underscores the rigid nature of the *Sendenspiel*: even denied visual reception, the work remains ocular and auditory. Despite the limitation, *Sendespiele* were immensely popular in early Weimar radio: around 600 works from 280 authors were broadcast by 1926.

⁷⁹ The few recordings that were made after 1929 when the technology became available were made on wax and never transferred to more durable celluloid.

⁸⁰ Gilfillan, *Pieces of Sound: German Experimental Radio*, 46.

⁸¹ von Saldern, “Volk and Heimat Culture in Radio Broadcasting during the Period of Transition from Weimar to Nazi Germany,” 317.

so their houses should become “home,” providing shelter not just from the rigors of the climate but also from the psychological perils of modern society, with its tendencies toward superficiality and anonymity.⁸²

Weimar radio's success in realizing these virtuous (if somewhat paternalistic) goals is debatable, but this high road was paved with the good intentions of classical music, educational lectures, and programming to both unify and celebrate the diversity of German culture. Führer describes this as “defensive modernization:” the task of Weimar radio to strengthen regional identities, satiate the urban longings of those in rural areas, and deliver audience members from the “complete mechanization” of everyday life.⁸³ This was an enormous set of expectations for a fledgling medium that Brecht surmised must still “create for itself a mass need.”⁸⁴

To achieve these stabilizing and educational goals, programming diversity increased. In 1926 Deutsche Welle introduced programs for homemakers and 1927 audiences heard the first broadcast of local government.⁸⁵ Production of *Sendespiele* and *Hörspiele* increased dramatically in the early 1930s with an estimated 460 true *Hörspiele* produced in 1932.⁸⁶ Many contemporary authors rose to the challenge of expanding radio programming including WWI-focused playwright Ernst Johannsen, naturopathic physician, author, and communist agitator Friedrich Wolf, journalist, lyricist, and author Eduard Reinacher, author Walter Benjamin, who wrote and delivered almost 100 broadcasts between 1927 and 1933, and Brecht.⁸⁷

⁸² Führer, “A Medium of Modernity? Broadcasting in Weimar Germany, 1923-1932,” 729.

⁸³ Führer, 730. The irony of this most modern of technologies delivering its listeners from modernization is not lost on Führer.

⁸⁴ “Young Drama and the Radio,” 1926 in Brecht, *Brecht on Film and Radio*, 33.

⁸⁵ “Radio ist da,” accessed January 14, 2019, www.radio-museum.de/geschichte-1923.php. Despite the similarity in names, Deutsche Welle gmbH has no relation to the contemporary Deutsche Welle international public broadcasting service, which was founded in 1953.

⁸⁶ Leonhardt et al., *Medienwissenschaft, 2. Teilband : Ein Handbuch Zur Entwicklung der Medien und Kommunikationsformen*, 1490. Production would shift in nature, if not substantially in number, with the Nazi takeover of German radio in 1933.

⁸⁷ For Benjamin's fascinating broadcasts now translated into English, see Walter Benjamin, *Radio Benjamin*, ed. Lecia Rosenthal, trans. Jonathan Lutes, Lisa Harries Schumann, and Diana K. Reese (Verso Books, 2014), EPUB PDF.

Benjamin contributed little to the true *Hörspiel* count, but greatly to the diversity of programming: he wrote for children, youths, the working class, and the intelligentsia. His *Hörmodelle* (listening models) offered coaching advice for practical situations, for example, asking for a pay raise, and he envisioned these brief lessons as “us[ing] the new medium of radio to teach the listener certain practical techniques for typical conflict situations of modern life.”⁸⁸ Benjamin’s works for the radio paralleled the experimental and philosophical directions of his friend Brecht, by explicitly acknowledging the nature and limitations of the medium, attempting to educate rather than passively entertain the audience, and, in the case of his *Hörmodelle*, encouraging audience interaction with the apparatus.⁸⁹ In his correspondence, Benjamin consistently refers to his radio works as financially necessary, and to this practical end he wrote and performed more than 75 between 1927 and 1933, many for children, and most without archiving the scripts.

Yet despite the diversity of programming, Weimar radio’s growing audience remained mostly urban and bourgeois. Deutsche Welle, the central broadcasting station available nationwide was essentially a “college on the air” of educational lectures, with more audience specific programming choices left to the individual Länder stations. Given that the vast majority of programming on local stations was of *ernste Musik* (serious music) and due to the relative expense of receivers capable of capturing more than one station, many proletarian families could only tune in to the single local offering – usually classical music, with the occasional *Sendespiel*, *Hörspiel*, or educational lecture.⁹⁰ In short, the lack of popular culture broadcasting, combined with the relatively high cost of owning a receiver, meant that many working class families either shunned Weimar radio, or tried and then turned off the medium.⁹¹ As a result it is no surprise that Brecht, whose enthusiasm for the radio is evident from his

⁸⁸ Notes to “A Pay Raise?! Whatever Gave you That Idea,” 1931 in Benjamin, *Radio Benjamin*, 390. The full text of this “Listening Model” is included and begins on page 370.

⁸⁹ Benjamin, 22.

⁹⁰ Führer, “A Medium of Modernity? Broadcasting in Weimar Germany, 1923-1932,” 744.

⁹¹ Führer, 751.

writings and who viewed the struggle of the proletariat as crucial to social (and artistic) evolution, also viewed radio as flawed: a fledgling medium that must find “its purpose in life.”⁹² There is also the irony that Brecht envisioned subversive potential for a medium that was to become, first for Hitler and later for Adorno and Horkheimer, a medium of subjugation.⁹³

Many Berlin literati were communists or at least sympathetic to the communist movement; Brecht read *Das Kapital* in 1926 and although he never explicitly professed an allegiance, he noted that “[w]hen I read Marx's *Capital* I understood my plays...It wasn't of course that I found I had unconsciously written a whole pile of Marxist plays; but this man Marx was the only spectator for my plays I'd ever come across.”⁹⁴ Rather than contribute his political critique to the weekly *Die Weltbühne* magazine, like so many of his Romanische Café contemporaries, Brecht wrote his politics in plays and local newspaper articles.⁹⁵ In “The Radio as a Communications Apparatus” (1932) Brecht returned to his ideas of 1927, now with the language of *Das Kapital*:

...the radio should step out of the supply business and organize its listeners as suppliers. Hence, any attempt by the radio to give a truly public character to public occasions is absolutely positive. Our government needs the activity of the radio as much as our court system does. If government or justice resist such activity, they are afraid and suitable only for the times prior to the invention of the radio, if not even prior to the invention of gunpowder...Radio must make exchange possible. It alone can organize the major discussions between business sectors and consumers about the norms for consumer

⁹² “The Radio as a Communications Apparatus,” 1932, Brecht, *Brecht on Film and Radio*, 42.

⁹³ In an unpublished text from 1927, Brecht wrote “The bourgeoisie judges them only according to the opportunities it can naturally derive from them...No one bother with results. They just stick to the possibilities. The results of the radio are shameful, its possibilities are ‘boundless.’ Hence the radio is a ‘good thing.’ It is a very bad thing.” “Radio - An Antediluvian Invention?” 1927, in Brecht, 37. Max Horkheimer and Theodor W. Adorno, “The Culture Industry: Enlightenment as Mass Deception,” in *Dialectic of Enlightenment*, trans. John Cumming (New York: Continuum, 1989). Focuses on the American privatized radio business, which was (and remains) different from the state-owned German system.

⁹⁴ Bertolt Brecht, *Brecht on Theatre: The Development of an Aesthetic*, ed. John Willett (London: Eyre Methuen, 1964), 23.

⁹⁵ *Die Weltbühne* was the premier weekly journal of left wing politics. Taylor describes it: “*Die Weltbühne* became the rallying-point for an astonishing variety of writers, Marxists and non-Marxists alike, who saw in some form of socialism the young Republic's only hope of survival.” Ronald Taylor, *Berlin and Its Culture: A Historical Portrait* (New Haven: Yale University Press, 1997), 212. As for Brecht's Marxism: “When other playwrights brought him copies of their manuscripts, he presented them with copies of *The Communist Manifesto* and told them to reconsider their work in terms of ‘scientific socialism.’” Otto Friedrich, *Before the Deluge: A Portrait of Berlin in the 1920's* (New York: Avon Books, 1972), 308.

goods, the debates about raising the price of bread, the disputes in municipalities.⁹⁶

Brecht's view of the radio as political and economic mediator and the "emancipatory power" of technology were ideals that he shared with Walter Benjamin.⁹⁷ The two were typical of the mid-1920s Berlin avant-garde, writes Roswitha Mueller in her analysis of Brechtian Media Theory, with their "attack on established art, a gradual politicization of art, and the belief in the beneficial influence that technological media – film and radio – would exert on the transformation of social values."⁹⁸ Furthermore, Benjamin believed that radio was uniquely able to "take advantage of established cultural goods," and to adapt cultural forms (such as rewriting theater productions as *Sendespiele*) through a combination of technology and market awareness in a manner that would overrun its "well-meaning, humanistic intentions."⁹⁹ Brecht similarly suggested that a "direct collaboration between theatrical and radio performances could be organized," which would bring the public at home closer to the theater and vice versa.¹⁰⁰

Many of the Berlin leftists/Marxists, such as Brecht and Benjamin, viewed technological advances such as film, radio, and photography as concomitant with social transformation, which was also great at the end of WWI.

[T]he presentation of reality in film is incomparably the more significant for people of today [in regard to painting], since it provides the equipment-free aspect of reality they are entitled to demand from a work of art...

⁹⁶ "The Radio as a Communications Apparatus," Brecht, *Brecht on Film and Radio*, 42.

⁹⁷ Roswitha Mueller, *Bertolt Brecht and the Theory of Media* (Lincoln, NE: University of Nebraska Press, 1989), 13.

⁹⁸ Mueller, 5.

⁹⁹ "Audience demands when the audience is a contemporary of said technology." "Theater and Radio," 1931 in Benjamin, *Radio Benjamin*, 465. "On the strength of its unprecedented technological potential to address unlimited masses simultaneously, popularization has outgrown its well-meaning, humanistic intentions and become an endeavor with its own formal laws..." "Two Kinds of Popularity," 1932, Benjamin, 468. Interestingly, Benjamin himself participated in the broadcast of almost all his radio works.

¹⁰⁰ Brecht, "The Radio as an Apparatus of Communication," 1932 in Brecht, *Brecht on Film and Radio*, 44.

wrote Benjamin in 1936, summarizing at least a portion of his thought concerning the relations between technology and society.¹⁰¹ Benjamin was a member of the “G group” during the mid-1920s in Berlin: a consortium of artists and authors including Ludwig Mies van der Rohe, László Moholy-Nagy, Hans Richter, and El Lissitzky, who published the journal *G*.¹⁰² Benjamin examined the possibilities offered to the cultural field by rapid advances in science and technology during this period. “The Work of Art in the Age of Mechanical Reproduction” offers a complex assessment of this situation, concluding that technology irrevocably alters the senses and that which is created to appeal to them. Despite (or perhaps because of) this, Benjamin and many of the Berlin intellectuals embraced scientific and technological advances: Max Planck and Albert Einstein were presences at the local universities. Berlin received its first television broadcast in 1929, and the troubled Weimar Republic bolstered its self-confidence by producing the fastest vehicles and creating a faultless national rail system.¹⁰³

Not surprisingly, contemporaneous right-wing theorists attempted to reconcile technological advances with pastoral German nationalism, creating the paradox of thought that Jeffery Herf describes as “reactionary modernism” and considers crucial to the success of the Nazi party.¹⁰⁴ Aligning themselves with technological advancement and the romanticism of German *Kultur*, the reactionary modernists

...taught the German Right to speak of technology *and* culture. Reactionary modernism was not primarily a pragmatic or tactical reorientation, which is not to deny that it transformed military-industrial necessities into national virtues. Rather, it incorporated modern technology into the cultural system of modern German nationalism, without diminishing the latter's romantic and antirational aspects.¹⁰⁵

¹⁰¹ “The Work of Art in the Age of Mechanical Reproduction, Version 2,” Walter Benjamin, *Walter Benjamin: Selected Writings, Volume 3, 1935-1938*, ed. Howard Eiland and Michael Jennings, trans. Edmund Jephcott and Howard Eiland (Cambridge: Belknap Press, 2002), 116. Written 1935-36, unpublished during his lifetime.

¹⁰² The journal *G* was published from 1923-1926.

¹⁰³ Walter Laquer, *Weimar: A Cultural History 1918-1933* (London: Weidenfeld and Nicolson, 1974), 34.

¹⁰⁴ Jeffrey Herf, *Reactionary Modernism: Technology, Culture, and Politics in Weimar and the Third Reich* (Cambridge: Cambridge University Press, 1984), 3. Herf names Hans Freyer, Ernest Jünger, Carl Schmitt, Werner Sombart, and Oswald Spengler, and Martin Heidegger as paragons of this movement.

¹⁰⁵ Herf, 2.

According to Arnolt Bronnen, a one-time Brecht collaborator and National Social party member, radio technology had the potential to protect, preserve, and inspire German culture, despite the “shameless gang of literary writers” who attempted to wrench it from “service to the nation.”¹⁰⁶ The Nazi party wasted no time deploying propagandistic radio programming in 1933, a task made easier by the established state-ownership of all German radio stations. The introduction of the radio receiver Volksempfänger VE-301 (“the people’s radio”) that same year dramatically increased radio reception by making the receivers financially accessible to most of the population.¹⁰⁷

But during the brief and contentious period of the Weimar Republic, unanimous political support for radio meant that the medium enjoyed a period of rapid growth, especially among the educated middle class. While Brecht, Benjamin, and other dedicated Marxists focused in large part on the proletariat, early German radio’s high cost and high-brow programming alienated many workers, a fact which would make the Nazi’s campaign of popular music and affordable receivers even more appealing.¹⁰⁸ In 1932, when Brecht published his final essay on the subject of radio, he addressed the medium’s “purpose in life” and argued that by its re-functionalization (*Umfunktionierung*) it *could* become “the finest possible communications apparatus in public life;” an optimistic potential resulting from “...constant, never-ending suggestions about better applications of the apparatus in the interest of the many...[intended to] shake up the social bases of these apparatuses and discredit their application in

¹⁰⁶ Arnolt Bronnen, “Radio Play or Literature,” *Deutsche Allgemeine Zeitung* no. 457 (October 1929), in Anton Kaes, Martin Jay, and Edward Dimendberg, eds., *The Weimar Republic Sourcebook* (Berkeley: University of California Press, 1994), 611.

¹⁰⁷ By 1938 50% of German households owned a receiver. The Volksempfänger was deliberately capable of receiving only local (German) stations.

¹⁰⁸ Führer argues that “In treating light music and entertainment in general as marginal to radio programs, Weimar radio executives placed the wishes of a small educated minority above those of the greater population. That Weimar broadcasting attracted relatively few listeners among proletarian families cannot therefore be ascribed exclusively to economic factors. Many workers were disappointed by the offered programs and turned their backs on the new medium for that reason.” Führer, “A Medium of Modernity? Broadcasting in Weimar Germany, 1923-1932,” 751.

the interest of the few.”¹⁰⁹ Brecht’s interest at this point was in the radio as a technology capable of restructuring the social order.

The multi-faceted radio apparatus, with its ability to activate the listener as a participant, could assist and (if not solely) facilitate social change – a measured and pragmatic view of technology informed by Brecht’s chosen social sphere. It was a vision shared in many parts by other members of the Berlin artist/café culture – notably a polymath named László Moholy-Nagy, who had preceded Brecht in his cultivation of Berlin contacts and then decamped the city for a new school in Weimar known as “Das Bauhaus.” More prone to grandly optimistic prognostication than his younger counterpart, the Hungarian professor with awkward German theorized and constructed apparatuses in pursuit of a “...DYNAMIC-CONSTRUCTIVE SYSTEM OF FORCES...attained whereby man, hitherto merely receptive in his observation of works of art, experiences a heightening of his own faculties, and becomes himself an active partner with the forces unfolding themselves.”¹¹⁰

Moholy-Nagy Joins Berlin

It was radio communication that László Moholy-Nagy needed at the Battle of Isonzo in 1916 – the order to retreat might have saved his battery, but instead “I had no orders [to withdraw]...from the floor I heard the Italians drill through the rock, and behind my back I heard the men loosen the safety catches on their guns.”¹¹¹ The memory of the fear that he felt at this moment remained with Moholy-Nagy through his life – and it was often activated as a motivating force during moments of intensity. The young Hungarian’s experience of the war was markedly different than Brecht’s: Moholy-Nagy saw the power of war technology in action. Brecht experienced the Auxiliary Army Hospital in Augsburg as an

¹⁰⁹ “The Radio as a Communications Apparatus,” 1932, in Brecht, *Brecht on Film and Radio*, 42, 45.

¹¹⁰ Moholy-Nagy, “Dynamisch-konstruktives Kraftsystem,” 1922, translated in Passuth, *Moholy-Nagy*, 290.

¹¹¹ Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 82.

orderly while Moholy-Nagy was the only member of his battery to even make it to a hospital bed, where he spent months battling infection and drawing with grease pencil on any paper available. In 1922, contemplating the power and purpose of the machine, Moholy-Nagy wrote:

Everyone is equal before the machine. I can use it, so can you. It can crush me; the same can happen to you. There is no tradition in technology, no class-consciousness. Everybody can be the machine's master, or its slave...Look around: the people are not happy in spite of the machine. Well-being is caused by the spirit that animates technology; it is a socialism of the mind, a dedication to the spirit of the group. Only a proletariat awakened to this grasp of essential communality can be happy.¹¹²

He was a communal in spirit, not a card-carrying member of the communist party, and his belief in the potential of new technology made him an ideal candidate for the faculty of Walter Gropius' newly reorganized Bauhaus: "Art and technology – a new unity" declared Gropius at the opening of the 1923 Bauhaus Exhibition in July.¹¹³ Moholy-Nagy joined the faculty in the spring of that year, replacing Johannes Itten (and his devotion to the metaphysical) with pragmatic ideas for the creation of useful objects such as functional metal lighting fixtures.¹¹⁴ Moholy-Nagy relocated to Weimar in 1923, a year before Bertolt Brecht arrived in Berlin.¹¹⁵ When Gropius was dismissed from the school in 1928, Moholy-Nagy tendered his resignation and returned to the capital, where he worked as a publication and exhibition designer, lectured, made films, exhibited locally and internationally, and was hired as a stage designer for both the Krolloper under Otto Klemperer and Erwin Piscator's theater.¹¹⁶

¹¹² László Moholy-Nagy, excerpt from "MA" article, May 1922, translated in Moholy-Nagy, 19.

¹¹³ Biographer Krisztina Passuth notes that in his late teens and early 20's, Moholy-Nagy frequented various philosophical, artistic, and social circles, without ever "feeling at home" in any of them. Moholy-Nagy signed the revolutionary statement of *MA* in 1919, and this early political Hungarian Activist influence was his most demonstrative. Passuth, *Moholy-Nagy*, 14.

¹¹⁴ Itten and his students represented the legacy of German Expressionism and mysticism. Moholy-Nagy, in contrast, was viewed as a "Constructivist," which was "the newest of the new." Paul Citroen, quoted in Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 35.

¹¹⁵ The Bauhaus (including Moholy-Nagy) was forced to move from Weimar to Dessau in 1925 as the local government refused further funding. Instead, the Dessau City Council adopted the Bauhaus as a "City College;" the state of Saxony recognized the college in 1926, the same year that the iconic Bauhaus buildings were opened. See Bauhaus-Archiv Museum für Gestaltung site (https://www.bauhaus.de/en/das_bauhaus/) for further details.

¹¹⁶ Walter Gropius designed a massive "Totaltheater" (1926) for Piscator, in which it would be possible to realize Piscator's version of Epic Theater: an interpenetration of audience and stage which he developed in concert with the ideas of his good friend Brecht. The design was never constructed.

Moholy-Nagy's publications during his pre-Bauhaus Berlin period attest to the path of a young artist – assimilating influences (Dada, Expressionism, Malevich), reacting to contemporaneity, engaging politically, making and breaking connections and allegiances. Written with Alfréd Kemény for the journal *Der Sturm*, “Dynamisch-konstruktives Kraftsystem” (1922) analyzed the faults of some Constructivism – “reduct[ion] either to technical naturalism or to an over-simplification of form limited to the horizontal, the vertical and the diagonal;” despite this, Moholy-Nagy was (and still is) often restrictively identified as a Constructivist. The co-authors posited that a “dynamic-constructive system of forces,” achieved through experimentation and culminating in the “creation of freely moving (free from mechanical or technical movement) works of art” would embody the vital constructivity so inherent in human life.¹¹⁷

Carrying further the unit of construction, a DYNAMIC-CONSTRUCTIVE SYSTEM OF FORCES is attained whereby man, hitherto merely receptive in his observation of works of art, experiences a heightening of his own faculties, and becomes himself an active partner with the forces unfolding themselves.¹¹⁸

Moholy-Nagy and Kemény envisioned an art form which educated the viewer as it was perceived (“heightened their faculties”); this would engender a constructive partnership between the viewer and the forces active in the work.

The short manifesto – written for a publication devoted to culture and art – was not explicitly political, nor did it provide a plan of action save a call to engage with works of art, but the tone and direction of its argument is indicative of the mood of the moment. Moholy-Nagy wrote a lengthier and more political call to artistic action/activation the same year in the Hungarian socialist magazine

Akaszott Ember:

Otto Klemperer conducted performances of *Flug des Lindberghs* and selections from *Dreigroschenoper*, and was a good friend of Kurt Weill.

¹¹⁷ Moholy-Nagy and Alfréd Kemény, “Dynamisch-konstruktives Kraftsystem,” 1922, translated in Passuth, *Moholy-Nagy*, 290. Moholy-Nagy was often referred to as a member of the Constructivist movement and his article “Constructivism and the Proletariat” also published in 1922 in the Hungarian journal *MA* explains his belief that Constructivism is a “fundamental, precise, and all-inclusive,” art with the ability to educate the masses to the unifying potentials of technology. Moholy-Nagy, “Constructivism and the Proletariat,” in Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 19.

¹¹⁸ Moholy-Nagy and Kemény, “Dynamisch-konstruktives Kraftsystem” translated in Passuth, *Moholy-Nagy*, 290.

We who today have become one with the necessity and the condition of class struggle in all respects, do not think it important that a person should find enjoyment in a picture, in music or in poetry. The primary requirement is that those who have not yet reached the contemporary standard of mankind (the current standard of mankind is always the standard of the living artists of a particular period) should be enabled to do so as soon as possible through our work...it is our duty to open all the channels of intuition so that we may influence the maximum number of people.¹¹⁹

It lacks the hyperbole of “Dynamisch-konstruktives Kraftsystem” – instead the *Akasztott Ember* article reveals the Marxist influence which informed Moholy-Nagy's early egalitarian desire for heightened human perception. Biographer Krisztina Passuth attributes Moholy-Nagy's belief in the revolutionary power of art to the Hungarian Activists, who envisioned the liberation and self-realization of humanity through artistic/social revolution.¹²⁰ Under the title of “On the Problem of New Content and New Form,” Moholy-Nagy justifies the role of the visual arts and argues for collaboration between “all of us who are fighting for the realization of a communist way of life” as an argument against the literary preference of the *Akasztott Ember* editor, Sándor Barta.¹²¹ Intrinsic to his argument is Moholy-Nagy's assertion that new directions in art occur simultaneously with new social orders and that a variety of channels (architecture, painting, spatial constructions, etc) are necessary to appeal to the varied tastes, and hence receptivities of the population.

The revolutionary language of “On the Problem...” is also present in a 1923 “Manifesto” signed by both Moholy-Nagy and Kemény, published in the Hungarian journal *Egység* (“Unity, Literature, Art”) which describes the responsibility of the artist to join the communist party and “fight alongside the proletariat.”¹²² Moholy-Nagy omitted direct references to “class struggle” and the “proletariat” from most of his writings after the early 1920s, instead focusing on cultural and ethical revolutions, for which his belief in the socio-political power of art to unify the individual and collective was unrelenting. His

¹¹⁹ Moholy-Nagy, “On the Problem of New Content and New Form,” 1922, translated in Passuth, 287.

¹²⁰ Passuth, 10.

¹²¹ Moholy-Nagy, “On the Problem of New Content and New Form,” 1922 in Passuth, 288.

¹²² Moholy-Nagy et al, “Manifesto,” 1923, translated in Passuth, 289.

final “pedagogic testament,” *Vision in Motion*, published posthumously in 1947, begins with the assertion that humanity must release itself from the symbolic “accretions” of history and dynamically balance its intellectual, emotional, social, and technological elements.¹²³ The intervening years softened Moholy-Nagy's political vocabulary, yet *Vision in Motion* is no less sweeping in its scope while simultaneously presenting a concrete plan:

...this book is an attempt to add to the politico-social a biological “bill of rights” asserting the interrelatedness of man's fundamental qualities...It proposes that new tools and technologies cause social changes; that they shift ways of production, possessions, wealth, and power; yet though the inevitable logic of new technologies, offering easy advantages for labor saving and profit making, is willingly accepted on pragmatic intellectual terms, it is stubbornly opposed in the emotional sphere, where man clings to obsolete standards and empty conventions of the past, unapproachable by logical argument and often against his best interests...The goal is to make available to everyone the ways of expression which culminate in the arts...The contemporary arts try to establish a new morality and new ethics not hampered by metaphysical absolutes...my hope is that the principles and the scope of [the Institute of Design, Chicago]'s program as outlined in this volume...will become an incentive to our whole general education, from the kindergarten to the university.¹²⁴

Moholy-Nagy's emphasis on the unique ability of art to catalyze humankind's growth and assimilation of new technologies did not waver, it solidified into the program that he designed for the New Bauhaus/Institute of Design in Chicago which opened in 1937.¹²⁵ “For the Moholy [sic] of the New Bauhaus it is only through a ‘new vision’ retooled technologically and applied practically that ‘the whole man’ might be remade,” writes Hal Foster, recounting Moholy-Nagy's amendments to rather than rewriting of the original Bauhaus *Vorkurs*, including the terminology of “designer” rather than “artist.”¹²⁶

“Dynamisch-konstruktives Kraftsystem” was the fiery manifesto which set forth a radical reconceptualization of art's potential and energetic integration based on contemporary theories: and as

¹²³ Hubertus von Amelnxun “Educator, Modulator and Integrator,” in Rubio et al., *László Moholy-Nagy*, 138. Moholy-Nagy, *Vision in Motion*, 10–12.

¹²⁴ Moholy-Nagy, *Vision in Motion*, 9.

¹²⁵ For a nuanced discussion of Moholy-Nagy's first school in Chicago, see Robin Schuldenfrei “Assimilating Unease: Moholy-Nagy and the Wartime/Postwar Bauhaus in Chicago,” in Robin Schuldenfrei, ed., *Atomic Dwelling: Anxiety, Domesticity, and Postwar Architecture* (Thomas Routledge, 2012).

¹²⁶ Hal Foster, “The Bauhaus Idea in America,” in *Albers and Moholy-Nagy: From the Bauhaus to the New World*, by Achim Borchardt-Hume (New Haven: Yale University Press, 2006), 97.

such, underscored the motivations of its authors. Earlier in time and more idealistic in temperament than Brecht, the Marxist foundation of Moholy-Nagy and Kemény's argument is informed by international dialog and theory rather than interaction with the urban proletariat. In this vein Moholy-Nagy scholar Oliver A. I. Botar suggests that the very idea of “dynamic-constructivity” is a reworking of Alexander Bogdanov's “tectology” – and the distinction is evident in Moholy-Nagy's desire to fight “alongside the proletariat,” rather than identify as a proletarian himself.¹²⁷ Moholy-Nagy's Marxism, in some ways similar to Brecht's, venerated the working class without supporting radical systemic change: both attempted a reworking/reconception of the system from within, through experiments and alterations to the status quo – Brecht produced (avant-garde) works for the radio and theater, Moholy-Nagy for the gallery and press, and neither sought to radically overthrow these paradigms.¹²⁸ Both visually presented their identification with the working class through style of dress – Brecht with his leather jacket and stubble, Moholy-Nagy with his fisherman's coverall (Figures 1-2).¹²⁹

In contrast to “Dynamisch-konstruktives Kraftsystem,” Moholy-Nagy's essay “Produktion-Reproduktion,” published the same year in *De Stijl*, was a prescient research plan for much of the work that he and his students would soon undertake at the Bauhaus. The essay suggests a remarkably nuanced potential for the application of technological apparatuses, asserting that a person will be contemporaneously “most perfect” if their sensory functions are “conscious and trained to the limit of

¹²⁷ Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 81.

¹²⁸ To this end, Moholy-Nagy's career as a professor and later leader of the new Bauhaus led to new ideas of art/design education as did Brecht's conception of *Verfremdung* and Epic Theater. However, both men worked within (and with) an existing structure. Training or performances were never offered without a price, indeed, the training of the Institute of Design was explicitly intended to teach design of consumer goods and architecture.

¹²⁹ Robin Schuldenfrei, “Images In Exile : Lucia Moholy's Bauhaus Negatives and the Construction of Bauhaus Legacy,” *History of Photography* 37, no. 2 (May 2013): 189. In her discussion of Lucia Moholy's iconic image and her capture of Moholy-Nagy's “character” as that of the “Monetist/artist-constructor” Schuldenfrei underscores the importance of the coverall as costume of the desired persona.

their capacity," a job performed by suitably avant-garde art which forces the senses to assimilate new phenomena and relationships.¹³⁰ Here Botar notes, "the argument takes an interesting twist:"

Since it is primarily production (productive construction) that serves human construction, we must strive to turn the apparatuses (instruments) used so far only for reproductive purposes into ones that can be used for productive purposes as well.¹³¹

Moholy-Nagy elaborated further, analyzing the latent potentialities in phonographic, photographic, and filmic instruments, and offering examples of experiments undertaken, finally suggesting directions for the future expansion of each medium. Botar describes the essay as "starkly biologicistic and functionalist, based on a certain understanding of positivistic scientific theory, proposing laboratory research and tinkering rather than artistic inspiration and creation."¹³² It is the writing of an artist unrepentingly engaged with technological experimentation, yet Moholy-Nagy's interest was ultimately humanistic rather than communistic: the "mechanistic phenomenon," correctly applied, would facilitate the growth, adaptation, and faculties of humankind rather than serve a merely technophilic urge.¹³³

In "Produktion-Reproduktion," Moholy-Nagy's hypothesis for the potential of an apparatus deployed through artistic means is remarkably similar to Brecht's conclusion in 1932 that "radio must be transformed from a distribution apparatus into a communications apparatus." Moholy-Nagy was influenced by Raoul Hausmann's 1922 article "PRÉzentismus," which called for "an electric, scientific painting" inspired by the colored light experiments of Thomas Wilfred and the "sound experiments of German and American radio stations;" so in contrast to Brecht, he was aware of early radio experimentation.¹³⁴

¹³⁰ Moholy-Nagy, "Produktion-Reproduktion," 1922, translated in Passuth, *Moholy-Nagy*, 289. In German, Moholy-Nagy chooses the term "Apparat" appending a parenthetical "Mittel" to it in his list of questions. Mittel refers to a medium, instrument, or even appliance.

¹³¹ Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 41. Moholy-Nagy, "Produktion-Reproduktion," in Passuth, *Moholy-Nagy*, 289.

¹³² Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 42.

¹³³ Steven Mansbach, *Visions of Totality: Laszlo Moholy-Nagy, Theo Van Doesburg, and El Lissitzky* (Ann Arbor: UMI Research Press, 1980), 27.

¹³⁴ Raoul Hausmann, "PRÉzentismus," 1 Feb 1922, quoted in Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 103. Moholy-Nagy sent a copy of Hausmann's article to MA for publication.

Moholy-Nagy employed a variety of media as examples In “Produktion-Reproduktion” – the phonograph, photography, and film – and his conception of these apparatuses is through the interrogation of their use value and essence of function: in Moholy-Nagy's analysis, each medium currently functions to reproduce – Brecht describes this as distributing. Instead of this reproduction, Moholy-Nagy suggests manners in which each can function productively; for Brecht this is the goal of communication exchange.¹³⁵ In the instance of the phonograph, Moholy-Nagy suggested hand-incising record grooves,

...without any external mechanical means, which then produce sound effects which would signify – without new instruments and without an orchestra – a fundamental innovation in sound production (of new, hitherto unknown sounds and tonal relations) both in composition and musical performance.¹³⁶

Moholy-Nagy envisioned a radical reconfiguration of the relation between human and the apparatus – the grooves imperfectly incised by hand and sound produced by a machine, rather than a voice or instrument. The results would be unpredictable “hitherto unknown sounds,” the experience of which would further human sensory expansion and capabilities; earlier in the same article, Moholy-Nagy posited that art which produces new relations is a form of training the indefatigable functional apparatuses of the human system to the limits of their capacity, at which point, they are “most perfect.”¹³⁷

Brecht's suggestions for the goals of the radio apparatus as demonstrated by the Baden-Baden presentation of *Der Lindberghflug* were generally in agreement with Moholy-Nagy's desire to use the

¹³⁵ This parallels the argument of media scholar Sjoukje van der Meulen in her comparison of Brecht's radio apparatus to the photography apparatus of Vilém Flusser: “the basic argument that technical media are not merely apparatuses but means of communicating information is essentially the same.” This is not an attempt to lump similar terminology: van der Meulen proves that Flusser's example of photography is meant to be paradigmatic of all contemporary technical apparatuses: rather than create a synecdoche, Moholy-Nagy lists the ways in which the technical aspects of the phonograph, photograph, and film camera might be further developed to produce rather than reproduce. Sjoukje Van der Meulen, “Between Benjamin and McLuhan: Vilém Flusser's Media Theory,” *New German Critique* 37, no. 2 (Summer 2010): 190.

¹³⁶ Moholy-Nagy, “Produktion-Reproduktion,” 1922 in Passuth, *Moholy-Nagy*, 289.

¹³⁷ Moholy-Nagy, “Produktion-Reproduktion,” in Passuth, 289.

apparatus as a pedagogical device. Rather than training the individual's senses however, Brecht saw the potential for educating the listener about their agency within larger political and/or cultural systems. This evolving position developed via Brecht's observation of broadcast radio even as he produced generalist *Hörspiel* and *Sendespiel* works until 1932, his most experimental work (*Der Flug der Lindberghs*) having been written in 1929. Brecht's summary of radio's potential ("The Radio as a Communications Apparatus," 1932) occurred at the end of his production for the medium and so its conclusions remained untested.

In contrast, between 1922 and 1930 Moholy-Nagy theorized and constructed the *Lichtrequisit* and for the next 16 years (until his death in 1946), used the *Lichtrequisit* and the concomitant film *Ein Lichtspiel: schwarz weiss grau* (1930) as examples in publications and as touchstones for works of both photography and sculpture. In his final (posthumous) publication, he referred to the *Lichtrequisit* as the fifth and final form of sculpture, "the mobile:"

In the successive stages of sculptural development the main characteristic is the reduction and lightening of the heavy mass so that even the normal characteristics of the material disappear. This is most effectively realized in the "mobile" moving sculpture... the original phenomenon of sculpture – the elements of which equaled material plus mass relationships – becomes dematerialized in the abstract formula: sculpture equals volume relationships.¹³⁸

Moholy-Nagy had constructed an example of this final stage of sculpture half-way through his career: the *Lichtrequisit* was an apparatus of experimentation and growth rather than a culminating theory.

Light at the Bauhaus

While the *Lichtrequisit* was both ideologically and to an extent architectonically conceived in 1922, Moholy-Nagy's time as professor at the Bauhaus (1923-1928) was the gestation period of the work. Moholy-Nagy reorganized the Bauhaus metal shop into a production line, for which students were

¹³⁸ Moholy-Nagy, *Vision in Motion*, 237.

assigned to develop prototypes such as Wilhelm Wagenfeld and Carl Jucker's *Table Lamp* (1924) (Figure 12). Lighting and the artistic potential of this contentless medium surrounded him at the Bauhaus – it was also in Weimar that his intentions for the *Lichtrequisit* were influenced by the projected light and color experiments of Ludwig Hirschfeld-Mack and Kurt Schwerdtfeger and the photograms with which he and Lucia had begun to experiment in 1922.¹³⁹ “Records of orchestrated darkroom performances,” from 1923 on the Moholy-Nagy's created photograms to capture the motion of manipulated objects and light – technically possible through the use of darkroom-specific developing-out paper (Figure 13).¹⁴⁰

Moholy-Nagy wrote of the works:

The photogram appears to be a bridge leading to new visual creation for which canvas, paint-brush and pigment cannot serve, but only through [sic] reflecting play of light, with 'lighting frescoes.'...Light is captured as it fluctuates and oscillates in its own radiation almost without any transmission.¹⁴¹

The photograms might have “captured” rather than “created” as the *Lichtrequisit* later would, but Moholy-Nagy's pattern of innovation paired with informed experimentation as represented by the photograms foreshadows the conception and use of the *Lichtrequisit*. Moholy-Nagy used similar vocabulary when speaking of both the photograms and the *Lichtrequisit*: the “reflecting plays of light,” light's “fluctuations,” and “oscillations.” While it is tempting to extrapolate the photogram's “reflecting plays of light” further – to be the motivation for certain mechanical actions of the *Lichtrequisit* – such a leap is unwise, as Moholy-Nagy would later confess: although he anticipated the effects produced by the *Lichtrequisit*, the apparatus surpassed his expectations, leaving him to feel as the “sorcerer's

¹³⁹ Moholy, *Marginalien zu Moholy-Nagy / Moholy-Nagy Marginal Notes*, 80. Earlier in the book Moholy asserts that the photograms of the Moholy-Nagy's were arrived at through independent means - unaware of similar techniques employed by Man Ray, Christian Schad, and El Lissitzky. (59)

¹⁴⁰ Julie Barten, Sylvie Pénichon, and Carol Stringari, “The Materialization of Light,” Witkovsky, Eliel, and Vail, *Moholy-Nagy: Future Present*, 189. The cheaper alternative of printing-out paper requires strong light (usually sunlight) for exposure and is not capable of capturing motion in the same way that developing-out paper is.

¹⁴¹ Moholy-Nagy, “Fotogramm und Grenzegebiet,” 1929, translated in Passuth, *Moholy-Nagy*, 305.

apprentice.”¹⁴² Edit Tóth writes that some of the photograms read as “condensed visual parallel[s] to a jazz performance,” a forerunner to the *Lichtrequisit* in their improvisatory nature and visual effects.¹⁴³

In the darkrooms of the Bauhaus Moholy-Nagy and Lucia were able to fully explore the potential of the photogram medium. The combination of facilities and artistic community was particularly important for Moholy-Nagy, who was most productive and innovative in a collaborative and conversational work environment. He was prone to the use of the word “we” and ideas of collectivity and totality: Moholy-Nagy thought first in terms of what, how, and the impact of, an accomplishment rather than of who might have done it.¹⁴⁴ He would describe this communality as *Gesamtwerk* (complete work), in 1925's *Painting Photography Film*: “the all-embracing *Gesamtwerk* (life) which abolishes all isolation, in which **all individual** accomplishments proceed from a biological necessity and culminate in a **universal** necessity.”¹⁴⁵ In her biography of her husband, Sibyl Moholy-Nagy described the friction caused by his conceptual freedom:

...charges of artistic plagiarism, leveled against Moholy [sic] by some of his colleagues. He was accused of taking someone else's concept and developing it into a new form, a new theory, a new workshop exercise. But there was nothing less comprehensible to him than the tight grip on an idea. Throughout his life he flung projects and suggestions into the arena, not caring whether anyone else would claim them. He lent carefully compiled lantern slides, his vast collection of prints and clippings, even his own manuscripts, to any friend who had to make a speech or wanted to write a book.¹⁴⁶

Moholy-Nagy explicitly rejected *Gesamtkunstwerk* (total work of art) as limited to the arts, instead the preferable concept of *Gesamtwerk* was the all-embracing expression of the unity of life. Interestingly, Brecht also rejected *Gesamtkunstwerk*, but for opposite reasons: he felt that the arts should be individually appreciated/strengthened rather than fused into a degraded melting pot which would also

¹⁴² Moholy-Nagy, *The New Vision and Abstract of an Artist*, 81.

¹⁴³ Edit Tóth, “Capturing Modernity: Jazz, Film, and Moholy-Nagy’s Light Prop for an Electric Stage,” *Modernism/Modernity* 22, no. 1 (January 2015): 31.

¹⁴⁴ Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 42.

¹⁴⁵ László Moholy-Nagy, *Painting, Photography, Film* (Cambridge: MIT Press, 1987), 17.

¹⁴⁶ Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 42.

consume the spectator.¹⁴⁷ With Moholy-Nagy's belief in communal innovation in mind, it is not surprising that precursory ideas of the *Lichtrequisit* can be seen in the works of other Bauhäusler Kurt Schwerdtfeger and Ludwig Hirschfeld-Mack, although the final form of Moholy-Nagy's work bore little resemblance to these earlier *Lichtspiele*.

Publicly debuted at the 1922 Bauhaus *Lanternenfest*, Schwerdtfeger's projections of colored light through cardboard stencils were manipulated by the artist and his assistants and cast onto transparent surfaces. The *Reflektorische Lichtspiele* were literally "plays of reflected light" and as such were presented to viewers on a screen of fabric or paper. The complex constructions of electric lamps, shutters, and stencils accompanied by the bodies of assistants, artists, and musicians were meant to be effectively "behind the scenes" (Figures 14-15).¹⁴⁸ Perhaps in the spirit of *Gesamtwerk*, Schwerdtfeger's *Lichtspiele*, created with the assistance of Hirschfeld-Mack, proved to be the motivation for further moving works of projected light by Hirschfeld-Mack, particularly those that included colors and music.¹⁴⁹ Hirschfeld-Mack's *Farblichtspiele*, debuted in 1924 during a matinee at the Volksbühne in Berlin, were influenced by his experiences in the movie theaters of Munich in 1912 and presented the audience with an experience barely discernible as a real-time performance.¹⁵⁰

Dr. Peter Stasny describes the experience of Hirschfeld-Mack's audience: located "On the other side of a projection screen, the audience followed the spectacle without their experience being affected

¹⁴⁷ "The Modern Theater is the Epic Theater," 1930 in Brecht, *Brecht on Theatre: The Development of an Aesthetic*, 37–38.

¹⁴⁸ <https://www.bauhaus100.com/the-bauhaus/works/photography/reflecting-light-games/> Schwerdtfeger debuted his modern version of the archaic magic lantern at the home of Bauhaus teacher Wassily Kandinsky earlier in 1922 and the performance of *Reflektorische Lichtspiele* (*Reflecting Light Games*) at the *Lanternenfest* in June of the same was well received and remembered by many. It is unclear whether Moholy-Nagy was present at the 1922 *Lanternenfest*, however the *Lichtspiele* were shown numerous times during 1922–23. Lucia Moholy writes that Schwerdtfeger, Hirschfeld-Mack, and Hartwig's method of achieving effects was "advocated by Moholy-Nagy." Moholy, *Marginalien zu Moholy-Nagy / Moholy-Nagy Marginal Notes*, 80.

¹⁴⁹ Schwerdtfeger's innovation and its impact is a matter of some controversy, and the artist left the Bauhaus in 1923 feeling that his vision had been co-opted by Hirschfeld-Mack. Rudolf Jüdes, *Kurt Schwerdtfeger (Bauhaus Weimar): Reflektorische Farblichtspiele (1922/1968)*, DVD (Red Avocado Film, 2010).

¹⁵⁰ Anne Hoormann, "Lichtspiele: zur Medienreflexion der Avantgarde in der Weimarer Republik" (München, W. Fink, 2003), 161.

by the visibility of the technical device.”¹⁵¹ Hirschfeld-Mack’s development of projection equipment that seamlessly transitioned between the moving colored lights earned him a prominent place in Moholy-Nagy’s 1925 publication *Malerei Fotografie Film*, in which Moholy-Nagy’s admiration for the *apparatus* created by Hirschfeld-Mack and his rich description of its results reveals his interest in the *Lichtspiele* to be both technological and formal:

The intensive work of Hirschfeld-Mack has created a practical apparatus for the continuous recording of film. He was the first to give the richness of smooth transitions and surprising changes of colored planes in motion. A prismatically guided and oscillating, dissolving, coalescing movement of planes. His newest experiments surpass this color-organ characterization. These investigations of a new spatio-temporal dimension of beaming lights and musically tempered movement will, in the spinning and depth of the shifting light beams, become ever more distinct.¹⁵²

The “practical apparatus” that Hirschfeld-Mack created consisted of a 110 cm cube, raised from the floor on a 70 cm frame (Moholy-Nagy’s choice of dimensions would be strikingly similar), set up as a rudimentary mechanical projector. Six to eight projection lamps were hung on wires stretched across the open back of this box, opposite moveable templates and negative templates; both the lamps and templates were moved by hand in accordance with the complex nine-part protocol written by Hirschfeld-Mack.¹⁵³ Ultimately, Moholy-Nagy’s *Lichtrequisit einer elektrischen Bühne* would manifest in a

¹⁵¹ Andreas Hapkemeyer and Peter Stasny, eds., *Ludwig Hirschfeld-Mack: Bauhäusler Und Visionär* (Ostfildern-Ruit, Germany: Hatje Cantz, 2000), 94.

¹⁵² Moholy-Nagy, *Malerei, Fotografie, Film*, 8:19. “Die intensive Arbeit von Hirschfeld-Mack hat eine für kontinuierliche Filmaufnahme geeignete Apparatur geschaffen. Er hat als erster den Reichtum feinsten Übergänge und überraschender Wechsel von farbigen Flächen in Bewegung gegeben. Eine prismatisch lenkbare und oszillierende, zerfließende, sich ballende Flächenbewegung. Seine neuesten Versuche gehen über diesen Farbenorgelcharakter weit hinaus. Die Ergründung einer neuen raumzeitlichen Dimension des strahlenden Lichtes und der temperierten Bewegung wird in den sich drehenden und in die Tiefe verschiebenden Lichtstreifen immer deutlicher.” The use of *Filmaufnahme* (recording of film) is confusing, but as Bernhard Ebert of the Hirschfeld-Mack archive, Hoorman, and Hirschfeld-Mack himself assert, the influence and audience experience of *Lichtspiele* was much more akin to avant-garde film of the time than to contemporary light-based works of art (Wilfred, László).

¹⁵³ Hapkemeyer and Stasny, *Ludwig Hirschfeld-Mack: Bauhäusler Und Visionär*, 94. There is a distinct similarity here between the work of the earlier Futurists and the later Happenings of Kaprow in language and intention. Hirschfeld-Mack uses *die Niederschrift* to describe the written instructions - which corresponds to transcript, protocol, record, or memorandum rather than *das Drehbuch* or *die Partitur* which would indicate the musical score (which was but one element of the overall protocol). He described the performance as “... a kind of orchestra, in which each of the participants, according to our sheet-like transcript, performs the activities that are necessary at a certain point in time at a certain place in the course of the presentation.” The result, as noted previously and explicitly by Hoorman, was that the audience viewed a work visually almost identical to contemporary abstract

completely different appearance - but the idea of creating a “practical apparatus” to “investigate spatio-temporal dimensions [of] beaming lights” was exactly what he would accomplish. Crucial differences of the *Lichtrequisit* were that it projected colored planes and shifting light beams on intimate interior surfaces rather than screens such as Hirschfeld-Mack's (and Schwerdtfeger's) *Lichtspiele*, and that the oscillating apparatus itself would be visually integral to the work.

Audibly, both *Reflektorische Lichtspiele* and *Farblichtspiele* incorporated music, with different emphases. In 1923 Hans Heinz Stuckenschmidt composed the accompaniment for *Lichtspiele* as an afterthought – Schwerdtfeger believed the work to be complete without music.¹⁵⁴ In contrast, acoustic accompaniment was integral to the presentation of Hirschfeld-Mack's *Farblichtspiele*:

...the temporal sequence of a movement can be grasped more readily and accurately through acoustical than through optical articulation. If, however, a spatial delineation is organised in time to become an actual movement, understanding of the temporal sequence will be aided by acoustical means

wrote Hirschfeld-Mack in 1925, explaining that he composed the musical accompaniment for *Farblichtspiele* in recognition of these facts.¹⁵⁵ For Moholy-Nagy, the sound made by the machinery and motion of the *Lichtrequisit* were its musical accompaniment, and he explicitly, yet politely, criticized Hirschfeld-Mack's musical/optical combination: “While I value what their experiments have achieved, I consider it a mistake to try, as Hirschfeld-Mack...and A. Laszlo do, to combine optical-kinetic with acoustic-musical experiments.”¹⁵⁶ This analysis, published in *Malerei Fotografie Film* (1925), demonstrates how Moholy-Nagy's evolving theories were often worked out in the *Bauhausbücher*. This lengthy series of Bauhaus textbooks, edited by Moholy-Nagy at Gropius's request, gave Moholy-Nagy

film, with the crucial difference that each performance was unique. Ludwig Hirschfeld-Mack, *Farben Licht-spiele* (Weimar: Bauhaus, 1925), 7. The similarity to Brecht's desire to involve the audience must be noted.

¹⁵⁴ Stefan Schwerdtfeger interviewed in Jüdes, Kurt Schwerdtfeger (*Bauhaus Weimar*): *Reflektorische Farblichtspiele* (1922/1968). Schwerdtfeger used a different score when reconstructing the *Lichtspiele* in 1965.

¹⁵⁵ Hirschfeld-Mack in Moholy-Nagy, *Painting, Photography, Film*, 80.

¹⁵⁶ Moholy-Nagy, 22. Sibyl Moholy-Nagy recalls László Moholy-Nagy considering a soundtrack to accompany *Ein Lichtspiel: schwarz weiss grau* (1931) when she was first introduced to the *Lichtrequisit* in 1931. Moholy-Nagy, *Moholy-Nagy: Experiment in Totality*, 64.

opportunities to formally critique diverse artistic theories, and to formulate his own positions vis-à-vis his own work. As another example, in *Die Bühne im Bauhaus* (1924) Moholy-Nagy wrote of the theatrical potential for complex apparatuses such as optical instruments and reflecting equipment to create more vertical motion on stage. “Theater, Zirkus, Varieté” also suggested the use of modern lighting technology to create glare or to momentarily blind the audience.¹⁵⁷ Many of the theories advanced in Moholy-Nagy’s essays and books were later practically tested and incorporated in his artistic practice, including the “kinetic relationships of projected light” proposed under the “Film” heading in “Produktion-Reproduktion;” the *Lichtrequisit*, finally turned on in 1930, would realize Moholy-Nagy’s 1922 idea of “...the formation of motion without the support of any direct formal development.”¹⁵⁸

Brecht and Theories of Theater

Bertolt Brecht’s best-known work, *Die Dreigroschenoper* (*The Threepenny Opera*) premiered in Berlin on 31 August 1928, less than a year after he published “Epic Theater and Its Difficulties” in the *Berlin Börsen-Courier*. *Die Dreigroschenoper*, employing many of Brecht’s tactics of Epic Theater, is set in Victorian London, however the characters: criminals, prostitutes, and ethically malleable police, are eternal.¹⁵⁹ The first three scenes of the premier met with stony silence, but with “Kanonensong” (“Cannon Song”) Brecht, Weill, and the cast won cynical Berliners over and the next morning the show

¹⁵⁷ Moholy-Nagy, “Theater, Circus, Variety,” 1924, in Oskar Schlemmer, László Moholy-Nagy, and Farkas Molnár, *The Theater of the Bauhaus*, ed. Walter Gropius and Arthur S. Wensinger, trans. Arthur S. Wensinger (Middleton: Wesleyan University Press, 1961), 67.

¹⁵⁸ Moholy-Nagy, “Produktion-Reproduktion,” in Passuth, *Moholy-Nagy*, 290.

¹⁵⁹ Eternal is a loaded term for Brecht, see “On Chinese Theater,” 1936. In this context, given that *Die Dreigroschenoper* was a reworking rather than an original piece, the term seems appropriate. Brecht and Elizabeth Hauptmann’s revision/translation of John Gay’s 1728 work “The Beggar’s Opera” resituates the story in the 19th rather than 18th century. The most notable change from the original was the new score by Kurt Weill. Brecht’s additions included four songs “borrowed” from poet François Villon and continuing changes to the dialogue as the work was edited for a movie and book.

sold out for the following three weeks.¹⁶⁰ *Die Dreigroschenoper*, despite being critically panned, was a play that Berliners identified with: the music was avant-garde, the story of and for the demimonde.¹⁶¹ It confirmed Brecht as a writer of and for the urban proletariat, despite the ironic fact that the income from the production raised his standard of living to that of petite bourgeois. Still, his perspective remained anchored in the politics and plight of the workers and the lust and indulgence of Berlin. Walter Benjamin praised his friend's attention to class struggle and politics, noting in 1934's "The Author as Producer," that of the Marxist writers active in Weimar Berlin, it was Brecht's Epic Theater which attempted to alter the apparatus of bourgeois production rather than supply the derelict status-quo; which is precisely what Brecht advocated with his call for "For innovation – against renovation!"¹⁶²

To this end, Epic Theater as developed by Brecht and Piscator, shifted the position of the spectator, from passive emotional involvement in the arc of action on the stage to an active and intellectual observer of an inflammatory montage. Their methodologies varied from the technological, using film and slide projections, to the famous *Verfremdungseffekt*, in which the audience is intentionally alienated from the action on the stage to create space for observation – the ultimate goal being radical innovation of theatrical writing, acting, production, and appreciation.¹⁶³ Similar to his theory of potentiality for the radio, Brecht's ambitions for epic theater were social and political:

¹⁶⁰ Stephan Suschke, "Rekonstruktion eines Erfolges: Am 31. August 1928 kamen die 'Dreigroschenoper' und das erste Fernsehgerät auf die Welt: Doch das Messer sieht man nicht," *Berliner Zeitung*, August 23, 2008, <https://www.berliner-zeitung.de/rekonstruktion-eines-erfolges--am-31--august-1928-kamen-die--dreigroschenoper--und-das-erste-fernsehgeraet-auf-die-welt-doch-das-messer-sieht-man-nicht-15894014>. My translation.

¹⁶¹ von Eckardt and Gilman, *Bertolt Brecht's Berlin*, xix. Significantly it was the first play restaged in smoldering Berlin in 1945, described by one audience member who climbed over and through the ruins to find the production in a roofless auditorium filled with Soviet troops:

Kurt Weill's familiar music struck up. It had never moved me so much. The beggars on the stage needed no grease paint to look haggard. They were haggard, starved, in genuine rags. Many of the actors, I learned backstage during intermission, had only just been released from concentration camp. They sang not well, but free.

¹⁶² "The Author as Producer," 1934 in Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media*, 90. "Notes to the Opera *The Rise and Fall of the City of Mahagonny*," 1930 in Bertolt Brecht, *Brecht on Theatre*, EBook, ed. Marc Silberman, Steve Giles, and Tom Kuhn, Third (Bloomsbury Methuen Drama, 2014), 87.

¹⁶³ "Notes on *The Threepenny Opera*," 1931 in Brecht, *Brecht on Theatre*, 88.

Once the content becomes, technically speaking, an independent component, to which text, music, and setting 'adopt attitudes;' once illusion is sacrificed to free discussion, and once the spectator, instead of being enabled to have an experience, is forced as it were to cast his [sic] vote; then a change has been launched which goes far beyond formal matters and begins for the first time to affect the theater's social function.¹⁶⁴

Through their observation and critique the spectators of Epic Theater were encouraged to reach independent conclusions. Brecht referred to this as the “watching-while-smoking attitude:” one is occupied by a cigarette and so unavailable to be drawn into the production – instead observing and commentating as an “expert,” and practicing the skill of “complex seeing.”¹⁶⁵ Epic Theater was a response to the new subject matters of the modern post-war era, intended to change the socially determined theatrical apparatus in such a way to reflexively alter the social fabric itself.¹⁶⁶

The socio-political realm of the country's largest metropolis was the first target of Epic Theater.

Described by British diplomat Harold Nicolson in 1932:

Berlin is a girl in a pullover, not much powder on her face, Hölderlin in her pocket, thighs like that of Atalanta, an undigested education, a heart that is almost too ready to sympathize, and a breadth of view that charms one's repressions from their poison, and shames one's correctitude. One walks with her among the lights and in the shadows. And after an hour or so one is hand-in-hand.¹⁶⁷

Berlin was decidedly leftist, with a large population of exiles/immigrants, and despite being the nation's capital, it would ironically be the only *Land* to vote against Hitler (by 75%) in 1933.¹⁶⁸ It was the center of German theater: during the Golden Twenties, Berlin's 35 dramatic theaters were usually at capacity, there were scores of cabaret halls and hundreds of new movie houses. Political satire was most often the material of the cabaret shows, while the “serious” theaters staged historical works, and the movie houses showed dark masterpieces such as *The Cabinet of Dr. Caligari* (1920) and *Metropolis* (1927).

¹⁶⁴ Brecht, “The Modern Theater is the Epic Theater,” 1930 in Willett, 39.

¹⁶⁵ “Notes to the Opera *The Rise and Fall of the City of Mahagonny*,” in Brecht, *Brecht on Theatre*, 89.

¹⁶⁶ “Notes to the Opera *The Rise and Fall of the City of Mahagonny*,” in Brecht, 79.

¹⁶⁷ Harold Nicolson, “The Charm of Berlin,” 1932 in Kaes, Jay, and Dimendberg, *The Weimar Republic Sourcebook*, 426.

¹⁶⁸ Read and Fisher, *Berlin Rising: Biography of a City*, 197.

In visual art, artists of the urban *Neue Sachlichkeit* (New Objectivity) movement often chose portraiture to communicate their post-war anger and disgust.¹⁶⁹ Verist portraits of the demimonde by Otto Dix or Christian Schad resonate with Brecht's archetypal characters of the late 1920s (*Die Dreigroschenoper*, *Aufstieg und Fall der Stadt Mahagonny*): generalized yet complex portraits of criminals, prostitutes, fugitives, and the working class. Additionally, the functional and sober aesthetic of New Objectivity resonated with Brecht's evolving ideas concerning Epic Theater; the reactionary "matter-of-factness" of the visual style was mirrored by Brecht's reportage writing, the imagery of characters, and by Brecht's innovative *Gestus*.¹⁷⁰ Brecht acknowledged the possibilities of the "reactionary" *Neue Sachlichkeit* influence:

Of course I'm not in favour of that ghastly flabby lack of matter-of-factness that alone keeps the present-day bourgeois theatre on its legs I find these people's lack of matter-of-factness ludicrous but about your 'new matter-of-factness' I'm bitter I suppose it's bound to come it's already there in painting it'll have to come in the theatre...sachlichkeit will come and it'll be a good thing when it does [footnote: I hope so by Lenin] till then nothing more can be done but this quite necessary and inevitable step forward will be a reactionary affair that's what I'm getting at neue sachlichkeit is reactionary.¹⁷¹

Brecht was reacting to the staid theatricality of Berlin theater – by 1926 he was writing plays which presented characters in a "matter of fact" manner rather than subjects meant to evoke the empathy of the audience.¹⁷² Otto Dix's *Portrait of Journalist Sylvia von Harden* (1926) portrays the subject in an exaggerated, unsympathetic way that provides the viewer with both visual and factual information (large hands, long face, bobbed hair, jewelry, and cigarettes of choice are key identifiers), but does not

¹⁶⁹ Sabine Rewald, *Glitter and Doom: German Portraits from the 1920s* (New Haven: Yale University Press, 2006), 5.

¹⁷⁰ Brigid Doherty succinctly describes Brechtian *Gestus* as "...the embeddedness of a particular gestic element of speech or posture in a complex of social relations or processes." Brigid Doherty, "Test and Gestus in Brecht and Benjamin," *MLN*, German Issue, 115, no. 3 (April 2000): 457. Brecht wanted actors to "consciously present" their knowledge and understanding of the play, independently of the reaction or expectations of the spectators. Actors were instructed not to create illusion, instead to be self-conscious, obtuse, and intellectually grounded rather than empathetically motivated. "Dialogue on Acting," 1929 in Brecht, *Brecht on Theatre*, 64.

¹⁷¹ Brecht in Brecht, *Brecht on Theatre: The Development of an Aesthetic*, 129. This is from an unpublished fragment possibly from 1928 and is quoted here in Brecht's original broken grammar.

¹⁷² Brecht, Bertolt. "Conversation with Bert Brecht." Interview by Bernard Guillemin. *Die Literarische Welt*, 20 July 1926. Translated in Brecht, 15.

offer any insight into her thoughts or private feelings (Figure 16). Similarly, Brecht's Galy Gay of *Mann ist Mann* (1926) is deconstructed and remade externally throughout the play by changes of gesture, posture, and speech – never giving the audience access to the psychological interior (Figure 17).

The goals of *Neue Sachlichkeit* translated quickly to cinema: directors shifted production from the studio to the street in an effort to “show everything.” Brecht observed the cinematic trend in 1927:

Already in the cinema I have seen with some distress how the Egyptian pyramids and the Indian Rajah's palaces move to Neubabelsberg in order to be filmed by an apparatus that a man can comfortably slip into his backpack. *In other words I believe that you must move with the apparatuses closer to the real events and not simply limit yourself to reproducing or reporting.*¹⁷³

...and applied this directive specifically to the new medium of radio, suggesting live political coverage, interviews, and debates – bureaucratic transparency in an era of political murkiness. The Weimar Republic, founded on an “unholy alliance” of the military and Social Democrats, faced challenges from anti-democratic parties on the right and left, overwhelming war reparations, inexperienced leadership, and the occasional assassination.¹⁷⁴ Live political coverage for the masses was the last thing on politicians' wish lists, a desire that was essentially written into the charter of the RRG: all radio programming was to be politically neutral or absent.¹⁷⁵ For Brecht, this was the place to start:

You must go to the *parliamentary sessions* of the Reichstag and especially to the major *court trials*. Since this would be a great step forward, there will certainly be a series of laws that try to prevent it. *You must turn to the public in order to eliminate these laws.*¹⁷⁶

Whether the public was ready for such revolutionary transparency was not clear, Brecht believed that new formats, for the radio, or such as Epic Theater, would reform the public, rather than vice-versa. The new apparatus of the radio, argued Brecht, will certainly engender medium-specific works (his own

¹⁷³ “Suggestions for the Director of Radio Broadcasting,” 1927 in Brecht, *Brecht on Film and Radio*, 35. Reporting here refers to the act of later summary, rather than the direct “reporting” favored by the *Neue Sachlichkeit*.

¹⁷⁴ Right wing anti-democratic parties included the National Socialist German Workers Party and the German People's Party. On the left were the Socialists and the Communists in various forms.

¹⁷⁵ Peter Jelavich, “Cabaret and the Dilemma of Satire in the Early Weimar Republic,” in *Views of Berlin: From a Boston Symposium* (Boston, MA: Birkhäuser, 1989), 70.

¹⁷⁶ “Suggestions for the Director of Radio Broadcasting,” 1927 in Brecht, *Brecht on Film and Radio*, 35.

included), which would then promote social change. However, the “democratic” potential of the radio lay first in its ability to broadcast existing events. Published in the *Berlin Börsen-Courier* (25 December 1927) as part of a discussion titled “How Can Radio Broadcasts Become More Artistic and Topical?” Brecht’s suggestions reiterate the position of many left-leaning Berlin intellectuals and precede his experiments at Baden-Baden in 1929.¹⁷⁷

Moholy-Nagy and the Electric Stage

“Art and technology – a new unity” was the newly revised motto of the Bauhaus that Moholy-Nagy joined in 1923. Hired to replace expressionistic Johannes Itten as the *Vorkurs* (foundation course) instructor, Moholy-Nagy’s young and energetic presence brought a breath of Constructivist contemporaneity in contrast to Expressionistic older masters such as Itten, Wassily Kandinsky, and Paul Klee. The influence was mutual, as Eleanor Hight describes, employment at the Bauhaus cemented Moholy-Nagy’s industrial aesthetic, while his typography and design became paradigmatic of Bauhaus printed material particularly due to his *Bauhausbücher* collaboration with Gropius.¹⁷⁸ *Die Bühne im Bauhaus* (1924) contained Moholy-Nagy’s first essay in the series, “Theater, Zirkus, Varieté,” in which he presented early ideas of the “Theater of Totality,” including an exercise described as the *Mechanische Exzentrik* (Mechanized Eccentric) in which human presence was eliminated from the theatrical performance entirely. A “fully controlled organization of form and motion, intended to be a synthesis of dramatically contrasting phenomena (space, form, motion, sound, and light),” it was quickly repudiated (three pages later) by Moholy-Nagy’s explanation that instead the human presence must be treated in a manner equal to the other formative media, as the lesson of exclusion has been learned.

The Theater of Totality...will use the spiritual and physical means at [human's] disposal
PRODUCTIVELY...it is the task of the FUTURE ACTOR to discover and activate that which

¹⁷⁷ “Suggestions for the Director of Radio Broadcasting,” in Brecht, Footnote, 36.

¹⁷⁸ Eleanor M. Hight, *Picturing Modernism: Moholy-Nagy and Photography in Weimar Germany* (MIT Press, 1995), 23.

is common to all men [sic].¹⁷⁹

These ideas of activating and producing parallel those of Brecht's Epic Theater, although Moholy-Nagy does not explicitly involve the audience. Moreover, there is a congruency between Moholy-Nagy's Theater of Totality as an inclusive and productive apparatus and Brecht's vision of the radio as a communications apparatus which would include the listener rather than mechanically distribute to them.

The *Lichtrequisit*, still unrealized but for sketches at this time, would prove to be apparatus to test these two extremes: as an eccentric construction of lights, sculpture, and mechanization it could operate independently once "switched on," but to what end? And how would the audience interact, let alone experience the projections? Moholy-Nagy's vague specifications for how the *Lichtrequisit* would be viewed (as discussed) suggest that the position of the work was flexible: the projections could be on the back wall of the box but this could also be removed to project onto a large screen.¹⁸⁰ His investigational attitude toward the work underscores his belief in the *Lichtrequisit* as a fluid apparatus of experimentation rather than a static work of completed sculpture.¹⁸¹ This variability of *Lichtrequisit* configurations is similar to Brecht's contemporaneous use of stage sets: modular and flexible environments which were, in Brecht's words "organic parts of the work of art."¹⁸² Brecht's sets included screens for the projection of texts and images, visible stage lights, and "sparse indications" of specific locations.

The final two years of the 1920s brought new directions for Moholy-Nagy and influences for the incipient *Lichtrequisit* as he and Lucia left the Bauhaus and returned to Berlin. Moholy-Nagy had created

¹⁷⁹ Moholy-Nagy, "Circus, Theater, Variety," in Schlemmer, Moholy-Nagy, and Molnár, *The Theater of the Bauhaus*, 54–58.

¹⁸⁰ Moholy-Nagy, "Lichtrequisit Einer Elektrischen Bühne," 297.

¹⁸¹ This perspective is valuable to keep in mind, as the *Lichtrequisit* would change many times, both physically and theoretically (and still does). In 1946 Moholy-Nagy described the work as a "mobile [kinetic] structure" and a "space kaleidoscope." Moholy-Nagy, *The New Vision and Abstract of an Artist*, 80.

¹⁸² "Indirect Impact of the Epic Theater," 1933 in Brecht, *Brecht on Theatre: The Development of an Aesthetic*, 58.

the stage set for Erwin Piscator's production of *Prince Hagen* in 1920 and as a post-Bauhaus career move he returned to the theater at the Krolloper (*Tales of Hoffmann*, 1928 and *Madame Butterfly*, 1931) and for Piscator's production of *Kaufman von Berlin* (1929).¹⁸³ In *Die Bühne im Bauhaus* (1924) he critiqued the historic forms of theater, suggesting instead a new Theater of Totality accomplished through "...the exciting new possibilities offered by the familiar and yet not properly evaluated elements of modern life - that is, its idiosyncrasies: individuation, classification, mechanization."¹⁸⁴ Concurrently in Berlin, similar ideas of integrating the audience and using mechanized platforms, sound effects, and film-projection had been tested: Piscator used slide projection beginning in 1924 and film in 1925.

At Piscator's request Walter Gropius designed the "Totaltheater" in 1926 which included elaborate possibilities for projection and audience integration into the performance.¹⁸⁵ As Passuth notes, in the late 1920s Moholy-Nagy viewed stage set design as "...a possible variant on the dynamic-constructive system of forces," and in that vein his approach was based on principles that he applied to other creative endeavors: the deployment of active light, the reorganization of permeable space, and the use of "complex apparatus such as film, automobile, elevator, airplane, and other machinery, as well as optical instruments, reflecting equipment, and so on."¹⁸⁶ Brecht's productions of the 1920s, including *Trommeln in der Nacht* (1922) were focused on avant-garde theatrical techniques, including the denial of the fourth wall and of the suspension of disbelief. Brecht's productions did use contemporary

¹⁸³ "These beautiful renderings [of stage designs for *The Tales of Hoffmann*] were produced by Hungarian architect István Sebök [sic], who was working in Moholy-Nagy's studio at the time [1928] and was responsible for many of the drawings in Moholy-Nagy's oeuvre that required architectural or engineering expertise." Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 114.

¹⁸⁴ Schlemmer, Moholy-Nagy, and Molnár, *The Theater of the Bauhaus*, 64.

¹⁸⁵ Bryan Randolph Gilliam, ed., *Music and Performance During the Weimar Republic* (Cambridge: Cambridge University Press, 1994), 3. A succinct discussion of Piscator's multi-media productions.

¹⁸⁶ Passuth, *Moholy-Nagy*, 56. Schlemmer, Moholy-Nagy, and Molnár, *The Theater of the Bauhaus*, 67. Several of these propositions were tested during the production of *Der Kaufmann von Berlin*, which used the film apparatus to project on screens, scrims, and side stages, establishing multiple dimensions around the proscenium space; portions of the narrative also took place on film while other parts were acted on three vertically moving platforms

technology, such as electrical lamps, in an obvious and non-illusory manner to emphasize the reality of the theater as a production, however such technology was conventionally deployed.¹⁸⁷

With his recent involvement in theatrical presentations, the inclusion of Moholy-Nagy's *Lichtrequisit* in the Theater Room of the 1930 Werkbund Exhibition was understandable - not to mention that the construction of the *Lichtrequisit* was financed by the Theater Department of AEG (a financial power which would have been untenable for Brecht).¹⁸⁸ Situated between Gropius' Totaltheater design, Schlemmer's costumes, Moholy-Nagy's theater sets, and a cinema projector, the *Lichtrequisit einer elektrischen Bühne* was meant for a mysterious "electric stage." Edit Tóth asserts that the *Lichtrequisit* "scatter[ed] diffused colored lights and shadows over the visitors and neighboring displays," however, no contemporary reviews specifically mention such an effect.¹⁸⁹ Siegfried Giedion, one of Moholy-Nagy's oldest and closest friends, acknowledged the presence of the *Lichtrequisit* as he indexed the room in his review:

... in the background the light as an animating element of the theater (Moholy-Nagy showed a moving light prop for an electric stage), finally, the living theater itself was included (Walter Gropius' model and plans for famous theater for Piscator, 1926), Schlemmer's figurines from the "Triadic Ballet" (1923), Moholy-Nagy's production scenes from Hoffmann's Tale and other plays. In the middle of the hall, an automatic projection apparatus showed pictures from the new Germany on the three walls of novel material (Trolit) which encircled it.¹⁹⁰

Giedion doesn't mention that colored lights bounced off the Trolit and interfered with the visibility of the projections there and neither did anyone else. Exhibitions of the *Lichtrequisit* since the 1960s have mostly shown the work without its enclosing cube – these open displays of the *Lichtrequisit* allow

¹⁸⁷ Roswitha Mueller comments that Brecht disagreed with Piscator's use of technology to create illusion on the stage, as he believed such an illusion would absorb the viewer rather than allowing them to exist separately. Mueller, *Bertolt Brecht and the Theory of Media*, 11.

¹⁸⁸ Brecht's animosity for corporatization of the arts was demonstrated by his lawsuit against the Nero Film Production Company in 1930. In contrast to Brecht, Moholy-Nagy followed an increasingly corporate career path post-Bauhaus, executing design work in the late 1920s and 1930s for various corporations including a long-term contract with Parker Pens.

¹⁸⁹ Tóth, 30.

¹⁹⁰ Siegfried Giedion, "Der Deutsche Werkbund in Paris," *Neue Zürcher Zeitung*, June 7, 1930.

multiple viewers to focus their attention on the rotating metal and glass “kinetic sculpture” – but at the Werkbund Exhibition the *Lichtrequisit* was an intimate demonstration of light effects. According to Oliver A.I. Botar, the work was intended to support Moholy-Nagy’s idea of Polycinema, or be a tool in the creation of abstract films, as suggested in 1925’s *Malerie Fotografie Film*.¹⁹¹ In either case, the physical construction of the *Lichtrequisit* was but a portion of a larger and more inclusive apparatus.

Etymology of Apparatus

Brecht first used the term “apparatus” in 1927 to refer to “the physical instrument of the radio and to the institutions of radio broadcasting.”¹⁹² In subsequent contexts he uses “apparatus” to connote other institutions, such as the established theater and the opera, with increasingly Marxist implications. By the time Brecht wrote “Der Rundfunk als Kommunikationsapparat” (“The Radio as a Communications Apparatus”) in 1932 the “apparatus” in question had multiple meanings.

“The Radio as a Communications Apparatus” stands as the culmination of Brecht’s written thoughts on the medium. His first published essay on the topic had addressed the inception of radio and its mandate to create, rather than fulfill, an existing public need, and subsequent essays (both published and not) vacillate between praise and criticism.¹⁹³ With “The Radio as an Apparatus of Communication” Brecht observed a medium in transition: initially a substitute for theater/opera/live experience, radio was now mature enough to begin searching for its “purpose in life.”¹⁹⁴ With this adolescence in mind, Brecht’s use of *Kommunikationspparat* in the title of the essay is instructive. Since the German language allows the construction of (unique) compound words, Brecht had the ability to be very specific. As an example, he could have used *Kommunikationsvorrichtung* (communication equipment) which would

¹⁹¹ Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 112.

¹⁹² In the translator’s notes, Brecht, *Brecht on Film and Radio*, 262.

¹⁹³ “Young Drama and the Radio,” 1927, Brecht, 33. For the most strenuous criticism, see “Radio, An Ante-diluvian Invention,” 1927, unpublished, Brecht, 37.

¹⁹⁴ “The Radio as a Communications Apparatus,” Brecht, 42.

have specified the radio as a piece of communication equipment, or *Kommunikationsausrüstung* (communications gear/facilities) which could signify radio as both equipment and infrastructure. Instead, in using *der Apparat* as the base of the compound, Brecht describes the radio as an *apparatus* of communication.

Apparatus in both English and German (*der Apparat*), are derived from the Latin “ad” to + “parare” make ready for, and the early use of the word in both languages is similar, although not identical. In German, *der Apparat* appeared sometime between the 15th and 17th centuries, first as an expression of expenditure or operating expense (*Aufwand*) and later as an inventory or supply of tools, implements, or instruments (*Gerätschaftssammlung*).¹⁹⁵ The 1910 Muret-Sanders *Encyclopaedic English-German Dictionary* defines Apparat/apparatus as equipment, device, machine, or contraption (*Vorrichtung*) or a supply of equipment, tools, or resources (“*Vorrat von Gerätschaften, Werkzeugen, Hilfsmitteln*”).¹⁹⁶

At first glance, then, Brecht's reference to the radio as a *Kommunikationsapparat* is intended to point at the physical nature of the radio and its components: the broadcast station, the radio tower, even the studio equipment necessary for the production of radio programming. This encompassing meaning evolves through Brecht's writing on the topic. In Brecht's 1927, “Suggestions for the Director of Radio Broadcasting,” he uses the term in describing the radio as a “wonderful distribution apparatus,” and posits that its portability, similar to that of the cinematographer's “apparatus that a man can comfortably slip into his backpack,” could best serve the public by the direct coverage of political events, court proceedings, interviews, and debates. In this instance, the apparatus refers solely to the receiver. Two essays from 1930 expand this definition in less concrete directions. “Explanations [about *The Flight*

¹⁹⁵ Friedrich Kluge and Walther Mitzka, *Etymologisches Wörterbuch Der Deutschen Sprache* (Berlin: Walter de Gruyter & Co., 1963), 28.

¹⁹⁶ Edmund Klatt, *Muret-Sanders Encyclopaedic English-German and German-English Dictionary*, Fifteenth Edition (Berlin-Schöneberg: Langenscheidtsche Verlagbuchhandlung, 1910), 44.

of the Lindberghs]” describes Brecht's goal of a collaboration between the participant (who listens to the sounds and speaks the text) and the apparatus, which must then encompass everything else.¹⁹⁷ The oppositional staging at Baden-Baden clarified what he defined as the apparatus in July of 1929: the physical components of the radio itself *and its program material*.

The second essay with a particularly instructive reference to the apparatus is “The Modern Theater is the Epic Theater,” (1930) which Brecht wrote as notes to accompany his opera *Aufstieg und Fall der Stadt Mahagonny*, during a period that personal friend and translator John Willett describes as his “most sharply Communist.”¹⁹⁸ “Great apparati like the opera, the stage, the press, etc., impose their views as it were incognito” writes Brecht, describing the manner in which existing apparatuses strangle the production of avant-garde art:

The avant-garde don't think of changing the apparatus, because they fancy that they have at their disposal an apparatus which will serve up whatever they freely invent, transforming itself spontaneously to match their ideas. But they are not in fact free inventors; the apparatus goes on fulfilling its function with or without them; the theatres play every night; the papers come out so many times a day; and they absorb what they need; and all they need is a given amount of stuff. [Brecht's footnote: The intellectuals, however, are completely dependent on the apparatus, both socially and economically; it is the only channel for the realization of their work. The output of writers, composers and critics comes more and more to resemble raw material. The finished article is produced by the apparatus.]¹⁹⁹

Here for the first time, Brecht implicates administrative entities and cultural practices – the theater, the press – as apparatuses. These are “channels” for the work of the author/artist, and as such Brecht considers their material and intangible aspects in his totality: the papers are a combination of newsprint, the presses, the editors, the corporations, etc.²⁰⁰ Transferring this perspective to the radio, it would include the physical technologies of the receiver, the broadcast tower, the studio, *and* the RRG, the

¹⁹⁷ “Explanations,” in Brecht, *Brecht on Film and Radio*, 39.

¹⁹⁸ Brecht, *Brecht on Theatre: The Development of an Aesthetic*, 33.

¹⁹⁹ “The Modern Theatre is the Epic Theatre,” 1930 in Brecht, 34–35.

²⁰⁰ “Brecht used the term apparatus as a broad category to include every aspect of the means of cultural production, from the actual technological equipment to promotion agencies, as well as the class that is in possession of the means of production.” Mueller, *Bertolt Brecht and the Theory of Media*, 15.

regional stations and their managers, the orchestras, actors, and staff. In short, everything *except* the listener and the raw material meant for broadcast. This clearly contradicts his position regarding *The Flight of the Lindberghs*, effectively demonstrating Brecht's developing thoughts on the subject of the apparatus, especially in relation to his political views.²⁰¹ The cultural apparatus that Brecht refers to in "The Modern Theater" is similarly inclusive and also responsible for stabilizing the status quo: it is that which must be changed.²⁰²

Moholy-Nagy's deployment of the term apparatus changed little: he used *der Apparat* in 1924 to suggest the fruitful use of film, cars, elevators, airplanes, machines, optical instruments, and mirrors in theatrical productions.²⁰³ This utilization of apparatuses seemingly realizes Brecht's allegation that the avant-garde employed existing apparatuses to "serve up whatever they freely invent" without attempting innovation. But in 1946, shortly before his death, Moholy-Nagy described the *Lichtrequisit* as an "experimental apparatus" which would "create rich light effects." In both of these instances, Moholy-Nagy's apparatus seems congruent with *Vorrichtung* as defined by the 1910 Muret-Sanders Dictionary: a piece of equipment, device, machine, or contraption.²⁰⁴ However, the crucial goal of this innovative apparatus was to facilitate Moholy-Nagy's attempted refinement of the human sensorium: the contingent, historical, shifting, technologically influenced sum of conscious and unconscious perceptions – in terms of this intention the *Lichtrequisit* was an apparatus in the more complex and Brechtian sense.²⁰⁵

²⁰¹ Both essays were first published in Brecht's *Versuche I und II* (1930), a collection of Brecht's writings not necessarily published elsewhere. Both "Explanations" and "The Modern Theater" were published as independent essays after *Versuche I* and *II* were released.

²⁰² "Society absorbs via the apparatus whatever it needs in order to reproduce itself." "The Modern Theater is the Epic Theater," 1930 in Brecht, *Brecht on Theatre: The Development of an Aesthetic*, 34.

²⁰³ Moholy-Nagy, "Theater, Zirkus, Varieté," in Oskar Schlemmer, László Moholy-Nagy, and Farkus Molnár, *Die Bühne im Bauhaus*, vol. 4, Bauhaus Bücher (München: Albert Langen Verlag, 1924), 54.

²⁰⁴ Moholy-Nagy, "Lichtrequisit Einer Elektrischen Bühne," 297.

²⁰⁵ Caroline Jones, "The Mediated Sensorium," in Caroline A. Jones and Bill Arning, *Sensorium: Embodied Experience, Technology, and Contemporary Art* (Cambridge: MIT Press, 2006), 8.

The Radio as an Apparatus

And now to say something positive, that is, to uncover the positive side of the radio with a suggestion for its re-functionalization: radio must be transformed from a distribution apparatus into a communications apparatus.²⁰⁶

Here is the crux of Brecht's argument: that radio has the potential to serve the (Marxist) public by facilitating communication, not by technological innovation, rather by engaging listeners as collaborators. *Umfunktionierung*, translated as "re-functionalization," is Brecht's term defined and used best by Benjamin as a mandate to "transform forms and instruments of production...freeing the means of production and serving the class struggle."²⁰⁷ This is crucial to understanding Brecht's radio project. Some of the translations of "Radio as a Communications Apparatus" change the title (Hood, 1967: "Radio as a Means of Communication") and some omit the crucial first sentence quoted above (Willett, 1964).²⁰⁸ For the purpose of this discussion, a recent translation by Marc Silberman is used, which retains some of Brecht's lengthy prose and most of his word choice, while also being edited for structural clarity. In the opening quotation, for example, Willett (1964) completely omits "re-functionalization," thereby eliminating the essay's link to Brecht's idea of *Umfunktionierung*. But this is Brecht's central hope for radio – not a reworking of the physical technology, rather a "structural reorganization of the relationship between...the producer and the listener – in order to bring about a more democratic structure of communication."²⁰⁹

Benjamin described this reorganization in terms of a musical concert: *Umfunktionierung* must eliminate the antithesis between performers and listeners and technique and content.²¹⁰ This re-functionalization is political, formal, and cultural, and while Brecht argues for on-location radio

²⁰⁶ "The Radio as a Communications Apparatus," 1932 in Brecht, *Brecht on Film and Radio*, 42.

²⁰⁷ "The Author as Producer," 1934 in Benjamin, *Walter Benjamin: Selected Writings, Volume 3, 1935-1938*, 774.

²⁰⁸ It cannot be argued that these translators were mistaken, as Willett was a personal friend of Brecht and Professor Hood's translation was praised as comprehensive.

²⁰⁹ Mueller, *Bertolt Brecht and the Theory of Media*, 21.

²¹⁰ "The Author as Producer," 1934 in Benjamin, *Walter Benjamin: Selected Writings, Volume 3, 1935-1938*, 775.

broadcasting, he does not suggest the rewiring of receivers to permit two-way communication:

Umfunktionierung is *not* solely technological, it is the manner in which the public interacts with that technology.

To that end, Brecht analyzes radio in its adolescence, finds it useful yet wanting, and offers suggestions for its continued growth. This argument is particular to the moment, as subsequent technologies would accomplish Brecht's communications and political goals (the call in radio show for a start), but also because Brecht sees this *need* arising from the "lack of consequences" endemic to contemporary public institutions.²¹¹ Re-functionalization would require the RRG to rescind its mandate of political neutrality and "supportive, stabilizing and educational" programming and instead allow radio to "transform reality...secur[ing] the radio a quite different, incomparably deeper impact and endow[ing] it with a quite different social meaning from the current decorative attitude," via the live broadcasting of political debates.²¹² Coverage of dissenting political views and the inclusion of potentially destabilizing realities is a foundation of *Umfunktionierung*, although the effects of such programming might have minimal effect, as those who disagreed with such opinions could well tune to another program (or shut off their receiver).

"The Radio as a Communications Apparatus," Brecht's final essay concerning radio in Germany, summarized his evolving thoughts on a public broadcast medium that was not yet nine years old at the time of publication.²¹³ Read in the context of Brecht's previous writings on this topic and the rapidly metamorphosing role of broadcast radio in German culture, Brecht's use of the term "apparatus"

²¹¹ "The Radio as a Communications Apparatus," 1932 in Brecht, *Brecht on Film and Radio*, 43.

²¹² Brecht, 43.

²¹³ "Der Rundfunk als Kommunikationsapparat," Bertolt Brecht, *Bertolt Brecht: Große Kommentierte Berliner Und Frankfurter Ausgabe*, ed. Werner Hecht, vol. Band 21 (Frankfurt am Main: Suhrkamp Verlag, 1992), 552. The subtitle and notes for this essay indicate that parts of it were delivered orally at a workshop for Southwest Radio in 1930, excerpts were then published in July 1932 in *Blätter des Hessischen Landestheaters*.

conveyed the complexity of a governmentally regulated, publicly available, socio-economically complicated medium in the transition of adolescence.

The *Lichtrequisit* as an Apparatus of Illumination

Moholy-Nagy's preoccupation with this project [the *Lichtrequisit*] is rooted in his long-standing belief that the task of the artist under modernity is not to produce individual autonomous works of art but to transform human vision.²¹⁴

László Moholy-Nagy's expressed intention, from the beginning of the 1920s until his early death in 1946, was to elevate humanity: to create new experiences which would educate the senses, "open all channels of intuition," and thereby stimulate human progress.²¹⁵ An ambitious goal, and one which he approached from practically every conceivable artistic direction during his life. As the paradigmatic example of Moholy-Nagy's effort to this end, the *Lichtrequisit* in its original form was a visually unavoidable apparatus in the Brechtian sense of the word: it was meant to display itself while creating a display that involved a spectator aware of both the machinations and their effects. The *Lichtrequisit* was a *prop* in what Botar regards as the "supreme realization of his [Moholy-Nagy's] representation of the *Gesamtwerk*" at the 1930 Deutscher Werkbund exhibit, and as such an object which "...could be utilized for numerous optical discoveries" with the goal of advancing light and motion design.²¹⁶ It was intended to pique curiosity – with metallic sounds and visibility of the chains and cogs evoking contemporary industry and cinema – from first apprehension the work was codified as a product of its technological moment.

²¹⁴ Joyce Tsai, "Excavating Surfaces: On the Repair and Revision of László Moholy-Nagy's *Z VII* (1926)," in Saletnik and Schuldenfrei, *Bauhaus Construct: Fashioning Identity, Discourse, and Modernism*, 151.

²¹⁵ Moholy-Nagy, "On the Problem of New Content and New Form," 1922, translated in Passuth, *Moholy-Nagy*, 286.

²¹⁶ Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 77. Moholy-Nagy, "Lichtrequisit Einer Elektrischen Bühne," 298. My translation.

An oddity in the corner, in the most extreme reports the *Lichtrequisit* lured viewers with the prospect of pushing a button or plunging their head into an illuminated box.²¹⁷ In the most conservative of estimations, the work was on a timed cycle which would have made it audible to visitors in the gallery who might have investigated the sounds and found a personal *Lichtspiel*. As a part of the realization of Moholy-Nagy's idealistic vision for the potential of an apparatus that he envisioned in 1922 it was an experimental object which could produce new effects and therefore stimulate the sensory growth of its audience – it was only in the totality of the apparatus that such feat was possible. His choice to create a free- and centrally-standing machine which engaged the viewer while simultaneously producing dispersed light effects through the motion of an (also visible) moving metal and glass sculpture was intentional at every turn, given that he was fully aware of theatrical and artistic techniques to achieve otherwise. To underscore this point, his publication of the explanatory essay “Lichtrequisit einer elektrischen Bühne” focused on the technological aspects and aspirations for the work and included no photos of the functioning apparatus, nor the effects it created (Figure 18).²¹⁸ Rather than the re-presentation of the physical work, Moholy-Nagy analyzed its effects and lack of desired reception:

I learned much from this mobile for my later painting, photography, and motion pictures, as well as for architecture and industrial design. The mobile was designed mainly to see transparencies in action, but I was surprised to discover that shadows thrown on transparent and perforated screens produced new visual effects, a kind of interpenetration in fluid change. Also unexpected were the mirrorings of the moving plastic shapes on the highly polished nickel and chromium plated surfaces. These surfaces, although opaque in reality, looked like transparent sheets when moving. In addition, some transparent wire-mesh flags, having been placed between differently

²¹⁷ Tóth translates one contemporary reviewer to have written that the *Lichtrequisit* operated when viewers pushed a button. Tóth, “Capturing Modernity: Jazz, Film, and Moholy-Nagy’s Light Prop for an Electric Stage,” 29. Botar evaluates the potential of the “show in a box” scenario posited by Jan Sahli, *Filmische Sinneserweiterung, László Moholy-Nagys Filmwerk und Theorie* 2006, ultimately concurring with scholar Noam Elcott in discounting this possibility based on their experience of the work. Botar, *Sensing the Future: Moholy-Nagy, Media and the Arts*, 116.

²¹⁸ “Lichtrequisit einer elektrischen Bühne” included diagrams of the location of each light bulb, and a schematic score (reminiscent of the *Mechanische Exzentrik Skizze*) which detailed the action of each light during the 2 minute “rotation of the switchboard.” Moholy-Nagy also described, in technical terms, the movement of each reflective rotating or moving part within the “mechanism,” but offered no elaboration upon the “lightplay” or “projected shadows” that the *Lichtrequisit* created. Published three weeks into the *Werkbund Exhibition*, the only photograph of the *Lichtrequisit* that accompanied the article was of a stage in its’ construction.

shaped ground and ceiling planes, demonstrated powerful, irregular motion illusions. Since I gave much time to this work, I found it somewhat depressing that, for most people, the beauty of such a mobile and its emotional penetration had not been revealed. Almost no one could grasp the technical wit or the future promise of the experiment. I had more luck with a motion picture, “Light Display – black and white and gray,” which I made from the mobile in 1930. There I tried to translate its action into photographic “light” values.²¹⁹

The experimental apparatus had produced (rather than reproduced)! Moholy-Nagy designated to the *Lichtrequisit* as a “mobile” in 1944 in reference to the five stages of sculpture he established in *The New Vision* (1928) – the fifth stage, the kinetic or mobile work, transformed the original formula of “sculpture = material + mass relations” to “sculpture = volume relationships” by employing media as a transmitter of motion rather than mass.²²⁰ It was the culmination of the dynamic materiality goals that he had established in 1922, but had the *Lichtrequisit* truly “heightened the faculties” of its viewers, encouraging them to become “active partners with the unfolding forces?”²²¹ Given the active legacy of the *Lichtrequisit* – its frequent quoting by artists since the 1950s, its rehabilitation and reconstruction for shows since the 1960s, and most recently its elevation to the status of a seminal work of twentieth century light art – the apparatus achieved Moholy-Nagy’s goals of being both “an experimental device for testing connections between man, material forces, and space,” and a “productive apparatus” to engage and expand the human sensorium.²²²

²¹⁹ Moholy-Nagy, *The New Vision and Abstract of an Artist*, 83.

²²⁰ Moholy-Nagy, 47.

²²¹ Moholy-Nagy, “Dynamisch-konstruktives Kraftsystem,” translated in Passuth, *Moholy-Nagy*, 290.

²²² Moholy-Nagy, “Produktion-Reproduktion,” and “Dynamisch-konstruktives Kraftsystem,” translated in Passuth, 289–90. Today, the *Lichtrequisit* exists in multiples copies, none of which include the originally designed enclosure of the enclosing box (Figure 5, 19). The original rehabilitated work resides at the Harvard Busch-Reisinger Museum on permanent display with once monthly activation, while the replicas (now numbering 3 in total) are shown frequently.

CHAPTER I: Figures



Figure 1: Bertolt Brecht, Berlin, 1926



Figure 2: Lucia Moholy, *László Moholy-Nagy at the Bauhaus*, 1926, Detroit Institute of Art

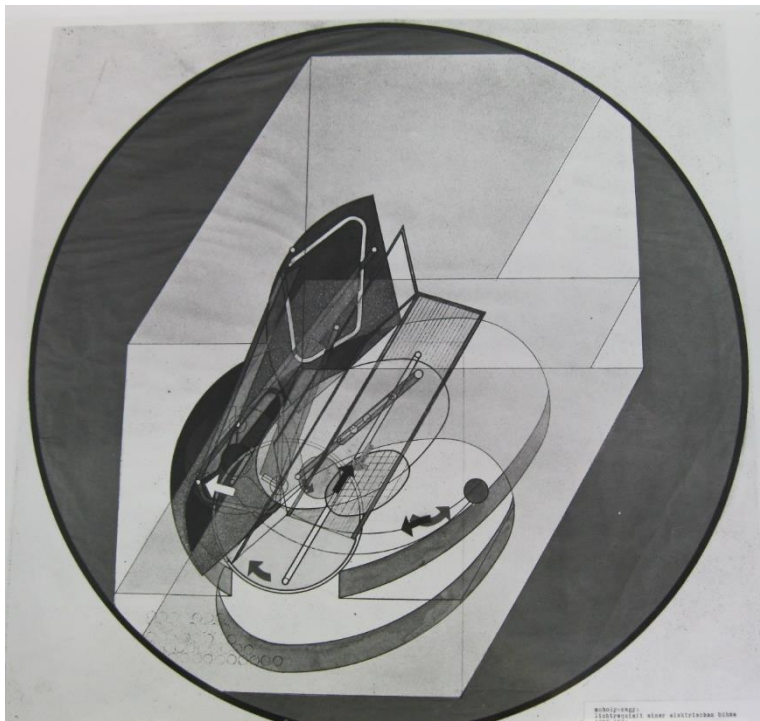


Figure 3: László Moholy-Nagy, *Lichtrequisit einer elektrischen Bühne - Darstellung des Gesamtmodelle*, 1930, Bauhaus Archiv Berlin Inv. Nr. 2410



Figure 4: Bertolt Brecht, *Der Lindberghflug*, 28 July 1929, Baden-Baden Chamber Music Festival

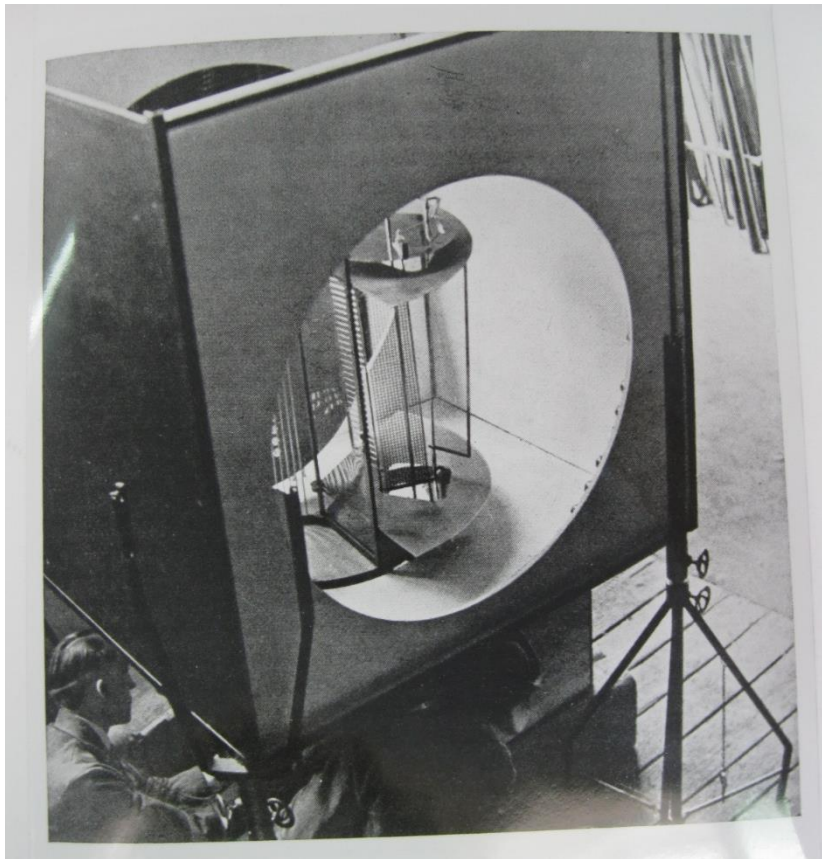


Figure 5: László Moholy-Nagy, *Lichtrequisit einer elektrischen Bühne (construction)*, *Die Form*, 1930

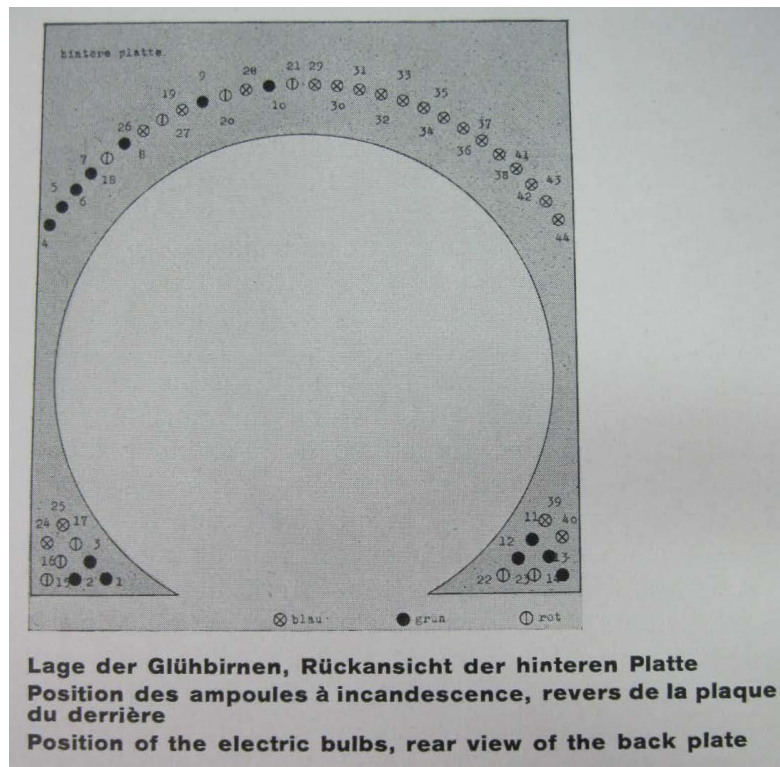
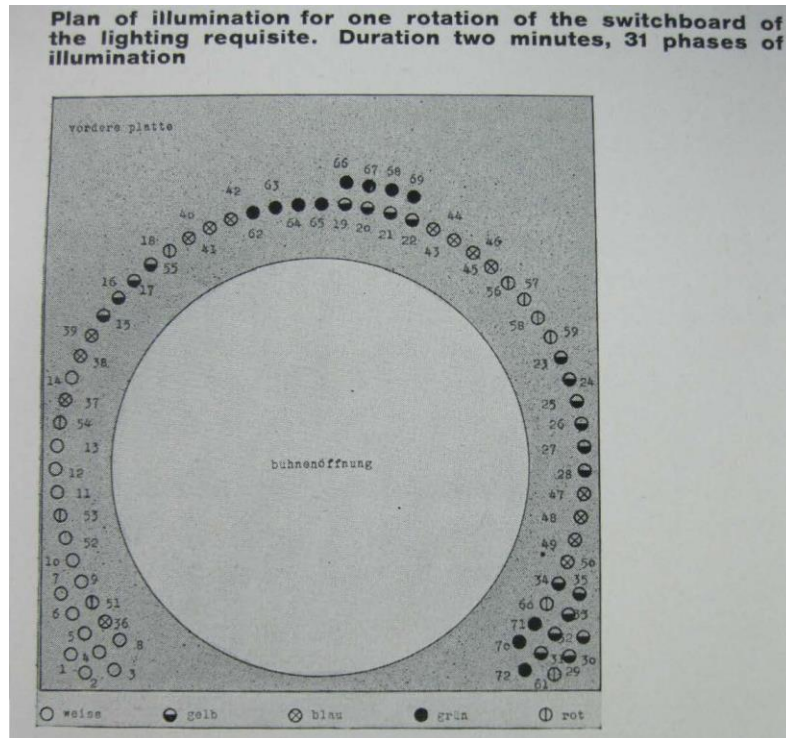


Figure 6: Diagrams of bulb locations inside the Lichtrequisit, *Die Form*, 1930



Figure 7: London Gallery Exhibition, 1937, from Sibyl Moholy-Nagy, *Experiment in Totality*, 1950, Figure 50



Figure 8: László Moholy-Nagy, *Kinetisch-konstruktives System*, 1922, Bauhaus Archiv, Inv Nr. 1533

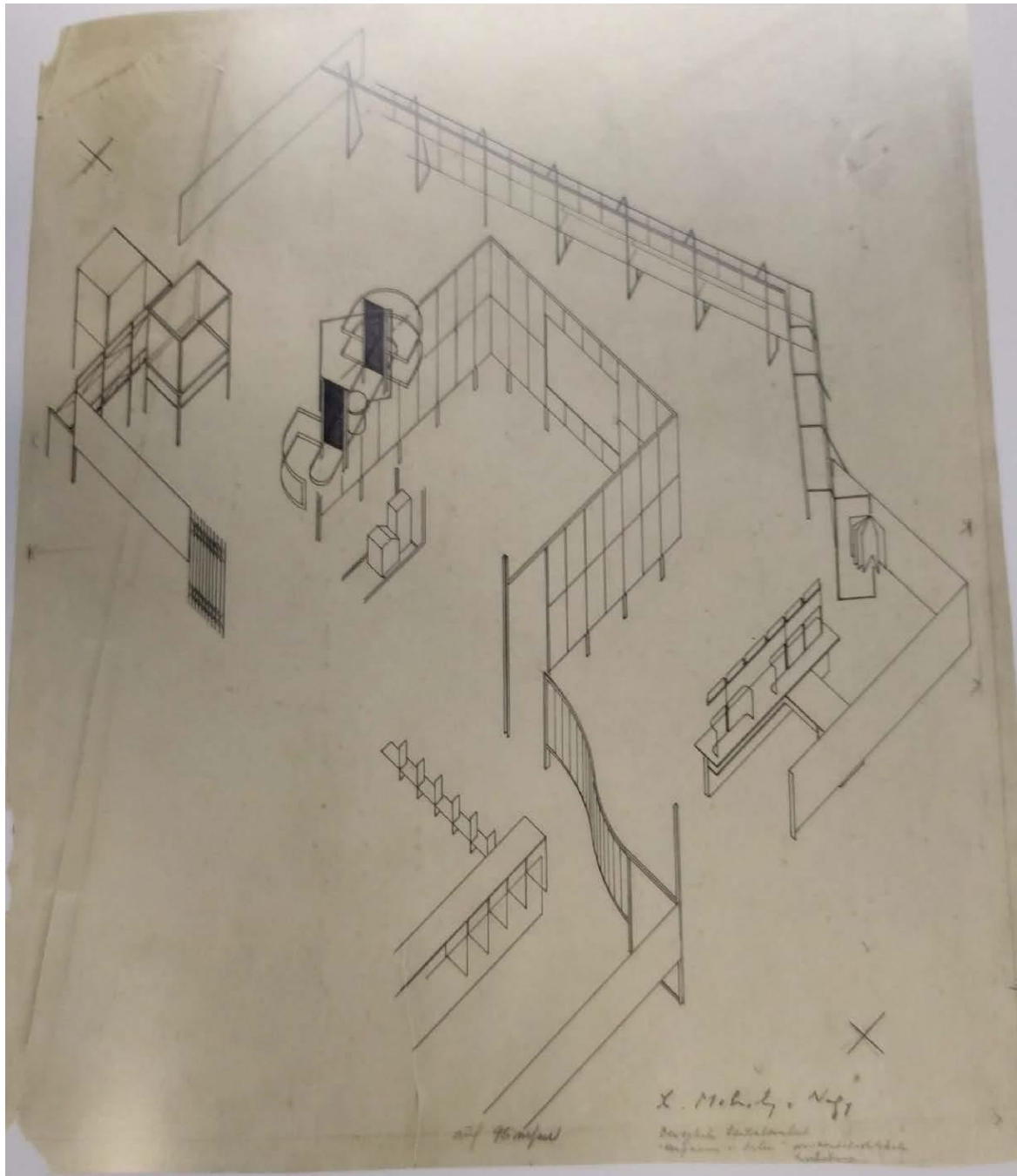


Figure 9: Rudolf Luderer, Isometric Diagram of Salle 2 of Section Allemande, 1930, Collection of David and Donna Travers, reproduced in Witkovsky et al, *Moholy-Nagy: Future Present*, Image 187

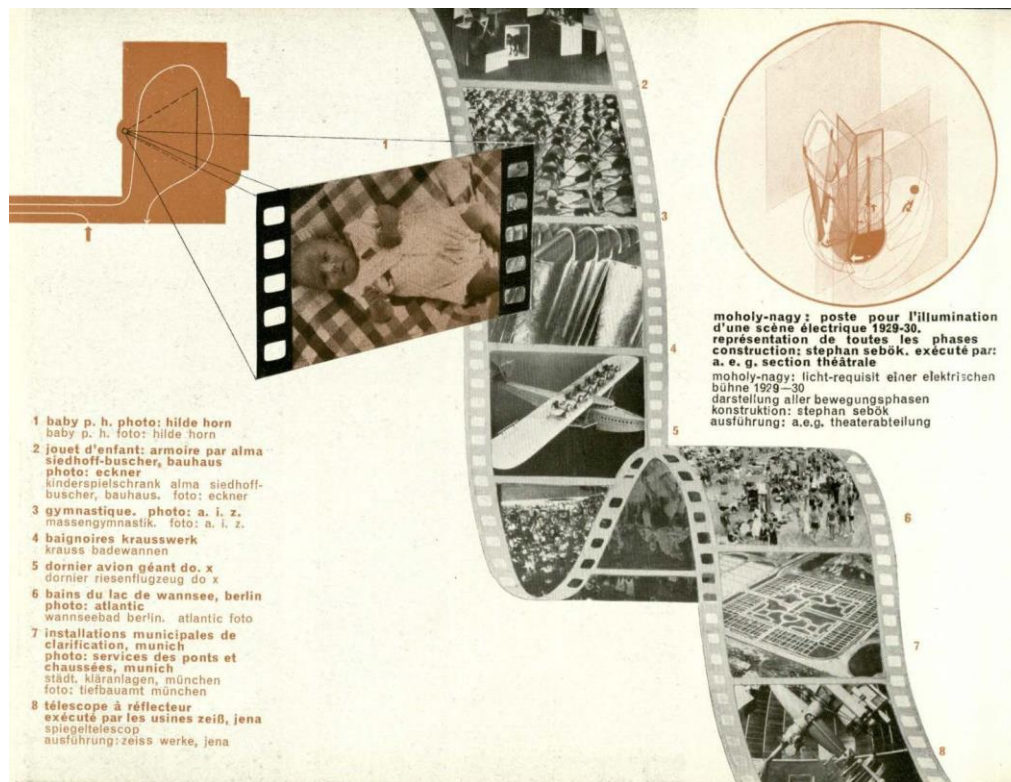


Figure 10: Herbert Bayer, *Section Allemande*, 1930, pg 4



Figure 11: László Moholy-Nagy, *Lichtspiel: schwarz-weiss-grau*, 1930, still



Figure 12: Wilhelm Wagenfeld and Carl Jucker, *Table Lamp*, 1924



Figure 13: László Moholy-Nagy, *Photogram*, 1924, <https://moholy-nagy.org/art-database-gallery/>

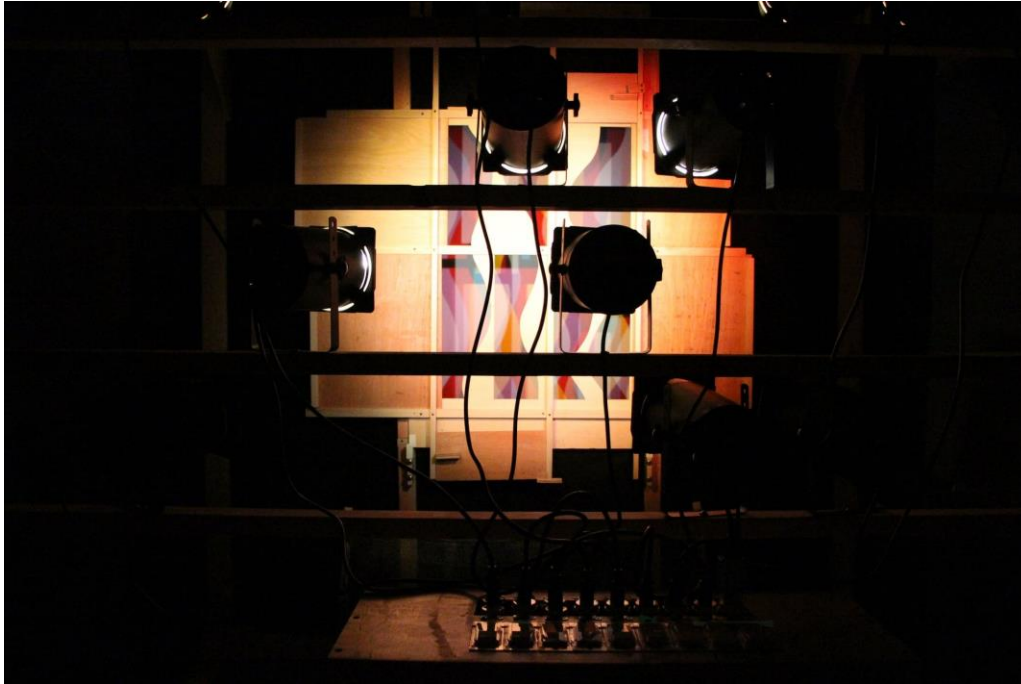


Figure 14: Kurt Schwerdtfeger, *Reflektorisch Farblichtspiel*, 1922, reconstruction, 2016
<https://www.bauhaus100.berlin/events/nostrum-incidunt-voluptate>



Figure 15: Ludwig Hirschfeld-Mack vor Lichtspielapparat, 1923, Stasny, *Ludwig Hirschfeld-Mack*, 105



Figure 16: Otto Dix, Portrait of Journalist Sylvia von Harden, 1926

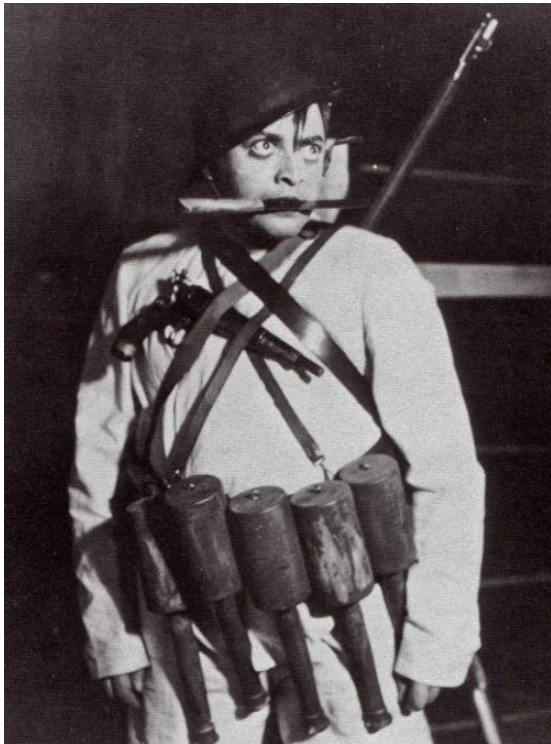


Figure 17: Peter Lorre as Galy Gay, *Mann ist Mann*, 1931

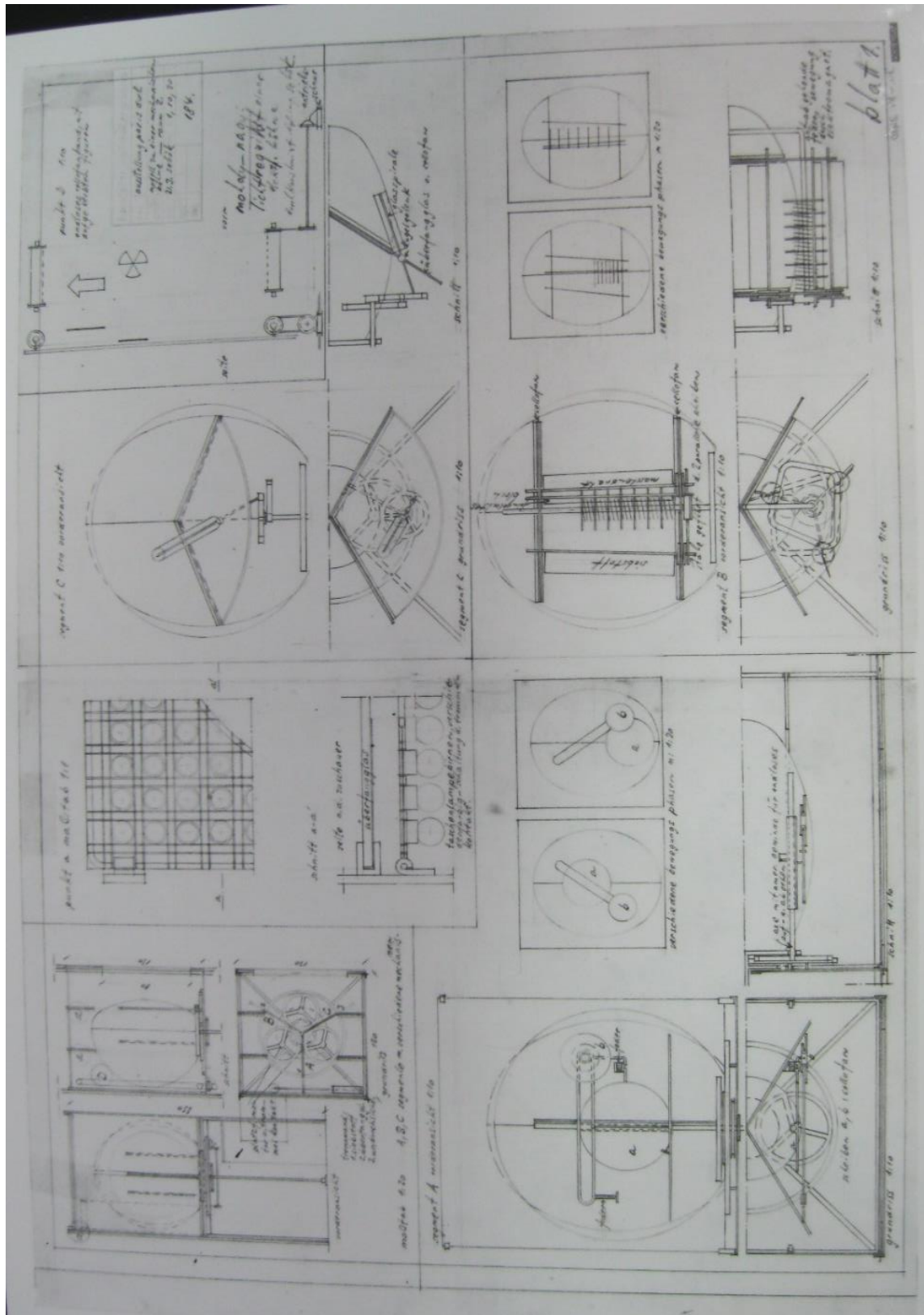


Figure 18: Stefan Sebök, Diagrams of the Lichtrequisit, 1930, Bauhaus Archiv Inv. Nr. 2410



Figure 19: László Moholy-Nagy, *Lichtrequisit einer elektrischen Bühne*, 1930, replica, <https://moholy-nagy.org/art-database-gallery/>

CHAPTER II: Piene's Apparatus of Activation

One glance at the sky, at the sun, at the sea is enough to show that the world outside of man is bigger than that inside him, that it is so immense that man needs a medium to transform the power of the sun into an illumination that is suitable to him, into a stream whose waves are like the beating of his heart.¹

There's one phenomenon that is really important, which is the reason why I chose some of the materials that I've employed, such as neon bulbs; they have a certain magic in them. Even now, they still carry that same magic. Even Grünewald could not create something this glowing, with everything he learned and that he could and did do, there was no glow in the dark.²

It is less than 20 kilometers from Hunsrückenstraße 16, where Otto Piene first performed his *Archaisches Lichtballett* in 1959, to the Langen Foundation in Neuss, the site of his penultimate *Lichtballett* installation in 2014.³ The *Lichtballette* are technological installations and manipulations which produce serene projections of light points. These works evolved over fifty-five years production – from solo performances by Piene holding a flashlight to visually synchronized projections by mechanized sculptures. In the Langen Foundation's quiet underground gallery, the eight meter high walls were alternately spotted with moving glowing flecks, crawled over by spidery legs of light, and illuminated from within –through a concentric circular pattern perforated into the wall itself (Figure 1). Viewers entered the gallery via a lengthy ramp which doubled back during the descent, allowing one to observe the cyclical illumination of each of the *Lichtballett* works from a different physical level (Figures 2-3). On the lower ramp, viewers passed close to the top surfaces of the *Lichtcube*, *Lichtkugeln*, and *Lichtsaule* – just close enough to see the variety of surface openings, from neatly drilled holes, to larger open slashes, each in turn filtering the light which moved across the walls. At the bottom of the ramp, one could choose to turn back and walk among the sculptural forms or continue forward into the brightness

¹ Otto Piene, "Paths the Paradise," from *Zero vol.3* (1961) translated and reprinted in Otto Piene, Heinz Mack, and Lawrence Alloway, *Zero* (Boston: MIT Press, 1973), 148.

² Otto Piene, "Otto Piene in Conversation with João Ribas," in João Ribas et al., *Otto Piene: Lichtballett* (Minneapolis, MN: Shapco, 2011), 54.

³ Otto Piene died 17 July 2014 in Berlin. On that day he had attended the opening of two exhibitions of his work: *Proliferation of the Sun* at the Neues Nationalgalerie and *Otto Piene: More Sky* at the Deutsche Bank Kunsthalle. *Lichtballett* denotes one work in the greater oeuvre of Piene's *Lichtballette*.

of a gallery hung with paintings and beyond that, another installed with Piene's giant, cheerful inflatables. Viewers who chose to double back into the twilight found themselves in the center of Piene's *Lichtballette* – surrounded by mechanized and moving light which washed over walls and bodies, sensorially aware of an orderly progression of gentle clicks and hums from parts and motors, able to quickly glimpse the recognizable edge of a bulb or a shifting armature (Figure 4). The hushed space encouraged one's attention to wander from objects to projections, around the walls, ceiling, and reflective glass of the ramp, to take in the reaction of others, and finally to refocus on the large, light emanating forms.

The defining aspect of the *Lichtballette* is that Piene never hid the technology. From their earliest "archaic" iterations, in which Piene beamed the light of flashlights through hand-held perforated screens, until the final permanent institutional installations of timed and mechanized halogen bulbs shining through polished aluminum sculptures, Piene always allowed the viewer sensory access to the mechanics of the works. The whirring rotors are always audible, the snaking electrical cords are always visible on the gallery floor, it is always possible to catch a glimpse of the bulb even as it spins by. In doing so, Piene tipped his hand regarding his conceptions of the embodied viewer and their relation to both the physical technology of the work and the projections it created: ideas which changed with each major iteration of the *Lichtballette*.

Baudry's Theory of the Filmic Apparatus

Looking to the apparatus to determine the position of the viewer is a strategy fruitfully employed in film theory, and is also useful in analyzing Piene's *Lichtballette* works, due to similar triangular relationships between physical projector/camera, projected image, and viewers. Writing in 1970 Jean-Louis Baudry moved progressively from the scope of the apparatus (the camera or the projector) to include the entirety of the cinema as a "*dispositif*" – his goal being the denial of the

neutrality of technology and the assertion of its ideological impact upon the viewer. In the span of two seminal essays, Baudry approached his own foundational questions:

[d]oes the technical nature of optical instruments, directly attached to scientific practice, serve to conceal not only their use in ideological products but also the ideological effects which they may provoke themselves?⁴

He then established that the technological apparatus both liberates the subject from corporeality and imposes a specific conception of reality, while the larger *dispositif* acts upon the incorporated isolated viewer to offer “simulation of the condition and position of the subject” as representation.⁵ Baudry's essays read as an evolution of thought, scope, and abstraction, and benefit from reference to their original French language. Philip Rosen, summarizing French contribution to filmic apparatus theory, notes that "...some distinctions may have been blurred by translations from French which have rendered both *appareil* [apparatus in the sense of machine, mechanisms] and *dispositif* [apparatus in the more general sense of device, arrangement, disposition] into English as 'apparatus.'"⁶ This distinction is particularly important as Baudry moves from the more specific technological apparatus to the larger *dispositif* encompassing the technology *and* the viewing situation, the viewer and the filmmaker:

Instead of considering cinema as an ideologically neutral apparatus, as has been rather

⁴ Jean-Louis Baudry, "Ideological Effects of the Basic Cinematographic Apparatus," *Film Quarterly* 28 (Winter -75 1974): 40. Whereas Bertolt Brecht's writings (discussed in the previous chapter) concerning cultural apparatuses such as the radio and theater were inextricably linked to his production for such media and to specific historical moments of their evolution, Baudry theorized a generalized and ahistoric cinema, a medium with which he interacted as consumer and critic but never producer. It is less necessary to discuss Baudry's contemporary moment (which is a shame, as French New Wave of the 1960s championed by *Cahiers du cinéma* and its writers rebelled against more traditional cinematic methods and narratives) as his cinematic apparatuses, large and small, appear timeless and totemic.

⁵ A structuralist at times and an author most interested in the mechanics of text, Baudry used these two terms instructively. His first essay, "cinéma: effets idéologiques produits par l'appareil de base," refers frequently to the 'appareil' as he builds an argument for the ideological impact "concentrated in the relationship between the camera and the subject." Baudry, "Ideological Effects of the Basic Cinematographic Apparatus," in Philip Rosen, *Narrative, Apparatus, Ideology: A Film Theory Reader* (New York: Columbia University Press, 1986), 295. His title, effects of the *basic* apparatus (*appareil*), indicate that the work done in this essay concerns the positioning of the physical technologies of cinema; this in relation to (and their impact upon) the spectator/subject. The apparatuses complicit in this act of subjectification include the camera, lenses, projector, screen, and cinematic techniques such as montage.

⁶ Rosen, 282.

stupidly stated...the impact of which would be entirely determined by the content of the film (a consideration which leaves unsolved the whole question of its persuasive power and of the reason for which it revealed itself to be an instrument particularly well suited to exert ideological influence) in order to explain the cinema-effect, it is necessary to consider it from the viewpoint of the *dispositif* that it constitutes, *dispositif* [sic] which in its totality includes the subject.⁷

Baudry fleshes out this expanded concept through a lengthy comparison of the cinematic *dispositif* and Plato's cave. The limited apparatus imposes its ideology on the subject, whereas the *dispositif* functions to simulate the encompassing reality of the dream state (separating the viewer from the exterior world, inhibiting motility, presenting them with images).⁸ The goal of the cinema *dispositif* is

...to construct a simulation machine capable to offer [sic] the subject perceptions which are really representations mistaken for perceptions...The entire cinematographic *dispositif* is activated in order to provoke this simulation: it is indeed a simulation of a condition of the subject, a position of the subject, a subject and not of reality.⁹

Baudry's comparison between cinema and the dream state demonstrates his conception of the way in which cinema *acts upon* the viewer: it induces, presents, offers, provokes. Despite his avowed interest in Brecht's pedagogical purpose for new art, Baudry's *dispositif* is antithetical to Brecht's conception of engaging the radio listener to become a collaborator: instead the *dispositif* assumes an isolated individual, statically positioned within the arrangement of the cinematic experience (Baudry's comparison to the chained prisoners of Plato's cave is particularly instructive here).¹⁰ The apparatus might be physically constructed by humans, yet it functions autonomously upon them. Furthermore, Baudry proposes that this technology, what Marshall McLuhan described as an "extension of man," functions to impose the unconscious.

Without his always suspecting it, the subject is induced to produce machines which

⁷ Jean-Louis Baudry, "The Apparatus," *Camera Obscura* 1 (Fall 1976): 119. I have replaced "apparatus" in the last sentence of the English translation of this quotation with the original French *dispositif*. Doing so, the distinction between the apparatus (referenced in the first sentence and in the original as *appareil*) and *dispositif* becomes clear.

⁸ Baudry, 122.

⁹ Baudry, 121–23. I have replaced the English translation "apparatus" in the last sentence with *dispositif* as was written in the original French text. Jean-Louis Baudry, "Le *Dispositif*," *Communications* 23 (1975): 72.

¹⁰ It is the unconscious of the subject which mediates perception of the images and Baudry explicitly states the subject/dreamer has no "possibility of exercising and kind of immediate control." Baudry, "The Apparatus," 121.

would not only complement or supplement the workings of the secondary process, but which could represent his overall functioning to him: he is led to produce mechanisms mimicking, simulating the apparatus which is no other than himself.¹¹

The “secondary process” that Baudry refers to is the working of the unconscious mind, usually manifested through the dream-state, during which the immobile subject processes thoughts and feelings not readily available during waking hours of conscious thought. The cinematic apparatus – the projector, the screen, the film – is the physical clue to the viewer that an externalization of what is usually a private and unconscious experience is about to occur, an illuminated projection of a mediated other reality which might bear some resemblance to their own.

The Origins of the *Lichtballett* Apparatus

Otto Piene was in the process of making photograms as a solution to the tricky reproduction of his monochrome *Rasterbilder* works when he realized that a phenomenon was occurring on the opposite wall: “I then moved my light sources and discovered that the projections also moved and from there the *Lichtballett* developed.”¹² Holding the *Rastersiebe* in one hand and a large flashlight in the other, Piene moved both the light source and the screens to create moving projections of star-like spots on the walls, ceiling, and floor of his studio (Figures 5-6).¹³ The nascent *Lichtballett* was not only on the wall, but also in the space, surrounding and including the viewer in the work – yet the apparatus remained central and acknowledged. The ideology of that apparatus, Baudry’s “simulation machine,” originated in Piene’s experience of WWII, the post-war aftermath, and his foundational role in the

¹¹ Baudry, 123. “Autrement dit, sans qu’il s’en doute toujours, le sujet serait amener à produire des machines qui, non seulement complèteraient ou suppléeraient aux fonctions du processus secondaire, mais seraient susceptibles de lui représenter son fonctionnement d’ensemble, appareils mimant, simulant l’appareil qu’il est.”

¹² Otto Piene in Wulf Herzogenrath, ed., *Selbstdarstellung: Künstler über sich* (Düsseldorf: Droste Verlag, 1973), 138.

¹³ Piene’s method of creating the earliest *Archaisches Lichtballett* was filmed by the Fox tönene Wochenschau in 1959 during the *Dynamo 1* exhibition at the Renate Boukes Gallery in Wiesbaden. *Fox tönende Wochenschau, 1959/0071*, 16mm, 1959.

international ZERO movement: it was a set of beliefs about the function of light which evolved from a commercial design project.

During World War II the Piene family lived just north of the Ruhrgebiet in Lübbecke, a town less than 100km west of Hanover and between two major industrial centers that were consistent Allied bomb targets. Drafted into an anti-aircraft battalion at the age of 15, Piene met Walter Kirschbaum in 1945 at Gütersloh Airfield shortly before the end of the war. Ten years later, after Piene had returned to Düsseldorf from the Art Academy in München, Kirschbaum opened a new building for his family's Stempelfabrikant (stamp-fabrication) business and asked his old friend for a new sign. Piene, teaching at the Fashion Academy of Düsseldorf, working out of his shared and dilapidated Gladbacherstrasse studio, and studying philosophy at the University of Köln, provided Kirschbaum with several pieces that are still in use: "...a brass light box with punctured perforations and a shop facade that consisted of sequences of metal letters, numbers and punctuation fields (see *ZERO 3*)."¹⁴ The reference at the end of Piene's brief description points to two reproductions in the *ZERO vol. 3* publication of 1961: per the labels on the facing page, one shows a detail of the 1955 *Buchstabenraster*, while another depicts the *Lichtkasten* of the same year (Figures 7-8). Both photos are small and grainy with no references for scale or location. Piene's adurance in retaining what might otherwise have been an early experimental work must be read as his insight into the importance of materials and methodologies which would become crucial to the ideology of his oeuvre.

Buchstabenraster literally translates to "grid of (alphabetic) characters," which are evident on the Ernst Kirschbaum sign as small islands of gridded numbers, letters, and symbols surrounding the proprietor's name rendered in bent white neon tubes in front of a reflective black background (Figure 9).¹⁵ Instead of this complete work, the black and white photo from *ZERO vol. 3* shows a close-up detail

¹⁴ Otto Piene, "Piene - Autobiography of early years, 1995," June 1995, 4, ZERO Foundation.

¹⁵ In the 1973 MIT collection and of *ZERO 1-3*, *Buchstabenraster* is translated as "Dot Pattern with Letters." Piene, Mack, and Alloway, *Zero*, 173.

of surface perforations to the right of a raised, possibly metal ampersand. It is the detail of a small area just above the neon “n” – almost unrecognizable from the original sign – in which the holes seem to be dots adhered to the surface and the black ampersands appear matte against the glossy background (Figure 9). In a similarly transformative manner the photographs of the two Kirschbaum *Lichtkasten* (Light-boxes) show light emanating from a undefinable source and reflecting off a dark and uneven surface, whereas the physical lamps of perforated brass, meant to be attached to the wall (cylinder) and the yellow painted ceiling (box), projected light from bulbs through a shiny, smooth, and reflective casing (Figures 10-11). These photos of Piene’s early works included in *ZERO 3* are part of a pictorial grid which spans 1953-57 and includes *Frequenz (Silbern)* (1957) which Piene believed to be a crux within his oeuvre: “...the key picture for the then emerging Group Zero” (Figure 5).¹⁶ Given the stated importance of many of the works on this page (the *Rasterbilder* were another crucial advance), the inclusion of the Kirschbaum pieces must not be overlooked. The photographic transformation of the works from practical advertising and lighting fixtures into black and white abstractions establishes a theme that would continue in Piene’s works with light: that of a pragmatically driven, visible, and imperfect apparatus being reworked or redeployed for a different result. The photographs of various *Lichtballette* which precede the images of the *Buchstabenraster* and *Lichtkasten* in *ZERO vol. 3* are also dichotomous: the spread of each page includes both apparatus and effects, with the same lamps appearing in different configurations in multiple installations. Although not as explicitly demonstrated, this is the same ethos as Piene’s inclusion of the *Lichtkasten* and *Buchstabenraster*.

Scholar Chris Gerbing argues that the early *Lichtkasten* should not be considered a forerunner to the later *Lichtballette* as they fail to demonstrate Piene’s spatial concepts.¹⁷ While this may be true (it is difficult to make claims concerning works that are neither clearly photographed nor exhibited), the

¹⁶ Piene, “Piene - Autobiography of early years, 1995,” NP.

¹⁷ Chris Gerbing, “Mit 12x12 Scheinwerfern zum Mond,” in Klaus Beuckers, ed., *ZERO-Studien: Aufsätze zur Düsseldorfer Gruppe Zero und Ihrem Umkreis* (Münster: Lit Verlag, 1997), 91.

Lichtkasten must be acknowledged in terms of their place in the physical and technological evolution of Piene's work: Piene himself recuperated them for inclusion in *ZERO vol. 3*, six years after their construction, and the physical technology of hand-perforated grids remained a core component of the subsequent *Lichtballette*.¹⁸ Gerbing asserts that the *Lichtkasten* are more congruous with the intentions of Heinz Mack's *Lichttroten* and Günther Uecker's *Nagelobjekte* as works which rely on the visualization of light vs. dark, but these comparisons do not account for Piene's physical and psychic involvement with the construction of the works, nor do they connect Piene's personal history with Kirschbaum and his avowed desire to "rehabilitate light" during the post-war period. The *Lichtkasten* and *Buchstabenraster* establish a nascent version of what would become Piene's signature combination of existing technology and handwrought aesthetic with personal history and utopian artistic vision.¹⁹ These elements would be central to Piene's artistic practice and were further investigated during the evolution of the *Lichtballette*, initially through the development of the hand-perforated screens similar to those of the *Lichtkasten*.

The "Archaic" Lichtballett

For the *Rasterbilder* I used self-made gridded screens, which I created by knocking out holes with the help of a hollow punch. There were about 10,000 holes in one such gridded screen. I made about 50 to 60 square meters. So you can calculate how many holes I punched in about four to five months. This was not for nothing, as I have made many things with the screens.²⁰

Piene first exhibited the *Rasterbilder* in 1957, two years after completing the *Buchstabenraster* and *Lichtkasten*, and the technique was obviously visually indebted to these earlier works. The metal or

¹⁸ Volker Kirschbaum, son of Walter, is adamant that "Onkel Ötte's" *Lichtkasten* are a forerunner to the *Lichtballette*, a position supported by Piene's inclusion of the works in *ZERO vol. 3*. Volker Kirschbaum, "ZERO Foundation / Otto Piene," April 16, 2016.

¹⁹ By "existing technology" I am specifically referring to the lamp per se, the fixtures, sockets, cords, and plugs. The handwrought aesthetic of the *Lichtkasten* is most evident in the random drilling of the holes in the brass plates. In the instance of the *Buchstabenraster* it is the arrangement of the groups of characters on the sign.

²⁰ Otto Piene in Herzogenrath, *Selbstdarstellung: Künstler über sich*, 138.

cardboard screens or sieves (*Siebe*), comprised of thousands of laboriously hand-punched holes, were laid on a stretched canvas and oil paint (white, silver, yellow, gold, red, blue, or black) was forced through the perforations.²¹ The results were monochromatic three dimensional compositions of subtle light and shadow in which Piene sought purity of medium and to separate the work from expressionist tendencies. As the body of work evolved, Piene created more elaborate designs with the screens, and emphasized (or diminished) areas of the raised texture.²²

The *Rasterbilder* also marked the beginning of ZERO-Zeit (ZERO-Time), a nine year period of intense activity and group shows by the loose affiliation of artists known as ZERO.²³ In Düsseldorf, Piene was joined by school comrade Heinz Mack – together the pair would develop artistic theories and exhibitions as Group Zero. They were formally joined by Günther Uecker in 1961. The larger international ZERO movement emerged simultaneously and included the Dutch group Nul, Italian La Nuoca Concezione Artistica, Neue Tendenzen, other individual artists, gallerists, and critics who would later occasionally associate themselves with the Germans under the name ZERO.

Piene focused on the *Rasterbilder* during 1957, a year which he described as “magical” due to the opening of two new galleries in Düsseldorf, the completion of his own “raw” studio, and the inauguration of the *Abendausstellungen* (single evening exhibitions) in this new space.²⁴ The *Rasterbilder* were first shown at the *Fourth Abendausstellung* (26 September 1957), then at Alfred Schmela’s

²¹ *Das Sieb* can be translated as sieve or colander, sifter or filter, all of which are interesting and relevant ways to regard the perforated metal that Piene created. I generally use the terms screen or filter, which is not to discount these other possibilities, but rather to be clear and consistent.

²² During a segment covering the Fourth Baden-Baden German Art Prize in September, 1959, the *UFA Wochenschau* showed Piene “working on” a *Rasterbild*. *UFA-Wochenschau 164/1959 - 15.09.1959, 1959*, <http://www.filmothek.bundesarchiv.de/video/584354?q=&xf%5B0%5D=Keywords&xo%5B0%5D=EQUALS&xv%5B0%5D=beauty+care>.

²³ ZERO archivist Tiziana Caianiello differentiates ZERO and Group Zero (or Zero Group) to clarify the between the international movement (ZERO) and the group of Heinz Mack, Otto Piene, and Günther Uecker (Group Zero) who were the local to Düsseldorf and a lynchpin of the movement’s loose organization. I have adopted her nomenclature throughout this chapter. Tiziana Caianiello and Mattijs Visser, eds., *The Artist as Curator: Collaborative Initiatives in the International Zero Movement 1957-1967* (Düsseldorf: ZERO Foundation, 2015), 13.

²⁴ Otto Piene, “More Zero,” n.d., ZERO Foundation, accessed October 30, 2013. Heinz Mack’s studio was at the same address, Gladbacherstraße 69, however his space was not as large as Piene’s.

Düsseldorf gallery, and then as part of the first ZERO exhibition (24 April 1958). The *Rasterbilder*, like many other early ZERO works, were monochrome products of industrial media, lacking obvious references to the autographic hand of the artist, which instead turned the focus to the immediate relation between the viewer and the work. This inclusion of the viewer as central to the work became a tenet of Piene's oeuvre.

In his 1958 meditation "On the Purity of Light," Piene elucidated a path away from contemporary painting – which he believed still responded to perspectival space.²⁵ Piene asserted that although Abstract Expressionism, Tachismus, and the resulting Art Informel had managed to move beyond flatness and form to capture "frozen moments" of past motion, they had done so at the expense of pure light and pure color.²⁶ ZERO's goals at this point were to intellectually and physically engage the viewer in the present moment rather than in the inner turmoil of the artist. Color, light, space, texture – qualities that were immediate, ahistorical, and intentionally un-expressionistic became the lynchpins of ZERO. Piene alluded to the pitfalls of expressionistic painting in 1960:

...the dramatic engagement of the author is useless for the viewer, the action is left 'frozen' and petrified. More important than the marks of tragedy as a result of the changing state of mind of the painter, more important than the psychological transcript, seems to me to bring a picture to light, to give it a permanent dynamic. In the painting there is the painting, not the demonstration of psychological circumstances.²⁷

The essay was accompanied by a reproduction of a *Rasterbild*, a monochrome white of smaller, raised paint points in concentric mirrored arcs, visible mainly by the tiny shadows cast by the paint.

²⁵ Otto Piene, "Über die Reinheit des Lichts," in Otto Piene and Heinz Mack, eds., *ZERO vol. 2* (Düsseldorf, 1958), 24. At this time, the creation or denial of two-dimensional space was also a central concern of Clement Greenberg, who would publish the seminal "Modernist Painting" in 1960, declaring the acknowledgement and pursuit of flatness to be the defining concern of Modernism, and the only condition unique to painting. Clement Greenberg, "Modernist Painting," in Charles Harrison and Paul Wood, *Art in Theory, 1900-2000: An Anthology of Changing Ideas*, 2nd ed. (Malden, MA: Blackwell Pub., 2003), 775.

²⁶ Piene, "On the Purity of Light," in *ZERO vol. 2* (1958) reprinted and translated in Piene, Mack, and Alloway, *Zero*, 46.

²⁷ Otto Piene, "Malerei" in *Piene: Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960* (Berlin: Galerie Diogenes, 1960), np.

The monochromatic immediacy of the *Rasterbilder* proved difficult to photograph, and Piene experimented with other reproduction methods. He produced photograms by layering the screens on photosensitive paper and shining light through the hundreds of hand-punched holes, describing these as “photographic interpretations” of the *Rasterbilder*.²⁸ As immediate indexical representations the images speak of nothing but their creation – they are products of the creative energy of light – but the photograms failed to physically engage the viewer or to move beyond the traditional two-dimensionality of art to be hung on a gallery wall. Piene’s evolution from the wall to the space surrounding the viewer occurred with his first projected *Lichtballett* and was theorized by his contributions to the *ZERO* publications of 1958 and 1961.

ZERO vol. 1 was released in April 1958 to accompany *Das rote Bild (The Red Painting)*, the seventh *Abendausstellung* at Piene’s Düsseldorf studio. A twenty-three page collection of essays, statements, and reviews that focused on painting and color, *ZERO vol. 1* began with Hegel’s claim that “Red is the concrete color par excellence” and concluded with a “Note Concerning Color in the Informel Style” by (Informel) artist and author Hans Platschek. Piene’s essay “Color in Different Value Systems” classified the various social and artistic uses of color and explored the connection between monochrome works, time, and dynamism, and provided a theoretical counterpart to his use of color in the concurrent *Rasterbilder*. Several of the gridded, monochrome works, including *Frequenz* (1957) were included in *Das rote Bild* exhibition.

Vibration, the eighth *Abendausstellung* took place in October of 1958 at Piene’s studio and focused on themes of grids, screens, and the eponymous vibrations.²⁹ *ZERO vol. 2*, released at the exhibition, was also dedicated to the theme of vibration and composed mostly of artist’s essays focused

²⁸ Otto Piene in Herzogenrath, *Selbstdarstellung: Künstler über sich*, 138.

²⁹ The show was originally to be called *Raster (Screen)*, which gives a better idea of the importance of Piene’s concurrent output of *Rasterbilder*. Otto Piene, “Bibliographie: Biographie, 1965,” March 30, 1965, 6, ZERO Foundation.

on the aesthetics of symbols, structures, and light. Included in the publication, Piene's manifesto "On the Purity of Light" asserts the central importance of light and color as that which "flows between the work and the spectator and fills the space between them."³⁰ Although Piene's claims for the importance of light and color refer to two dimensional painting as their origin, he repeatedly describes the spatial effects that occur around the canvas and in the viewer's perception:

Purity of light, which creates pure color, which in turn is an expression of the purity of light, takes hold of all men with its continuous flow of rhythmic current between painting and the observer; this current, under certain formal conditions, becomes a forceful pulsebeat, total vibration. The vitality of color is in its persuasive power. The energy of light emanating from the field of the painting is converted mysteriously into the spectator's vital energy.

ZERO vol. 2 includes reproductions of four abstract, wall-hung artworks, the texture of which is sacrificed to the black and white photos.³¹ Piene realized the necessity of "certain formal conditions" to engender the desired "vibration;" the impossibility of ideal viewing via a reproduction might be central to his new strategy regarding reproductions of his work in the next issue of *Zero*.

By the release of *ZERO vol. 3* in 1961, Piene's *Rasterbilder* had generated the *Lichtballette* which had evolved through several critical early stages. His personal artistic growth was mirrored by the rapid expansion of the ZERO Group, and the maturity of the *ZERO vol. 3* journal. ZERO archivist Dirk Pörschmann describes the contrast between volumes one, two, and the final publication:

ZERO 3 was no longer directly linked to an exhibition – as were the first two editions – even if it appears so in hindsight. Due to the years of preparation time, *ZERO 3* became a milestone in the history of artists' publications. The exclusion of art critics, the clear and innovative graphic design, and the manner in which the journal was presented at Galerie Schmela, demonstrated that Mack and Piene learned to take the medium of the artists' magazine seriously over the course of making the three issues.³²

³⁰ Otto Piene, "On the Purity of Light," *ZERO vol. 2* (1958) translated and reprinted in Piene, Mack, and Alloway, *Zero*, 46.

³¹ The included works are by: Oskar Holweck, Almir Mavignier, Heinz Mack, and Piene.

³² Dirk Pörschmann "ZERO bis unendlich. Genese und Geschichte einer Künstlerzeitschrift." in Dirk Pörschmann and Mattijs Visser, eds., *ZERO 4 3 2 1* (Düsseldorf: Richter/Fey Verlag GmbH, ZERO Foundation, 2012), 430.

The event that celebrated the publication was a full-blown *ZERO Edition, Exposition, Demonstration* that completely enveloped the small Galerie Schmela in central Düsseldorf. The largest of the ZERO publications at 302 pages, *vol. 3* focused on the visual work of ZERO: fully half the pages were photographic reproductions and the volume was divided into subsections devoted to individual artists. Overall, the volume represents the full-fledged, multi-faceted, international ZERO. As an artist's book, *ZERO vol. 3* employed innovative design and typesetting: the cover with its proclamation of ZERO opened to an arrow pointing to the right and the symbol for infinity on the facing page. The next pages announced the theme of DYNAMO, the term which would then serve of the title of address for each of the included artists: DYNAMO Mack, DYNAMO Klein, DYNAMO Arman, etc.³³ The section of "DYNAMO Piene" follows printed proofs of Jean Tinguely's *Hommage Á New York* with Piene's most poetic essay, "Paths to Paradise."

Piene begins "Paths to Paradise" by obliquely referencing László Moholy-Nagy's letter to *Telehor* collaborator František Kalivoda.³⁴ In 1936 Moholy-Nagy wrote:

We are ready to replace the old two-dimensional colour patterns by a monumental architecture of light. I have often dreamed of hand-controlled or automatic systems of powerful light generators enabling the artist to flood the air – vast halls, or reflectors, of unusual substance – such as fog, gaseous materials or clouds, with brilliant visions of multi-coloured light. I elaborated numerous projects – but no patron ever commissioned me to create a monumental fresco of light...I longed to have at my disposal a bare room containing twelve projectors, the multi-coloured rays of which would enable me to animate its white emptiness. Have you ever witnessed a large search-light with its vast cones of light flashing wildly across the sky and searching

³³ The exception to this nomenclature is Lucio Fontana, who is the first presented artist. In his introductory speech to the exhibition *Lucio Fontana: Werke aus drei Jahrzehnten* (1962, Städtisches Museum Leverkusen/Schloss Morsbroich) Piene described Fontana as one who "...destroys in a single, spontaneous, creatively radical act the world of old pictures and ideas...his fearless action brings a new wonder to the fore: we witness in the sinking of the old order the arising of new possibilities." Otto Piene, "Introductory Speech for the Exhibition *Lucio Fontana*," 12 January 1962, translated and abridged in Dirk Pörschmann and Margriet Schavemaker, eds., *ZERO* (Köln: Walther König Verlag, 2015), 302.

³⁴ During my research I have not found an acknowledgement by Piene of this literary connection with Moholy-Nagy. Piene does state in the second half of "Paths to Paradise" that "I have arrived at the light ballet through painting and many other things, through my own methods and instruments. I only heard later that I was the son of half a dozen fathers whom I did not know as such." Piene, "Paths to Paradise," *ZERO vol. 3* (1961) translated and reprinted in Piene, Mack, and Alloway, *Zero*, 149.

further and further afield into infinite space? I envisaged similar results.³⁵

Moholy-Nagy continues his essay filled with resignation: he was working in the London design industry at this time, the Bauhaus had closed, he was in exile. *The Lichtrequisit*, although displayed once at the London Gallery in 1936, remained an experimental instrument rather than a well-regarded facilitator of new light and space relationships. He writes of “revolutionary ideas” with “limiting factors,” “gradual evolution” and the present impossibility of full realization.

As if in answer, twenty-five years later, Piene begins his optimistic manifesto of action with:

My dreams are different from songs and sagas. I am working toward their being festive and visible from far off. I am not pining away from longing and resignation because no patron will give me smoke and light. I already have my 12 searchlights, they belong to me. But they are just the beginning, for I would like 12 times 12, and then more, and they must be strong enough to light up the moon.³⁶

The reference, both to the form and content of Moholy-Nagy’s letter, is unmistakable, however Piene’s focus quickly shifts to the relations between art and the viewer.³⁷ Piene argues for the expansion of the monistic mind-body through the energy of light and art, moving from the mirror-potential of pictures to the grand perspective of a human in space. Writing explicitly of his ultimate goals for the nascent yet successful *Lichtballette*, Piene dreams of a work that provides “something giving, flowing,

³⁵ László Moholy-Nagy, “Letter to Kalivoda,” *Telehor* 1-2, 28 February 1936, 30-32, translated in Passuth, *Moholy-Nagy*, 333.

³⁶ Otto Piene, “Paths to Paradise,” in *ZERO vol. 3* (1961) translated and reprinted in Piene, Mack, and Alloway, *Zero*, 148.

³⁷ Piene and Karl Ruhrberg, critic and later director of the Städtischen Kunsthalle Düsseldorf, engaged in a heated correspondence concerning Moholy-Nagy’s influence. Piene steadfastly maintained that his *Lichtballette* works, in theory and physicality, developed without influence from Moholy-Nagy. “Leonardo’s *Last Supper* can still be seen today, but not Moholy’s light actions; there are no photos. So you can’t say that the *Lichtballett* “goes back to” M.N., it’s a visual phenomenon; the ideas of using light are different.” Piene, Otto, “29 December 1965, Piene to Ruhrberg,” December 29, 1965, Box 6 F18, Getty Research Archive. In a letter dated one month later, Piene elaborates “Have you seen Moholy’s experiments? Not me. I know two men who have seen them. One is J.A. Thwaites. You can find his opinions of myself and ZERO in the July 1965 issue of *Studio International* (London). The other eyewitness I know is Prof. Gyorgy Kepes of the Massachusetts Institute of Technology. He verifies that the only similarity is the medium of light.

pulsating...shooting the viewer into space where he can breathe deeply of fresh air.”³⁸ He connects this interest in the embodied viewer with his artistic vision concerning the potentiality of light :

I go to darkness itself, I pierce it with light, I make it transparent, I take its terror from it, I turn it into a volume of power with the breath of life like my own body, and I take smoke so that it can fly.³⁹

By materializing darkness: something that he can pierce, make transparent, turn into a solid (volume) and blow away like smoke, Piene also gives the viewer something to physically relate to, as a replacement for the previous position of a physical painting. Toward the end of the essay he describes the light of war as a “naïve light ballet (*Lichtballett*),” using the same nomenclature in the original German as he would for his own *Lichtballette* works:

Up to now we have left it to war to dream up a naïve light ballet for the night skies, we have left it up to war to light up the sky with colored signs and artificial and induced conflagrations.⁴⁰

Photographs of the “archaic” and “classical” *Lichtballette* are included on the following pages, and in each instance, an image of Piene and the apparatus is paired opposite an image of the light which is projected. Including both the technology and his body either operating, adjusting, or observing the apparatus demonstrates Piene’s continued focus on the relations between the human body and the sources of light.⁴¹ In the span of three years, Piene had made a radical shift of focus from the surface and effects within the picture plane (*ZERO vol. 1 and 2*) to the space surrounding the viewer (*ZERO vol. 3*), which was simultaneously demonstrated in the changing *Lichtballette*.

³⁸ Piene, “Paths to Paradise,” in *ZERO vol. 3* (1961) reprinted and translated in Piene, Mack, and Alloway, *Zero*, 149.

³⁹ Piene, “Paths to Paradise,” (1961) in Piene, Mack, and Alloway, 148. The last phrase of this text could also be translated as “...I use smoke so that it can fly.” The image that this conjures – of materialized darkness being blown away – seems more in line with Piene’s ideas here. The original German is: “...ich nehme Rauch, damit es fliegen kann.”

⁴⁰ Piene, “Paths to Paradise,” (1961) in Piene, Mack, and Alloway, 149. This essay treads perhaps the most poetic path of those that Piene wrote for the *ZERO* publications.

⁴¹ Piene is shown operating the *Archaisches Lichtballett* (1959), adjusting a *Scheibenprojektor* (1960/61), and observing the *Klassisches Lichtballett* (1961).

Flashlights and Gridded Sieves

Piène's first solo show at the Galerie Schmela in Düsseldorf, *Otto Piene. Ölbilder, Lichtballett, Lichtmodelle*, opened on 6 May 1959. Inside, Piene performed what he would title the *Archaisches Lichtballett* by himself with perforated *Rastersiebe* and a hand-held flashlight.⁴² Piene recalled the event as being a "scandal" due to the *Lichtballett*; the reviewer for the *Düsseldorfer Nachrichten* did not use such a tantalizing term, but did note that the *Lichtballett* was performed twice (instead of the one scheduled showing) on opening night, due to its success and the large "cluster of expectant and curious onlookers...ranging from old-timers to academy professors" blocking the street outside the gallery.⁴³

One photograph by Manfred Tischer exists of this performance, a term that Piene used repeatedly in reference to the early *Lichtballett* events. In the black and white image, Piene stands before a curtain holding a screen of approximately 3 feet square in his left hand, which is perforated with large arcs of small holes (Figure 12). Although the source of light is blocked by the head of the spectator in the foreground of the photograph, Piene is illuminated from a point somewhere in the vicinity of his navel, given the light spill onto his face and the curtain behind. His concentration is determinedly fixed several feet over the head of the audience, so it is quite probable that the flashlight in his right hand is projecting through the screen at a slightly upward angle. The photograph also provides an idea of the physical locations of audience and performer, Piene stands alone facing the assembled group of viewers, creating an unusual viewing situation: the audience faces the performer, who ostensibly faces them, however his attention is focused on the space above and behind their heads, giving the physical cue that their focus is misplaced. Chris Gerbing maintains that this setup solidifies the

⁴² Piene briefly mentions his early choices of technology in a 2012 interview with MIT curator João Ribas. "The instruments I used were not meant to be or initially built as light instruments or performing instruments. They were flashlights of different kinds and different strengths, different sizes." Ribas et al., *Otto Piene: Lichtballett*, 46.

⁴³ Piene described the opening as a "scandal" in the brochure for "Experimenta 1: 3.-10.6.1966, Woche für experimentelles Theater, Deutsche Akademie der Darstellenden Künste, Frankfurt am Main," 1966, Getty. Karl Ruhrberg reviewed the opening and excerpts from the article are reprinted in *Alfred Schmela: Gallerist, Wegbereiter der Avantgarde* (Köln: Wienand Verlag, 1996), 33.

opposition between actor and viewer, but it also demands that the audience *first* recognize the mechanics by which the light effects are produced and then the projections.⁴⁴

One can imagine the sequence of events: at the stated time of the performance a small cluster of viewers gathered about Piene, the lights were dimmed, and Piene began to create a play of light on the ceiling and walls above and behind the assembled audience.⁴⁵ At this point, the audience must physically turn their visual focus from Piene to the surfaces of the space to observe the projected light. The viewers' initial visual apprehension of Piene's apparatus seats the ideology inherent in that apparatus (Baudry's terms), meaning that the light effects are then informed by the viewer's comprehension of their means of production. The impact of this is best understood in terms of absence and presence: the common flashlight and handmade screen are clearly visible, as is their manipulation. There is no magic or technological wizardry at play in the *Archaisches Lichtballett*, the recognition that the effects are achieved by simple means is innate, visibility is unique and transient, and spectatorship implies inclusion.

This split of the viewer's attention is also evident in the *Fox tönende Wochenschau (FtW)* film of Piene's next *Lichtballett* performance, a news clip filmed during the *dynamo 1* exhibition at the Renate Boukes Galerie in Wiesbaden (10 July – 7 August 1959) (Figure 13). Attempting to convey the entirety of the *Lichtballett*, the one-minute segment is comprised of four distinct shots: the first shows Piene moving two stacked screens in front of a stationary source of light, the next shot switches to capture the blurry rectangles of light being projected on the wall. The third shot is again of Piene, this time holding two flashlights in his right hand, while moving a single *Rastersiebe* with his left. Again, the shot switches to show projected light, this time to circles of light that are falling on the gridded canvas of Oskar Holweck. By cutting between shots of Piene's performance and the play of light created, the *FtW*

⁴⁴ Gerbing, "Mit 12x12," in Beuckers, *ZERO-Studien: Aufsätze zur Düsseldorfer Gruppe Zero und Ihrem Umkreis*, 85.

⁴⁵ Piene used the term *Lichtspiel* many times in his discussion of the *Lichtballette* and later light-based works.

managed to capture the experience of being in the audience for the archaic *Lichtballett*, of witnessing both the making and the outcome of the work. Piene described his spatial conception of the *Archaic Lichtballett* in the catalog to accompany his 1960 show at the Diogenes Galerie in Berlin:

The most important thing is the complete use of space in contrast to popular mainstream theater and film. The light is not bound to a separate stage or the plane of a screen at the end of a long room where the viewer sits in darkness. It can reach most places in the room. (According to viewers) those who experience the work gain the impression of being in the middle of events that 'go through and throughout,' in which one 'feels like part of the light.' ...A strictly continuous light transformation will only be possible when the light ballet has achieved a greater amount of mechanization. Then the actor will take a back seat.⁴⁶

The *Lichtballett* is intentionally different from “familiar stage arts of theater and film” through its immersive presentation, but the presence of Piene in his self-described role of “the actor,” manipulating the apparatus of the work’s production concretizes the theatrical nature of the performance. The theatricality of the *Lichtballett* performance at Galerie Schmela, communicated particularly well by Tischer’s photograph of the event, and the cause and effect as shown on the *Fox tönende Wochenschau*, prove that in these earliest iterations, Piene was still considering where and how to position himself and the viewers.

Piene used both the terms *Aufführung* and *Vorstellung* to describe the earliest *Lichtballett* shows, and while the words have similar meanings (performance, presentation, or show) *Aufführung* connotes the theatrical – of a performance on a stage, in front of an audience.⁴⁷ As the *Lichtballett* was in its infancy/“archaic state” in 1959, this varying terminology supports the idea that Piene was refining his conceptualization of the work. It is important to consider his presentation of the *Lichtballett* in terms of either performance or theater as each form differently theorizes the role of the audience, the space, the actor(s), and the props.

⁴⁶ Otto Piene, “Lichtballett,” in *Piene: Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960*, np.

⁴⁷ Willmar Sauter, *Theatrical Event: Dynamics of Performance and Perception* (Iowa City: University of Iowa, 2000), 38.

Elin Diamond, writing of the differentiation that occurred in the 1960s between theater and performance, defines theater as a scripted event in which both actor and audience understand their respective roles, in contrast to a performance which “dismantl[es] textual authority, illusionism, and the canonical actor in favor of the polymorphous body of the performer.”⁴⁸ Theater functions based on a tacit agreement between actor and audience, that the former will present a scripted fabrication, while the latter will suspend disbelief and buy into the alternate reality for the duration of the presentation, whereas performance, proposes Erika Fischer-Lichte, is dependent upon real time/space interaction between the performer and the observer during which production and reception occur simultaneously.⁴⁹ In the moment of the performance objects might fail to assume ubiquitous symbolic meanings, or they might only be endowed with symbolism in retrospect, when the observers have a chance to reflect upon the work; more important is the immediate experience and reaction of the audience during the performance itself.⁵⁰ In contrast to the scripted conclusion of theater, performance is flexible and responsive and, to an extent, unknown before its presentation. The presentations of the *Archaisches Lichtballett* were definitive performance events, yet Piene retained aspects of the theatrical, particularly in his personal location in front of the viewers.

At the 1959 Galerie Schmela *Lichtballett* debut, the audience faced Piene, although from Tishcer’s image it is difficult to ascertain whether they were seated on chairs or standing (Figure 12).

⁴⁸ Elin Diamond, ed., *Performance and Cultural Politics* (New York: Routledge, 2006), 3. For Diamond, performance is a broader field that is less predictable and rigid than the theater, despite having its origins within the theatrical avant-garde. Josette Féral further argues that theater requires a subject, which it then narrates, represents, and attempts to realize although in actuality it is imaginary. Josette Féral, “Performance and Theatricality: The Subject Demystified,” trans. Terese Lyons, *Modern Drama* 25, no. 1 (Spring 1982): 175. Richard Schechner comments on the power of theater to collapse, extend, or rearrange time, to fabricate space, and to imbue everyday objects (props) with symbolism and undue worth. Richard Schechner, *Performance Theory* (New York: Routledge, 2003), 16.

⁴⁹ Erika Fischer-Lichte, *The Transformative Power of Performance: A New Aesthetics*, trans. Saskya Iris Jain (New York: Routledge, 2008), 18, 38.

⁵⁰ Fischer-Lichte, 17. Féral describes this as the “synaesthetic relation” between actor and observer – the generative power behind the performance that ultimately determines its course. Féral, “Performance and Theatricality: The Subject Demystified,” 173.

From the height of the camera and the position of the visible viewer, it seems that either Piene was slightly elevated or the audience was seated, but a seated viewer would necessitate awkward neck-cranning to view the light projections. Set up in this theatrical manner, the audience would naturally focus their primary attention on Piene rather than the projected lights.⁵¹ Seen in the context of Piene's theoretical texts which emphasize the psychological and embodied reaction of the viewer, this set-up was less than ideal as it provides too many changing points of visual focus. However, the improvisational nature of Piene's presentation, in combination with the anti-illusionistic deployment of the apparatus and the lack of definitive space and focus for the viewers, confirms the performative nature of this event.

Looking at the visible apparatus of the work, its technological immediacy, contingency, and lack of overt symbolism, viewers were able to immediately grasp the mechanism of the *Lichtballett* projections. Piene held a flashlight, or in some cases two, in one hand and the metal screen(s) in the other, an arrangement central to the *Fox tönenede Wochenschau* clip. Piene did not present an illusion, instead he colluded with viewers in that moment to appreciate the possibilities of projecting light from a hand-held flashlight, through a metal screen, onto the architecture of the gallery.⁵²

The following year, 1960, Piene elaborated the *Lichtballette* to include multiple performers, most often drawn from his circle of friends. At the Galerie Diogenes in Berlin the *Chromatisches Lichtballett* incorporated both colored lights and musical accompaniment: an LP record of Thelonious Monk that included the track "Blue Monk" caused Piene to also adapt the *Lichtballett* to blue. He enlisted artist Benjamin Katz, gallerist Günter Meisner, actor Hermann Ebeling, and costumer Monika

⁵¹ Piene as the locus of attention would be natural regardless of whether the audience were/were not seated. His presence and visible manipulation of the apparatus was inherent to the work at this point, which, in respect to the later form of the *Lichtballette* underscores its evolving nature at this point.

⁵² The failure of the photographic and filmic documentation to capture the totality of the event only underscores the contingent nature of the performance.

Hasse to assist with the performances. In a letter to the author of 31 October 2014, Katz described the experience of performing what he remembered as the “Blue Light-Ballet:”

On the evening of February 20, 1960, on the occasion of the presentation of his *Lichtballett Bleu*, Otto Piene asked me to assist him and gave me a large perforated piece of cardboard and a flashlight about 60cm in length. Accompanied by a musical recording of Thelonious Monk I moved the lamp behind the cardboard, [projecting light] in the direction of the ceiling and walls. I was situated with Otto Piene in a gallery that was accessed by a side stairway, and we were about 3 meters above the audience. The audience followed the *Lichtballett Bleu* virtually from below. The space itself was probably 5-6 meters high. I estimate, based on my memory, that the *Ballett* lasted about 15 minutes, or the length of an LP record.⁵³

From this description, the physical separation between the performers and the audience was dramatic: a consequence of the architecture, which also happened to agree with Piene’s ideology of un-theatrical practicality (Figures 14-15). Opened only two months earlier, Meisner’s experimental space was a walk up apartment-gallery on the fourth and fifth floors of a residential building in West Berlin – conceived very much under the influence of the ZERO *Abendausstellungen* held at Piene’s Düsseldorf studio.⁵⁴ *Piene: Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett* was the second show in the new space, the first had been a group show of painting, sculpture, and music-accompanied performance that the Berlin *Abend* described as a “small Paris in Bleibtreustraße.”⁵⁵

Piene’s *Chromatisches Lichtballett* at the Diogenes utilized the raised gallery to accommodate the performers, who created light projections around the viewers. Gerbing asserts that despite the greater “withdrawal” of the artist and his assistants, the *Chromatisches Lichtballett* retained its “archaic” qualities of opposition between the artist and the observers.⁵⁶ As archaic as this performance was, with performers projecting lights through handmade screens of cardboard, the physical separation of the

⁵³ Benjamin Katz, “Lichtballett Otto Piene,” October 31, 2014.

⁵⁴ Dieter Scholz, “ZERO in Berlin,” *Jahrbuch Der Berliner Museen* 48 (2006): 118.

⁵⁵ “Pinseln mit Musik: Klein-Paris in der Bleibtreustraße,” *Abend*, 15 December 1959, in Scholz, 118. Meisner had a vision to present multiple media under the umbrella of a single show/roof, indeed he continued this trajectory with Mack’s show in August of 1960: drawings, paintings, relief sculptures, and moving structures of reflective surfaces.

⁵⁶ Gerbing in Beuckers, ZERO-Studien: Aufsätze zur Düsseldorfer Gruppe Zero und Ihrem Umkreis, 92.

performers and viewers foreshadowed the theatrical nature of later (post-1965) *Lichtballette* in the lessening of responsiveness between the performers and viewers. The surfaces of projection were similar to those of the previous *Lichtballett* presentations – the walls and ceiling of the gallery itself, already hung with two-dimensional works, in this case exclusively by Piene.

For the catalog to the exhibition, Piene wrote a brief essay on the *Lichtballett*, in which he described the work as “more or less improvised, based on the sound and guiding beam,” adding that the sound was not so much music as accompanying noise that might produce a calm in which the light could be “all alone.”⁵⁷ No script (or rehearsal) is mentioned by either Katz or Piene, and the influence of the accompanying LP seems to have extended beyond governing the mood, but also to determining the duration of the performance.⁵⁸ Gerbing’s explanation that “the complete harmony of optics and acoustics was not necessarily desirable...” resonates with Piene’s desire for the *Archaisches Lichtballett* to be improvisational rather than theatrical and, as Gerbing also notes, creates a unique rather than reproducible technological experience.⁵⁹

The contingent nature of the production, despite the separation between performers and audience, indicates that this was still very much a “performance” in the terms of Diamond, Féral, and Fischer-Lichte. Piene himself underscored this contrast in the catalog essay, writing:

...most important is the complete use of space in contrast to popular main-stream theater and film. The light is not bound to a separate stage or to the plane of a screen...those who experience the work gain the impression of being in the middle of events that ‘go through and throughout...’⁶⁰

⁵⁷ Piene: *Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960*, np translation mine.

⁵⁸ Curator Dieter Scholz notes that various jazz records, ranging from Dave Brubeck to Thelonious Monk were played while Piene’s friends moved the flashlights back and forth behind the gridded filters. Scholz, “ZERO in Berlin,” 119.

⁵⁹ Gerbing in Beuckers, *ZERO-Studien: Aufsätze zur Düsseldorfer Gruppe Zero und Ihrem Umkreis*, 92. In his footnote, Gerbing is explicit in his reference to Benjamin’s “The Work of Art in the Age of Technological Reproducibility.”

⁶⁰ Piene: *Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960*, np.

Recognizing the embodied viewer as present within the work, Piene also described the *Lichtballett*'s potential to surround the viewer with a "dynamic sensation of space in which gravity has lost its power" – a sensation which was not a product of theatricality, but rather of his anti-illusionistic honesty.⁶¹ This truth began at the point of origin for the *Lichtballett*: the hand-held flashlights manipulated by Piene and his friends instead of theatrical or obscured lighting sources. This intrinsic apparatus was not, however, the art work itself, and Fischer-Lichte argues that a crucial feature of performance works is the failure of the artist to present the audience with a distinct and transferable art object that can repeatedly examined and assigned symbolic meaning.⁶²

The *Archaisches Lichtballette* audiences engaged in the process of creating the work with the artist through their presence, but during these early iterations it was only their presence which was necessary – not their physical interaction. In this way, the *Archaisches Lichtballette* were paradigmatic examples of Baudry's *dispositif* which acts upon the viewer, anchored by the ideologically loaded apparatus (Piene's flashlight, *Rastersiebe*, and music). Piene did not write about the flashlights which he used for the *Archaisches Lichtballette* other than to acknowledge their hand-manipulation: instead, beginning in the 1960s Piene described the importance of the Human-Nature-Technology relationship within both his work and that of ZERO.⁶³

In addition to his expressed interest in the potential of technology, Piene often reiterated the impression left on him as a child-soldier in WWII, the fighter planes and tracers, the "reversal of signs" in

⁶¹ "Es entsteht ein dynamisches Raumempfinden, in dem die Schwerkraft viel Macht verloren hat." *Piene: Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960*, np.

⁶² Fischer-Lichte, *The Transformative Power of Performance: A New Aesthetics*, 17.

⁶³ Piene begins "Paths to Paradise" (*ZERO vol. 3*, 1961) with his explicit desire for more searchlights. He references the nature/man/technology relationship as crucial to *ZERO vol. 3* in an essay published in the Times Literary Supplement (1964) reprinted in *Lightworks*, no. 13 (n.d.): 26–28. The explicitly stated importance of technology in Piene's oeuvre increases throughout the 1970s, especially as he was appointed Director of the MIT Center for Advanced Visual Studies in 1974.

which light and color meant danger and darkness security.⁶⁴ While the darkness of an unlit home or city might make it invisible to the night-time Allied bombers, paradoxically, it was the darkness of the night itself that facilitated the surprise raids. With these contexts in mind, the importance of the flashlight is clearer: a dim hand-held light that would illuminate just a small area safely during the darkness of WWII blackouts. A human technology capable of “transforming the power of the sun into an illumination that is suitable” while “piercing the darkness itself” and “taking its terror from it.”⁶⁵

Piene showed the *Archaisches Lichtballett* twice more in 1960, at Mary Bauermeister’s Atelier in Cologne and the Studio f Galerie in Ulm. In Cologne, young Nam June Paik saw the work and later wrote that the small space with the triangular ceiling had been ideal and that the light ballet was “dazzling” (Figure 16).⁶⁶ At Studio f, fellow ZERO artist Almir Mavignier was described as an “inspired team mate” for his assistance with the *Lichtballett* performance (Figure 17).⁶⁷ However, as Piene had intimated in his text for the Diogenes show, an “uninterrupted transformation of light” and “retreat of the actor/s” would only be possible through further mechanization of the *Lichtballett*.

The Changing of the *Lichtballett*

Piene: ein Fest für das Licht opened at the Galerie Schmela on 7 October 1960, showing Piene’s new smoke paintings, photograms, and projections, complemented by three nights of *Lichtballett* events at his Gladbacherstrasse studio. The studio performances were billed as the *Ninth Abendausstellung*, and began at 8pm on Monday, Thursday, and Saturday. The first evening, *Licht und Jazz* was similar to

⁶⁴ Piene refers to WWII and his experiences multiple times in both published and personal archival writing. Two good examples are: Otto Piene, *Piene: Lichtballett*, Howard Wise Gallery, Nov. 4 - Nov. 20, 1965 (Solingen: Fr. Knoche, n.d.), np; Herzogenrath, *Selbstdarstellung: Künstler über sich*, 133.

⁶⁵ Piene, “Paths to Paradise,” *ZERO vol. 3*, 1961, translated and reprinted in Piene, Mack, and Alloway, *Zero*, 148.

⁶⁶ Nam June Paik, “Two Rails Make One Single Track,” in Stephan von Wiese et al., *Otto Piene Retrospektive 1952-1996* (Cologne: Wienand Verlag, 1996), 46.

⁶⁷ Otto Piene, “Gedenken und Gedanken an Kurt Fried,” in Brigitte Reinhardt, ed., *Kurt Fried zu Ehren: Ulmer Museum, 7 April - 20 Mai 1991* (Süddeutsche Verlagsgesellschaft, 1991), 44. This performance was recalled by Almir Mavignier as a normal example of artists working cooperatively in the 1960s. Almir Mavignier, “Re: Forschung Anfrage, bzgl Otto Piene’s Lichtballett in Ulm, 1960/62,” October 5, 2014.

recent *Lichtballett* performances in Ulm and Berlin: Piene was accompanied by an “ensemble” and the sounds were of “Morse tone” (in a reference to the staccato sounds of Morse code). This was the last performance of the *Archaisches Lichtballett*, and the subsequent two evenings pushed the performance in new directions.

On Thursday, 13 October, Piene presented the *Chromatisches Lichtballett* using *Scheinwerfer* (spotlights), a technology he had introduced at the Ulm show earlier that year.⁶⁸ The documentation of this evening of the *Abendausstellung* is very sparse, and it is unclear as to exactly what this night’s work entailed other than the use of colored light (from the title) and the effects of specific spotlight bulbs which Piene referred to as “‘*Spinnen*’ mit *Scheinwefern*” (‘spiders’ with spotlights).⁶⁹ The specific Osram bulbs which Piene had chosen produced abstract leggy projections when filtered through the “lenses” of Piene’s *Rastersiebe*.⁷⁰ *Die Spinnen* would become a standard *Lichtballett* effect, produced after 1961 by the *Lichtkugeln* (Light Globes) in which a spotlight mechanism shines through a roughly constructed, mechanically rotating sphere of perforated black fabric (Figure 18). The physical presence of the *Scheinwerfer* demonstrate a significant shift in Piene’s ideology. The hand-held flashlight(s) of the *Archaisches Lichtballett*, in combination with Piene’s experiences of WWII, in which darkness meant safety and light danger, had positioned Piene and the viewers in a safe dark space, dimly illuminated by a personally controlled light. The flashlight(s) could be immediately shut off and were very obviously controlled by Piene (and his friends). The shift to the electrical and ideological strength of *Scheinwerfer*, which can be translated as searchlights, spotlights, or floodlights, began the realization of Piene’s goal to “pierce” the darkness with light, to “take its terror from it:” the image of the spotlight was central to the

⁶⁸ Piene, “Bibliographie: Biographie, 1965,” 6. Dirk Pörschmann notes that Piene owned a Citroen DL by this time and was fascinated by the halogen headlamps.

⁶⁹ Piene, 7.

⁷⁰ Tiziana Caianiello, *Der Lichtraum (Hommage à Fontana) und das Creamcheese im Museum Kunst Palast: zur Musealisierung der Düsseldorfer Kunstszene der 1960er Jahre* (Bielefeld: Transcript, 2005), 77, 187. Caianiello notes that the long filament bulbs are Bosch, 220V, 100W, BQ20D, although Piene states they were originally Osram.

publicity for the shows (Figure 19).⁷¹ The *Scheinwerfer* are not used by people cowering in the dark, fearful of night-time attack, but instead belong to those who illuminate and secure.⁷² This ideological shift became even more evident on the third and final evening of the *Ninth Abendausstellung*, when Piene presented a completely new work.

Historian and curator Wieland Schmeid later recalled the first performance of Piene's *Vollelektrisches Lichtballett*, stating that:

...in the positions of the players with transparencies and flashlights, machines and spotlights appeared. The light was filtered through pivoting, 'programmed,' filters which could be set in motion by the artist or the hand of the visitor."⁷³

Documentary photographs by Manfred Tischer of the final evening of the *Ninth Abendausstellung* show an assistant using a pair of scissors to perforate paper lanterns before the Saturday night performance: the gaping cuts and holes are visible in the photos of the illuminated *Vollelektrisches Lichtballett* (Figures 20-21).⁷⁴ The basic paper lanterns can be read as evocative of the annual German celebration of Sankt Martinstag (11 November) during which children bearing such lanterns follow "St. Martin" to the site of a bonfire. Usually occurring after sunset, the illuminations represent the light of Christianity spreading into the darkness (Figure 22).⁷⁵ Here again, the idea of overpowering the darkness is evident: Piene is both piercing the darkness with light and recuperating a moment of childhood innocence. The result of

⁷¹ Piene, "Paths to Paradise," in Piene, Mack, and Alloway, *Zero*, 148.

⁷² As a young child in the 1930s, it's unclear whether Piene was familiar with Hitler's use 150 *Scheinwerfer* at the Nuremberg Party Rallies (1927-1939) to create a "cathedral of ice" around the assembled multitude. Piene used similar lamps, but his democratic inclusion of both viewer and technology in the same space without a central demagogic figure or even explicit directive is markedly different.

⁷³ Wieland Schmeid, *Zero: Mack, Piene, Uecker: Kestner-Gesellschaft Hannover; 7.5.1965-7.6.1965* (Hannover: Max Vandrey, 1965), np.

⁷⁴ The later *Lichtkugeln* (see image) were constructed in a very similar manner. The spheres of black fabric over metal framework were made by a lampshade factory in Düsseldorf. Piene (and possibly assistants) then perforated the black fabric by hand until the feeling was "just so." Piene later commented that if it was too much, the cuts could be stitched together. Caianiello, *Der Lichtraum (Hommage à Fontana) und das Creamcheese im Museum Kunst Palast*, 187.

⁷⁵ St. Martin of Tours lived in the 4th century CE. The day of his death, 11 November, is celebrated internationally. German celebrations of St. Martinstag center on a parade of children with lanterns, often accompanied by a "St. Martin" figure on horseback. Bonfires and torches figure prominently.

the light shining through the perforations created a safe space, defined by the reaches of the light beams, into which viewers were invited.

Piene constructed an intriguing and complex system of supports, handles, cogs, and wires to suspend the paper lanterns in front of stationary spotlights and smaller clip lamps. The *Scheinwerfer* are recognizable in Tischer's photos from their shiny black rear casings and protruding electric cords (Figure 23). They were placed squarely behind the perforated paper lanterns, so the light was filtered through the cut holes. The play of light (*Lichtspiel*) that resulted from this arrangement is visible, although frozen, in Tischer's photograph: the spidery projections confirm that Piene was once again using the long-filament bulbs. The supports, strings, wheels, handles, and motors which held the paper lanterns are also visible in Tischer's images, however their specific mechanical attachments are not so clear. A small motor, readily available from a party supply store, was connected by a system of cogs, wire, and string to the mounting point of the paper lantern, with an electrical cord trailing from the support toward the floor (Figure 24).⁷⁶ The motor rotated the perforated white paper lantern in front of the spotlight, causing the moving "spiders" of light on the rear wall as the light filtered through the cut paper "lenses." Also apparent in Tischer's photographs is the sizeable central electrical board which Piene had constructed for the event and which he would describe as an "interactive element" (Figure 25).⁷⁷ All of the electrical components of the installation plugged into this board and each plug had a unique switch, like a sound board, allowing the connected lamps and motors to be turned on and off by either the artist or the viewers.

⁷⁶ *Discokugeln/Spiegelkugeln* (Disco or mirror balls) were patented in 1897 and have a lengthy history in German culture, documented in the 1920s by a presence in films such as *Berlin: Die Sinfonie der Großstadt* (1927) and *Der blaue Engel* (1929). Small, inexpensive, electric motors power the rotation of discoballs and both are generally sold at German party supply stores. Piene describes purchasing these early motors at decoration stores, or otherwise procuring clock mechanisms, which he then painted black. In Caianiello, *Der Lichtraum (Hommage à Fontana) und das Creamcheese im Museum Kunst Palast*, 187.

⁷⁷ Piene, Interview from 1999, in Caianiello, 189.

In 1959, Piene was particularly struck by the kinetic sculptures of Jean Tinguely, whom he encountered when both participated in *Vision in Motion / Motion in Vision* at the Hessenhuis in Antwerp. Recalling both this meeting and the evolution of the *Lichtballett* during an artist's talk in 1973, Piene spoke of his critical evaluation of the *Archaisches Lichtballett* as a work that could only occur when he or his assistants were present:

When I determined that one could only experience when myself or the team was there, I resolved to regress for museum purposes, inspired in large part by Jean Tinguely. To be specific I motorized the screens. This initially inspired the *Lichtmaschinen* and later the *Lichtplastiken*.⁷⁸

The final night of the *Ninth Abendausstellung* was the demonstration of what Piene strangely described later as a “regression” – perhaps because it renounced the direct agency of the artist? However, the newly mechanized *Lichtballett* was instead under the direct influence of the viewer, much like Tinguely's recent *MetaMatic* series which had debuted at the Galerie Iris Clert in 1959 (Figure 26).⁷⁹ In both instances a mechanized construction would create a work conceptualized and, to an extent, psychically sketched by its creator, however the final product was dependent upon interaction with viewers.

Whereas the audience had previously been a part of the unique conditions of a particular performance, they were now invited to directly determine the visual outcome of a situation established by Piene. The outstretched handles and centrally placed switchboard encouraged viewers to alter the positions of the filters and resulting projections, or to turn the lamps and motors on and off. In the process, the audience became a part of the apparatus itself, moving through the wires, lamps, and motorized lanterns to access the interactive switch board. Such direct interaction with the *Lichtballett* would be short lived: Piene stopped using the switch activated version of the board in 1962, choosing instead to control all subsequent *Lichtballette* with programmed timers.

⁷⁸ Otto Piene in Herzogenrath, *Selbstdarstellung: Künstler über sich*, 138.

⁷⁹ Tinguely's relation with ZERO was ongoing. He would show multiple times with the group and was included in the *ZERO vol. 3* (1961) publication.

The Activated Viewer and the Interactive *Lichtballett*

The unique period of Piene's activated viewer was 1960-1962: beginning at the third evening of the *Ninth Abendausstellung* and culminating with the ZERO *salon de lumière* at the Amsterdam Stedelijk *nul* exhibition. For this brief time, the *Lichtballett* demanded an active viewer that neither the earlier *Archaisches Lichtballett* nor the later *Automatisches Lichtballett* would require.

Claire Bishop characterizes the activated viewer as being "surrounded by and given a role within the work, as opposed to 'just looking' at painting or sculpture," or 'just moving' through an environment/installation.⁸⁰ The activated viewer willingly interacts, and surpasses the limitations of Jonathan Crary's observer – instead acting as an autonomous interlocutor with the art work, negotiating their own experience or interpretation.⁸¹ Bishop observes a further similarity between the activated viewer and Jacques Rancière's emancipated spectator in the communicative relations that are engendered by such a work: "[t]his type of work conceives of its viewing subject not as an individual who experiences art in transcendent or existential isolation, but as part of a collective or community."⁸² The group which gathered in the Gladbacherstraße Studio for the final night of the *Ninth*

⁸⁰ Bishop, *Installation Art: A Critical History*, 102.

⁸¹ Crary's observer is simultaneously a product of and a contributor to modernity, a site of corporeal, subjective, visual perception encouraged by contemporary technology which served to "remake the individual as observer." Key to this observer are the multiple positions that might be simultaneously occupied: as a spectator, as a subject, and as a machinic producer of images created from identical, external stimuli. The observer is perhaps best understood as a parallel to the industry of nineteenth century modernity, as a living, breathing machine: a homogenous site of image assembled by the rapid social, technological and political advances of the period. Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, Mass.: MIT Press, 1990), 22. In contrast, Piene's *Lichtballette*, even in the earliest iterations, assumed autonomous viewers and provided singular experiences free from pre-determined perceptive goals.

⁸² Bishop, *Installation Art: A Critical History*, 102. Rancière's emancipated spectator is very similar to Bishop's activated viewer: "...emancipation' means: the blurring of the boundary between those who act and those who look; between individuals and members of a collective body." Jacques Rancière, *The Emancipated Spectator* (New York: Verso, 2009), 19. Rancière exemplifies this "collective body" through a discussion of the Marxist working class, whereas Bishop defines "collective or community" as viewers who are present in the same space as the artworks, and are engendered to communicate about them.

Abendausstellung were asked to actively integrate their bodies with the *Lichtballett* through their determination of the work's visual properties.⁸³

Piène's choice to mechanize the final *Lichtballett* of the *Ninth Abendausstellung* in 1960 foreshadowed his innovations of the following year, all of which were on display during a performance at the Schloss Morsbroich Museum in Leverkusen. In the grand Rococo *Spiegelsaal* (mirror gallery) Piène installed a tangle of wires, spotlights, and mechanized filters in the form of perforated black discs and spheres, some with additional mirrored reflectors attached, all of which were connected to a central electrical board which was placed prominently in the center of the floor (Figure 27). The *Lichtkugeln* (*Lightspheres*) and *Lichtscheiben* (*Lightdiscs*) of the *Klassisches Lichtballett* required no physical intervention other than to be turned on/off by the viewer or artist; the motorized wheels of the *Lichtscheibe* and the mechanisms rotating the *Lichtkugel* functioned once power was supplied. Placed in the center of the main floor, the apparatus projected on both the ceiling and a double story wall of covered windows (Figure 28). The projections of light sometimes overlapped and filled the ornate walls and ceiling of the space, while at other points it was possible to discern the spidery wanderings of individual bulbs (Figure 29). On the balcony, Piène installed a *Lichtkugel* and a multi-disc *Lichtschiebe*, bringing the total mechanical apparatus count to three *Lichtkugeln*, four locations of *Lichtscheibe* (some works had multiple discs), an additional spotlight, and two electrical boards. To engage with the work,

⁸³ While it is tempting to describe works involving an activated viewer as "interactive," the term is fraught due to its late twentieth century associations with media art. Krista Kwastek acknowledges that "interactive art" often implies "computer-supported installations for human-machine interface," despite other and broader definitions that are also regularly used. Early cybernetic artists of the mid-twentieth century preferred terms such as responsive or reactive, which is instructive in understanding how they conceived of the relation between the work and the viewer. Katja Kwastek, *Aesthetics of Interaction in Digital Art* (The MIT Press, 2013), 8. Similarly, using the term "participatory" in explanation of the viewer's expected cooperation with a work invokes Nicholas Bourriaud and Claire Bishop's conceptions of relational aesthetics, in which "...the artist is conceived less as an individual producer of discrete objects than as a collaborator and producer of *situations*; the work of art as a finite, portable, commodifiable product is reconceived as an ongoing or long-term *project* with an unclear beginning and end; while the audience, previously conceived as a 'viewer' or 'beholder,' is now repositioned as a co-producer or *participant*...all aim[ing] to place pressure on conventional modes of artistic production and consumption under capitalism." Claire Bishop, *Artificial Hells: Participatory Art and the Politics of Spectatorship*, (London; New York: Verso, 2012), 2.

viewers entered the *Spiegelsaal* through doors opposite the wall of projection; to reach the electrical board one would weave between the *Lichtkugeln* and *Lichtscheibe*, so that when a switch was engaged, the lights in front, beside, or behind the activated viewer changed. In this manner, the cause and effect of a viewer's actions were crucial to the appearance of the work.

There are no (known) visual or audio recordings of the 1961 *Klassisches Lichtballett* at Schloss Morsbroich. However, other installations of the *Lichtballett*, particularly the *Lichtkugeln*, have demonstrated that the apparatus does emit soft but audible sounds: a clicking on (or off), a faint mechanical sound of motion as parts of the work rotate, the hum of electrical circuitry. These sounds were not present in the *Archaisches Lichtballett* due to the nature of production (handheld flashlights) – but are intrinsic to the *Mechanisches Lichtballett*.⁸⁴ Such sounds tether the *Lichtballett* to its technological point of origin, in a similar manner to Piene's presence in the *Archaisches Lichtballett*, neither the sound nor the man wielding the flashlights allows the viewer to focus solely on the light projections. If one were able to become a disembodied eye only attentive to the moving points and spiders of light, the ideology of the apparatus would not be important.⁸⁵ However, the sounds of the *Lichtballett* are part of the apparatus that reinforces the viewer's awareness of the means of production. With the rapid evolution of the *Mechanisches Lichtballett* the apparatus became more intricate, and in the instance of the *Lichtkugeln* much less obvious (Figure 18). The lights are obscured by the rotating black sphere, only visible occasionally – when a perforation and bulb align. The sound of the motor, albeit quiet, reminds the viewer of the mechanism of the work, and draws their visual and mental attention back to the apparatus. In installations such as Schloss Morsbroich, or the following year at the

⁸⁴ The fact that Piene occasionally accompanied the *Archaisches Lichtballett* with music or other sound is not the point here: he was not “covering up” intrinsic sounds with such accompaniment. The sounds of mechanization were not part of the *Lichtballett* until the *Ninth Abendausstellung*. All installations of the *Lichtballett* after 15 October 1960 (the final night of the *Ninth Abendausstellung*) were *Mechanisches Lichtballette*.

⁸⁵ The feasibility of a neutral eye, capable of “pure” perception without attaching signification is a major focus of Cray, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*.

Stedelijk in Amsterdam, viewers were expected to be in the middle of the installed apparatus – using the electrical board to control the work. In such a position, surrounded by moving, illuminating, switching apparatuses, the mechanical sound could not be unheard.

In March of 1962, Heinz Mack, Günther Uecker, and Otto Piene, acting as Group Zero, installed a collaborative *Salon de lumière* at the *nul* show in Amsterdam. *Nul* was presented in a series of 13 gallery spaces arranged in a “U;” visitors passed through each gallery in succession to reach the exit, insuring maximum exposure to the “upside down world in the Stedelijk” in which *nul* was “something that means nothing” (Figures 30-31).⁸⁶ The Group Zero space included three *Lichtkugeln*, a *Lichtscheibe*, and reflectors from Piene, a *Nagelsäule* and a *Nagelscheibe* by Uecker, and a wall mounted *Reflector* panel by Mack (Figure 32). A film of the exhibition shows Piene demonstrating the central electrical board to turn on the *Lichtkugeln* in the *Salon de lumière*; in the background Piene’s *Lichtscheibe* rotates, and cut off from full vision in the foreground is a turning *Nagelscheibe* by Günther Uecker.⁸⁷ As Piene leans over the electrical board and manipulates the switches, he looks up in the direction of the *Lichtkugeln*, indicating with his gaze what he has turned on. In a 1999 interview with lead ZERO archivist Tiziana Caianiello, Piene described the importance of the interactive electrical board, as the “mind/soul” of the Zero installation. He also described the impetus for the pragmatic decision to automate the *Salon de lumière* during the *nul* show:

I had originally made the switch panel myself, for my first *Lichtballett* in the Gladbacherstrasse studio. They then became the virtual mind/soul of the Zero-Spaces, Zero-Installations. At the Amsterdam Stedelijk for example, everything ran through the switchboard. They were considered an interactive element. There was a mass of switches on it. All of the electrical sockets had a switch, and one could switch each

⁸⁶ *Nul* was curated by Henk Peeters and Willem Sandberg, 9-26 March 1962.

⁸⁷ “Exhibition ‘Nul’ Stedelijk Museum Amsterdam, 1962,” Vimeo video, 5:55, posted by “O-INSTITUTE,” 14 October 2015, <https://vimeo.com/142359722>. The *Salon de lumière*, alternately known as the *Salle de lumière*, is shown at the 30” and 2:10 in the film. No audio is made available, so the specific narrative is unknown; the second presentation (at 2’10”) is considerably longer in duration and occurs just after a close-up shot of the mechanism used by Piero Manzoni for his work *Linie* (1962). Piene’s demonstration of the electrical board turning on the *Lichtkugeln* is followed by Hermann Goepfert’s *Optophonium* (1960-61), shown both from the frontal position of the viewer and the rear, where Goepfert’s apparatus is not concealed.

individually. They were meant as an interactive element, not only for the artists, but also for the viewer, who would switch individual positions on and off. Word got around relatively quickly. I can remember how appalled I was in the Stedelijk Amsterdam: in the afternoon, when the parents went to the movies they sent the children to the museum. The children (10-12 years old) came into the *Zero-Raum*, determined that there were switches, and pounded on them like a piano keys (and harder!).

That was the first experience of interactivity, and the wrong side of interactivity. The switch board was a vital element. Today [1999] we no longer have it in the system. It is no longer included because the wiring is not acceptable.

The interactive element of the electrical board pressed viewers into action and into the center of the *Lichtballett* or *Salon de lumière* space. After the *nul* exhibition, works with moving or lighting elements were plugged to a central timer which played the automated pieces in continuous succession, eliminating the need for an activated viewer. This is the form that all of the *Lichtballette* were to take by the mid 1960's: configurations of automated apparatuses controlled by central timing devices; new versions of the *Automatisches Lichtballett* were created until Piene's death in 2014. But before that occurred, Piene made an interim work in 1961: *Please Turn*, a piece that explicitly requests the viewer to interact with it, to animate the rotating disc in front of a spotlight "very slowly."

From *Please Turn* to "Please Don't Touch"

The earliest photographs of *Please Turn* show the work at the 1962 *nul* exhibition at the Stedelijk Amsterdam, in the gallery next to the *Salon de lumière* dedicated to the independent works of Heinz Mack, Otto Piene, and Günther Uecker (Figure 33). *Please Turn* is a perforated black disc with a diameter of approximately 90cm, inscribed in white paint with the words "slowly, extremely slow – please turn – by hand –" (Figure 34). These instructions are painted over the cross-brace on the front of the disc, which also acts as a handle.⁸⁸ At nine and three o'clock on the circumference of the circle one

⁸⁸ Gerd Winkler's film "0x0=kunst" for Hessische Rundfunk includes footage of a woman turning *Please Turn* by hand. The narrator describes the lack of overt subject matter and the opening of new "zones of experience" for visitors. Gerd Winkler, "0x0=kunst" (1962), Vimeo video, 15:57, posted by "O-INSTITUTE," 6 July 2015.

can see the terminations of the roughly hewn back-mounted cross-supports.⁸⁹ The other shorter protrusions appear to rotate with the disc, indicating that they might also be used as handles. The disc is affixed to a vertical support via a rotating joint, and that support is then secured to a sawhorse. The entire assemblage is painted black. In front of this, at least in 1962, are two spotlights, directed at the surface of the rotating disc. As the viewer turns the disc, slowly, the lights shine through the perforations, creating a *Lichtspiel* on the wall behind.⁹⁰

This play of light is visible in several photos – a web-like projection of light strands no bigger than the disc of *Please Turn* itself (Figure 35). As the activated viewer turns the wheel, a web of light crept across the wall behind the work in a spidery dance. *Please Turn* is un-automated and relies on the viewer for its function: if the viewer’s activity ceases, chances are that the projected light is also extinguished, as the holes in the wheel must align with the lamp for the effects to occur. When activated, the *Lichtspiel* projected by *Please Turn* depended upon just how slowly the visitor turned the disc, as explicitly requested on the wheel itself, “extremely slow [sic]” was the most desirable.

The arrangement of viewer, then lamps, then Piene’s construction, and lastly the projected light on the wall, placed the viewer and the light at the furthest possible distance, while making the origin of the light coincide with the location of the viewer (Figure 35). Piene described the role of the physically constructed apparatus as “secondary” but integral:

[The poor materials] are an artistic element...One shouldn’t ignore that these simple materials are part of the object...The point of the thing was the light – it’s the same whether it comes from a painted, perforated surface, or a chromed perforated surface – the light serenely develops in the space as clean and pure and beautiful despite the

⁸⁹ Piene discussed his, and Zero’s, use of “simple, poor materials” which were financially and logistically accessible in his 1999 interview with Caianiello. Caianiello, *Der Lichtraum (Hommage à Fontana) und das Creamcheese im Museum Kunst Palast*, 186.

⁹⁰ Piene used the term *Lichtspiel* in a December 1962 interview with the Belgian public television station VRT. VRT “Dynamo: Mack, Piene, Uecker.” (1962), Vimeo video, 8:31, posted by “O-INSTITUTE,” 10 April 2014. He referred to the *Lichtballett* as “ein kleines Spiel” in the Diogenes catalog of 1960. *Piene: Ölbilder, Rauchzeichnungen, Lichtmodelle, Lichtballett: Galerie Diogenes, Berlin, 20.2.1960-15.3.1960*. The term *Lichtspiel* has a historical connection with the Bauhaus works of Kurt Schwertfeger and Ludwig Hirschfeld-Mack, as discussed in the previous chapter.

“poor” materials. The objects were secondary.⁹¹

At *nul* in 1962, *Please Turn* did not physically instantiate Piene’s hierarchy of effect before object, instead, by confronting the viewer with the “poor” materials of its construction and requesting their physical contact and activation of the work, Piene asserted the importance of the physical apparatus. Photographs of the work in situ show the prominent presence of the black disc, black sawhorse, black spotlights, cords, and tripods, all placed in the corner of the mostly white Stedelijk gallery. The white words on the black painted wood request interaction and draw further attention to both the surface of the apparatus and the functionality of the spotlights. The result of a viewer’s action, although orchestrated by Piene, is what Rancière describes as the “third thing that is owned by no one,” and it concretizes the viewer/apparatus interaction as that which completes the work.⁹² *Please Turn*, with its undeniable physical presence and mandate for interaction, created an equilibrium in which this “third thing” – the moving luminary effects – could be seen as only a part of the total work.

Please Turn pressed the viewer into service beyond the flipping of a switch, which was required by Piene’s other *Lichtballette* works of 1962, and engendered a level of viewer activation that transgressed the boundaries of Baudry’s apparatus/*dispositif* arrangement which acts upon the viewer, physically and ideologically in the cause of presenting them with a “simulation.”⁹³ Instead, the original version of *Please Turn* exemplified the more socially oriented ideas of the apparatus put forth by Baudry’s contemporary, Jean-Louis Comolli.

⁹¹ Caianiello, *Der Lichtraum (Hommage à Fontana) und das Creamcheese im Museum Kunst Palast*, 186.

⁹² Rancière, *The Emancipated Spectator*, 15.

⁹³ Baudry, “The Apparatus,” 121.

The Social Turn of Comolli

Rather than focusing on the subject and their position within, or reality supplied by, the cinematic apparatus, Jean-Louis Comolli located the origin (and hence motivation) of what he described as the "cinema machine:"

...which is not essentially the camera, the film, the projector, which is not merely a combination of instruments, apparatuses, techniques. Which is a machine: a *dispositif* articulating between one another different sets - technological certainly, but also economic and ideological. A *dispositif* was required which implicate [sic] its motivations, which be the arrangement of demands, desires, fantasies, speculations, (in the two senses of commerce and the imaginary): an arrangement which gives apparatus and techniques a social status and function.¹⁸

Comolli's deployment of "machine" in addition to the *dispositif* and apparatus (and his use of italics as emphasis) elucidates the significant differences between these terms in his theory, and underscores his theoretical alliance with Michel Foucault's conception of the *dispositif* (more on this in the next chapter). The machine is the overarching conception, it *is* the *dispositif* which unites both physical technology and motivating forces. For Comolli, the totality of cinema is a "social machine," not solely technological and dependent on advances in filmic equipment, but, building on Althusser, a product of ideology, which in turn drives technological advances and their deployment.⁹⁴ Early in his seminal essay, "Machines of the Visible," Comolli asserts that

¹⁸ Comolli, "Machines of the Visible," in *The Cinematic Apparatus*, 122. Jean-Louis Comolli, a contemporary and indirect interlocutor of Baudry, editor of *Cahiers du Cinéma*, and film-maker, also advanced a theory of the expanded cinematic apparatus, which he argues will forever be both imperfect and in-flux, for while technology repeatedly attempts to close the gap between reality and the image, the very existence of film is an "impression of reality," and the "ideological systems of recognition." Comolli, "Machines of the Visible," 133.

⁹⁴ As with Baudry, translations can be tricky, for while the apparatus in the preceding quotation is definitively that of the camera, the projector, etc., Comolli also attended lectures by Louis Althusser at the École Normale Supérieure (ENS) with a large group of Marxist leaning intellectuals that included Foucault, Rancière, and Badiou during the 1960s, and as noted in the previous discussion of Baudry, the Althusserian apparatus possesses a definition of its own. Althusser published "Ideology and Ideological State Apparatuses" in 1970; Comolli issued the first essay of the "Technique and Ideology" series the following year. It is entirely probable that Comolli used Althusser's specific definition of the ideological (state) apparatus when he refers to the larger "representative apparatuses" at work in society: "There are not only the representations produced by the representative apparatuses as such (painting, theatre, cinema, etc.); there are also, participating in the movement of the whole, the system of the designation of power (political representation), the ceaseless working up of social imaginaries (historical, ideological representations) and a large part, even, on the modes of relational behaviour (balances of

The cinema is born immediately as a social machine, and thus not from the sole invention of its equipment but rather from the experimental supposition and verification, from the anticipation and confirmation of its *social profitability* [sic]; economic, ideological and symbolic. One could just as well propose that it is the spectators who invent cinema...⁹⁵

Comolli's argument is that the machine, a *dispositif* that incorporates both the physical apparatus and its' motivation in a form which has social agency, is also a product of the viewer's position, re: desires, capabilities, philosophies. To further substantiate this proposal, he cites Deleuze and Parnet's explanation that

An assemblage is never technological; if anything, it is the opposite. Tools always presuppose a machine, and the machine is always social before being technical. There is always a social machine which selects or assigns the technical elements used.

And that:

The machine is social in its primary sense, and is primary in relation to the structures it crosses, to the men it makes use of, to the tools it selects, and to the technologies it promotes.⁹⁶

The social aspect of *Please Turn* is inherent in both its construction, from "poor" materials which were readily available to Piene at the time, and in its unspoken but inherent effect of creating a social interaction in the space of the gallery, as one viewer activated the work and provided a *Lichtspiel* for all those present. Deleuze's social machine is the museum, the exhibition, the coded spaces of the *nul* gallery itself, and beyond that, the art market; Piene's choice to include *Please Turn* in *nul* indicates a recognition on his part that the physical work would have a particular function in that social machine. *Please Turn* transgressed the usual boundaries of museum behavior – visual observation of an inherently

power, confrontations, manoeuvres of seduction, strategies of defense, marking of differences or affiliations)."Comolli, "Machines of the Visible," 121. Comolli's film theories, mostly advanced during his period at *Cahiers*, are deeply informed by Althusser's conception of ideology. For a detailed discussion of this aspect, see: Daniel Fairfax, "Introduction," in *Cinema Against Spectacle*, 2015.

⁹⁵ Comolli, "Machines of the Visible," 122.

⁹⁶ Deleuze and Parnet, *Dialogues II*, 70, 105. In the original French edition of *Dialogues* (1977), *machine* is used, which is later translated to English as "machine."

complete work without physical interaction. Instead, of all the *Lichtballette*, *Please Turn* came the closest to concretizing what Piene considered (in 1964) to be the Zero goals:

One of our [Group Zero] most important aims was the re-harmonization of the relationship between humans and nature...the artist is not the refugee from the modern world – no, they use new technical means as well as the forces of nature...Mack tried to change untouched landscapes, to make them humanly beautiful before they become hideously civilized. In contrast, I attempt to affect the ‘human landscape’ through the *Lichtballett*, my pieces, and my writing.⁹⁷

Please Turn is a particularly successful attempt at the “re-harmonization” of nature and humanity, as it deploys the most basic natural element of light in through human interaction with an apparatus of familiar materials to project contingent luminary effects on the walls of a structure dedicated to the presentation of art. A crucial apparatus of the greater “social machine” of the *nul* exhibition, *Please Turn* was a work which activated the human-nature-technology relationships and simultaneously informed the viewer of its construction from simple materials when they approached to activate the work.

Piene stated that the simple or “poor” materials were an artistic part of an object: bringing the viewer closer to the apparatus of the *Please Turn* and encouraging their touch of an object made of scrap wood and cardboard recoups these elements as integral to the piece (Figure 36).⁹⁸ Close viewing shows that the perforations in the disc are unevenly drilled, some even from back to front, resulting in rough edges protruding on the front; the wooden supports are reclaimed from other uses, and the substantial rear beam appears to be broken off at the ends (Figure 37). In the original configuration of the work, with the spotlights shining on the surface of the disc from the position of the viewer, these physical qualities of the apparatus would have been literally highlighted; moving the spotlight to the rear of the piece, which occurred after 1962, with the light directed through and away from the disc directs attention away from the physical apparatus.

⁹⁷ Otto Piene, “Zuerst erschienen in ‘The Times Literary Supplement,’ London, 3 September 1964, Die Entstehung der Gruppe ‘Zero,’” in Piene, Mack, and Alloway, *Zero*, xxiii–xxiv. My translation.

⁹⁸ Caianiello, *Der Lichtraum (Hommage à Fontana) und das Creamcheese im Museum Kunst Palast*, 186.

Please Turn Away from the Object

The physical configuration and acceptable operation of *Please Turn* changed sometime after 1962, when it was rearranged in such a way that a single spotlight is now affixed to a second rear support and projects toward the viewer – the light literally shines in their eyes (Figure 38).⁹⁹ The activated viewer at *nul* (1962) stood near the work to turn the disc with spotlights at their side, shining in the direction of their vision, through the perforations and onto the wall behind. At no point could the viewer see the play of light without also seeing the apparatus that produced it. Today, viewers can choose between looking at the light *or* that which creates it, there is no possibility of looking at both simultaneously, a position which effectively separates the work and its effect, rather than creating a unified environment of light, apparatus, and activated viewer.

At *ZERO in Gelsenkirchen 1963/2013* and at the 2014 *Otto Piene: More Sky* exhibition in Berlin, the work was shown with a rear mounted spotlight and was occasionally demonstrated by a gallery attendant (Figure 39).¹⁰⁰ Viewers are no longer permitted to directly interact with the work (although many “illegally” did, per the apparent instructions). The statuesque presence of *Please Turn* is not diminished by these changes and the work still commands considerable attention between its scheduled demonstrations.¹⁰¹ The altered version of *Please Turn* revokes the agency of the activated viewer, repositioning them instead somewhere between an audience member and Crary’s culturally produced observer – as an embodied viewer who exists in the space of the installation, but who will receive only the same sensory information as all others who see the work. Rancière’s emancipated spectator, who

⁹⁹ Per Dr. Tiziana Caianiello, lead archivist at the ZERO Foundation, the exhibition history of *Please Turn* is incomplete. Between the *nul* (1962) exhibition and the 2013 *ZERO at Gelsenkirchen 1963/2013* show, it is uncertain where and when the work was shown. Dr. Caianiello is certain that it was not shown at the 1963 *ZERO in Gelsenkirchen* exhibition, it was included in the 2013 show to “convey an idea of the atmosphere” in 1963. Tiziana Caianiello, “Re: Information about ‘Please Turn’ and a Few Other Questions,” Message to G. Ruff, May 22, 2014. Email.

¹⁰⁰ *ZERO in Gelsenkirchen 1963/2013* was held at the Kunstmuseum Gelsenkirchen, 22 November 2013 – 19 January 2014. *Otto Piene: More Sky* was at the Deutsches Bank KunstHalle in Berlin, 17 July – 31 August 2014.

¹⁰¹ At the Deutsches Bank KunstHalle show, *Please Turn* was demonstrated daily at 6pm.

would develop their own interaction and translation of the work, is denied their independent discovery as they are cut off from direct interaction and investigation, instead invited to the daily exposition.

Should visitors attend the presentation of the work, the aspects of mystery, discovery, and creation are subverted by an informative docent, who fully described *Please Turn*, Piene's interest in light, and the history of the *Lichtballette* as she demonstrated the piece. The instructions painted onto the front of the work were no longer meant for the general public, but rather the gloved docent of the KunstHalle. The attention of the viewers was not fixed on the apparatus or the play of light, but rather on the person explaining the significance of the artist and the work.

Touching an artwork transgresses normal boundaries and alters the relationship between viewer and object, contributing to what Michael Fried famously criticized as a "theatrical" relationship – one that attempts to eliminate the border between stage and audience, art and viewer. If the artist is attempting to activate the viewer, then an intimate interaction is necessary to deconstruct the common barriers between the viewer and the work of art. Moreover, if the activated viewer is to become part of a "community," as prescribed by Bishop and Rancière, the results of this interaction with the work must be shared in some way – in the case of *Please Turn*, by producing a *Lichtspiel* for the other viewers in the gallery.

Instead, the reconfiguration of *Please Turn* resonates with Baudry's conception of an isolated and static individual, acted upon by the *dispositif* of the art installation, in which *Please Turn* is central technological apparatus. There is little collaboration between the *Please Turn* apparatus and the viewer in its 21st century configuration: viewers are positioned within the greater *dispositif* of the gallery space, instructed by the attendant, their only possible agency is the positioning of their bodies, and possibly inserting their hands into the beams of light. The *Lichtspiel* created by the turning of the wheel reads as the production of Piene's unconscious mind, especially if one knows (or is informed during their experience of the exhibition) of Piene's wartime history and his desire to recoup light from its function

of illuminating that which is to be shot at, to instead “to demonstrate that light is a source of life which has to be constantly rediscovered.”¹⁰² *Please Turn* in this form is truncated from its original intention and potential of activating the viewers and placing them within the *dispositif* Piene created.

After the *nul* show, Piene’s works would never again truly request the activated viewer or place that viewer in a particular spatial relationship to the apparatus of the work. Rather, the physical alterations made to *Please Turn* herald the role of the viewer in Piene’s later *Lichtballette*: as an embodied and dualistic participant.

The Later *Lichtballette*

Despite their similar shapes, there is one essential difference between Gothic cathedrals and rockets: a cathedral seems to soar, expressing the yearning of its builders to ascend to heaven; a rocket does soar. The same technical difference exists between traditional sculpture and my objects. Previously paintings and sculptures seemed to glow, today they do glow, they are active, they give, they do not merely attract the eyes, they do not merely express something, they are something. A filament glows and warms, a painted halo only reflects light. Energy in a contemporary form produces the living media. Is the filament in itself a piece of art?¹⁰³

Lichtballette installations after 1962 evolved in a manner that gradually minimized viewer activation and instead focused on the work’s ability to create mediated spaces similar to the Arcades as described by Benjamin. The Parisian utopian spaces relocated the viewer both physically and sensorially and encouraged transcendent dreams while maintaining sets of visual cues concerning contemporary reality. In 1961, Piene wrote:

Utopias have a largely literary worth. Utopias with a real basis are not Utopias. My Utopia has a solid foundation: light, smoke, and 12 searchlights!

I have something real to offer. Instead of narrowing the field of vision, instead of absorption, a view of something giving, flowing, pulsating. Not the shrinking of the world in the cells of human imagination, but expansion on every side, the shooting of the viewer into space, where he [sic] can breathe deeply of fresh air. In this heaven is

¹⁰² Piene, *Piene: Lichtballett*, Howard Wise Gallery, Nov. 4 - Nov. 20, 1965, np.

¹⁰³ Piene, np.

paradise on earth.¹⁰⁴

However, in shifting the viewer away from the apparatus of the *Lichtballette*, Piene also positioned them differently with regard to his Utopian ideas. The *Lichtballette* now acted upon the viewer – to “shoot them into space” perhaps, but it was a space of Piene’s own construction rather than a collaborative effort. Benjamin included a lengthy discussion of Fourier’s utopia in his *Arcades* study:

One of the most remarkable features of the Fourierist utopia is that it never advocated the exploitation of nature by man...Instead, in Fourier, technology appears as the spark that ignites the powder of nature.¹⁰⁵

Piene’s *Lichtballette* after 1962, read in this manner, have a better correspondence with the artist’s explicit goals. The works depict the potential of technology, the aspirations of Piene’s greater artistic practice, which would include large scale inflatables, such as over the 1972 Olympic Games (Figure 40). Piene’s focus on the “human landscape” concretized as an interest in the shared perception of many rather than a specific individual instance of collaboration. *Please Turn* and the interactive electrical board never reappeared – indicating that Piene did not consider the activated viewer central to his intentions for the *Lichtballette*.¹⁰⁶

Shown at least 24 times between 1962 and 1965, each new *Lichtballett* work appeared increasingly sculptural; as Piene asserted, his sculptures actually would glow. Installed at the *Europäische Avantgarde* show (1963) in Frankfurt, the apparatus of the *Lichtballett* bore a striking resemblance to the 1961 Schloss Morsbroich show: *Lichtkugeln* and *Lichtscheibe* connected via obvious electrical cords to a central electrical board (Figure 41). However, since the damage inflicted on the electrical board at the *nul* show, Piene no longer invited viewers to activate the *Lichtballett* – the electrical board was placed so as to be less accessible, and it can be assumed that the works were turned on at the gallery’s opening and off at closing time each day. At the Howard Wise Gallery in New

¹⁰⁴ Otto Piene, “Paths to Paradise,” *ZERO vol. 3*, 1961, translated in Piene, Mack, and Alloway, *Zero*, 149.

¹⁰⁵ Walter Benjamin, *The Arcades Project*, ed. Rolf Tiedemann (Boston MA: Harvard University Press, 1999), 17.

¹⁰⁶ I am specifically referring to the original version of *Please Turn* (1961).

York the following year (1964), Piene utilized timers for the first time, creating a cyclical progression of illuminated and moving works.¹⁰⁷ His solo show at the gallery the following year debuted eight polished new works light works, half of which were constructed in New York (Figures 42-43). *Light Ballet* was indicative of the new “internationality” of Piene’s work – which had always been international in the sense of European, however now also meant trans-Atlantic.¹⁰⁸

In 1966, Group Zero disbanded after a final exhibition in Bonn. There, Piene showed a new version of the *Lichtballett* in which both photographic images of New York and hand-painted abstractions were projected on canvases and the ceiling of the gallery space while sounds of the American city played through speakers. Viewers were welcome to move through the geographically dislocating space, now far removed from any relation to war-time Germany; viewers would perhaps cast a shadow on screen or wall, but had no direct interactive agency. In 1968, Piene’s move to the US became permanent when he joined MIT as the first appointed fellow to the Center for Advanced Visual Studies (CAVS). Piene’s production of *Lichtballett* works slowed as his interests diversified; the works continued to be shown however, and Piene returned to the series in 2010, creating a new version of the work embedded in the wall of the Hubertus Scholler Stiftung at the Leopold Hoesch Museum in Düren. Several more such works were installed before his death in 2014, including at the MIT List Gallery in 2011, and the Langen Foundation in Neuss in 2014 (Figure 44). The work is described as an “installation with miscellaneous parts: electric lights, motors, perforated metal components.”¹⁰⁹ Looking behind the scrim wall was in many ways evocative of Piene’s first *Mechanisches Lichtballett* at the *Ninth Abendausstellung* – snaking cords, naked light bulbs, and hand-made perforations, yet the viewer is now excluded from all of this, left on the other side of the wall to wonder about the clicking of the machinery

¹⁰⁷ Herzogenrath, *Selbstdarstellung: Künstler über sich*, 138. *Group Zero: Mack, Piene, Uecker* ran 12 November to 5 December 1964.

¹⁰⁸ Ribas et al., *Otto Piene: Lichtballett*, 54.

¹⁰⁹ Ribas et al., 78.

and the momentary glare of the bulb as it perfectly aligns with the rough-hewn hole in the wall (Figure 45-46).

CHAPTER II: Figures



Figure 1: Otto Piene, *Lichtballett*, 2014, installed at the Langen Foundation, Neuss, 2014. Photo G. Ruff, April 2014



Figure 2: Otto Piene, *Lichtballett*, view from the top ramp, Langen Foundation, Neuss, 2014. Photo langenfoundation.de



Figure 3: Otto Piene, *Lichtballett*, view from the bottom ramp, Langen Foundation, Neuss, 2014. Photo langenfoundation.de



Figure 4: Otto Piene, *Lichtballett*, Langen Foundation, Neuss, 2014. Photo G. Ruff. Image is adjusted to be brighter than original to show scale and attention of viewers

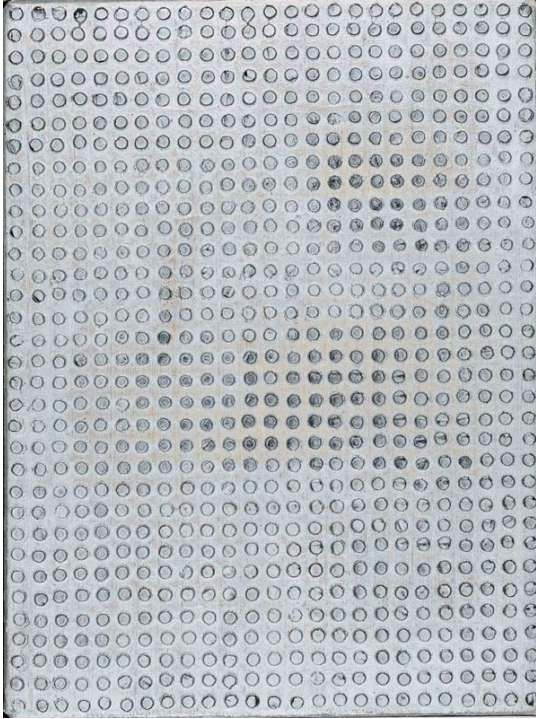


Figure 5: Otto Piene, *Silber Frequenz*, 1957. Rasterbilder

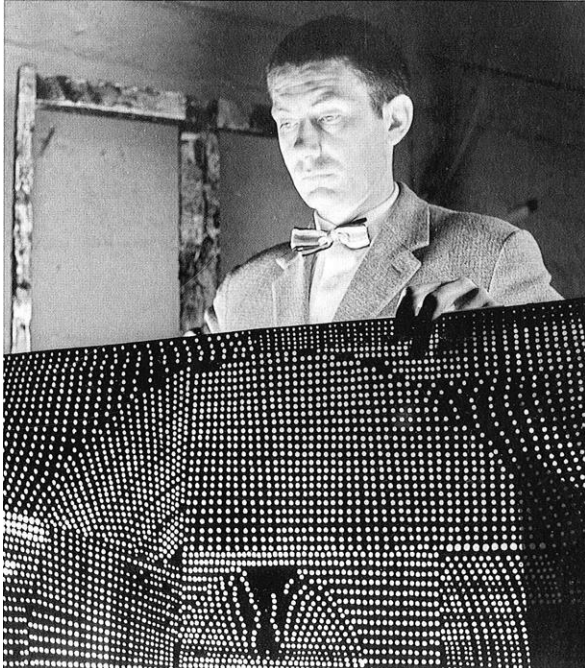


Figure 6: Otto Piene in studio with *Rastersiebe*, date unknown. Photo artnews.com

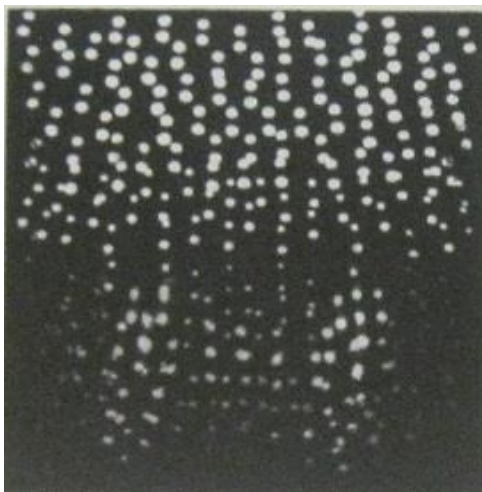
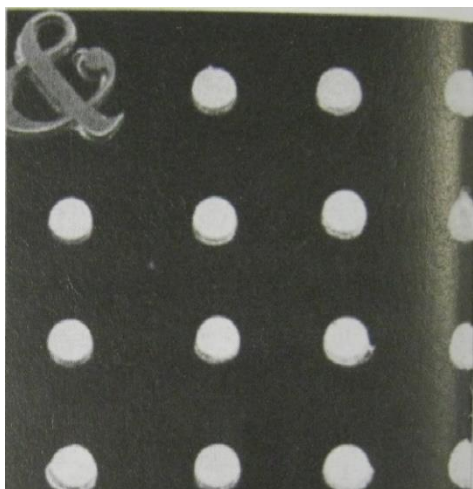


Figure 7: Otto Piene, *Buchstabenraster*, ZERO vol. 3, 1961 Figure 8: Otto Piene, *Lichtkasten*, ZERO vol. 3, 1961



Figure 9: Otto Piene, sign for Ernst Kirschbaum, 1955, Solingen. Photo D. Pörschmann



Figure 10: Otto Piene, box light fixture for Ernst Kirschbaum, 1955. Photo D. Pörschmann



Figure 11: Otto Piene, light fixture for Ernst Kirschbaum, 1955. Photo D. Pörschmann



Figure 12: Otto Piene, *Archaisches Lichtballett*, 1959, Galerie Schmela, Düsseldorf. Photo tischer.org



Figure 13: Otto Piene, *Archaisches Lichtballett*, 1959, *dynamo 1*, Galerie Renate Boukes, Wiesbaden. Still from *Fox tönende Wochenschau*, in Pörschmann and Schavemaker, eds. *ZERO*, 2015, pg 39



Figure 14: Günther Uecker by the stairs of the Diogenes Galerie, Berlin, 1963. Photo reproduced from Pörschmann and Schavemaker, eds. *ZERO*, 2015, pg 100



Figure 15: View of the Diogenes Galerie from the balcony. 1963. Photo reproduced from Pörschmann and Schavemaker, eds. *ZERO*, 2015, pg 100



Figure 16: Mary Bauermeister's Studio, Cologne, 26 March 1960. Photo Zentralarchiv für deutsche und internationale Kunstmarktforschung

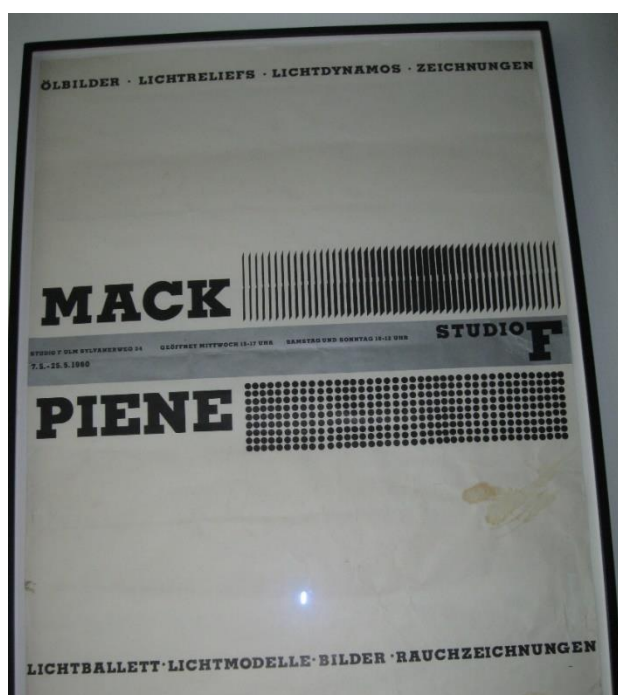


Figure 17: Poster for *Mack / Piene*, 7-15 May 1960, Studio f, Ulm. ZERO Archive



Figure 18: Otto Piene, *Lichtballett*, 1963, Günther Uecker, *Nagelsäule*, 1963, ZERO in Gelsenkirchen, 22 November - 8 December 1963. ZERO Archive

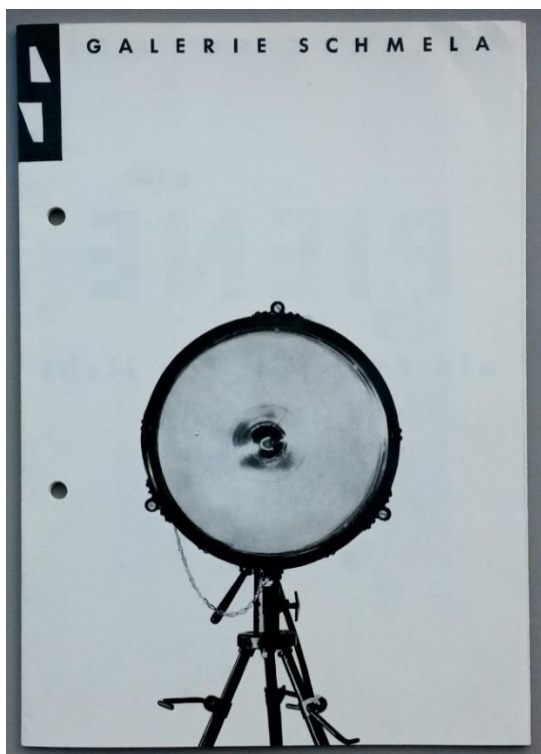


Figure 19: Piene: *ein Fest für das Licht*, invitation to opening, 7 October 1960 and *Ninth Abendausstellung*, 10-15 October 1960, Galerie Schmela, Düsseldorf. ZERO Archive



Figure 20: Cutting the lanterns before the third night of the *Ninth Abendausstellung*, 15 October 1960. Photo Manfred Tischer / ZERO Archive

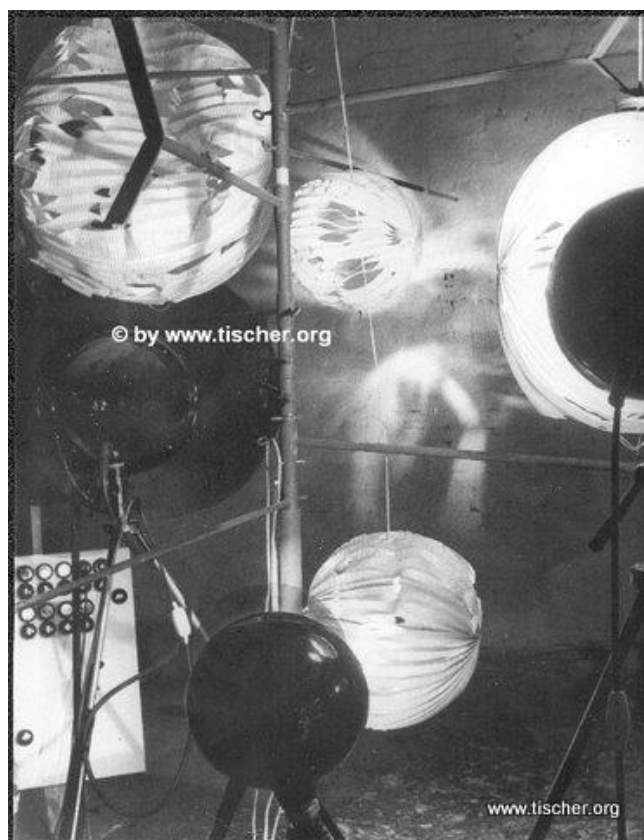


Figure 21: The cut lanterns of the *Mechanisches Lichtballett*, 15 October 1960, Gladbacherstrasse Studio. Photo tischer.org



Figure 22: Drawing of Children in Erfurt celebrating St. Martinstag, 1939. Image Gettyimages

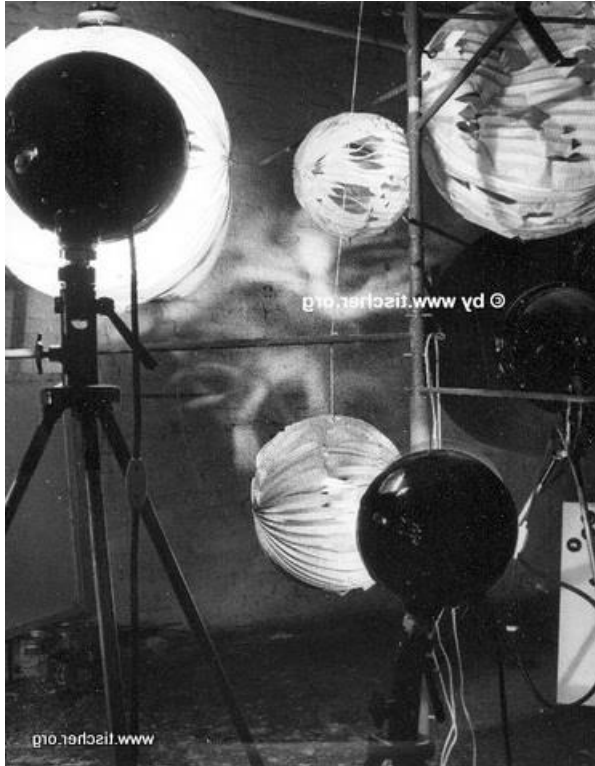


Figure 23: Otto Piene, *Mechanisches Lichtballett*, Gladbacherstrasse Studio, 15 October 1960. Photo Tischer.org

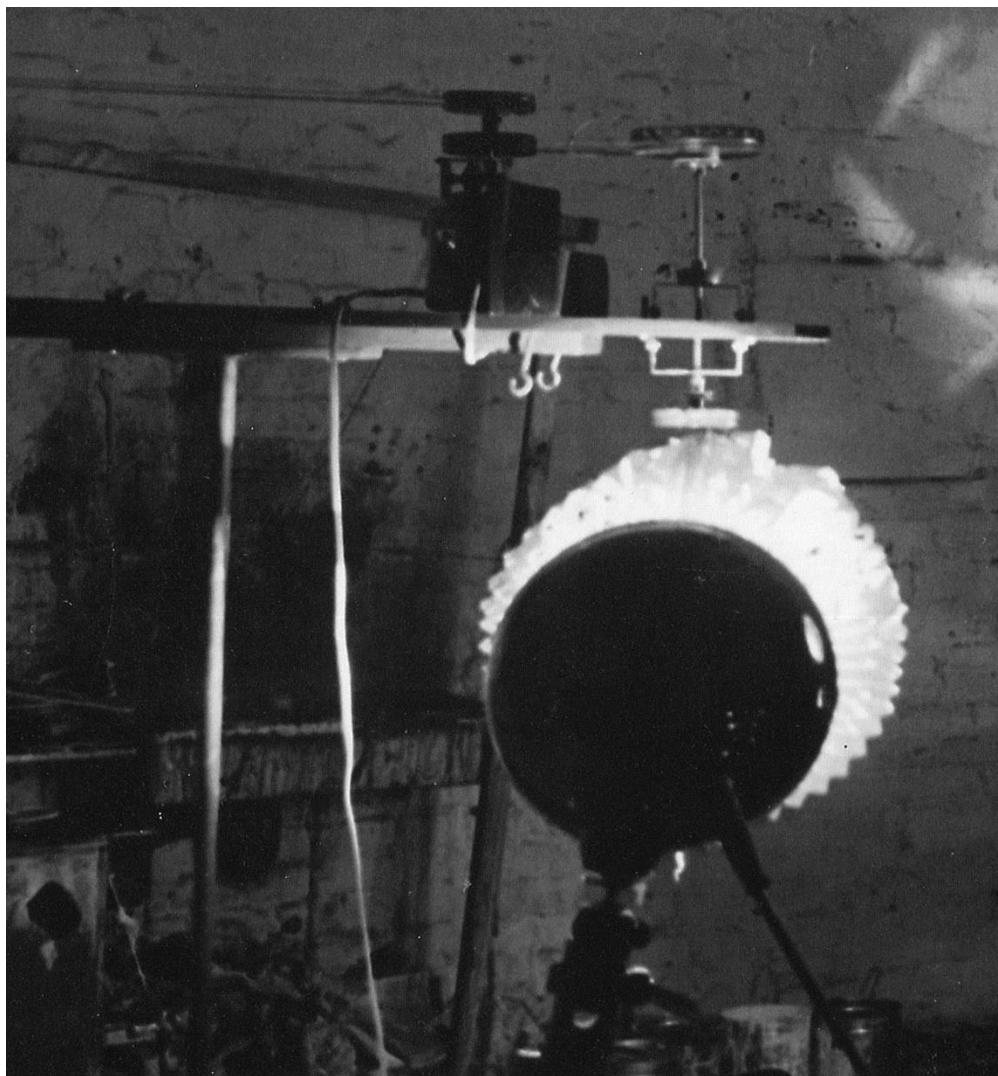


Figure 24: A motor in the *Mechanisches Lichtballett*, 15 October 1960. Photo ZERO Archive



Figure 25: *Mechanisches Lichtballett* with prominently placed electrical board, Gladbacherstrasse Studio, 15 October 1960. Photo ZERO Archive

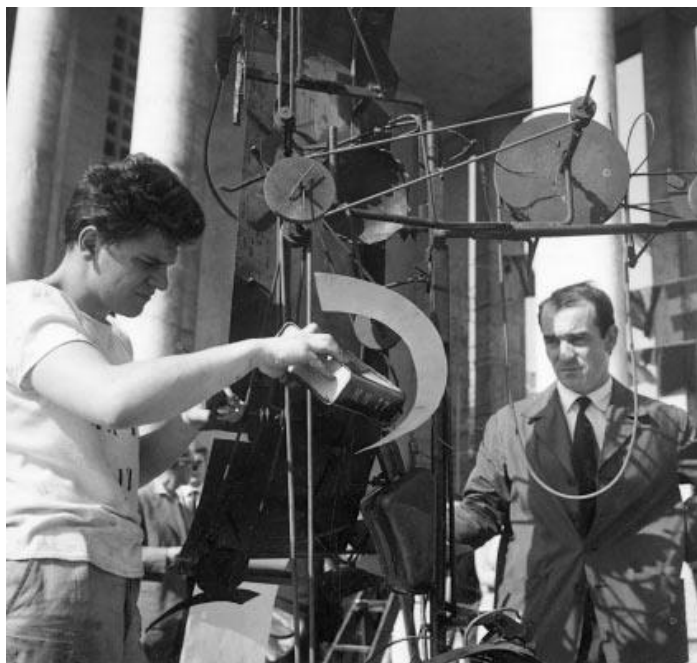


Figure 26: Jean Tinguely, *MetaMatic 17*, Biennale de Paris, 1959. Photo Tinguely.ch



Figure 27: Otto Piene, *Klassisches Lichtballett*, 1961, Schloss Morsbroich. Photo Tischer.org



Figure 28: The wall projections of the *Klassisches Lichtballett*, 1961, Schloss Morsbroich. Photo Tischer.org



Figure 29: The ceiling projections of the *Klassisches Lichtballett*, 1961, Schloss Morsbroich. Photo Tischer.org



Figure 30: *Nul*, poster for 9-26 March 1962 show at Stedelijk Amsterdam. ZERO Archive

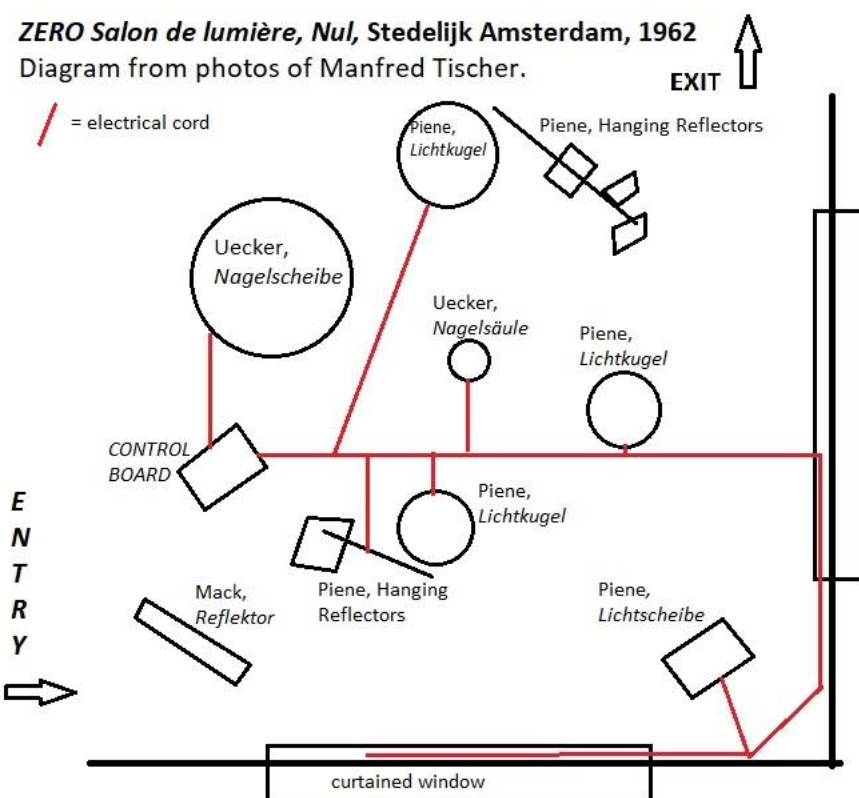


Figure 31: Floorplan of *Salon de lumière* at *nul*, 1962

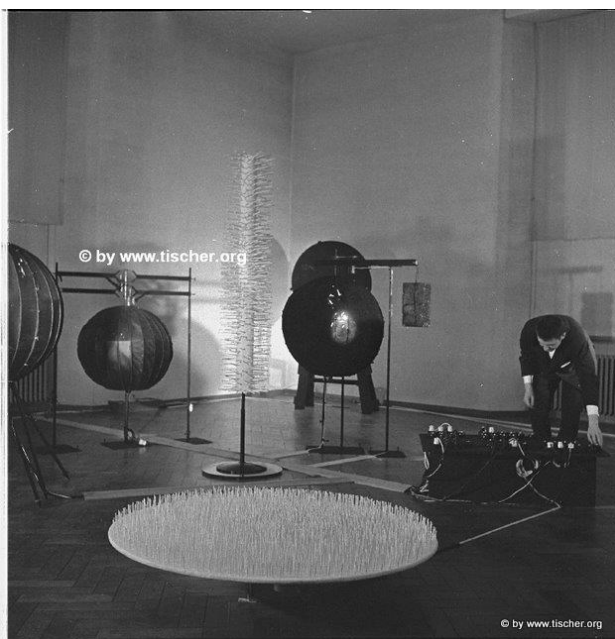


Figure 32: Group Zero, *Salon de lumière*, 1962. Photo Tischer.org



Figure 333: Otto Piene, *Please Turn*, 1961, *nul*, Stedelijk Amsterdam, 1962. Photo Tischer.org



Figure 34: *Please Turn* being activated during the *nul* show, 1962. Photo Tischer.org



Figure 35: *Please Turn*, with visible projections on wall during the *nul* show. Photo Tischer.org



Figure 36: Otto Piene, *Please Turn*, 1961, shown during *Otto Piene: More Sky* at Deutsches Bank KunstHalle, Berlin, 2014. Photo G. Ruff, August 2014



Figure 37: Otto Piene, *Please Turn*, 1961, *Otto Piene: More Sky*, Deutsches Bank KunstHalle, 2014. Photo G. Ruff, August 2014



Figure 38: Otto Piene, *Please Turn*, 1961, *Otto Piene: More Sky*, Deutsches Bank KunstHalle, 2014. Photo G. Ruff, August 2014



Figure 39: *Please Turn* being turned by a docent during *Otto Piene: More Sky*, 2014. Photo G. Ruff, August 2014



Figure 40: Otto Piene, *Olympic Rainbow*, 1972. Photo Wikiart.org

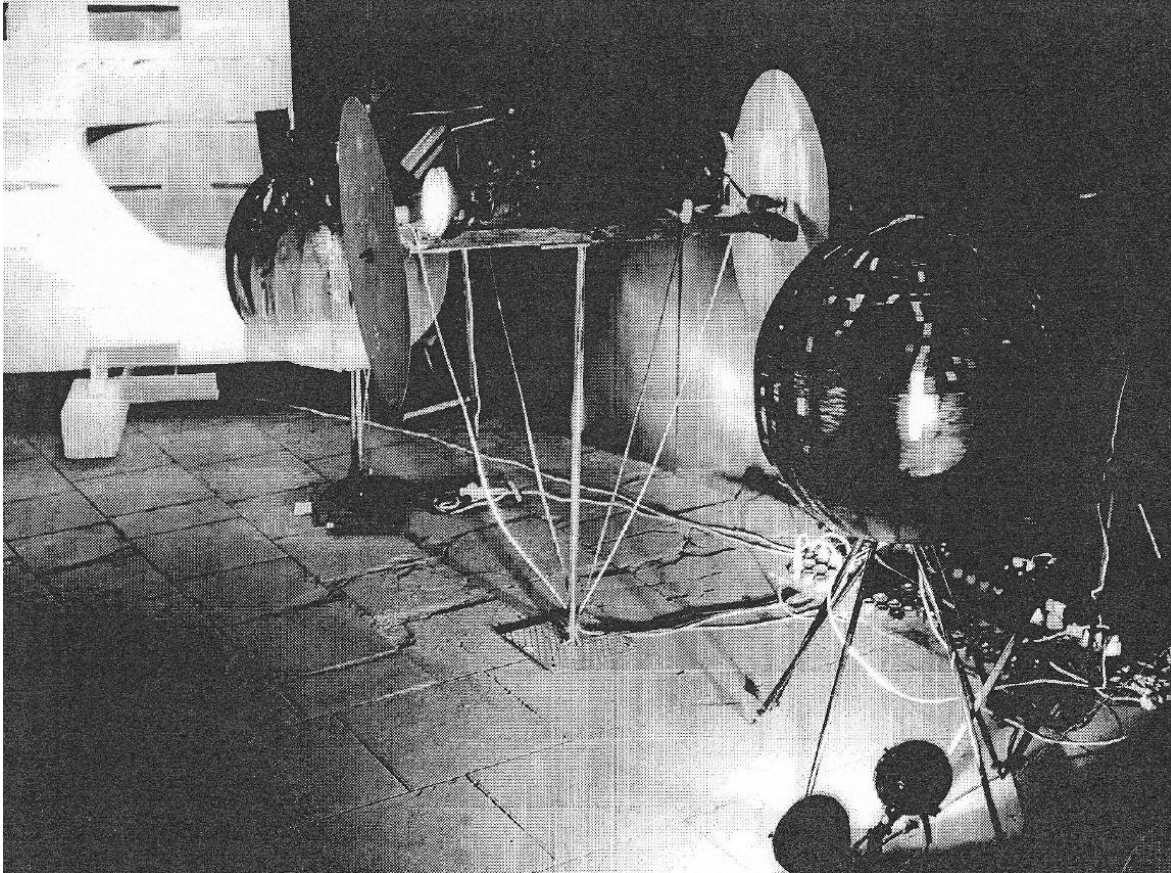


Figure 41: Otto Piene, *Lichtballett*, 1963, *Europäische Avantgarde*, 1963, Galerie d, Frankfurt. Photo Hartmut Recort, ZERO Archive



Figure 42: Otto Piene, *Electric Rose*, 1965, *Light Ballet*, Howard Wise Gallery New York. Photo Otto Piene, reproduced in *Otto Piene: Lichtballett*, 2011, pg 53



Figure 43: Otto Piene, *Electric Rose*, 1965. Photo MIT LIST Visual Art Center



Figure 44: Otto Piene, *Lichtballett*, 2011, MIT List Gallery, 2011. Photo MIT List Gallery



Figure 45: Otto Piene, *Lichtballett*, 2010, Hubertus Schoeller Stiftung at the Leopold Hoesch Museum. Photo G. Ruff, September 2014



Figure 46: Otto Piene, *Lichtballett*, 2010, Hubertus Schoeller Stiftung at the Leopold Hoesch Museum. Photo G. Ruff, September 2014

CHAPTER III: Eliasson's Technologically Sublime Apparatus

Dein Ausstellungsguide (2014), Olafur Eliasson's paradigmatic combination of central apparatus, technological sublime, and carefully constructed *dispositif* occupied an intriguingly dim open space in Düsseldorf's modernist K20 (Kunstsammlung NRW) building.¹ Installed in the Grabbe Halle, opposite the exhibition *Kandinsky, Malevich, Mondrian: The Infinite White Abyss*, Eliasson's container of darkness was striated with revolving prismatic arcs of light which scraped over walls, ceiling, floor, and users – the beams of light seemingly searching for an escape (Figures 1-2). An enormous projector hung from the ceiling about 16 meters from the west gallery wall and the hushed sounds of people's conversations combined with the quiet fan cooling the bright lamp gently echoed in the cavernous space.² At the far western end of the 47.5 meter long gallery, a gentle glow emanated from a line of 11 waist high iPad screens.³ The quiet shadowy shapes of viewers were the only other presence in the space. *Your museum primer* (2014), the work of revolving diffracted light, was described by Studio Eliasson like this:

Suspended from the ceiling of a darkened gallery space, a prismatic ring with a pane of colour-effect filter glass at its centre slowly rotates within a beam of light projected by a focused spotlight. As the ring turns, it casts circles and arcs of light that move along the walls, scanning the space. Some of these are single tones, while others display the full range of colours in the visible spectrum. Because of the properties of the colour-effect filter glass, the reflected light appears blue while the light that passes through the glass is yellow.⁴

This description, published in Eliasson's online archive, is accompanied by a short film from The ShimuraBros, *Your Museum Primer* (2016), which documents the eponymous work installed in Seoul.

¹ *Dein Ausstellungsguide* refers both to the name of Eliasson's 2014 installation at K20 and to the German language title of one of the two works, *Your exhibition guide* (2014) shown. To keep these distinctions clear, I use *Dein Ausstellungsguide* to refer to the show and the English titles of the works shown: *Your exhibition guide* and *Your museum primer* (2014)

² "Olafur Eliasson: Dein Ausstellungsguide – K20 Düsseldorf," Institut für Kunstdokumentation, accessed 23 June 2019, <https://vimeo.com/93169778> and personal recollection.

³ The Grabbe Hall is 12.35 x 47.5 meters (40.5 x 155.8 feet), with a 12.46 meter (40.9 feet) high ceiling.

⁴ "Your museum primer," Olafur Eliasson, accessed 23 June 2019, <https://www.olafureliasson.net/archive/artwork/WEK108815/your-museum-primer#slideshow>.

The film opens with the arcs of light expanding across the screen while a woman's voice speaks in Korean.⁵ Twenty seconds in, the screen becomes light and the woman ushers five children, who appear to be five or six in age, into a corner of the installation. The children mill around each other, pointing first to the arcs of light and then to the point of origin. The film goes silent and dark again without clarifying whether the little boy was pointing to the turning plexiglass ring or the spotlight itself, although either can be considered the apparatus – the technology which produced the moving arcs of light that swept the walls.

The children's engagement with *Your museum primer* is not so different from that of adult viewers: photos of the work installed in the Grabbe Halle show shadowy groups of figures with their attention (indicated by orientation) directed at the arcs of light or the rotating ring and lens (Figure 3). What the viewers are most likely discussing is a deceptively simple apparatus which produces intriguing effects, and Eliasson himself agrees. In conversation with curator Marion Ackermann, Eliasson emphasizes *Your museum primer*'s simplicity stating "This is just a small plastic lens, a piece of glass, relatively unspectacular. But these refractions are so incredibly great."⁶ His tone is of an artist who has found an "unbelievably amazing" effect by experimenting with basic technology, and it is an interest echoed by Ackermann, who asks "...we seem to see a sun and a planet. Or is this interpretation too concrete?"⁷ This exchange between Eliasson and Ackermann demonstrates a principle function of art in contemporary society as described by Walter Benjamin in "The Work of Art in the Age of its

⁵ The ShimuraBros, *Your Museum Primer*, 2014, <https://www.soe.tv/channels/artworks#your-museum-primer-2014-a-film-by-shimurabros>. The film was made during Eliasson's *The parliament of possibilities* (2016-2017) solo show at Leeum, Samsung Museum of Art, Seoul.

⁶ Olafur Eliasson in "#32 trifft: Marion Ackermann und Olafur Eliasson im Gespräch," <http://www.number32.de/making-of/32-trifft-marion-ackermann-und-olafur-eliasson-im-gespraech.html>. Accessed 19 October 2019.

⁷ Marion Ackermann in "#32 trifft: Marion Ackermann und Olafur Eliasson im Gespräch."

Technological Reproducibility:” to explore the interaction between nature and the human, what Benjamin labels the “second technology.”⁸

The origin of the second technology lies at the point where, by an unconscious ruse, human beings first began to distance themselves from nature. It lies in other words, in play.⁹

As an example of play, (noun, an enjoyable activity) *Your museum primer* hinges on the enjoyment of the viewers and the artist in discovering the potentiality of recognizable technology to refract the most natural and artificial of elements, light.¹⁰ No lengthy explanatory panels accompanied *Your museum primer* in Düsseldorf, and at the far end of the Halle, the bank of iPads (*Your exhibition guide*, 2014) offered users a new App from Studio Eliasson designed to encourage radical new perceptions of art that depart from “habitual patterns of vision” and instead center on the individual, the sensory, and the intuitive.¹¹

As with other of Eliasson’s works to be discussed in this chapter, the two works in *Dein Ausstellungsguide* asserted presence – of the viewer, of the museum, of the apparatus - and emphasized the collaboration between these elements in “productive tension.” This generated a paradoxical relation that MCA Chicago Director Madeleine Grynsztejn describes as both phenomenological and transcendent:

Both the work’s clear material basis and the emotional investment by which we engage with its conditions – the literal and the metaphoric, scepticism [sic] and belief – are kept in productive tension. Each time perception goes beyond a ground-level apprehension of what is given to look at, moving towards what would constitute meaning, it is immediately led back to the work’s structural components, the material and devices that exist prior to its effects.¹²

⁸ Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media*, 26.

⁹ Benjamin et al., 26.

¹⁰ OED, online edition, 2015. In the original German, Benjamin used *das Spiel* to describe the origin of the second technology. The meaning is identical.

¹¹ Marion Ackermann and Isabelle Malz, “Press Release: Olafur Eliasson: Dein Ausstellungsguide” (Kunstsammlung NRW, April 2014).

¹² Madeleine Grynsztejn et al., *Olafur Eliasson, Contemporary Artists* (London ; New York, NY: Phaidon Press, 2002), 49.

It is a work which continues an explicit thread that Eliasson has woven through his oeuvre for almost thirty years:

I was interested in light from the very beginning because it negotiates strongly with the spatial conditions, which means that it can be an independent object on the one hand, a projection such as a form on a wall, a light projection; yet it can also be the source of light in general, the lighting for the entire room. That means we have a situation where an object and a phenomenon exist simultaneously. There is also no transition from the phenomenon to the space. One could say that the space and the phenomenon become one. It was ideas like this that sparked off my interest in light at the beginning of the nineties.¹³

The “scanning” arcs of light emphasized, rather than dematerialized, the walls of the Grabbe Halle and the visible apparatuses of production – ring, lens, projector – which anchored the work in the present and refused reference to the ethereal sublime were integral to Eliasson’s realization of *Your museum primer*.

Additionally, the location of the gallery within the larger K20 museum (opposite *The Infinite White Abyss* exhibition), the inclusion of *Your exhibition guide* with attendant screens and provoking questions, the drone of the spotlight fan – all of these aspects were also calculated elements of Eliasson’s *dispositif*.

In the art of Eliasson...the objects being produced, and the sociomaterial technologies they imply, are only part of the story. Seen in broader context, the physical works are nodes in the ongoing activity of knowledge production.¹⁴

Knowledge production, continues Caroline Jones, includes reasoning, sensory perception, and memory. Jones underscores the multi-faceted aspects of Eliasson’s installations. As with *Your museum primer* it is inaccurate to point to the spotlight, ring, and lens as the work. Instead *Your museum primer* exists in the relations created between this technological apparatus and the arcs of light, the activated gallery space, the engaged viewer, and the knowledge produced (sensory data, memories, associations).

¹³ Olafur Eliasson in conversation with Holger Broecker in Olafur Eliasson, Gijs van Tuyl, and Holger Broecker, *Olafur Eliasson : Your Lighthouse*, 2004, 45.

¹⁴ Caroline A. Jones, “The Server/User Mode: The Art of Olafur Eliasson,” *Art Forum* 46 (October 2007): 319.

Michel Foucault's *dispositif*, a messy "heterogeneous ensemble" and its attendant "system of relations" offers a framework for considering Eliasson's works that recoups the power of the technological apparatus without diminishing the phenomenological foundation of the works.¹⁵ In doing so, the concept of the *dispositif* acknowledges that the production of knowledge also changes the reception of the work and that

[t]he complex research, technical experimentation, and layers of representation in the work become evident only on a second, slower take.¹⁶

The longer the viewer considers the interrelations and penetrations, the more interesting such relationships become. For example, Eliasson chose to install *Your museum primer* opposite *The Infinite White Abyss* in Düsseldorf. This exhibition of early 20th century abstraction focused on Malevich, Kandinsky, and Mondrian's use of white. *Your museum primer* splits white light into its constituent colors, defying Malevich's accomplishment of removing all color to achieve white. According to Malevich:

I have ripped through the blue lampshade of the constraints of color. I have come out into white...I have overcome the lining of the colored sky, torn it down and into the bag thus formed, put color, tying it up with a knot. Swim in the white free abyss, infinity is before you.¹⁷

In contrast, Eliasson released the captured color from within the white light – but the source is not the natural light of the sky. These associations must be realized through viewers' discussion and consideration, as neither Eliasson nor K20 provided such analysis, although the museum's description of the work did acknowledge the correspondence between *Your museum primer* and *The Infinite White Abyss*:

In collaboration with the Kunstsammlung and in direct reference to the exhibition "Kandinsky, Malevich, Mondrian: The Infinite White Abyss," (ended on 6 July 2014)

¹⁵ "Confessions of the Flesh," 1977 in Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, 194.

¹⁶ Jones, 319.

¹⁷ Kazimir Malevich, "Non-Objective Art and Suprematism," 1919, in Harrison and Wood, *Art in Theory, 1900-2000: An Anthology of Changing Ideas*, 293.

Olafur Eliasson has developed an unusual project that prepares visitors for the presentation in astonishing ways. Through his fusion of large-scale installation and digital app, Eliasson opens up a space of experience – an exploratorium that strives to counteract the progressive mummification of our senses by a ceaseless daily flood of images and information.¹⁸

How this space of experience is meant to counteract the “mummification of the senses” is never clarified, and Jones argues that ultimately the work is produced in the mind of the viewer – as a sum total of the myriad nodes, operations, and perceptions in play. Any subtle alteration of any of these elements would necessarily shift the relations between them, hence the importance of the “sociomaterial technology” – the very visible, tactile material that solidifies a portion of the work in a concrete and recognizable form. Sociomateriality, a term Jones borrows from organizational studies, foregrounds the “constitutive entanglement of the social and the material in everyday organizational life.”¹⁹ This concept attempts to eliminate the binary between that which is viewed as social or material within an organization, and instead proposes that some systems, such as a Google search are intrinsically sociomaterial: relying on the interaction of computers, software, and algorithm (materials), with engineers and web page authors (that which is societal).²⁰ Jones’ use of the term “sociomaterial technology” is redundant, but underscores the centrality of the entangled nature of Eliasson’s objects. To be clear, the sociomateriality of *Your museum primer* is concretized by the interpenetration of the projector, ring, and space of the Grabbe Halle (the material), and the conception and realization of the work by Eliason and his team. The “production of knowledge” occurs when viewers enter the space and interact with the work.

¹⁸ “Olafur Eliasson: Dein Ausstellungsguide,” <https://www.kunstsammlung.de/en/get-involved/labor/archive/olafur-eliasson.html> Accessed 29 November 2019.

¹⁹ Wanda Orlikowski, “Sociomaterial Practices: Exploring Technology at Work,” *Organizational Studies* 28, no. 9 (2007): 1438.

²⁰ Orlikowski, 1440.

Foucault's *Dispositif*, Including the Apparatus

In a 2005 interview with curator Daniel Birnbaum, Olafur Eliasson described his “need” to create a machine as means to the greater end of viewer’s experience:

[o]ften people ask if I have a scientific background, but in fact I'm less interested in science than in the result of a particular scientific phenomenon. By 'result' I mean the way that people experience it. But I need some media, I need some 'stuff' to create a situation. I need a machine to create a phenomenon in order to have an experience.²¹

Eliasson’s interest in specific technologies is supported by his well-staffed Berlin studio and his collaborators, which include scientists, Non-Governmental Organizations, and structural engineers.²² His “scientific background” is sometimes project specific, supplemented by his studio team, or is driven by personal interest, as in an unrealized filmic experiment to turn viewers into projectors through the manipulation of visual afterimages.²³ The viewer’s experience of a particular scientific phenomenon, such as the refraction of light through a prismatic ring and lens in *Your museum primer*, is Eliasson’s professed primary interest, however, to achieve this seemingly isolated experience he and his team must also “create a situation;” which requires more than the understated assembly of “some stuff.” “The machine” that Eliasson requires is greater than merely technological apparatuses – which often play a large role. Rather, the phenomenon making machine includes what Jonathan Crary describes as the shifting relations between “...spectator, apparatus and milieu - elements out of which a non-identifiable and non-localizable phenomenon coalesces and subsists.”²⁴ Crary’s argument is that despite Eliasson’s utilization of concrete and visible apparatuses, his works truly reside in the creation of temporospatial conditions within which sensory and cognitive phenomenon occur.²⁵

²¹ Olafur Eliasson, interview by Daniel Birnbaum, *Pressplay : Contemporary Artists in Conversation* (London ; New York: Phaidon, 2005), 185.

²² <https://olafureliasson.net/studio>. Accessed 19 October 2019. Eliasson’s studio currently employs about 90 staff members, including archivists, researchers, designers, architects, film-makers, and craftspeople.

²³ Eliasson described this as a “...little scientific movie about the after-image phenomenon.” Eliasson, Soyugenc, and Torchia, *Olafur Eliasson : Your Colour Memory*, 79.

²⁴ Eliasson Olafur and Johnathan Crary, *Olafur Eliasson* (Basel: Schwabe & Co. AG, 1997), 63.

²⁵ Eliasson and Crary, 63.

Olafur Eliasson's creative "stuff," the experiential phenomena he creates, and the relations between the disparate elements of his installations can be explored using Michel Foucault's concept of the *dispositif*, which he described succinctly in 1977 responding to a direct request from Rousseau scholar and *Cahiers pour l'Analyse* founding editor Alain Grosrichard: "What is the meaning or the methodological function for you of this term, *apparatus [dispositif]*?" Foucault explained:

What I'm trying to pick out with this term is, firstly, a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions - in short, the said as much as the unsaid. Such are the elements of the *[dispositif]*. The *[dispositif]* itself is the system of relations that can be established between these elements. Secondly, what I am trying to identify in this *[dispositif]* is precisely the nature of the connection that can exist between these heterogeneous elements...between these elements, whether discursive or non-discursive, there is a sort of interplay of shifts of position and modifications of function which can also vary very widely. Thirdly, I understand by the term '*[dispositif]*' a sort of - shall we say - formation which has as its major function at a given historical moment that of responding to an urgent need. The *[dispositif]* thus has a dominant strategic function. This may have been, for example, the assimilation of a floating population found to be burdensome for an essentially mercantilist economy: there was a strategic imperative acting here as the matrix for a *[dispositif]* which gradually undertook the control or subjection of madness, mental illness and neurosis.²⁶

Foucault's final example gives an idea of the fluid nature of the *dispositif*: it is an aggregation of thoughts and practices, born of a need, responsive to the changing positions of its (mostly) incorporeal anchors.

In the original French, Foucault used "*dispositif*," a term which unfortunately has no direct equivalent and is usually slantingly translated as "apparatus." Herein begins the confusion, for Foucault used "*appareil*" elsewhere in his writings and lectures - and this term, as scholar Jeffrey Bussolini notes, is etymologically similar to apparatus.²⁷ The fact that Foucault translator Colin Gordon chose to use apparatus to capture the multi-faceted meaning of *dispositif* creates a confusing triple-duty for

²⁶ Michel Foucault, "The Confession of the Flesh," interview by Alain Grosrichard, Gerard Wajeman, Jacques-Alain Miller, Guy Le Gaufey, Dominique Celas, Gerard Miller, Catherine Millot, Jocelyne Livi, Judith Miller, Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, 194-95. The interview was initiated to discuss Foucault's recent publication of *The Will to Knowledge*, what he considered to be the first volume of *The History of Sexuality*. I have re-placed Foucault's original "*dispositif*" in the text where translator Colin Gordon instead chose the term "apparatus" for reasons addressed in the next paragraph.

²⁷ Jeff Bussolini, "What Is a Dispositive?," *Foucault Studies*, no. 10 (November 2010): 86.

apparatus: is it also a term loaded with meaning by Louis Althusser. An Althusserian Ideological State Apparatus, such as the private domain of the family, church, or trade union, secures the means of production for the singular, public State Apparatus, which in turn establishes ideal functioning conditions for the Ideological State Apparatuses.²⁸ These apparatuses can be delimited and defined, in contrast to Foucault's *dispositif*, which is the "system of relations" between such concrete elements. The *dispositif* exists only *in situ* – it cannot be discussed without the apparatuses it serves to relate, and its nature changes with the shift of any element.

The technological apparatus of the lamp, as one element of the *dispositif* and one very obvious example of the "stuff" that Eliasson requires to create a situation, is also a central clue as to the "strategic function" of the *dispositif*. The physical action of the lamp, ring, and lens of *Your museum primer*, to "scan" the walls of the darkened gallery with refracted white LED light, suggests Eliasson's intention for the viewer. Conscious apprehension of the museum is represented by the light scanning the containing walls. The division of the white light of illumination into various spectrum colors indicates the multiple ways in which the museological structure impacts the reception of art and the work it displays, or perhaps it represents the phenomenological differences of multiple perceptive consciousness? *Your museum primer* – Eliasson's title emphasizes the personal aspect of the installation which is substantiated by the differences in perception; each viewer of *Your museum primer* perceives the work differently. Physiologically, this is confirmed by the disparities between each individual's vision; each viewer sees the work differently before layering on personal experience and associations. The relations between the lamp, the museum, and the viewer act as the *dispositif* of the work; the lamp, ring, and lens apparatus being but one, albeit very important, element.

...the light in the room of a museum is not white. But it appears to us not only as just that – white – but also, on top of that, as natural light – for the environment of a room in a museum...Museum light is also not sunlight, that is, by no means is it natural. By

²⁸ Louis Althusser, "Ideology and Ideological State Apparatuses," in *Lenin and Philosophy" and Other Essays*, trans. Ben Brewster (Monthly Review Press, 1971), 17.

bringing the construction of their eyesight to the eyes of the users of my spaces, I also hope to be prodding them to think about the constructs of everything else that might be made of – the room, the museum itself, etc....I'm first creating experience. But above all I'm prompting awareness.²⁹

Gilles Deleuze further explained the *dispositif* as analogous to a unique tangle of lines: curves of visibility and enunciation, lines of force and of subjectification, all of which can be untangled to determine those of the archive and those of the present, with each *dispositif* directing attention to the possibilities of the new.³⁰ As a constantly shifting miasma of relations, there could be no definitive boundary to the *dispositif*: it serves to articulate and disclose itself. Foucault's ambition for the *dispositif* might well have been the “repudiation of universals,” concluded Deleuze, whose own contribution to the *dispositif*-discourse is the teasing out of specific elements within the “system of relations,” naming their functions and limitations, and extrapolating Foucault's regrettably truncated conceptual project.

Each [*dispositif*] is thus defined in terms of its newness content and its creativity content, this marking at the same time its ability to transform itself, or indeed to break down in favour of a future apparatus, unless it concentrates its strength along its harder, more rigid, or more solid lines.³¹

The *dispositif* is malleable, amorphous, and transformative - dependent upon the shifting of relationships for its existence and visibility. To concretize these concepts and argue for the differentiation of the apparatus from the *dispositif*, Olafur Eliasson's arguably best-known work, *The Weather Project* (2003) can be outlined in Foucault/Deleuze's terms, employing the rich discourse surrounding the installation as substantiation.

Created for installation in the Tate Turbine Hall, *The Weather Project* used hundreds of Low Pressure Sodium (LPS) lamps, an opaque scrim, mylar mirror film and scaffolding, and mist machines (Figure 4). Eliasson's concept for the project stemmed from his interest in the social role of the

²⁹ Olafur Eliasson, Interview with Joachim Bessing, “Olafur Eliasson: Experiencing Space,” magazine, 032c, Winter 2004, <https://032c.com/experiencing-space-olafur-eliasson/> Accessed 25 October 2019.

³⁰ Gilles Deleuze, “What is a *Dispositif*?” in Timothy J. Armstrong, ed., *Michel Foucault Philosopher* (New York: Harvester Wheatsheaf, 1992), 159–66.

³¹ Deleuze, 163.

institution, the history of the Turbine Hall structure, and the activation of information exchange between humans; he elaborated these foundations in a planning-stage conversation with Tate administrators and architect Jacques Herzog. Eliasson introduced his goal for the project as being “a window onto the construction that is behind the integration of art into society,” which would utilize the Turbine Hall as a catalyst between art production, the museum, and society.³² Herzog and Pierre de Meuron’s conversion of the post-war Bankside Power Station building into the Tate Modern was also an integration of art into society – their architectural plan had retained the exterior structure originally completed in 1953. The vast space of the Turbine Hall (3,300 m²), which is named after the massive electrical generators that it originally housed, is a main entry point and central to visitor’s experience of the museum.³³

The visibility of *The Weather Project* was defined in two manners: by Eliasson's installation of the lights, the mirrored ceiling, and the mist within the centrally located Turbine Hall, and by his conscious effort to eliminate a preconceived visual image of the work being distributed via marketing materials. Eliasson's ideal situation was a viewer entering the space without knowing what they would encounter, a blank slate approach which would individually mediate independent sets of expectations at the site of the installation rather than in advance via publicity images (Figure 5-6).³⁴ Instead of images of the installed “sun” or verbal descriptions of the visual work, direct statements from Eliasson prior to the opening of *The Weather Project* focused on the social discourse of weather and how such conversations are mediated by (and themselves mediate) time and location, a conversation which Eliasson employed

³² Susan May, ed., *Olafur Eliasson: The Weather Project* (London: Tate Publishing, 2003), 66. Participants in the round-table discussion were: Jane Burton (Education and Interpretation, Tate Modern), Helen Charman (Education and Interpretation, Tate Modern), Olafur Eliasson, Brian Gray (Operations and Front of the House, Tate Modern), Sophie Harrows (Communications, Tate), Jacques Herzog (architect), Nicholas Serota (Director, Tate), Dominic Willson (Education and Interpretation, Tate Modern).

³³ The Bankside Power Station ran off oil and produced electricity for the city of London between 1953 and 1981. It was closed in part due to the pollution it created. The Turbine Hall was enlarged slightly by removing the original first floor to include the basement as part of the space. It is now 155m long x 23 m wide x 35 m high.

³⁴ May, *Olafur Eliasson: The Weather Project*, 72. Of course this approach was plausible only for the first few days of the exhibition, as photographs, reviews, and word of mouth quickly gave away the visual content.

as an instance of consciousness concerning the mediation of reality.³⁵ Two weeks before the 16 October 2003 opening of *The Weather Project*, *The Daily Telegraph* (London) noted Eliasson's unusual participation in the marketing of the installation, and described *The Weather Project* only as "...play[ing] in the ways in which we think about our relationship to the weather."³⁶ Despite the article's byline, "...what does Olafur Eliasson have in store for the Tate Modern?" no description or details were provided concerning the physical realization of the work. Simultaneously, at the Tate Modern, privacy fencing was erected around the entrances to the Turbine Hall during the installation of *The Weather Project*. Tate Modern Front of House Manager Adrian Hardwicke would later describe visitors' curiosity in the face of the fence:

...this just encourages the intrepid visitor to try to find a way in, to see what's going on. I even saw someone getting a lift on another person's shoulders and holding up a camera.³⁷

With the opening of the installation to the public on 16 October, secrecy was summarily dismissed, and the physical work revealed in that day's London headlines: "Tate Modern awakens to Dane's rising sun" (*The Guardian*), "A giant neon sun fills the Tate space" (*Daily Telegraph*), "A Tate Sunset" (*The Evening Standard*). Almost as ubiquitous as the solar headline were article's references to "perceptual phenomena," and the technological apparatus: lights, mirrors, haze.

Here, then, are the lines of visibility and enunciation that Deleuze describes - the ways in which the *dispositif* of *The Weather Project* showed and obscured itself and the statements (enunciations) which served to "distribute variables" such as discussions of perception, the role of the museum, the

³⁵ May, 134. "My interest is not to first make an experience and then deconstruct it, but to create an experience which has a certain transparency or self-reflexiveness built into it." Olafur Eliasson in Sebastian Smee, "The Artist Who Paints with the Weather," *The Daily Telegraph*, September 30, 2003, <https://infowebnewsbank-com.proxy.cc.uic.edu/apps/news/document-view?p=WORLDNEWS&docref=news/0FDEA961A50CD4C9>.

³⁶ Smee, "The Artist Who Paints with the Weather."

³⁷ Adrian Hardwicke, "Secret Diary of an Art Gallery Attendant," *The Guardian*, March 18, 2004, <https://infowebnewsbankcom.proxy.cc.uic.edu/apps/news/document-view?p=WORLDNEWS&docref=news/1016B4EC29E4B8C4>

relationship between art and society.³⁸ By keeping his cards close to his chest concerning the physical realization of *The Weather Project*, Eliasson prioritized discussions of the interactions between art, museums, and the viewers: an emphasis reiterated in the show's catalog, which contains only one brief discussion of the physical/visual nature of the work, and instead concentrates on discussions of meteorology, sociology, and the role of the museum.³⁹

The third element of Foucault's *dispositif* are the lines of force, which Deleuze describes as the invisible "go-betweens between seeing and saying" and the true objects of Foucault's interest.⁴⁰ Foucault explained that while the *dispositif* might be "inscribed in a play of power," it is also delimited by *and* a producer of knowledge.⁴¹ Power, meaning "a more-or-less organised, hierarchical, coordinated cluster of relations," is dependent upon the smallest shifts and exchanges for its overall mass; these transactions occur at all levels, in all directions, simultaneously moving information with each transaction.⁴² In *The Weather Project*, Eliasson publicly engaged with various departments of the museum (institutions within the institution in Foucauldian terms) throughout the conception, execution, and duration of the work, foregrounding the impact/power that each deployed within the project. Eliasson is explicit about his interest in the power relations within the museum:

I want to...question my own idea of what museum is and what it does for people. However, this is not something with a manifest programme attached to it, nor an evaluation of an industry. It's about a couple of fundamental issues: whether or not art, or the reading and experience of art, is being influenced by the different jobs with which various departments are occupied, and to what extent the people in those departments acknowledge or understand that and have an opinion about it...The one thing that I am seeking to present is a certain kind of transparency.⁴³

³⁸ I am paraphrasing main discussion points from Eliasson's "Museums are Radical," included in *The Weather Project* catalog but many of these concepts are reiterated in interviews and literature concerning the installation.

³⁹ Susan May provides a scant two page description of the physical installation of *The Weather Project* in her essay "Meteorologica," the thesis of which is the importance of individual perception within Eliasson's oeuvre.

⁴⁰ Deleuze in Armstrong, *Michel Foucault Philosopher*, 160.

⁴¹ Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, 191.

⁴² Foucault, 198-201.

⁴³ May, *Olafur Eliasson: The Weather Project*, 66.

Accompanying the transcript of this conversation are colorful graphs depicting the answers to a questionnaire distributed to museum departments five months prior to the installation of *The Weather Project*. The paper survey included questions such as “Do you think the weather impacts your salary?” (81% said “No”), “Do you think the idea of weather in our society is based on Nature or Culture?” (53% said “Culture”), and “Do you think there is a hierarchy of daylight in society?” (44% said “Don’t Know,” 41% said “Yes”).⁴⁴ The subsequent graphs are visually appealing exercises in data mapping which use the questionnaire answers as the raw materials of abstraction, and this exemplifies Eliasson’s technique of eliding science and art. Furthermore, the data culled from this research was used to develop the marketing campaign for *The Weather Project*, which, as previously noted, made no reference to the physical reality of the installation but instead offered statistics and conversational questions (Figures 5-6).

Eliasson’s presentation of transparency at the Tate included making power – “a relation, [which] always inhabits the space between signs and things” – visible, from its emanation at the level of the individual to the Tate Museum in toto and at all levels in between.⁴⁵ Foucault asserted that power does not necessarily move from the “top downwards” as we might envision the policies of a museum exhibition being issued from the director or chief curator down to a museum docent. Viewer response to *The Weather Project* demonstrates this: Hardwicke described the Museum’s reaction to and accommodation of the “most extraordinary things,” including impromptu dance performances, public displays of inappropriate affection, political activism, and inflatable canoes paddled into the “sunset.”⁴⁶ Such reactions were markedly different from the quiet contemplation or hushed discussion often encountered in museum galleries and necessitated specific training for gallery attendants to “...be very

⁴⁴ May, 63–64.

⁴⁵ Daniel O’Connor, “Lines of (F)Light: The Visual Apparatus in Foucault and Deleuze,” *Space and Culture* 1 (1997): 63.

⁴⁶ Hardwicke, “Secret Diary of an Art Gallery Attendant.”

aware when not to impose or come between visitors experience of the artwork unless absolutely necessary.”⁴⁷ As the technological components of *The Weather Project* were not physically reachable by viewers, the main concern was reaction:

...there was much anticipation as to how visitors would react to the mirrored environment and how they would behave within the space. I recall it was always the aim to leave visitors to explore the space and react to the unique atmosphere and literally 'reflective' nature of the work.⁴⁸

Eliasson's extended conversation with the museum staff exposed that much of the Tate's concern is with re-establishing the power of the viewer, equipping them (or stripping them, as appropriate) to confidently approach, understand, and respond to artworks independently. Tate Modern Curator of Interpretation, Jane Burton, described the Tate's interpretive goal as “allowing a number of possibilities to co-exist and to encourage people to form their own views...in terms of trying to keep meaning open.”⁴⁹ Burton elaborated that the Tate's program of transparent and multi-faceted interpretation is applied throughout the museum; audio tours provide multiple narratives, texts are explicitly presented as one author's perspective so as to encourage critique and discussion, and exhibition events are intended to create new perspectives rather than reiterate an artist's intentions. This neatly intersects with Eliasson's interest in the representation and commodification of experience engendered by the museum, a continuous theme during *The Weather Project* round-table discussion, as Eliasson explains:

I would like people, when they engage with my work, to engage with it on one day on a highly representational level, looking at it as an abstraction, and on the next day to have an ephemeral experience of the same work. The would mean that the institution would be very aware of its position in this relationship between the spectator and the artwork and where the institution stands in relation to this...And if the institution reveals its own infrastructure to the extent of letting people know that it [the artwork] is in fact also a construction, no matter how it's displayed, then I would argue, we give the visitor the

⁴⁷ Fionn Lees, Information Assistant with the Tate Visitor Experience – Communication Department, email to Georgina Ruff, 9 May 2019.

⁴⁸ Fionn Lees, email to Georgina Ruff, 9 May 2019.

⁴⁹ May, *Olafur Eliasson: The Weather Project*, 76.

freedom to choose the mode of engagement themselves.⁵⁰

Here, the trajectories of power (the mediation of the museum, the intention of the artist) interact with and within the artwork and the institution to create Foucault's fourth element: lines of subjectification.

For Foucault, subjectification is the change that occurs when one becomes subject to/of the power-knowledge structure of a given *dispositif*.⁵¹ Foucault uses the example of the penal *dispositif* to illustrate subjectification achieved: nineteenth century imprisonment, with all the contingent discourse, (in)visibility, knowledge, and power ultimately produced the unforeseen effect of professionalizing a criminal social class.⁵² In the instance of *The Weather Project*, the visibility of the work both within the Museum and in the accompanying press, the knowledge of the visitor concerning the technological apparatus of the work, and the power trajectories acting between the viewer, the institution, the gallery attendants, the artist, and the critics produced the effect of an installation focused on the reactions of the viewers.

Foucault highlighted the unexpected results of the penal *dispositif*, however the results of Eliasson's *dispositif* were intentional: the specific subjectification of the viewer as “user” of the installation. This subtle linguistic shift indicates both the function of the work and that the project “constructs a set of conditions and sets in motion a process that demands action on the part of the viewer/user” stated Eva Blau in her analysis of Eliasson's 2010 *Your Chance Encounter*, a collaborative work of art and architecture which sought to generate a third project that “extend[ed] beyond the parameters of either artwork or architecture individually.”⁵³ In both works, the user negotiates with the

⁵⁰ May, 83.

⁵¹ Todd May, *The Philosophy of Foucault* (Routledge, 2006), 98 and 108, <https://ebookcentral-proquest-com.proxy.cc.uic.edu/lib/uic/detail.action?docID=1886853>. The original french “mode d'assujettissement” is also translated as “mode of subjection.”

⁵² Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, 196.

⁵³ Blau, 100-101. Blau links this construction of a third project to a Henri Lefebvre's third space: that generated by interaction and new experience. The correlation between Lefebvre's perceived, conceived, and lived spaces, and their potential for the generation of third space and Foucault's *dispositif* has been discussed by others, including Gerhard Hatz, “Foucault’s Concept of Heterotopia as an Épistémé for Reading the Post-Modern City: The Viennese

work and with the museum. The user is the object of certain lines of power, yet holds their own power within the *dispositif*: changes in any of these myriad variables – “a sort of interplay of shifts of position and modifications of function” as Foucault described it – necessarily effect the *dispositif* as a whole, even in a minuscule manner.⁵⁴

Giorgio Agamben summarizes Foucault's *dispositifs* as those which

...take the place of universals...not simply this or that police measure, this or that technology of power, and not even the generality obtained by their abstraction. Instead, as [Foucault] claims in the interview from 1977, an apparatus [*dispositif*] is ‘the network that can be established between these elements.’⁵⁵

Agamben then excavates an etymology of *dispositif* as derived from the Greek theological *oikonomia*, which, translated to the Latin, *dispositio*, provided the base for the later French. “The term ‘*dispositif*’ designates that in which, and through which, one realizes a pure activity of governance devoid of any foundation in being,” explains Agamben, before concluding that “this is the reason why *dispositifs* must always imply a process of subjectification.”⁵⁶ Subjectification, Agamben argues, occurs during the “relentless fights” between living beings and *dispositifs* - according to Agamben, we are constantly struggling with multiple processes of subjectification and we are (and have always been) consistently under the influence of a *dispositif*:

Further expanding the already large class of Foucauldian [*dispositifs*], I shall call [a *dispositif*] literally anything that has in some way the capacity to capture, orient, determine, intercept, model, control, or secure the gestures, behaviors, opinions, or discourses of living beings.⁵⁷

Example,” *Current Urban Studies* 6, no. 4 (January 2018): 456. Andrew Thacker, *Moving Through Modernity: Space and Geography in Modernism* (Manchester: Manchester University Press, 2003), 23.

⁵⁴ Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, 194.

⁵⁵ Giorgio Agamben, “What Is an Apparatus?” *And Other Essays*, Meridian, Crossing Aesthetics (Stanford, Calif.: Stanford University Press, 2009), 7.

⁵⁶ Agamben, 11. In this and all other Agamben quotes/references I have re-translated ‘apparatus’ to ‘*dispositif*’ to avoid confusing the terms. The original title of Agamben’s essay (in Italian) is “Che cos’è dispositivo?” (Roma: Nottempo, 2006). A good discussion of the pitfalls of the translation of dispositivo to apparatus is Bussolini, “What Is a Dispositive?,” 1 footnote 1.

⁵⁷ Agamben, “What Is an Apparatus?” *And Other Essays*, 14–15.

In these terms, *The Weather Project* subjectified the viewer as a museum visitor, a target of a marketing campaign, and a contemplator of contemporary art. The viewer might not be “struggling” (in the words of Agamben), however Eliasson is repeatedly explicit in his intention for negotiation or engagement with his subjectifying works. For example, discussing his 2006 installation of *notion motion* (2005), a work in which light is reflected from a pool of water disrupted by the tread of viewers, Eliasson explained “...I am trying to work with the idea of waves as a tool to make non-negotiable spatial situations more negotiable.”⁵⁸ And in the catalog accompanying *Take your time*, a 2007-2009 exhibition traveling from San Francisco to New York to Chicago, Eliasson stated “[t]o emphasize the importance of engagement I have tried to connect it to temporality...Any situation or object can be made relative and negotiable if you insist [on necessary components of perception].”⁵⁹

The *dispositif* of *The Weather Project* ostensibly sought to transform the art museum viewer into a user who would interact with the “particular machine” of lights, mirrors, and mist; and while Eliasson’s focus is admittedly on the interaction between these elements, he has a larger objective. One of Eliasson’s central and explicit goals for this work was to examine interaction between discrete elements, to essentially study the *dispositif* itself.⁶⁰

...my goal is to set out yet another sort of discourse: that art is not an autonomous science, nor an objective mass to be exposed. The question is when you talk about a construction that is obviously a construction, then this construction goes beyond the formula in an architectural sense, it goes into all the details.⁶¹ (85)

Foucault described such a “strategic objective” as the achievement which will necessarily change the structure of the *dispositif* itself. If the viewer/user accepts Eliasson’s challenge to contemplate the

⁵⁸ Olafur Eliasson and Caroline Eggel, eds., *Olafur Eliasson: Your Engagement Has Consequences On the Relativity of Your Reality* (Baden: Lars Müller Publishers, 2006), 69.

⁵⁹ Olafur Eliasson et al., *Take Your Time : Olafur Eliasson*, 2007, 58.

⁶⁰ May, *Olafur Eliasson: The Weather Project*, 76. “I’m very interested in the body and experience, not only in terms of creating a certain experience or a certain interpretation, but also in terms of questioning the conditions that affect what goes on. A particular machine creates a certain phenomenon that can be very minimal or very complex. What I then tend to focus on is what happens between this machine and visitor/participant in the project.”

⁶¹ May, 85.

mediating power of the museum, perhaps they will visit more (or less) often, actively seek new museum experiences, or simply commit to viewing subsequent works shown in the Turbine Hall.⁶² Any of these outcomes would impact the Tate Modern in a small way, subtly shifting the forces at work in Eliasson's *dispositif* and beyond as the museum reorients to accommodate increased (or decreased) visitation, additional demand for educational programming, etc. Such shifts in the *dispositif* demonstrate Foucault's "strategic elaboration," the perpetual process of adjusting the *dispositif* for effects previously unexpected; Eliasson recounted this later in an interview, recalling

What surprised me was how people became very physically explicit. I pictured them looking up with their eyes, but they were lying down, rolling around and waving. One person brought an inflatable canoe. There were yoga classes that came, and weird poetry cults doing doomsday events. When President Bush visited London some people arranged themselves on the floor to spell "Bush go home" as a protest – to do that in reverse so it read in the mirror is actually pretty difficult. I liked how the whole thing became about connecting your brain and your body. That I did not foresee.⁶³

Reviews of *The Weather Project* invariably mention the words and symbols modeled from human bodies to be viewed in reflection – a mode of engagement generally discouraged in art institutions which became an integral part of the work (Figure 7).

The importance of each element within Eliasson's *dispositif* is recognized and the smallest shift of knowledge or power influences the entire "heterogeneous ensemble." As a result, the importance of the technological apparatuses which produce the visual effects of the installation – in the instance of *The Weather Project*, the lamp, the bulb, the mirrored film, the mist – cannot be overstated as their choice, deployment, intention, and influence establish curves of visibility through and around which a system of

⁶² Dieter Burchhart and Olafur Eliasson, "Wie in Der Pop Art Klaue Ich Direkt Naturphänomene Und Wissenschaftliche Darstellungen," *Kunstforum International* 167 (December 2003): 195. Foucault, *Foucault Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, 195. Dramatic increases in Tate visitor counts during *The Weather Project*, in conjunction with published anecdotal evidence of repeated visits and unusual viewer interaction with the work indicate that Eliasson was successful in significantly shifting the *dispositif*.

⁶³ Olafur Eliasson quoted in Tim Jonze, "How We Made Olafur Eliasson's The Weather Project," *The Guardian*, October 2, 2018, <https://www.theguardian.com/artanddesign/2018/oct/02/how-we-made-olafur-eliasson-the-weather-project>.

relations is established. Given the astronomical number of variables, each *dispositif* is necessarily unique, however it is worth establishing that, even in comparison to other works of immersive installation art that employ the elements of light and space, Eliasson's foregrounding of the technological apparatus substantiates the lamp as central to his intention for a viewer's negotiation of the work.

Room for one colour Made by Lots of Lights

Eliasson's work emphasizes the centrality of the viewer's perception and attempts to merge what he describes as the representational and the real. Pressed on this by curator Daniel Birnbaum, Eliasson agreed with a comparison to Brecht's *Verfremdungseffekt*, that the revelation of the machine reminds the viewer of the situation, elaborating that "I think there's a subliminal border where suddenly your representational and your real position merge, and you see where you 'really' are, your own position."⁶⁴ This is a claim that Eliasson has staked since early in his career – it is presented in various psychological and phenomenological forms throughout his extensive catalogs. However, the complex manner in which Eliasson incorporates self-reflection on specific political issues, such as global warming, into his *dispositif* transcends the theatrical framing of Brecht's *Verfremdungseffekt*.

Eliasson repeats his insistence on the viewer as physically and psychologically present, he discusses the centrality of the viewer's perception of themselves and their relation to the work he created in most interviews. For example, in a discussion of *Room for one colour* (1997) as shown at the 2003 Venice Biennale, Eliasson is asked why the room doesn't contain anything for the viewer to look at. He answers:

You are in there. You can look at your hands...if somebody else walks in you not only look at them, but you also realize very quickly that they are looking at you. In a normal space, we don't think about who is looking at what and why are we looking, so it raises

⁶⁴ Olafur Eliasson in *Pressplay : Contemporary Artists in Conversation*, 178.

these questions.⁶⁵

This explanation is completely plausible. *Room for one colour* is a seemingly straightforward work: a series of high intensity Low Pressure Sodium (LPS) mono-frequency lights installed on the ceiling of an empty space (Figures 8-10). Viewers who are paying attention notice that the bright yellow light in the room drains the color from any other object or presence, an effect that is desirable in certain situations, such as highways at night, which is where LPS is most often used. The specific wavelength of the mono-frequency light (589nm) falls very close to the peak receptivity of retinal foveal rods (575nm) – resulting in highly accurate visual focus; Eliasson describes this effect as “seeing more,” or “hyper-seeing.”⁶⁶ He describes the work as also shifting the viewer between reality and representation: as the yellow light frames the space, making it more like a representational picture it also creates a situation of heightened visual perception and self-awareness as present in a real experience.⁶⁷ The dichotomy between, and realization of, these positions is what Eliasson is driving at.

There is a playful receptivity that happens when experiencing Eliasson's *Room for one colour*: viewers move in and out of the space, interact with each other, and invariably look toward the lamps on the ceiling before “trying to find color” once again.⁶⁸ In a 2017 video produced by the British National Gallery, the effusive comments of viewers describe the experience as “...walking into a black and white movie but with orange light” and “...found myself in a black and white world where anything could have happened, because it was not...real.” Even critics combine terms such as “funhouse,” “magic,” and “weird” to describe installations of *Room for one colour* (1997), thereby acknowledging that the

⁶⁵ Brian Cathcart, “Captain Spectacular,” *Tate Magazine*, no. 7 (October 1, 2003): 62.

⁶⁶ Cathcart, 62.

⁶⁷ Olafur Eliasson, Jessica Morgan, and Lars Lerup, *Olafur Eliasson: Your Only Real Thing Is Time* (Ostfildern-Ruit: Hatje Cantz Verlag, 2001), 20.

⁶⁸ “Olafur Eliasson's 'Room for One Colour' - Monochrome Painting in Black and White,” The National Gallery, accessed 20 June 2019, <https://www.youtube.com/watch?v=hd077pa-5Cl>.

decontextualized yet understandable light is approached from a pleasurable position of curiosity, rather than that of formalist criticality.

Despite being in an enclosed space, *Room for one color* is anything but contained. The light spills out into neighboring spaces, impacting the visual perception of any light-based (or other media based) works that might be too close. Similarly, the strong yellow light causes violet-blue afterimages on the retinas of departing viewers as their fatigued red and green photoreceptor cells are perceptually overpowered by the underutilized blue cones. Rather than have a specifically shaped afterimage, viewers experience a “bluing” of vision for moments after leaving *Room for one colour*, a visual reminder of the perceptual, rather than objective basis of color. The work literally changes what the viewer sees for a short period and with this in mind, Eliasson often places the work in an unavoidable transitional gallery (Figures 11-13), insuring that viewers will experience altered color vision in the next space. “I like to show such a room [speaking of *Room for one colour*] lit with mono-frequency at the beginning of an exhibition in order to lead users to the principles of construction of their eyesight.”⁶⁹

With such central placement, particularly in solo exhibitions, *Room for one colour* also impacts the customary flow of viewers: many stop, return, or on occasion step into and out of the space multiple times in an effort to fully appreciate the effects. The exposed lamps create a *Verfremdungseffekt*, because understanding the source and basic mechanics of altered visual perception challenges any magical or illusory effects which *Room for one colour* might produce, and encourages inquiry on the part of the viewer.⁷⁰ Installed in the first room of *Take Your Time* (2007) at the SFMoMA, visitors stepped off the elevator to find

a blinding yellow light that rendered everything a variation on the bumblebee, save the haunting purple afterimages. As with too much of a good thing, the immediate 'wow' factor was quickly surpassed by physical discomfort ranging from dimensional distortion

⁶⁹ Bessing, “Olafur Eliasson: Experiencing Space.”

⁷⁰ “Short Description of a New Technique of Acting That Produces a Verfremdung Effect,” 1940 in Brecht, *Brecht on Theatre*, 211.

to nausea.⁷¹

During the New York MoMA iteration of *Take Your Time* (2008), the work was installed at the landing of the third floor escalators, allowing viewers to rise into or fall away from duotone (see Figures 11-13 for exhibition plans that show placement of *Room for one colour*). As with many of Eliasson's works, there is conversation within and around *Room for one colour*: it is an unusual and exciting work, displayed without overt explanation of expectations or effects - which seem to be most often noticed not in relation to the self, but rather through changes in one's visual perception of others. Installed in the central hallway of the south wing of *Take Your Time* at the Chicago MCA (2009), the work was revisited by necessity, as viewers crossed from one gallery to another, but also in curiosity and with a spirit of experimentation by viewers who appeared to ponder the mechanics of the piece.⁷² Of course, if one looked up, the apparatus of the work was revealed.

A One-Color Apparatus

Reviews of Eliasson's exhibitions and installations seldom fail to mention the obvious technology of production which is visually available. With the same regularity as the idea of "seeing yourself seeing" authors mention the "obvious machinery," the "revealed secret," or the "shattering of illusion." Writing for the catalog of Eliasson's solo show at the Kunsthalle Basel in 2000, Jonathan Crary asserted that

Eliasson does not engage in any concealment or mystification of how specific effects are fabricated...[his] pieces are resolutely transparent in their exposure of the usually simple and straightforward functioning of the machine components. Thus while there is this distinctly de-mystifying character to the practical and mundane concreteness of these elements, it is paradoxically at odds with the highly evanescent and even sublime effects

⁷¹ Laura Richard Janku, "Olafur Eliasson: Impresario of the Senses," *Sculpture* 27, no. 1 (February 2008): 39. This seems to be the only mention of physical discomfort caused by *Room for one colour*. No other reviewers mention nausea, although distortion of visual perception is a common theme.

⁷² As a registrar intern at the MCA during the 2009 *Take Your Time* exhibition I spent an inordinate amount of time both with the works and observing the behavior of visitors. *Room for one colour* consistently engendered conversation, repeat visitation, and experimental actions such as holding a limb half-in half-out of the light, moving quickly/slowly through it, or finding objects of various colors/patterns and bringing them into the space.

that these elements produce.⁷³

Room for one colour is paradigmatic of this description – the yellow light is sublime in the fearfully overwhelming manner evoked by Edmund Burke as it changes visual perception and eradicates color *and* in the sense of the technological sublime of human achievement (more on this later); yet its source is mundane, a row of familiar and innocuous looking tubes and ballasts mounted to the ceiling.⁷⁴ It seems a contradiction, *Room for one colour* is a perfect example of Eliasson/Foucault/Agamben's *dispositif* - it exists through perception and interaction, it activates the gallery spatially, impacts the experience of the viewer and the appearance of other works, it is indeterminate, yet defined by a very concrete label: "monofrequency lamps."

But what about those lamps? The initial lines of visibility and enunciation of Eliasson's installations are scripted from the museological, phenomenological, sculptural, and especially viewer's standpoints, yet no one writes more than a sentence about the lamps. Only brief acknowledgments of their conspicuousness, importance, and illusion-shattering effects ever appear. Examples include:

...he [Eliasson] often pledges his allegiances by playing the card of a faux-Brechtian: all of his scenarios reveal the mechanics of their making – the tripods, motors, extension cords and mist machines.⁷⁵

...the installation [*The Weather Project*] did not fetishize its visual and atmospheric effects, but openly displayed the technological resources that made it possible.⁷⁶

Wanting to avoid what he calls the "Siegfried and Roy effect," Eliasson has no interest in creating illusion, and therefore in most of his works...he makes it clear just how the effects are achieved. When he uses projectors, they are not hidden but placed out in the room. At the Tate [*The Weather Project*] you could walk to the end of the hall and look up behind the sun's plastic to see the lights. Far from detracting from the effect, this

⁷³ Olafur and Crary, *Kunsthalle Basel : Olafur Eliasson*, 63.

⁷⁴ "With regard to light; to make it a cause capable of producing the sublime, it must be attended with some circumstances, besides its bare faculty of shewing other objects...such a light as that of the sun, immediately exerted on the eye, as it overpowers the sense, is a very great idea." Edmund Burke and Adam Phillips, *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful* (Oxford: Oxford University Press, 2008), 73.

⁷⁵ Anja Bock, "Olafur Eliasson: Blurring Spectacle and Critique," *Art Papers* 32, no. 6 (2008): 24.

⁷⁶ Eliasson Olafur, Carles Guerra, and Madeleine Grynsztejn, *Olafur Eliasson : La Naturalesa de Les Coses = La Naturaleza de Las Cosas = the Nature of Things* (Barcelona Girona: Fundació Joan Miró ; Fundació Caixa Girona, 2008), 28.

obvious-ness makes you feel complicit; he shows you something you've never seen before, but there's nothing to figure out.⁷⁷

What is missing from these descriptions is any explicit commentary concerning the specifics of those “technological resources.” What type of projectors does Eliasson utilize? Are they industry specific or custom made? Is the mist machine visible? And if so, is it similar to one that is readily available to any consumer? The specifics of the apparatus – identifications such as brand, common usage, whether or not it is familiar – influence the viewer's perception of the overall work by connecting with previous experience. Commenting on the associations or availability of the technology has the potential to shift the focus away from the uniqueness of Eliasson's installation and instead to create a DIY ethos for the work. For Eliasson this is not productive, as the work itself is the greater *dispositif* anchored by the physical apparatus, and perhaps it is for this reason that his studio is reticent to release specific information concerning brands of lightbulbs and manufacturers of fixtures – instead offering assistance in procuring difficult replacement bulbs or the repair of malfunctioning works.⁷⁸ A consideration of the specific technologies of the work is particularly valuable when considering conservation, curation, and future presentations of the work.

Olafur Eliasson uses identical low pressure sodium vapor bulbs for each installation of *Room for one colour*; until the recent advent of light-emitting diode (LED) technologies, such bulbs were the most efficient way of producing light.⁷⁹ Commercially introduced in 1932 sodium discharge bulbs operate by sending a wired electrical discharge through gas within a double jacketed sealed glass tube – a technology first explored in the 1740s by Jean Antoine Nollet. Subsequent research focused mostly on mercury discharge lamps, with the goal of emitting white light without high-voltage electrical supply. By

⁷⁷ Carol Diehl, “Northern Lights,” *Art in America* 92, no. 9 (October 2004): 113.

⁷⁸ Paolo Stolpmann, Boros Collection Manager, Conversation with Georgina Ruff, September 4, 2014.

⁷⁹ All installations of *Room for one colour* are created with identical bulbs mounted in custom fixtures. Both are shipped directly to installation sites from Studio Eliasson in Berlin. Vajra Spook, “Research Inquiry: Room for One Colour,” March 12, 2019.

the 1920s mercury vapor lamps were in limited use, but demonstrated significant promises of efficiency, especially when paired with cathodes borrowed from radio valves which could supply greater electrical power.⁸⁰ British firms championed research concerning mercury, while the Philips Company, based in Eindhoven (NL), pursued sodium as the discharge gas. With the German company Osram GmbH's innovation of a sodium-resistant glass in 1931 and through joint research between General Electric (US), Philips, and Osram, sodium discharge lamps became commercially feasible and were introduced to the market in 1932.⁸¹ Bulb life and lumens per watt were dramatically higher than their mercury competitors, with the major drawback being that the yellow light emitted by Low Pressure Sodium (LPS) lamps eliminates visible color, rendering surroundings in shades of grey.⁸² Eliasson describes how this greying effect is experienced by viewers of *Room for one colour*:

...as a user, you're given this sort of hyper-vision – from a distance of twenty meters, you can make out a liver spot; everything is immediately recognizable. Since colors are also carriers of information across the dimensions of a room, people positioned far away in a room lit with mono-frequency lamps seem flatter than usual, almost two-dimensional.⁸³

Increased visual acuity is particularly desirable for night-time drivers, however studies of LPS lights are mixed: at lower luminance levels the light increases contrast while diminishing definition, at high luminances (in roadway tunnels or concentrated in art installations) the yellow light is optimal for reception by the cones of the retinal fovea (center of the eye), lessening peripheral reception while increasing frontal fine focus.⁸⁴ Luminance was therefore an important consideration when using LPS for

⁸⁰ Brian Bowers, *Lengthening the Day: A History of Lighting Technology* (New York: Oxford University Press, 1998), 172.

⁸¹ "Low Pressure Sodium Lamp, Type NA-10," Smithsonian National Museum of American History, accessed 7 June 2019, https://americanhistory.si.edu/collections/search/object/nmah_751238. Earlier experimentation at the Westinghouse labs in Pittsburgh, PA had demonstrated that sodium vapor discharge was possible, however sodium gas reacted with conventional soda glass. The answer was a thin coating of aluminoborosilicate glass on the inside of a soda-lime glass tube inside a jacketed vacuum tube. Lumen efficiency was more than four times that of mercury discharge lamps, and bulb life was more than double.

⁸² In Europe and Asia LPS bulbs are referred to as SOX.

⁸³ Bessing, "Olafur Eliasson: Experiencing Space."

⁸⁴ The heightened contrast created by LPS light intensifies perception of moving versus stationary objects, but as levels of any light decrease, scotopic vision dominates, in which the rods of the outer retina are most effective,

roadways, with research recommending a level well within mesopic parameters, meaning that the both the rods and cones of the perceiving eyes would process information and both frontal and peripheral vision would be active.⁸⁵ The luminance of *Room for one colour* varies by installation, but it is consistently bright enough to facilitate frontal visual acuity, as in a roadway tunnel. In contrast, the luminance level of *The Weather Project*, which also used LPS bulbs, was much less, and vision was further altered by Eliasson's use of a fine mist. Viewers of the *The Weather Project* were therefore more successful seeing moving rather than stationary objects, a physiological fact which partially contributed to viewer's location of themselves in the mirrored ceiling via movement. Interactions with *Room for one colour* are generally less gestural and instead center on visual examination of closer objects because the space is bright enough that the red foveal cones receive nearly optimal information in terms of wavelength. LPS light wavelength of 589.3 nanometers is close to the ideal received wavelength of red foveal cones (575 nm).

At correct luminance levels, and despite the lack of color rendering, LPS lamps were a sound choice for economic and effective road lighting. Their effect on color could not be ignored however, and in 1958 a Keeper of the London Science Museum wrote the following derogatory description:

The experts work out economic sums and point to the marvels of sodium and the lesser marvels of mercury. We are told that color is unimportant for the night driver sees an obstacle, human or otherwise, preponderantly in silhouette against the illuminated surface of the road...while it is possible to stretch a point in favour of mercury, as it is not too unlike moonlight for toleration, sodium gives a distressing monochromatic light that has no natural or historical counterpart to persuade us into accepting it. One day we may find that long familiarity has persuaded us at last; but before that time comes it is probable that fluorescent lighting will have made us still less willing to sacrifice colour at night. Meanwhile City Fathers, even in pleasant towns, continue to save their citizens

supporting peripheral vision. Benefits of LPS monochromatic light also include low levels of light pollution, with the ability of astronomers to easily filter any LPS skyglow using a single filter. The almost singular wavelength of LPS light is also less easily dispersed (as through a prism), minimizing the impact of fog or rain on retinal perception. "Spectral Properties of the Sodium Discharge," Lamptech, accessed 2 May 2019, <http://www.lamptech.co.uk/Documents/SO%20Spectral.htm>.

⁸⁵ S Fotios and R Gibbons, "Road Lighting Research for Drivers and Pedestrians: The Basis of Luminance and Illuminance Recommendations," *Lighting Research and Technology* 50 (2018): 156. The level recommended in this study is .5 Horizontal Foot Candles (HFC). Mesopic vision employs both rods and cones.

a penny in the pound at the price of illumination jaundice after dark, and to present their historical buildings in shapes and colours that the architect never intended.⁸⁶

O'Dea's objection to the yellow (jaundiced) color of LPS is important to consider - it is a specific color of illumination associated with a particular situation. LPS bulbs, and later their High Pressure Sodium (HPS) successors, became standard major artery street lighting for most of Europe and parts of the United States, suspended above roadways and parking areas at an average height of 30 feet.⁸⁷

The commonly cited reason for such wide use is economic – LPS was the most cost-efficient lighting option almost immediately upon introduction, and as European cities rebuilt and re-illuminated after WWII LPS fit into tight budgets. In post WWII East Berlin, LPS lights were installed on high, widely spaced lampposts to maximize their efficiency and minimize the cost. In West Berlin, Mayor Ernst Reuter chose fluorescent, xenon, and mercury halide lights in stark contrast to the jaundiced glow of the east. The bright white “promising glow” of West Berlin was intentional and clearly visible (the Berlin Wall was not built until 1961) and for those who inhabited the divided city prosperity and freedom were symbolized by the costly bright white illumination of streets themselves.⁸⁸

Eliasson's current studio on Christinenstraße is well within what was once the monochromatically flattened nightscape of East Berlin. Despite the slow replacement of LPS by LEDs in the city, the unique golden yellow glow is still prevalent in what was once the East, to the extent that it remains a visual reminder of the division when viewed from space (Figure 14).⁸⁹ For Berliners, particularly those who lived through the city divided, or like Eliasson, those who moved to the city

⁸⁶ William T. O'Dea, *The Social History of Lighting* (London: Routledge and Kegan Paul, 1958), 176.

⁸⁷ Heights vary with wattage and range from 12 to 120 feet. LPS lights emit light at an average of 589.3 nanometers. High pressure sodium bulbs emit light between 500 and 700 nm, across the green to red visual spectrum, with the greatest concentration around the yellow-orange (600nm) mark. As a result, HPS bulbs allow the human eye to recognize some colors in comparison to LPS and appear a lighter, less intense yellow in color.

⁸⁸ Neumann, “Berlin,” in *Cities of Light*, 70. After the construction of the Berlin Wall, the white glow of West Berlin was still visible in the night-time sky, especially on cloudy/foggy nights. The 43,000 LPS lights of East Berlin are now slowly being replaced with LEDs, and although the backlash is not as passionate as that concerning (West) Berlin's replacement of gas lights, there are those who argue for their retainment.

⁸⁹ Eliasson's first studio in Berlin was next to the Hamburger Bahnhof Contemporary Art Museum, also within the old East side of the city, but adjacent to the location of the Wall.

shortly after its reunification, such unmistakable markers of the differentiation between East and West were commonplace. In interviews Eliasson acknowledges the influence of his Danish and Icelandic upbringing and the accessibility and opportunities afforded by Berlin.

You can arrive in Berlin, open up a club, a little hotel, or a publishing company within a week...many young artists open a gallery for a couple of months...the discussion is not commercially driven, it is linked to the academies, the universities, the subcultural activities.⁹⁰

The choice to open a studio in former East Berlin in 1995, only five years after the reunification, was economically motivated, Eliasson admits. Berlin was struggling with economic growth in 1995: unemployment was high, rents were low, and the city was not yet committed to a coherent plan of reconstruction. The substandard infrastructure of the former East side required massive investment – in basics such as phone lines and gas lines – street lighting was not a primary concern, and as a result the nighttime differentiation between east and west remained until well into the 2010s. Eliasson has never been explicit about the link between the East Berlin nightscape and *Room for one colour*, although he often refers to the “efficient” nature of the LPS light and its common use for road lighting.⁹¹

Even for those accustomed to LPS light, the bulb itself is a foreign technology usually placed at considerable distance and obscured by a lamp enclosure – street light height can vary from 9 to 120 feet depending upon the type of luminaire and power (Figure 15). If apprehended by a viewer, as in *Room for one colour*, the bulb might be mistaken at first glance for a muscular version of a quotidian fluorescent, but for those who persist in staring into the light, the differences are quickly obvious. Straight fluorescent fixtures incorporate a ballast, usually contained in the rectangular box behind the cylindrical bulb which is connected at both ends. This bulb contains an inert gas such as argon and a small amount of liquid mercury, which is vaporized as the bulb warms and then conducts the arc of electricity from one end to the other emitting a UV spectrum light within the tube. The UV light is converted to visible

⁹⁰ Bruce Millar, “The Sun King - Interview,” *The Times*, March 20, 2004, sec. Times Magazine.

⁹¹ Bessing, “Olafur Eliasson: Experiencing Space.”

spectrum by a triphosphate powder coating on the interior of the glass: the coating makes the interior of the bulb invisible while making the electromagnetic emissions (light) visible to the human eye (Figure 16). In contrast to LPS, fluorescent lamps can emit light of almost any wavelength on the visual (and UV and infrared) spectrum based upon the powder coating lining the inside of the glass tube.⁹² Different in configuration, the clear cylindrical LPS bulb is most often connected only at one end, as the interior tube is commonly bent back on itself before being contained by a second jacketing tube. Like fluorescents, the LPS bulbs require “control gear:” a ballast in addition to a capacitor and ignitor which can be obscured in a rectangular backing box or elsewhere, such as at the base of a streetlamp.

In the instance of *Room for one colour*, LPS bulbs are connected to their control gear via a pronounced (dark) wired cap and two lamp supports protrude from the middle of the ceiling mounted box, which extend as belts around the bulb itself. The distance between the bulb and the fixture appears consistently minimal through the many exhibitions of the work, emphasizing the importance of both - either intentionally or pragmatically. The fixtures are then serially wired in grid forms across the ceilings with (what appear to be) white wires.⁹³

Eliasson's choice to pair bulb with control gear must be read as a reference to fluorescents, particularly those of Dan Flavin, whose canonical works with “off the rack” fluorescents also foregrounded the lamp apparatus as integral to the work (Figures 17-18).⁹⁴ Early in his career, Flavin

⁹² There are several types of fluorescent bulbs that are beyond the scope of this comparison - circular bulbs, Compact Fluorescents (CFL), etc.

⁹³ The two notable exceptions to the bulb/fixture formation are at the Neue Galerie in Graz (2000), in which the bulbs hover several inches below the ballast, still secured by two “belts,” and at the 2003 Danish Pavilion installation at the Venice Biennale. In the latter instance the control gear for the bulbs is mounted on the walls and the bulbs span a high wall opening. It is my conjecture that this configuration was chosen to illuminate the short entry hallway from which one must turn into the larger space and to insure light leakage through the doorway into the neighboring room.

⁹⁴ The Nominal Three is regarded by Joseph Kosuth (who owns the work) as the end of modernism and the crucial bridge between the readymades of Duchamp and 60's art. Joseph Kosuth, quoted in J. Fiona Rageb, ed., *Dan Flavin: Architecture of Light* (Guggenheim Museum Publications, 2000), 18.

described what he had found with his first fluorescent work (*the diagonal of May 25, 1963*), rendered by an eight foot fluorescent apparatus (with a gold bulb) from the local hardware store:

The radiant tube and the shadow cast by its pan seemed ironic enough to hold on alone. There was no need to compose this lamp in place; it implanted itself directly, dynamically, dramatically on my workroom wall - a buoyant and relentless gaseous image which, through brilliance, betrayed its physical presence into approximate invisibility....Now the entire interior spatial container and its parts - wall, floor and ceiling, could support this strip of light but would not restrict its act of light except to enfold it.⁹⁵

The pan Flavin refers to is the ballast-containing fixture, necessary for the function of the bulb – and for the shadow it cast – and Flavin would continue to exclusively use such commercially available apparatuses for the rest of his career.⁹⁶ Summarizing “the most interesting artists currently using light” in 1967, critic Elizabeth C. Baker emphasized that the presence of the light source concretized Flavin’s works as art objects rather than ephemeral or experimental “light research.” The untransformed fixtures and tubes have “multiple existence[s] – as objects, as light and as line” states Baker, emphasizing the centrality of the fluorescent bulb as visual focus.⁹⁷

Flavin's wall-mounted fluorescents and their reference to more traditional wall-hung media differs from Eliasson's overhead deployment of the apparatus. In placing the LPS bulbs on the ceiling, albeit in dense formations, Eliasson’s work does not appropriate the bulb and fixture as a sculptural medium, nor does *Room for one colour* read as an art object. *Room for one colour* fulfills scholar Claire Bishop’s binary definition of installation art: it is a totality, a sum of space and the elements within that space, and requires the presence of an embodied spectator to be complete.⁹⁸ The work physically changes with each installation; at the Galleri Andreas Brändström (Stockholm, 1997) it was two bulbs

⁹⁵ Dan Flavin, “...In Daylight or Cool White,” *Artforum* 4 (1965): 24.

⁹⁶ One exception to this was a 1992 installation for Chase Manhattan Bank, *untitled (To Tracy Harris, 1992)*, for which Flavin's studio assistant Steve Morse contracted with a local union shop to have stainless steel fixtures produced in exactly the same form as commercially available white counterpart. Carol Macusi-Ungaro, Dan Flavin: Interview with Steve Morse, Artist’s Assistant to Dan Flavin, 1991-96, transcript of video, November 19, 1998, 23.

⁹⁷ Elizabeth Baker, “The Light Brigade,” *Art News* 66 (March 1967): 65.

⁹⁸ Bishop, *Installation Art: A Critical History*, 6.

and fixture in a small room (Figure 19), at the New York MoMA (2008) it was a long column of bulbs in a central hallway (Figure 10), and at the Moderna Museet Malmö (2015) it was a large gallery with four columns of bulbs (Figure 20).

Flavin's non-site-specific works, such as *the diagonal of May 25, 1963*, have been installed identically in various locations, and began as sketches of colored lines symbolizing the angles and configurations of fluorescent tubes (Figure 21). "I know now that I can reiterate any part of my fluorescent light system as adequate...The physical fact of the tube as object in place prevailed whether switched on or off," wrote Flavin in 1966, attesting to his use of the fixtures as medium and "[e]lectric light as just another instrument."⁹⁹ Eliasson approaches each installation of *Room for one colour* differently: the work is conceived primarily as a central space of varying size and shape to be filled with mono-frequency yellow light, lamps are installed to achieve the desired effect.¹⁰⁰ Vajra Spook of the Studio Eliasson Research and Communications Team elaborates that the LPS bulbs used for *Room for one colour* are from a studio stockpile of a particular manufacturer and that the fixtures and control gear are custom made; both the bulbs and fixtures are shipped to a site directly from Studio Eliasson.¹⁰¹

The important similarity between Flavin and Eliasson is their intentional use of either explicitly commercial, or commercially referential lighting apparatuses, exposed to the viewer in such a way that the bulb and fixture are visual parts of the work.¹⁰² Eliasson confirms this:

I have very little interest in the surface of materials. My works are, for the most part, "off the shelf" – material from the hardware store; it's all made very simply. I think it's important that the works are made technically well, that the construction is stable and won't fall apart. The aesthetic considerations of whether a surface should be smooth, colorful, or matte are not interesting to me. The relationship that arises between the users of my works and the object – that's what it's about for me and nothing else.¹⁰³

⁹⁹ Dan Flavin, "Some Remarks...Excerpts from a Spleenish Journal," *Artforum* 5, no. 4 (December 1966): 27.

¹⁰⁰ Jeffrey Weiss, *Dan Flavin: New Light* (New Haven: Yale University Press, 2006), 52.

¹⁰¹ Studio Eliasson declines to identify the manufacturer of the bulbs and maker of custom control gear.

¹⁰² Spook, "Research Inquiry: Room for One Colour," March 12, 2019. Studio Eliasson will not disclose the specific commercial manufacturer of the bulbs.

¹⁰³ Bessing, "Olafur Eliasson: Experiencing Space."

It is a superficial philosophy of artistic practice that echoes Flavin's: "The contents of any hardware store could supply enough exhibition material to satisfy the season's needs of the most prosperous commercial gallery" he wrote.¹⁰⁴ Yet both Flavin and Eliasson attend to the details of their mediums more than these comments suggest, Flavin to the pan of the fluorescent fixture, as previously discussed, and Eliasson to the placement and presentation value of his chosen apparatus. While Eliasson's early works, such as the 1997 installation of *Room for one colour*, used actual "off the rack" fixtures, more recently his Studio's attention to the appearance and custom manufacture of the apparatus which is deployed within the larger *dispositif* indicates that attention is paid to whether a surface is "smooth, colorful, or matte." Whereas Flavin regarded the fixtures as an artistic medium, Eliasson explicitly invokes and challenges the nature-culture dichotomy in his deployment of a complex *dispositif*, within which the apparatus represents the cultural/social, and its' effect the natural. Flavin's fixtures appear as lines of composition in his preparatory sketches, whereas Eliasson's preliminary research takes the form of scientific or philosophical inquiry and the amassing of data, which is then presented as part of the work.¹⁰⁵

Street Lighting

Born in 1967, Eliasson spent his childhood in Copenhagen, Denmark and Iceland, countries with agriculturally based economies which avoided large scale bombing decimation during WWII by declaring themselves neutral.¹⁰⁶ Denmark became an "industrialized" country in the mid-1950s, placing its major

¹⁰⁴ Evelyn Weiss, Dieter Ronte, and Manfred Schneckenburger, eds., *Dan Flavin: Three Installations in Fluorescent Light / Drei Installationen in Fluoreszierendem Licht* (Köln: Kölnischer Verlagsdruckerei GmbH, 1973), 91.

¹⁰⁵ In the instance of *The Weather Project*, the data from questionnaires was published in the catalog. *Your museum primer* (2014) incorporated an app which offered alternate ways to intellectually experience art. Eliasson states that his catalogs are meant to be part of his exhibitions, with the intention of elaborating the manner in which his works "...reach out to a lot of different people and experts and draw on many different areas of knowledge." Mark Godfrey, ed., *Olafur Eliasson In Real Life* (London: Tate Publishing, 2019), 154.

¹⁰⁶ As a result of these declarations, Denmark was occupied by Germany, and Iceland by Great Britain and then the United States. Neither country suffered as a battleground or underwent the systematic destruction of repeated Allied or Axis bombing.

urban planning chronology on par with the reconstruction of the rest of Europe during the late 50s and 1960s, with its nascent economy then crashing into the global energy crisis and economic slump of the 1970s.¹⁰⁷ Despite being the only major city in Iceland, Reykjavik did not have paved roads or an airport until its occupation by the British during WWII; in 1948 a city plan was made which included roadway and housing expansion, which supported the county's 60% population increase between 1940 and 1960. In both Denmark and Iceland, LPS was a natural fit for budget conscious illumination of roads and highways, with the later development of High Pressure Sodium (HPS) lamps offering a more natural light for pedestrian and residential areas. Copenhagen hung HPS lamps throughout the downtown in the 1970s, augmenting the 1960s lighting of major roadways that was, at least in part, accomplished by LPS (Figure 22-23). Growing up between these two countries – with the majority of each year spent in Copenhagen, Eliasson undoubtedly encountered LPS light used as street lighting.

Associations that one might have with the exposed apparatus of *Room for one colour* (1997), such as recognizing the luminary fixture from a particular time, or a connection that one might make between the jaundiced yellow light and a specific place, phenomenologically become part of their experience of the work. This is an influence that has been accepted by scholars and curators such as Chrissie Iles, Dieter Daniels, and Karl Pontus Hultén, in regard to works that utilize archaic visualizing technologies, such as Paul Sharits' films which require 16mm projectors or the cathode ray tube television pieces by Nam June Paik.¹⁰⁸ Both Sharits and Paik centralized their particular technological medium to the extent that it became an unavoidable part of the work; technologies which now, 50 years later, are obsolete and still crucial to viewer's apprehension. These works crucially rely on what media

¹⁰⁷ Ole B. Jensen and IB Jørgensen, "Danish Planning: The Long Shadow of Europe," *Built Environment* 26, no. 1 (2000): 31.

¹⁰⁸ Chrissie Iles, *Into the Light: The Projected Image in American Art 1964-1977* (New York: Harry N. Abrams Inc., 2001); Dieter Daniels, "Strategies of Interactivity," in *Media Art Interaction: The 1980s and 1990s in Germany*, trans. Tom Morrison (Vienna: Springer, 2000), 170–97; Karl G. Pontus Hultén, *The Machine: As Seen at the End of the Mechanical Age* (New York: The Museum of Modern Art, 1968).

scholar Siegfried Zielinski refers to as the “variantology” of media: a theory which acknowledges the use and potentiality of individual variations of media whether or not they conform to a grander “master narrative” of technological development.¹⁰⁹ Variantology expands the diversity of media history to include dead ends, failed experiments, and unique instances. The specific technologies that Eliasson uses transcend the functional goal of illumination and act as a marker to remind the viewer of a moment in socio-technological history – evoking associations with experiences and places which are outside of the realm of art. He refers to this as the viewer’s internal history: “History is not external and objectified in a situation but is inside the spectator. I expect the spectator to bring history or memory or culture with them. I take it for granted that the memory of the spectator is a portion of the project.”¹¹⁰ In the instance of *Room for one colour*, the specific use of LPS bulbs is inextricably related to the history of street lighting and the evolution of safety via illumination during the night, a narrative traced from the resinous pine torches of the Homeric era through the advent of urban gas lighting in the 19th century.¹¹¹

By the mid-1800s, electrical street lighting in the form of arc lamps advanced in fits and starts as cities constructed electrical power stations and lamp-posts, and by 1890 metropolitan British streets were illuminated with approximately 700 arc lamps - US and European cities such as Paris having similar numbers.¹¹² The light of arc lamps originates from the glowing tips of carbon rods - a powerfully bright purplish-white light that was reflected or diffused from a source lamp placed on a tower several hundred feet tall so as not to blind citizens. Even with the construction of such infrastructure, arc lamps

¹⁰⁹ Siegfried Zielinski, *Deep Time of the Media: Toward an Archaeology of Hearing and Seeing by Technical Means*, Electronic Culture--History, Theory, Practice (Cambridge, MA: MIT Press, 2006), 7. This also relates to Marshall McLuhan's assertion that the content of any medium is another medium, with the exception of light which is “pure;” however, this even this purity does not detract from the fact that any (new) medium, as an extension of the human, extends human potential. In the instance of a particular light, such as LPS, this extension is specific, as previously discussed, LPS light extends human potential for night-time vision and as a result, activity. Marshall McLuhan and W. Terrence Gordon, *Understanding Media : The Extensions of Man*, Critical (Corte Madera, CA: Gingko Press, 2003), 7, <http://www.loc.gov/catdir/toc/ecip044/2003012174.html>.

¹¹⁰ Eliasson, Morgan, and Lerup, *Olafur Eliasson: Your Only Real Thing Is Time*, 16.

¹¹¹ For a detailed discussion of the interim 2000 years, see O’Dea, *The Social History of Lighting*, ch IV.

¹¹² Bowers, *Lengthening the Day: A History of Lighting Technology*, 85.

were more economical than gas lamps, and addressed the ultimate goals of night-time safety (both crime and potholes in the road) although not completely, as light in the dark creates darker shadows. Due to the inefficient nature of incandescent lights, arc lighting remained the standard until the advent of high-pressure mercury and the more economical LPS bulb in the 1930s. Lighting the streets of urban areas has greater significance than simple visibility or the important aspects of safety - it is symbolic and powerful, it emphasizes certain aspects (such as landmarks) and demarcates particular areas.¹¹³ Read in this way, late twentieth-century illumination by LPS bulbs indicated that an area considered financial concerns to be secondary only to the safety of its users (it was the budget option) - a shift from the pre-WWII use of the lamps, when such cost-effective cutting edge technology meant that streetlights could be installed over wider areas (and that residents would benefit from the application of new scientific advances).¹¹⁴ Read with this history in mind, the LPS sunset of *The Weather Project* becomes a low-budget alternative to a more expensive and broader spectrum mid-day sun.

Based in the Eindhoven NL since 1891, Philips Company used the formidable research power of its Natuurkundig Laboratorium (NatLab) to develop a commercially available LPS bulb which produced so much light that “they didn’t quite know what to do with it at first.”¹¹⁵

When the sodium lamp was demonstrated for the first time, people didn't quite know what to make of the strange yellow light. It was certainly an efficient light source, but what could you do with it? And then someone took out a pocket-sized train timetable booklet, the sort that was well known for being hard to read. The contrast and legibility were surprisingly good. “That's it, street lighting,” exclaimed Holst [Gilles Holst, NatLab

¹¹³ David Nye in Sandy Isenstadt, Margaret Maile Petty, and Dietrich Neumann, eds., *Cities of Light: Two Centuries of Urban Illumination* (New York: Routledge, 2015), xx. Many histories of urban illumination detail the manner in which lighting was extended into the city from the area around a royal palace, and due to its cost-prohibitive nature this was often only during special occasions.

¹¹⁴ Recent exception to the cost-benefit use of LPS bulbs is in the instance of localities around astronomical observatories, whose primary concern might also be dark skies. Meta-data analyses have concluded that street lighting decreases injurious automobile accidents by an average of 60%, however 10-40% of a locality's total electrical use may be consumed by street lighting, hence economic savings can be considerable. Ghazwan Al-Haji, “The Impact of New Street Lighting Technologies on Traffic Safety,” *Journal of Traffic and Logistics Engineering* 2, no. 3 (September 2014): 202.

¹¹⁵ Wall text, Philips Company Museum, Eindhoven NL.

director]. And that's exactly what it became.¹¹⁶

LPS lights were experimentally installed in 1931 on the Philips and Osram Company campuses and on the road between Beek and Geleen in the Netherlands (1932) (Figure 24). Although early LPS bulbs were effective, several rapid improvements made them much more commercially viable, notably an adaption to alternating current (AC) which also stabilized the bulb's temperature, and a change in bulb shape to adapt to luminaires already in production.¹¹⁷ With these advances, LPS bulbs were first commercially installed in the Scheldt Tunnel in Antwerp (Belgium) in 1933 and thereafter marketed as economical street, tunnel, and parking lamps. Generally, Philips and the German firm Osram GmbH split the European lamp market, with each firm's bulbs available throughout northern Europe.¹¹⁸ Each of the three market leaders manufactured LPS bulbs, and although the two European based firms suffered great losses of facilities and personnel during WWII, by the early 1950s both Philips and Osram had recovered and the period of European reconstruction coincided with further refinements of LPS technologies (Figure 25).¹¹⁹ By the mid-1960s, LPS lamps were used in concert with fluorescent, mercury vapor, and incandescent bulbs for street lighting.

Eliasson grew up and still maintains a main residence in Copenhagen. As a youth, he spent summers with his artist father in Iceland and attended the Royal Danish Academy of Art from 1989-1995: the light and scenery of his Danish and Icelandic youth is often reiterated in his photography and color-based projects. *Room for one colour* was first installed in 1997 at the Galleri Andreas Brändström in Stockholm; for both local viewers and the artist, previous experience of LPS light would primarily have

¹¹⁶ Hendrik Casimir, later leader of NatLab, wall text, Philips Company Museum, Eindhoven NL.

¹¹⁷ "Low Pressure Sodium Lighting Celebrates Its Golden Jubilee," *Lighting News: Philips Information on Products, Applications, Marketing - For Staff Use Only*, 1982, 8, Philips Company Archives.

¹¹⁸ Competitor GE made significant incursions into the European market from its place of dominance in the US. By 1927, GE controlled 97% of the US lamp market. Susan Walsh Sanderson et al., "Lighting Industry: Structure and Technology in the Transition to Solid State," in *Industry Studies* (Annual Conference, Boston MA, 2008), 8.

¹¹⁹ Osram supplied filaments for the British General Electric Company (GEC), a different concern from the American firm General Electric.

been as highway and major street illumination (Figure 19).¹²⁰ As such, the distinctive yellow light connotes safety in the dark, streets, and traffic – a viewer might have only ever have observed such light from within a vehicle or from a distance.¹²¹ In this way, *Room for one colour* displaces and decontextualizes a familiar light while the visual display of the LPS bulbs and control gear presents the viewer with comprehensible yet rapidly obsolescing commercial/industrial lighting technology.¹²² Installing LPS lights, which are normally relegated to outdoor usage, in an indoor gallery space immediately alerts viewers to a subversion of normal boundaries, and the bright yellow light, for some intense enough to cause nausea, acts as omnipresent reminder of this transgression.

The symbolism of color, as John Gage so eloquently detailed, is culturally determined and impossible to generalize: yellow might invoke sunshine, gold, intellect, or in the case of Kandinsky, madness.¹²³ For Charlotte Perkins Gilman, the yellow wallpaper appeared “smouldering and unclean.”¹²⁴ In *Room for one colour*, Goethe’s observations of pure yellow versus matte yellow offer one explanation:

In its highest purity [yellow] always carries with it the nature of brightness, and has a serene, gay, softly exciting character...a strong yellow, as it appears on satin, has a magnificent and noble effect...When a yellow color is communicated to dull and coarse surfaces, such as common cloth, felt, or the like, on which it does not appear with full energy, the disagreeable effect...is apparent. By a slight and scarcely perceptible change, the beautiful impression of fire and gold is transformed into one not undeserving the epithet foul; and the colour of honour [sic] and joy reversed to that of ignominy and

¹²⁰ Stockholm eschewed LPS lamps in the downtown pedestrian and residential zones, utilizing LPS mainly for highway lighting. As of 1990 there were approximately 3000 LPS lamps on the highways around Stockholm, including the E4 which passes directly through the city. The bulbs were replaced by HPS and LED during the 1990s, leaving less than 200 by the year 2000. Veronica Trafikkontoret Administrator, “Angående Ärende SY1908231023BWG [Fråga],” August 27, 2019.

¹²¹ Recent overhead studies of lighting recently undertaken in the UK indicate that LPS lighting most often remains in low density built areas and as street and highway illumination. James D. Hale et al., “Mapping Lightscapes: Spatial Patterning of Artificial Lighting in an Urban Landscape,” *Plos One*, May 6, 2013, <https://doi.org/10.1371/journal.pone.0061460>.

¹²² In the 21st century most cities are replacing LPS (and HPS) with Light Emitting Diodes (LEDs) that offer greater cost benefits and a wider spectrum of visible light. Replacing the lamps within existing luminaires maintains the daytime visual appearance of a streetscape, however the night-time difference is immediately noticeable. For those underneath the streetlight looking up, the pattern of light emission from the lamp might be familiar - rather than a glowing tube, LED light originates from small nodes within the lamp.

¹²³ John Gage, *Color in Art*, World of Art (New York, N.Y.: Thames & Hudson, 2006), 147–58.

¹²⁴ Charlotte Perkins Gilman, “The Yellow Wallpaper,” 1892, <https://www.gutenberg.org/files/1952/1952-h/1952-h.htm>

aversion.¹²⁵

Perhaps it is not the “softly exciting” yellow light which causes occasional nausea, instead it is the sight of the light as absorbed by “coarse surfaces” such as clothing or hair, especially in contrast to the surrounding presentation of bright serenity.¹²⁶ *Room for one colour*’s yellow light is insidious – it evokes personal color associations while simultaneously altering one’s perception of other colors for several moments after leaving its space. Blue-violet ghost images or fluffy spots pulse through the viewer’s visual field as their eyes readjust to full spectrum light. There might be color associations here too, perhaps with the dimensionless blue of Yves Klein, or the dark blue of the evening sky, reinforcing the unusual presence of outside-associated LPS light inside the museum.¹²⁷

The Sublimes of James Turrell and Olafur Eliasson

In contrast to James Turrell, a Light and Space artist well-known for installations in which light materializes from unknown sources or appears to be simply framed by architectural construction, Eliasson's insistence on exposing the mechanics of his works appears un-Romantic. Madeline Grzynstejn explains:

The 'natural' phenomena are always marked as fabricated, and the operations of the sublime are thereby demystified and revealed, as if in a scientific demonstration. Thus Eliasson deliberately interrupts any sense of an unmediated relationship to or transcendental contemplation of 'nature' that would ally his work with the Northern Romantic tradition.¹²⁸

The bulbs and fixtures create a controlled simulation of a natural phenomenon – obviously brought to radiance by the flip of a switch – it’s an emotionless machine that gives minimal insight into the psyche of the artist. Scholar Jonathan Crary explains that rather than produce a transcendent immateriality,

¹²⁵ Johann Wolfgang von Goethe, *Theory of Colors*, (1810) in Charles Harrison, Paul Wood, and Jason Gaiger, eds., *Art in Theory: 1648-1815* (Oxford UK: Blackwell Publishers, 2000), 1085–86.

¹²⁶ See quote from Janku, note 70.

¹²⁷ Yves Klein, “The Evolution of Art Towards the Immaterial,” (1959) in Harrison and Wood, *Art in Theory, 1900-2000: An Anthology of Changing Ideas*, 819.

¹²⁸ Grzynstejn et al., *Olafur Eliasson*, 49.

Eliasson's goal is instead to refocus attention on the transcendental possibilities of embodied reality.¹²⁹

In contrast, Turrell's obfuscation of lamps, fixture, and cords presents viewers with illumination similar to the Romantic light of J.M.W. Turner or the Hudson Valley School – paintings in which human figures are dwarfed and attention is focused on the power and unique qualities of light. Compared in this treatment of technology, Eliasson's works resonate with what Hal Foster describes, through the example of post-modern appropriation art, as “the return of the real,” in which

it can be critical of the screen, even hostile to it, and fascinated by it, almost enamored of it. And sometimes this ambivalence suggests the real; that is, as appropriation art works to expose the illusions of representation, it can poke through the image-screen.¹³⁰

Eliasson's works are obviously critical of the screen of illusionistic representation by their foregrounding of their means of production/technology. In this way they deny the illusion and self-containment that is the goal of Turrell's installations and instead continuously reference the reality of their situation within the museum and contemporary culture.

A comparison of Turrell's *Aten Reign* (2013) and Eliasson's *Weather Project* (2003) captures key differences anchored in each artist's use of the technological apparatus. Both *Aten Reign* and *The Weather Project* were large site-specific museum installations, open for a brief amount of time to largely positive critical and public reception.¹³¹ Both engendered viewer dalliance in an artificially illuminated immersive space and interaction with the architecture and the infrastructure of the museum. Critical accounts and artists' statements emphasize the importance of individual perception and the contingent nature of visual reality, although those concerning Turrell's *Aten Reign* also tend to discuss the sculptural and illusory qualities of Turrell's light, while reviews of Eliasson's *The Weather Project* more

¹²⁹ Eliasson and Crary, *Kunsthalle Basel : Olafur Eliasson*, NP.

¹³⁰ Hal Foster, *The Return of the Real : The Avant-Garde at the End of the Century* (Cambridge, Mass.: MIT Press, 1996), 146.

¹³¹ *Aten Reign* was created for Turrell's 21 June - 25 September 2013 exhibition at the New York Guggenheim and the installation filled the central rotunda. *The Weather Project* was conceived for the Tate Modern in London as part of their Turbine Hall series of exhibitions and was installed from 16 October 2003 - 21 March 2004.

often remark on the enormous scale produced by Eliasson's sun and mirrored ceiling.¹³² Crary attributes this different reading to Turrell's intent to create a dematerialized zone of experience in contrast to Eliasson's focus on materiality:

...where Turrell simulates and creates an immaterial, hyper-real environment that borders on the hallucinogenic, Eliasson is interested more in the way the form of the sculptural object (or situation), and way it is constructed, determine the spectator's experience. By exposing its origins and mechanisms, he refuses to let the artwork be fetishized. By showing us how it is made, he shows us that it is only *nature installed* [sic]. An orange sun at the Tate Modern is not an orange sun in the sky. The aesthetic event resides in the tension between the reality of the image and the model to which it refers.¹³³

Crucially, as described by Crary, it is the exposure of the functional apparatus which facilitates this tension between what Eliasson refers to as the representation and real. As discussed previously, the Low Pressure Sodium (LPS) lights, the screen, the fog machines, and the scaffold and foil mirrored ceiling were all visually accessible to interested viewers of *The Weather Project*, making the fabricated and installed nature of the faux-sun evident. In stark contrast, viewers of *Aten Reign* were hard pressed to identify where light bulbs might be located, as this would interfere with the work's ability to suspend the viewer's connection to time or place and instead focus their attention on the immateriality presented. Art Historian, Claire Bishop, describes this elimination of all objects physically distinguishable from the self as Turrell's effort to "undermine the self-reflexivity of phenomenological perception."¹³⁴ The goal of *Aten Reign* was neither representational nor real: the materiality of light and luminous spatial volume were meant to promote "...a state of meditative contemplation in the communal viewing space."¹³⁵ This

¹³² Ironically, *Aten Reign* is a direct reference to the ancient Egyptian disc of the sun (Aten), while *The Weather Project* does not directly reference the sun at all. This is most likely due to the lengthy evolution of Eliasson's work in response to his investigations of the Tate Turbine Hall and interactions with the staff. In the roundtable discussion published in the center of *The Weather Project* catalog, Eliasson describes his initial intention for the installation as "developing the idea of a weather system," further elaborating that he and his studio are still in the process of mapping opinions about the weather and correlating them with his target relationship between the institution and society. From this discussion, it seems as if the final form of *The Weather Project* was determined later in the artistic process. May, *Olafur Eliasson: The Weather Project*, 93.

¹³³ Anne Colin, "Olafur Eliasson: The Nature of Nature as Artifice," *Art Press* 304 (Spring 2004): 37.

¹³⁴ Bishop, *Installation Art: A Critical History*, 85.

¹³⁵ "James Turrell," *Guggenheim Museum*, accessed 9 March 2019, <http://web.guggenheim.org/exhibitions/turrell/>

explicit refusal to acknowledge external reality is idealistic in a setting such as the Guggenheim rotunda. Whereas smaller and/or more remote Turrell installations (such as his *Skyspaces*) limit access either by scale or location and offer viewers ideal situations for disembodied contemplation without sensory interruption, *Aten Reign* was at the central crossroads of a major museum in the metropolis of New York City during the summer. “Meditative contemplation” was inexorably compromised by the physicality of the crowd and by the, albeit occasionally hushed, echoing conversation within the rotunda. Additionally, as *Aten Reign* was the first piece of a museum-encompassing exhibition, there naturally exists the psychological pressure to see the other works, to move with the crowd of viewers rather than focus only on the light and space of the central rotunda.

The idea of “seeing yourself seeing” which is often quoted in the literature surrounding both Turrell and Eliasson consequently means very different things.¹³⁶ Turrell's goal is to eliminate the perception of all physical presence such that the viewer is disembodied and prone to “wordless thought:” seeing yourself seeing as consciousness. Eliasson's goal is to imbue the viewer with a consciousness of their own perception and perceptual influences by exposing the physicality and illusion of their experience: seeing yourself seeing as a body in culture. Turrell's study of the psychology of perception began in the late 1960s during his experience with the LACMA Art and Technology initiative, during which he and Robert Irwin performed numerous visual and audio experiments in the UCLA anechoic chamber. They tested Ganzfelds – fields of perceptible light without any texture or borders in which the human eye has no edges to perceive. Exposed to such an environment for a prolonged period, the brain produces unusual visual effects and/or hallucinations. For Turrell's lightbulbs to show would not only break the sensory phenomenon, it would be counter to the timelessness one experiences in a

¹³⁶ Curator Annelie Lütgens attests specifically to the frequent use of the phrase “seeing yourself seeing” by both Turrell and Eliasson. Annelie Lütgens, “Twentieth Century Light and Space Art,” in Eliasson, Tuyl, and Broeker, *Olafur Eliasson : Your Lighthouse*, 37. Some additional examples include: Eliasson, Morgan, and Lerup, *Olafur Eliasson: Your Only Real Thing Is Time*, 20. James Turrell, interviewed by Alison Sarah Jacques in *James Turrell: Perceptual Cells* (Hatje Cantz, 1992), np.

Ganzfeld. If Eliasson did not make the physical apparatus of *The Weather Project* obvious, the intriguing sunset would appear primarily mystical, rather than technological, shifting the viewer's experience from self-reflexive to transcendental.

In *The Analytic of the Sublime*, Kant described the sublime as “boundless” in contrast to the beautiful which is clear and concise.¹³⁷ This boundlessness transcends the concept of the open ocean or clear night sky and refers to the human inability to conceptualize the infinite. The true comprehension of the sublime can then only occur, posits Philip Shaw, “...precisely in the setting of rather than overcoming of, limits.”¹³⁸ There is a framing necessary for the recognition of Kant's sublime which circumscribes that which is limited in order to recognize that which is without limit. A paradigmatic example of this in visual art is the work of Caspar David Friedrich, in whose works a human figure or architectural feature provides the necessary frame for reason to contrast the limitless sublime depicted by the looming mountains, stormy sea or ominous sunset. *Aten Reign* invited viewers to recline in the familiar ground level of the Guggenheim rotunda while looking up to apprehend fields of slowly changing colors which filled one's field of vision. Crucially, any other perspective was denied by the construction of the suspended tower. Viewers could see either each other against a colored backdrop or the elliptical tunnel of light rising to the (scrimmed) natural light oculus: the limited, or above, the limitless. This positioning, with one's body (and those of other viewers) outside one's field of vision pressed consciousness outwards, toward illuminated space absent a frame of external or bodily reference.

Jacques Derrida expanded the Kantian sublime in *Truth in Painting* to be a double function that both attempts to signify in a limited manner that which is too large for the comprehension of human reason, while simultaneously being that very boundless thing in itself.¹³⁹ For Derrida, the sublime

¹³⁷ Immanuel Kant in Philip Shaw, *The Sublime* (London: Routledge, 2006), 117.

¹³⁸ Kant, 118.

¹³⁹ Kant, 119.

becomes dependent upon human reason/imagination/cognition, which has two functions, those of apprehension and comprehension: the first of these can enter into the infinite without difficulty, and the latter quickly reaches its maximum capacity and uses this “amount” as its unit of basic measure.¹⁴⁰

The sublime is at the juncture of reason and infinity, with a foot on each side of the threshold, allowing the contemplation of the infinite while providing a measure to which reason can relate. This reads very similarly to Kant's original concept of the sublime, until Derrida's final synthesis, in which he argues that, because it is constructed on the innate contradiction of sensible and suprasensible, “the Kantian sense of the beyond is therefore an illusion, the by-product of a philosophical system.”¹⁴¹ Which leaves us with a concept of the sublime that realizes that the infinite subject of contemplation is a construct of human reason, a philosophical premise which potentially gives rise to an internal dialog concerning the sublime nature of the human mind.

The reclining viewer of *Aten Reign*, surrounded by the familiarity of an art installation in an art institution, is not overwhelmed in the Burkian sense of a terrifying or blinding sublime, but is conscious of apprehending that which intentionally appears infinite to invoke a particular perception. Turrell describes this goal as the alpha state, a direct connection between his early experiments with Robert Irwin and Dr. Ed Wortz during the LACMA Art and Technology initiative.¹⁴² In the alpha state, the relaxed, but focused, mind of the subject enhances the sharpness and brilliance of vision, which allows

¹⁴⁰ Jacques Derrida, *The Truth in Painting* (Chicago: University of Chicago Press, 1987), 140.

¹⁴¹ Shaw, *The Sublime*, 117.

¹⁴² An alpha state is that in which the subject is relaxed, yet focused, and brainwaves are measured mostly at 8-14 cycles per second. These are the brainwaves associated with meditation, and prolonged production can incur other effects such as the sensation of floating, the illusion of visual light, and the compression of time. Dr. Wortz designed an alpha state training device, a small light attached to a pair of glasses which illuminated only when the brainwaves of the subject indicated an alpha state. Both Irwin and Turrell used the device successfully and continued with other alpha state experiments with Wortz. Maurice Tuchman, *A Report on the Art and Technology Program of the Los Angeles County Museum of Art, 1967-1971* (Los Angeles,: Los Angeles County Museum of Art, 1971), 137–38.

the morphing colors and alternating flatness and depth of the observed light-space to be plumbed for non-existent visual concretion.

At least while the viewer's attention was directed upward, *Aten Reign* offered a sublime tunnel of light without apparent end. This effect was well described by poet Frances Richard, in her 2001 analysis of Turrell's relation with the Sublime:

Turrell's exchange of paint for light makes literal this layered metaphor about enlightenment. His structured lightscapes infiltrate the body synaesthetically and redistribute the privileged function of sight toward the groping extremities-muscles are seduced to feel color, the eyes to touch shape. Such sublimity still depends, however, on the premise of restricted boundlessness. With tactile and optical functions blurred and the logical mind outwitted, Turrell's viewer slips through a radiant aperture into unbounded dissolution. But, despite its implication of enormity, Turrell's materialized light is not (as paint is not) coterminous with the world at large. It is not formless. Its framed shape holds the viewer in the gallery on a temporarily suspended but nevertheless reliable continuum with regular existence.¹⁴³

Turrell's is a contemporary sublime based on recognition: of the viewing situation, of the phenomena as such, of the self as the center of cognitive sight and light as the material; what Georges Didi-Huberman described as "a light clarifying nothing, presenting itself as visual substance."¹⁴⁴ It is the avant-garde sublime of Lyotard: an expected "intensification of [the art-lover's] conceptual and emotional capacity...associated with ontological dislocation. The art-object no longer bends itself to models, but tries to present the fact that there is an unrepresentable."¹⁴⁵ The lights and scrims of *Aten Reign* are not the work at all, as both Turrell and Lyotard assert; the work occurs in the perception of the viewer, as they apprehend that which is visually expanding, while cognitively appreciating that it is a situation emulating the visual infinite:

In my work there's not one thing that's been made - you determine the reality you see. The work is a product of my vision, but it's about *your* seeing. The poles of the realm in

¹⁴³ Tracey R. Bashkoff et al., *On the Sublime : Mark Rothko, Yves Klein, James Turrell* (New York: Guggenheim Museum Publications, 2001), 92.

¹⁴⁴ Georges Didi-Huberman quoted in Jeffery L. Kosky, "Contemplative Recovery: The Artwork of James Turrell," *Crosscurrents* 63, no. 1 (March 2013): 51, <https://doi.org/10.1111/cros.12012>.

¹⁴⁵ Jean-François Lyotard, "L'Inhumain/The Inhuman," in Simon Morley, ed., *The Sublime*, Documents of Contemporary Art (Boston: MIT Press, 2010), 36.

which I operate are the physical limitations of human vision and the learned limits of perception...¹⁴⁶

Whereas Turrell creates the sublime, Eliasson the “technological sublime.” For Olafur Eliasson, seeing oneself seeing is not achieved by the contemplation of the infinite via an independent eye/cognition, instead this sublimity is denied by his works' reliance on engagement, explication, embodiment, even community. Scholar Mieke Bal convincingly denies the connection between Eliasson and the (classical) sublime on each of these points in her essay for the 2009 *Take your Time* catalog.

His art, by complicating ideological engagements with nature that rest on the boundary between humanity and nature, resists contemporary misreadings of Kant that turn the experience of the sublime into a feature of the object.¹⁴⁷

What Eliasson offers viewers is the experience of the “technological sublime” – a term crafted by David E. Nye to convey the power of mechanical/industrial/engineering advancements to provide a sublime concept (rather than a sublime vision) of humanity's mastery of the natural world: of that which could be threatening to our very existence were it not capably controlled.¹⁴⁸ The technological sublime has roots in Burke and Kant's idea of the sublime as terrifying, and reconciles these origins with the developments of industrialization – which resulted in the powerful forces once produced only by the natural world being technologically replicated, harnessed, explained, and outshone by railroads, factories, architectural innovation, and the drama of electric illumination. “On every hand man [sic] is displaying titanic powers,” wrote professor Leo Marx, referencing a 1846 account of a steamboat, “[t]o look at a steamboat in other words, is to see the sublime progress of the race.”¹⁴⁹ The power of the

¹⁴⁶ James Turrell, quoted in Patricia Failing, “James Turrell's New Light on the Universe,” *ARTNews* 84, no. 4 (April 1985): 71.

¹⁴⁷ Eliasson et al., *Take Your Time : Olafur Eliasson*, 164.

¹⁴⁸ David Nye provides a concise lineage of the concept of the technological sublime, beginning with Perry Miller's Pulitzer Prize winner trilogy on the history of American thought from the Revolutionary to Civil Wars: *The Life of the Mind in America* (1965). Leo Marx (*The Machine in the Garden*, 1964) deploys the term in a similar manner, but neither author presents a concrete definition. Nye's *The American Technological Sublime* (1994) does so, and offers specific subsets such as the Nuclear Sublime, the Electrical Sublime, Industrial Sublime, etc.

¹⁴⁹ Leo Marx, *The Machine in the Garden; Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964), 196–97.

technology to move faster and farther with a heavier load combined with the fact that such a mechanical marvel is the result of the human ingenuity: this is the technological sublime.

By exposing the mechanics of *The Weather Project*, Eliasson invites viewers to cognitively engage, rather than relax into, visual experience, a maneuver which has been theorized to cause recognition of the act of perception, and which foregrounds the cause and effect relationship of the many lamps + fog machine + mirrors = un-natural sun(set). It is again a Brechtian move – to deny the viewer an opportunity to become absorbed and complacent, and as Curator Susan May argues, in recognizing the staging of a work, the viewer also becomes conscious of the act of perception.¹⁵⁰ A similar point is made by MCA Chicago Director Madeline Grynsztejn, who describes the manner in which Eliasson evokes and simultaneously interrupts the Romantic sublime, by creating works rooted in traditionally sublime natural phenomena, which are then

...always marked as fabricated, and the operations of the sublime are therefore demystified and revealed, as if in a scientific demonstration. Thus Eliasson deliberately interrupts any sense of an unmediated relationship to or transcendental contemplation of 'nature' that would ally his work with the Northern Romantic tradition.¹⁵¹

While the initial visual effect of *The Weather Project* was immersive, expansive, and perhaps evocative of the Romantic sublime, by presenting the causes of the visual conditions Eliasson shifted the emphasis from the effect to the relations between the viewers, the apparatuses, and the Turbine Hall. These were precisely Eliasson's expressed intentions:

I believe that in order to achieve a challenging engagement with art that avoids the manipulation of the viewer, every part of the construction behind the presentation of art must be made a transparent part of that presentation. Thus art can achieve its social function and make visible the relationship with time with which it is engaged: to be of time rather than in time. An exhibition cannot stand outside its social context and we have a responsibility to understand that we are a part of what we are evaluating as well as the result of it.¹⁵²

¹⁵⁰ Susan May, "Meteorologica," in May, *Olafur Eliasson: The Weather Project*, 17.

¹⁵¹ Grynsztejn et al., *Olafur Eliasson*, 49.

¹⁵² Olafur Eliasson, "Museums are Radical," in May, *Olafur Eliasson: The Weather Project*, 138.

The Weather Project captured the sun within architecture, replicated it by technology, and presented it to viewers in much the same way that Eliasson's *Waterfall* works dislocate a potentially sublime natural phenomenon, reconfigure, and re-present it as a product of visible and obvious human-made apparatus (Figure 26).

In his engagement with, and replication of, natural phenomena often described as “beautiful” – sunsets, waterfalls, rainbows – Eliasson's works oblige a comparison to the qualities of Kantian Beauty: that independent aesthetic judgement founded upon taste rather than reason.¹⁵³ *Beauty* (1993), an installation of water, sprinkler, pump, spotlight, and drain in a darkened room produces a subjective rainbow effect depending upon the viewer's location, and the very title acknowledges Eliasson's recognition of the Kantian connection (Figure 27, 28). Yet *Beauty*, like *The Weather Project* and *Room for one colour*, incorporates the physical technology of its production as part of its visual presentation, thereby engaging logic and reason in a manner that shifts the emphasis of the work from the aesthetic to the deductive. A viewer might very well own a sprinkler system, and that identification with the apparatus transcends the boundaries between the self and the work (for Kant, the individual and that which is judged to be beautiful). The recognition of potential agency, of being humanly capable of constructing the apparatus to create a rainbow – previously the domain of the natural world – is a characteristic of technological sublime, and perhaps also a burden of industrialized society.

Beauty allows a momentary appreciation of the Kantian beautiful before presenting the viewer with a larger *dispositif*, one which creates

...a loose and differentiated collectivity of individuals defined not by a common interest or essential feature, but simply by a copresence in a ‘constructed situation’ designed (in part) to generate provisional but compelling social bonds.¹⁵⁴

¹⁵³ Immanuel Kant, *Critique of Judgement*, trans. Werner Pluhar (Indianapolis, IN: Hackett Publishing Company, 1987). In particular, §32-38.

¹⁵⁴ Grynsztejn, “(Y)our Entanglements: Olafur Eliasson, the Museum, and Consumer Culture,” in Eliasson et al., *Take Your Time : Olafur Eliasson*, 19.

In this cognizance of one's role within the social structure, as one of many viewers of a rainbow and member of a society capable of technologically recreating that which was once the sole purview of nature, there might then be a sense of loss for that Kantian beautiful.¹⁵⁵

Similarly, there was no unknown to contemplate in the Tate Turbine Hall, technology was celebrated in an atmosphere occasionally as raucous as a rock concert.¹⁵⁶ Anna Colin's contemporary critique of *The Weather Project* described the work as "nature installed," the transformation of the Turbine Hall into the site of an endless sunset celebrated the distinction between natural and artificial, creating a new sensory experience, a key characteristic of Nye's technological-electrical sublime. Furthermore, *The Weather Project* provided an electrically sublime experience at the viewer's convenience and in the manner designed by Eliasson, in contrast to the unexpected, unpredictable, and perhaps discomforting romantic sublime in an anthropocentric manner described by Nye:

Whereas Kant had expected the individual to draw the correct transcendental conclusion from a sublime encounter with nature, the electrical sublime produced awe on demand and ensured it would be understood within the interpretive framework of the impresario.¹⁵⁷

Describing Eliasson and his team as the "impresario" emphasizes the greater scope of the *dispositif* of *The Weather Project*, it was not a single work of lights and smoke to be installed, but a production to be organized.

Created by the obvious deployment of electrical lighting, the electrical sublime has the contradictory power to both dematerialize and highlight the surrounding environment. Both phenomena occurred in the Turbine Hall, as the dim and foggy micro-climate seemingly stretched the space, elongating the vanishing point away from the entrance, emphasizing the horizontality of the

¹⁵⁵ Kant asserted that the beautiful must be universally agreed upon, which differentiates it from that which is "agreeable." In *Beauty* the comparison of these terms is played out through the juxtaposition of the beautiful rainbow with the totality of the work, which is less universal in terms of appreciation, and hence, for those who do care for it, would be thought of as "agreeable." Kant, *Critique of Judgement*. §7

¹⁵⁶ Cynthia Zarin, "Seeing Things: The Art of Olafur Eliasson," *The New Yorker*, November 13, 2006, NP, <https://www.newyorker.com/magazine/2006/11/13/seeing-things-2>.

¹⁵⁷ Nye, *American Technological Sublime*, 152–53.

architecture while simultaneously obscuring its dimensions (Figure 29). From the entrance viewers could not see the light fixture(s) producing the glowing orange sun facing them, but comprehension of the work based on prior experience could be assumed, given the ubiquitous nature of electrical lighting, particularly the LPS bulbs used for both *The Weather Project* and street illumination (Figure 30). When, during the course of one's interaction with the work, a thought concerning mechanics occurred, curiosity was easily assuaged by walking close to the "sun" and looking up – the hundreds of lights and overlaying scrim were observable from the ground floor as were the entry points of mist on each side of the hall (Figure 31). The phenomenon of electrical light, often seen as technologically sublime in and of itself during the early twentieth century, seldom overwhelms a viewer today unless it is deployed in unusual or surprising circumstances; many of the viewers of *The Weather Project* were doubtlessly well acquainted with the means, even the specific technology, of electrical illumination.¹⁵⁸ *The Weather Project* hinged on the interaction between viewers, the light, the mist, and the mirrors - the surprising apparent height of the space, the scale of the sun, and the darkened nebulous architectonics. The hazy sunset construction did not frighteningly confuse and overwhelm as the Burkian sublime, but rather created a congenial space of group interaction.

Scholar James Meyer described the scene in the Turbine Hall:

Viewers sit down on the cold floor. Others spread themselves out, gazing up at their distant images with narcissistic regard. Groups of friends arrange their bodies in ornamental configurations, opening and closing their limbs to resemble snowflakes and stars. We look at ourselves, and at others looking at *themselves*. *The Weather Project's* perceptual qualities, as such, are ultimately less compelling than the work's social effects.¹⁵⁹

¹⁵⁸ I am referring specifically to the sublimity of electrical light as a product of electricity and fixture, not to its illumination. Nye uses the example of electrical lighting at the World's Fairs and Expositions between 1893-1905 to make this point: "some visitors saw more electric light in a single night at the fair than they had previously see in their entire lives." Nye, 147. Viewers of *The Weather Project* were exposed to a concentration of lighting technology, but nothing cutting edge – in fact, Eliasson's use of Low Pressure Sodium fixtures was decidedly archaic, as discussed in the next section.

¹⁵⁹ James Meyer, "No More Scale: The Experience of Size in Contemporary Sculpture," *Art Forum* 42 (2004): 222.

The figures lying on the floor are not bowled over by power and awe, instead they are reveling in a moment of technologically produced displacement, a situation in which seeing oneself is inextricable from seeing others and their (re)actions. Meyer's critique of *The Weather Project* centers on the overwhelming size (as opposed to scale) of the work, which, in Meyer's estimation, flattens the phenomenological experience of an active spectator and creates instead a "mass audience."¹⁶⁰ Meyer's argument centers on a comparison to the human scale of Minimalism and its consistent affirmation of the presence of the viewer. However, Eliasson's works, *The Weather Project* as a paradigmatic example, are conceived less in the individualistic context of Minimalism, but rather as an elaboration on the positioning of the individual within various social structures (*dispositifs*), a goal which Meyer acknowledges, yet elides. The sensory perception (tactile, odorous, audible, and visual) demanded by *The Weather Project* insured the bodily presence and self-awareness of the viewers, as individuals, while the encompassing size of the work and reflective mirrored ceiling emphasized the totality of the viewers – yes, as a mass. There is a dynamic dialectical tension between the viewer as individual and as part of a social network in Eliasson's works; Miwon Kwon describes this as spatial abstraction versus particularity, and relates it to the capitalist drive for difference and authenticity, but Eliasson does not (yet) press hard on this Marxist trope.¹⁶¹ Instead, Eliasson professes interests in the shifting possibilities of "coded space," and how his installation works can emphasize individual or collective experience.¹⁶²

Appreciation of the technological sublime often occurs in a group dynamic which corroborates one's experience with the similar reactions of others. Dense population centers display the technological

¹⁶⁰ Meyer, 223.

¹⁶¹ Miwon Kwon, *One Place after Another : Site-Specific Art and Locational Identity* (Cambridge, Mass.: MIT Press, 2002), 159.

¹⁶² Olafur Eliasson, interviewed by Marianne Krogh Jensen, "What we have in common is that we are different," in Katrina Brown and Olafur Eliasson, *Olafur Eliasson: Your Position Surrounded and Your Surroundings Positioned* (Dundee, Scotland: Dundee Contemporary Arts, 1999), 14–15. In this interview, Eliasson acknowledges the goal of capitalism to create homogeneous consumers in an effort to minimize production effort. Marxist analysis is hence not foreign to Eliasson, however it does not present as one of his central narratives.

sublime removed from the natural world, presented instead against a backdrop of human achievement, replacing the introspective experience of Friedrich's traveler with a social consensus. The Golden Gate Bridge, World's Fairs, skyscrapers – these are Nye's paradigmatic examples of a technological sublime that he underscores as comparative, contingent, and constantly evolving.¹⁶³ While Eliasson's lights presented as “sun,” the indoor location and the severing of the star from daily cycles was more important to the reception of the work than visual parity. Chicago MCA Director Madeline Grynsztejn describes this as locating the works between nature and culture, with each projecting a “geography of reciprocal connections...acknowledg[ing] the strange and significant beauties of a landscape that commingles the natural and the artificial.”¹⁶⁴ Bruno Latour would label this the collapse of a divide between nature and culture which never truly existed – and Eliasson confirms that his work emphasizes the totality rather than duality of experience:

...it is important that we humans acknowledge that we are nature, too, and only by appreciating this will we fully sensitise ourselves to our effect on the climate...nature is not an ‘Other,’ something external. In the same somewhat holistic way, I sometimes say that we do not walk into a museum to step out of a reality. We walk into a museum to see reality in higher resolution...*Connectedness* is the crucial element here, as it is for Latour. We are infinitely bound up, whether we want to be or not. One institution relates to the another; people and things are inextricably linked together. They are no longer ‘entities,’ they are ‘agents,’ and the consequences of all their actions constitute our world.¹⁶⁵

The significance of *The Weather Project* is the presentation of an entire web of relations, within which Eliasson expects the viewer to have agency, to both affect and be effected by the reality experienced in the Tate Turbine Hall. Within this higher resolution reality, the apparatus cannot be regarded without seeing both its visual effects and the reactions of other viewers – consequently each viewer is both complicit with and reactive to the work, taking the *Verfremdungseffekt* to the proverbial next level.

¹⁶³ Nye, *American Technological Sublime*, 241 and xvii.

¹⁶⁴ Grynsztejn et al., *Olafur Eliasson*, 54.

¹⁶⁵ Godfrey, *Olafur Eliasson In Real Life*, 157.

The “reciprocal connections” in Grynstejn's description resonate with the lines of force as previously described in Eliasson's *dispositif* and her acknowledgement of both the natural and artificial at play obliquely summarizes the technological sublime. Emulation of the natural world and its phenomena by artificial/technological apparatuses continues to be central to Eliasson's oeuvre, as his recent retrospective at the Tate, *Olafur Eliasson: In real life* (5 July 2019 – 5 January 2020) demonstrates.

Room for one colour in Real Life

Recently reinstalled for *Olafur Eliasson: In Real Life* at the Tate Modern, *Room for one colour* acts as the host of the retrospective, welcoming viewers into the elevators, where a single LPS bulb has replaced the usual elevator lighting. Arriving at the second floor, the doors slide open to reveal a powerful wave of LPS light which pushes immediate bluish-violet afterimages into the visual cortex. It is a strong presentation of *Room for one colour*: the concentration of 51 lamps in the small hallway between the elevator banks produces a monofrequency light that evokes visible and audible reactions in visitors (Figure 32). Like at the SFMoMA, viewers appeared slightly stunned when exiting the elevator, despite being introduced to the LPS light during their ascent, and in contrast to other installations of the work, there seemed to be less playful experimentation or lingering within the brightly yellow space, perhaps due to the intensity of the light.

At the Tate, the LPS bulbs of *Room for one colour* were separated from their control gear and suspended approximately 7 feet from the ceiling (Figure 33). This is a rare configuration of the work, it was shown at the 2003 Venice Biennale in a similar manner, however there were significantly fewer LPS bulbs (6 in total) and the work did not span the gallery space (Figure 34). The Tate installation reinforces the presence of the bulbs by drawing visual attention to them as they apparently float in space. The suspended bulbs are closer to viewers and more likely to be present in one's field of vision upon exiting the elevator than if they were installed with the control gear on the ceiling. This presentation of the

bulbs clarifies the media of *Room for one colour*, asserting the presence of a familiar technological apparatus, leaving no mystery to discern and no curtain to pull back. Instead, viewers are immediately privy to the physical totality of the work and can relax into visual stimulation and perhaps delve into contemplation of the *dispositif*.

“The technological reproducibility of the artwork changes the relation of the masses to art,” wrote Walter Benjamin in 1935, clarifying this statement through a comparison of film and painting.¹⁶⁶ Exposing the apparatus - the understandable, readily available, multiple light bulbs in this installation of *Room for one colour* – shifts viewer's approach to the work from a position of criticality to that of intrigued pleasure:

The extremely backward attitude toward a Picasso painting changes into a highly progressive reaction to a Chaplin film. The progressive attitude is characterized by an immediate, intimate fusion of pleasure - pleasure in seeing and experiencing - with an attitude of expert appraisal.¹⁶⁷

This pleasure in seeing and experiencing is obvious when observing viewer's interactions with Eliasson's works via physiological cues, such as laughter and smiling, physical actions, such as experimentation with or returning to a work, conversations with other viewers, and the overwhelming number of photographs and selfies. These “highly progressive reactions” in which “simultaneous collective reception” serves in part to regulate the reactions of the viewers are facilitated in large part by the scale of Eliasson's works. For example, the flooding of a large and central museum space with LPS light offers a collective experience; Benjamin argued that although new art forms are historically criticized, art forms which employ a technological apparatus to facilitate exposure to a wider audience engender positive group consensus.¹⁶⁸

¹⁶⁶ “The Work of Art in the Age of Technological Reproducibility: Second Version,” Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media*, 36.

¹⁶⁷ Benjamin et al., 36.

¹⁶⁸ Benjamin et al., 36.

Benjamin differentiated between two distinct concepts of technology. The first stage, human's use of technology for ritual or magical practices, was a way to understand and attempt to master nature. The second technology is that of experimentation, as humans attempt to distance themselves from nature, to play with their interaction with the natural world and the possibilities of new technologies.¹⁶⁹ Eliasson takes up this second stage of technological experimentation as Benjamin intended, investigating both individual perception and the larger encompassing structure: Benjamin described this as the necessary mastering of elemental social forces which precedes playing with natural forces.¹⁷⁰ Through this play and mastery, Benjamin predicted, a revolution would occur:

Because [the second] technology aims at liberating human beings from drudgery, the individual suddenly sees his [sic] scope for play, his field of action immeasurably expanded. He does not know his way around this space. But already he registers his demand on it.¹⁷¹

Eliasson's installations, visually anchored by the technological apparatus, provide viewers with an expanded field of interaction – the space around the physical installation itself and the expanded constructs of the institution, technological history, and subjective perceptions, the separation of which they simultaneously collapse. In this way, Eliasson's revolution is not the Marxist triumph that Benjamin envisioned. Instead, what Eliasson's most successful installations do achieve are expanded perceptions, both visual and cognitive, within a familiar and playful space coded as such by the technological apparatus and its luminary effects. Eliasson's (desirable) outcome of broadened perception is similar in tone to that of László Moholy-Nagy, who sought to "heighten human faculties," and Otto Piene who sought to rehabilitate light for the "free, playful, and active" expansion of humanity.¹⁷² These intentions exceed Benjamin's goal of "liberating human beings from drudgery," as these artists present the viewer

¹⁶⁹ Benjamin et al., 26.

¹⁷⁰ Benjamin et al., 45, n11.

¹⁷¹ Benjamin et al., 45, n11.

¹⁷² Moholy-Nagy and Alfred Kemény, "Dynamisch-konstruktives Kraftsystem" translated in Passuth, *Moholy-Nagy*, 290. Piene, *Piene: Lichtballett*, Howard Wise Gallery, Nov. 4 - Nov. 20, 1965.

with an organized and directed experience, or expanded field of interaction (or Benjaminian space) from which one can negotiate a productive relationship with technology.

Chapter III: Figures

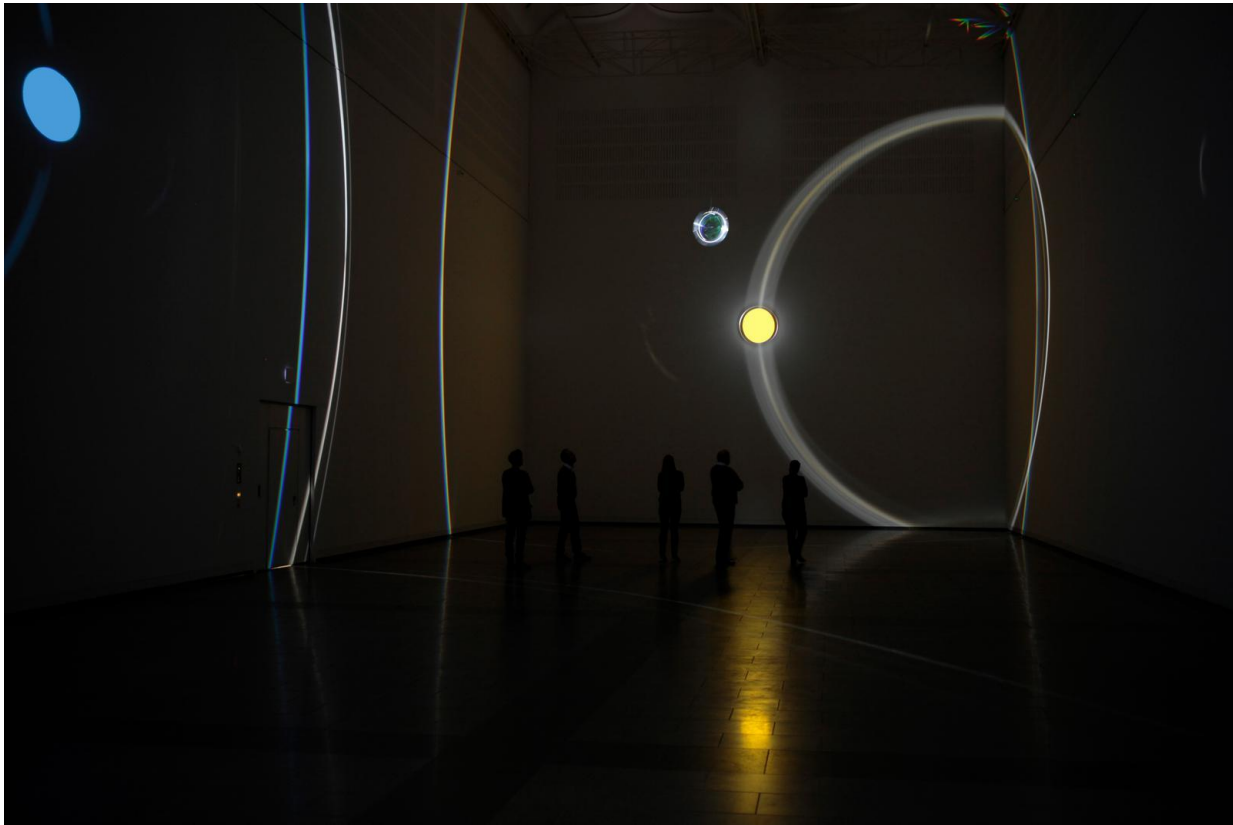


Figure 1: Olafur Eliasson, *Your museum primer* (2014), installed as part of *Dein Ausstellungsguide* at K20 Düsseldorf, 2014. The figures of viewers are just visible in the center; on the upper right the scaffolding supporting the LED spotlight can be seen. Photo olafureliasson.net



Figure 2: Olafur Eliasson, *Your museum primer* (2014), installed as part of *Dein Ausstellungsguide* at K20 Düsseldorf, 2014. Photo G. Ruff, April 2014

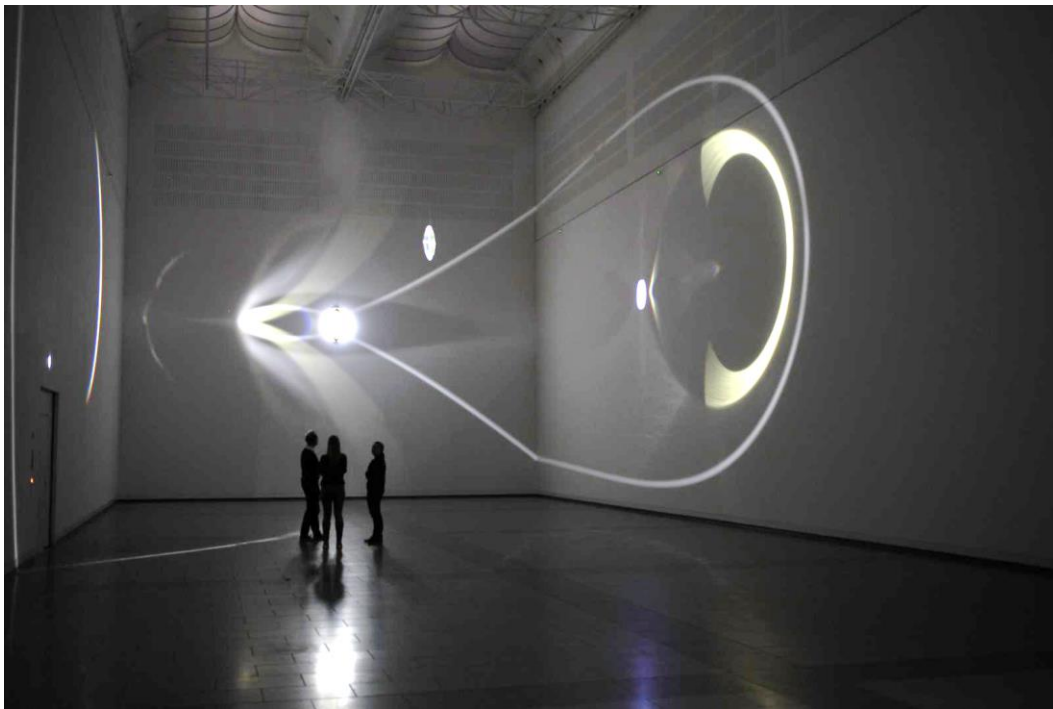


Figure 3: Olafur Eliasson, *Your museum primer* (2014), installed as part of *Dein Ausstellungsguide* at K20 Düsseldorf, 2014. The brightness of this photo has been adjusted to allow the figures to be seen. Photo olafureliasson.net

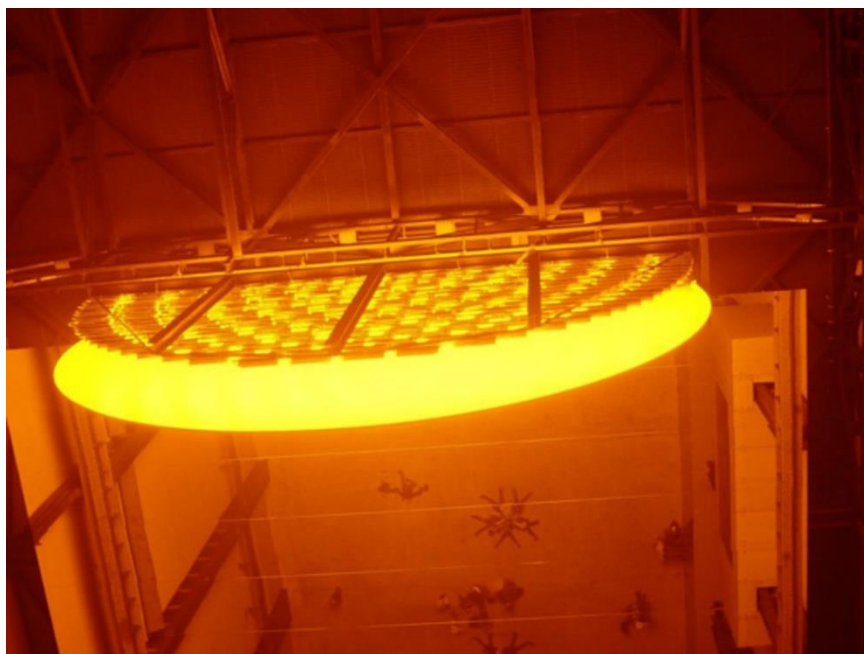


Figure 44: *The Weather Project* (2003) looking in the mirrored ceiling from below the "sun." Photo from images.e-flux-systems.com

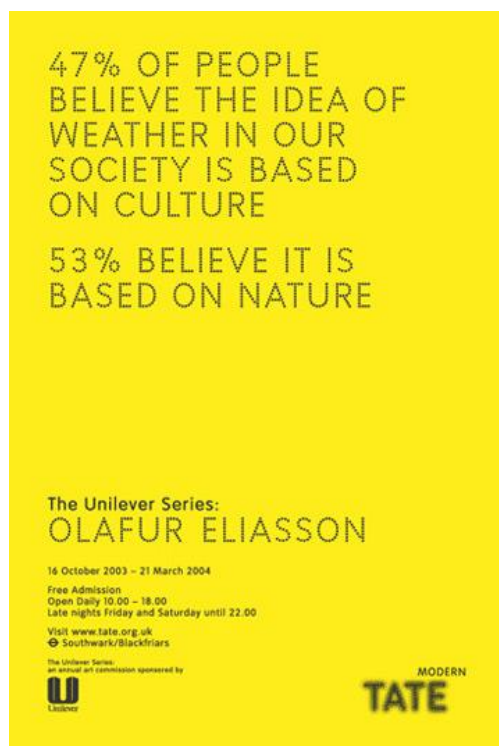


Figure 5: Print publicity ad placed in London taxis during *The Weather Project* (2003-2004). Image from designobserver.com



Figure 6: Print invitation to the opening of *The Weather Project* (2003). Photo from *The Weather Project* catalog, pg 132

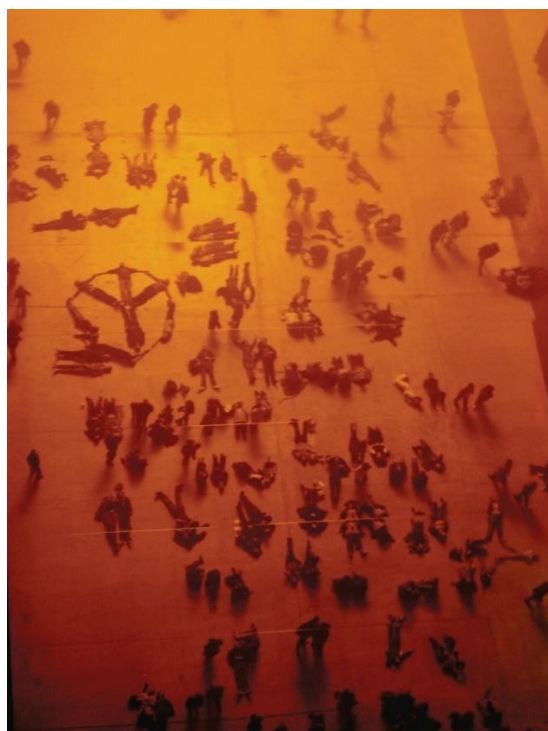


Figure 7: *The Weather Project* (2003) viewer reflections in the mirrored ceiling of the Tate Turbine Hall. Photo olafureliasson.net



Figure 8: Olafur Eliasson, *Room for one colour* (1997), installed at PinchukArtCentre, Kiev, 2011. Photo olafureliasson.net



Figure 9: *Room for one colour* (1997) installed at SFMoMA, 2007. Photo olafureliasson.net



Figure 10: *Room for one colour* (1997) installed at New York MoMA, 2008. Photo olafureliasson.net

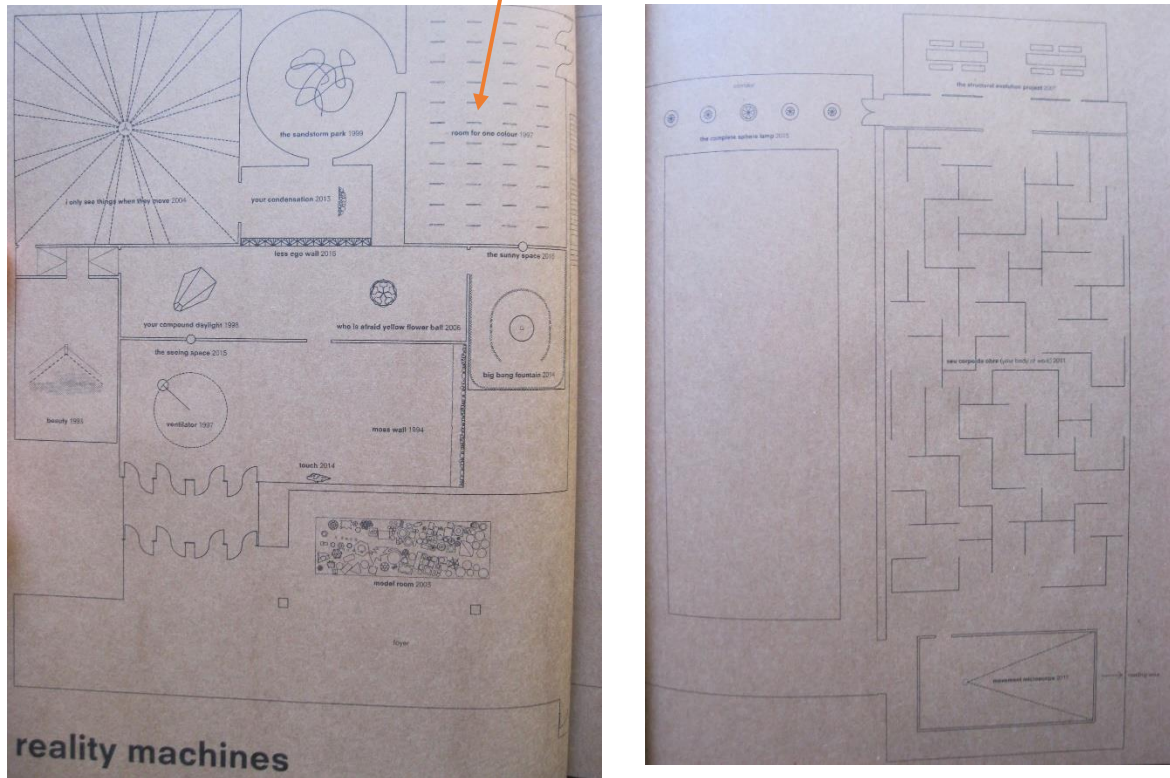


Figure 11: Floorplan of *Reality Machines* at Moderna Museet, Stockholm, 2015. Reprinted from *Reality Machines* catalog, np

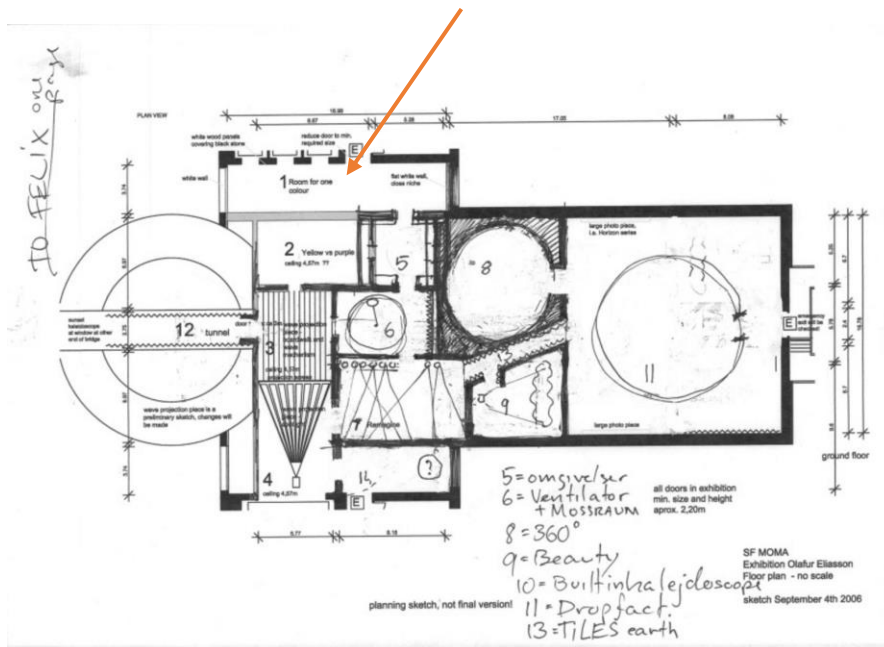


Figure 12: Sketched floorplan for *Take Your Time* (2008) at SFMoMA. Photo olafureliasson.net

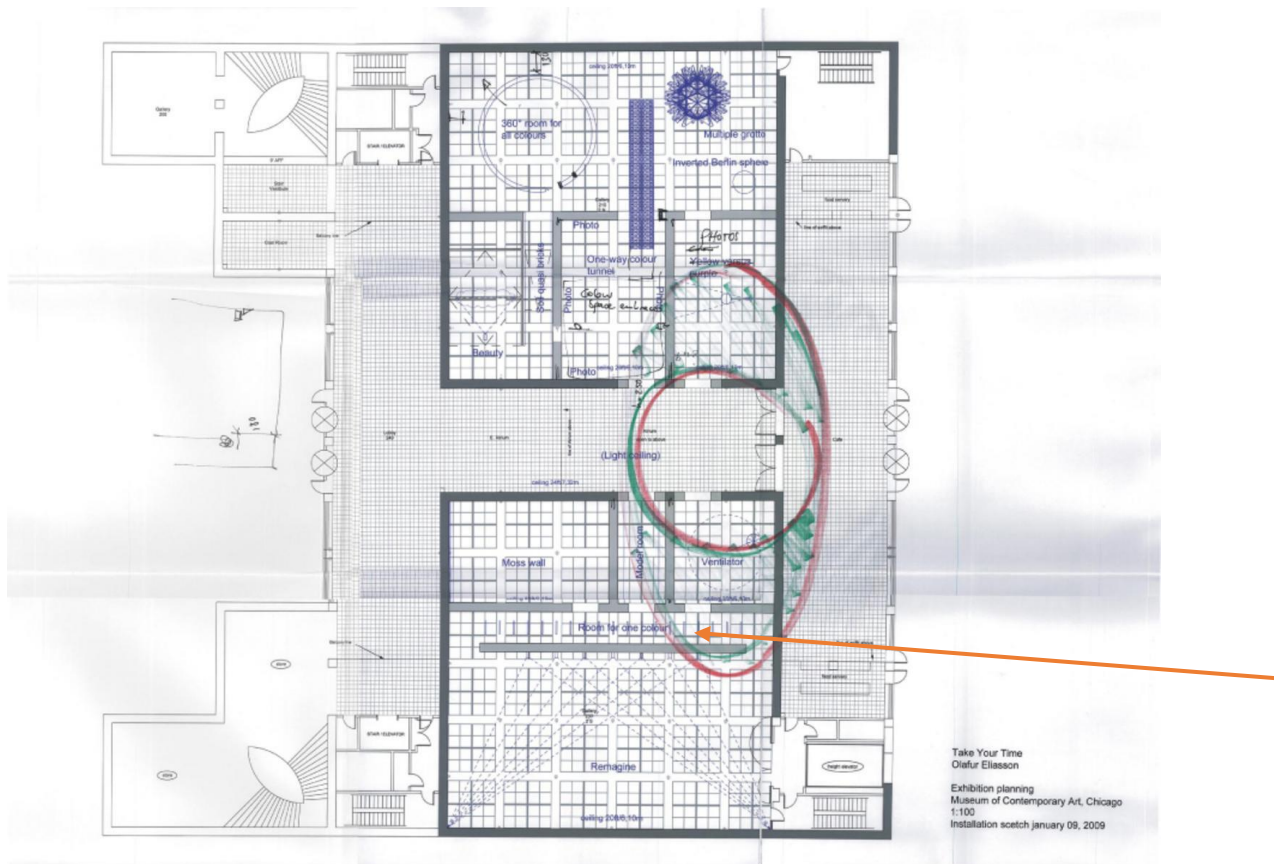


Figure 13: Floorplan for *Take Your Time* (2008) at the MCA Chicago. Image from olafureliasson.net



Figure 14: Chris Hadfield, *Berlin from Space*, 2013 photograph from the International Space Station. Photo chrishadfield.ca

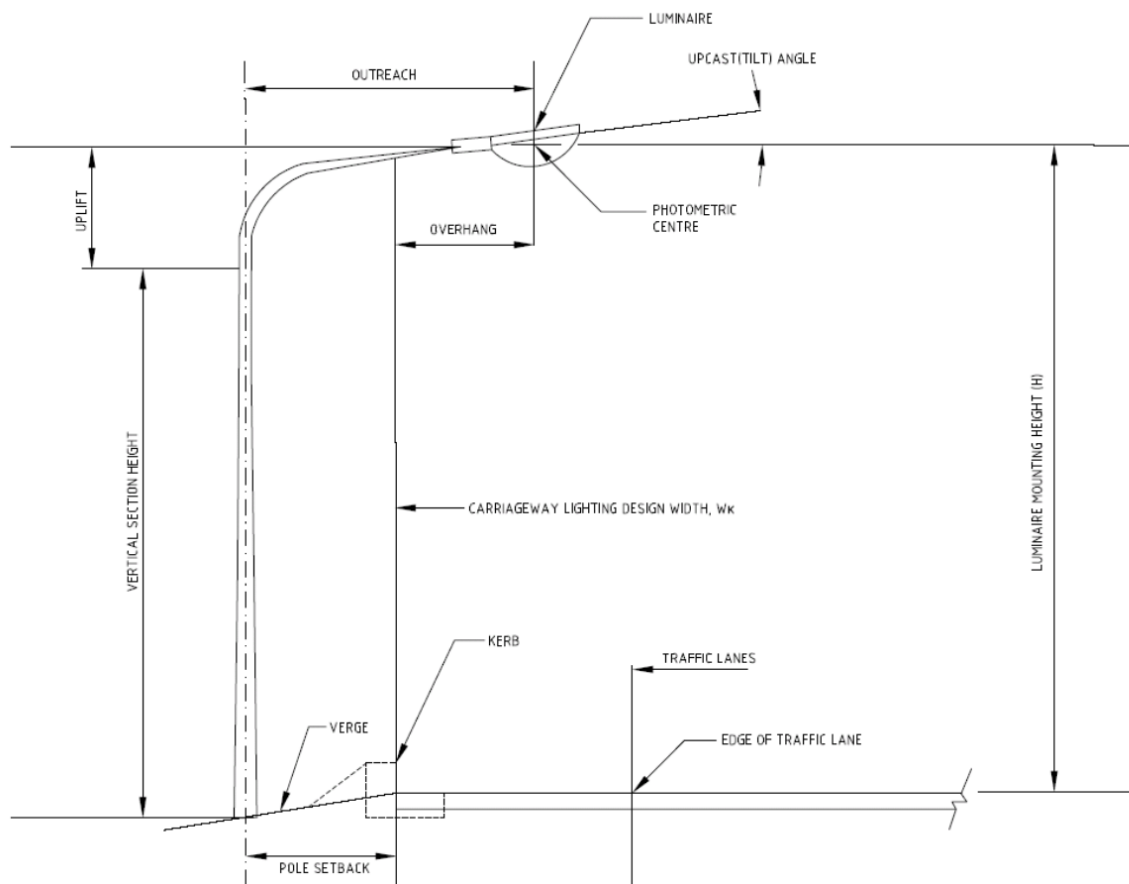


Figure 15: Geometry and terminology used in typical road lighting installation. Ergon Energy Public Lighting Design Manual, 2010. www.ergon.com.au/_data/assets/pdf_file/.../Public-lighting-design-manual.pdf

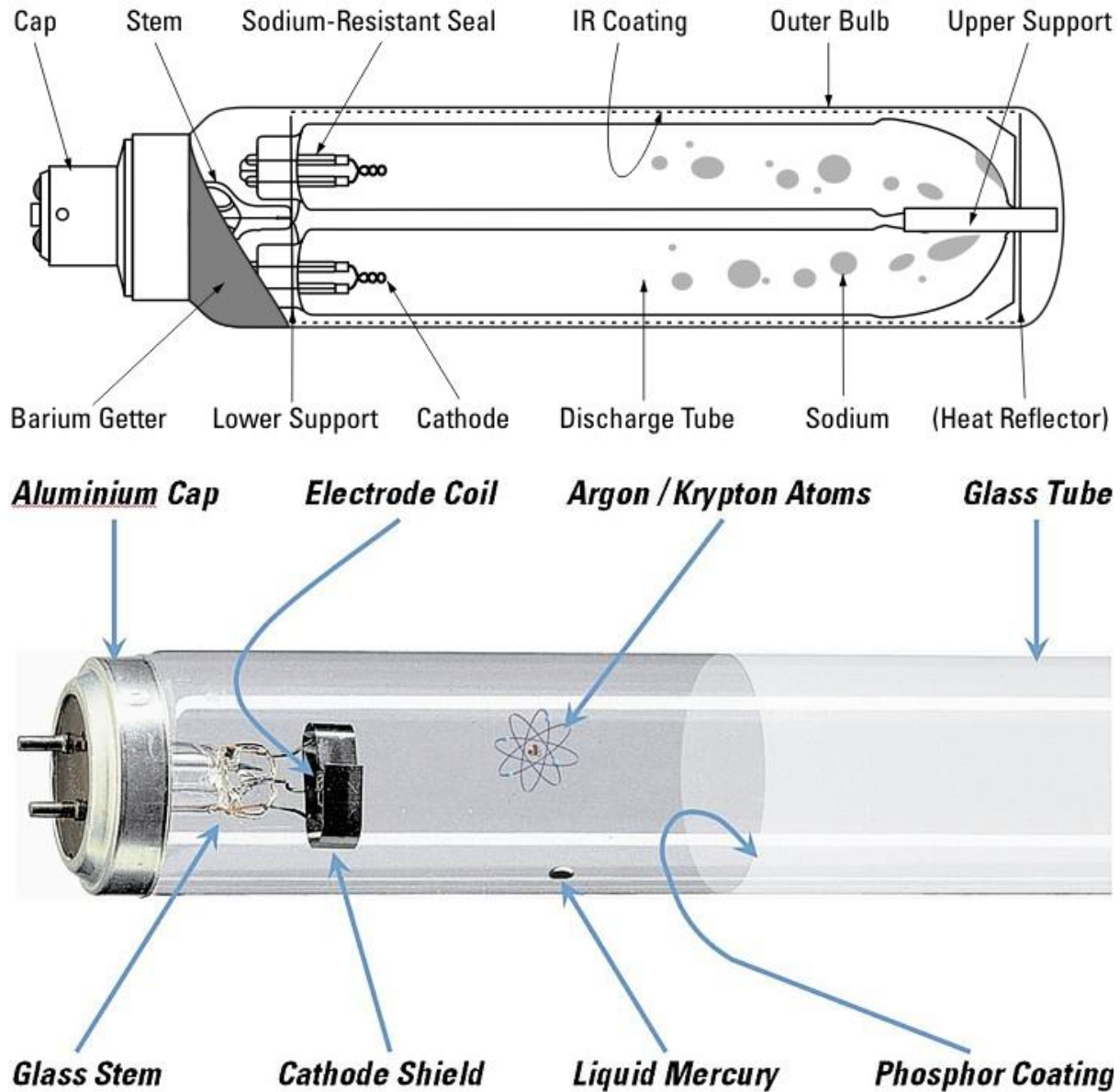


Figure 16: Low Pressure Sodium (top) vs. Linear Fluorescent bulbs. lamptech.co.uk



Figure 17: Dan Flavin, *the nominal three (to William of Ockham)*, 1963. Photo www.guggenheim.org



Figure 18: Olafur Eliasson, *Room for one colour* (1997) installed at Malmö Konsthalle Sweden, 2005. Photo olafureliasson.net

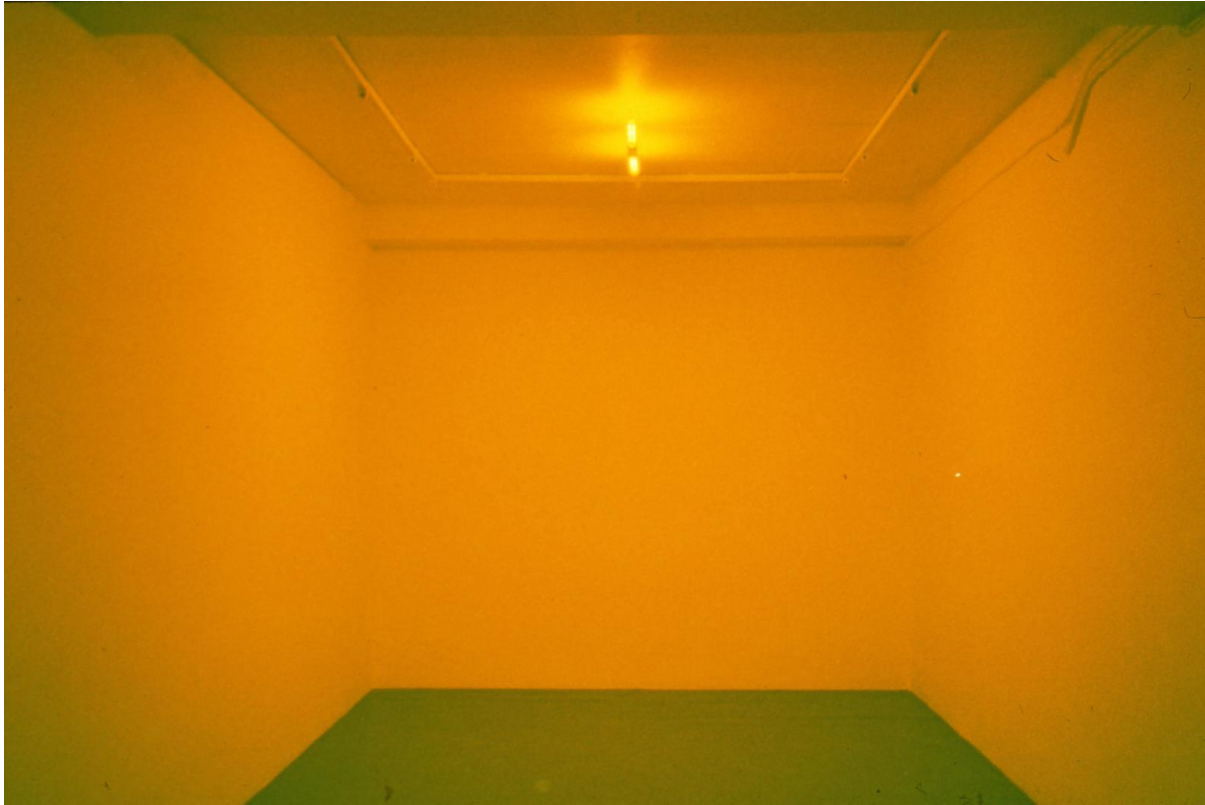


Figure 19: Olafur Eliasson, *Room for one colour* (1997) installed at Galleri Andreas Brändström, Stockholm, 1997. Photo olafureliasson.net



Figure 20: Olafur Eliasson, *Room for one colour* (1997), installed at Moderna Museet, Stockholm, 2015. Photo olafureliasson.net

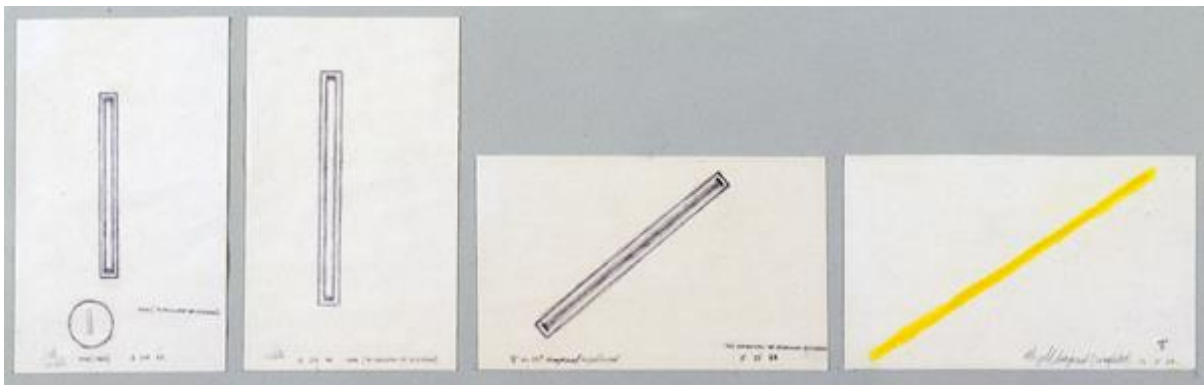


Figure 21: Dan Flavin, *one (to William of Ockham)*, *one (to William of Ockham)*, *the diagonal of personal ecstasy* and *the gold diagonal (completed)* [four drawings framed together, left to right], 1963. Image zwirnerandwirth.com



Figure 22: Copenhagen in the 1960s. Matthew Eagles (<http://www.mattheweagles.co.uk/soxlights.htm>) has identified the streetlights on the bridge as most likely being either a LPS GEC Z9554 or Eleco model. Matthew Eagles, "Research Inquiry: SOX in Denmark," email, 22 June 2019. Photo <https://vikinglifeblog.wordpress.com/2017/06/23/copenhagen-1960s/>



Figure 23: Reykjavik at Night, 2010. The vividly orange lights, particularly around the harbor are LPS, the slightly "yellower" light is HPS. Photo <https://www.deviantart.com/dogmundsson/art/Reykjavik-night-185223072>

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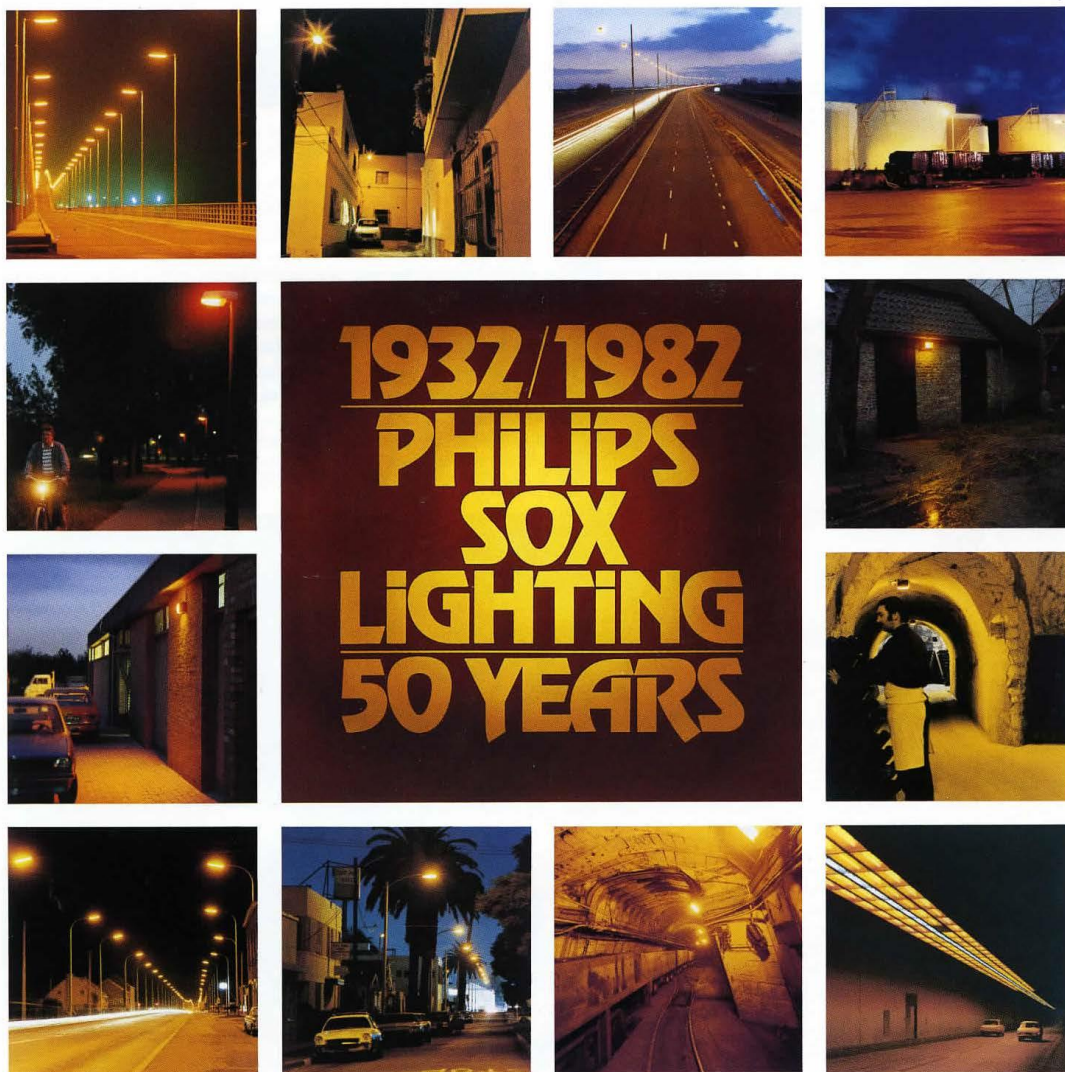
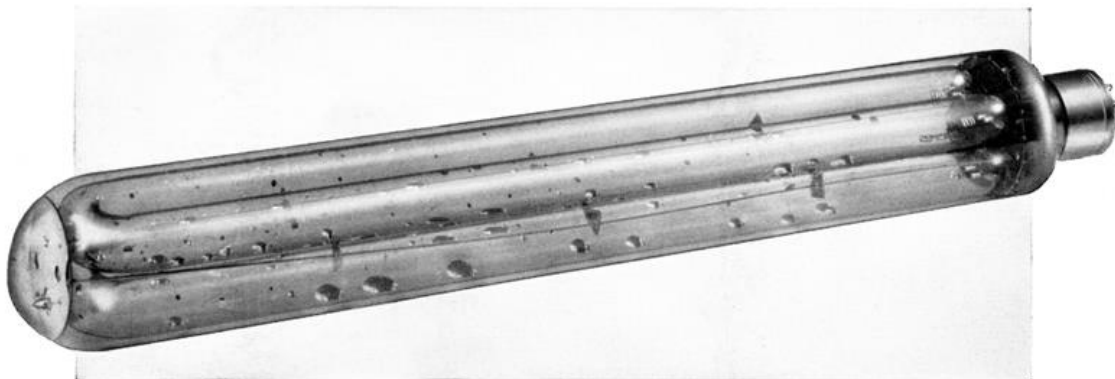


Figure 24: Cover images of "Philips Lighting News," No. 8, 1982, from an issue celebrating the many applications of Low Pressure Sodium lighting. Courtesy of Philips Company Archive

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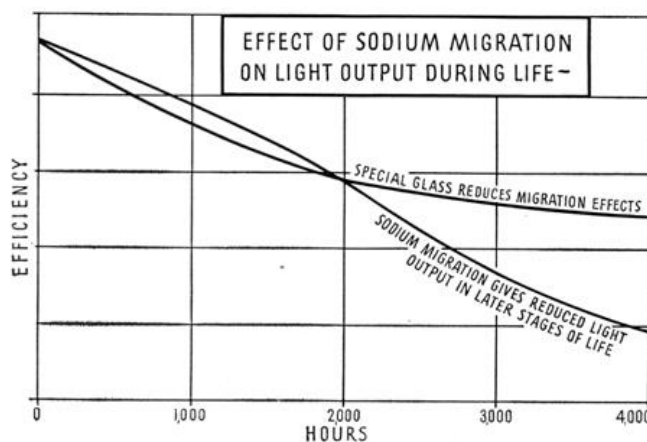
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Figure 25: Osram LPS advertisement, *Public Lighting Engineer*, March 1960



Figure 26: Olafur Eliasson, *Reversed Waterfall* (1998). Photo olafureliasson.net

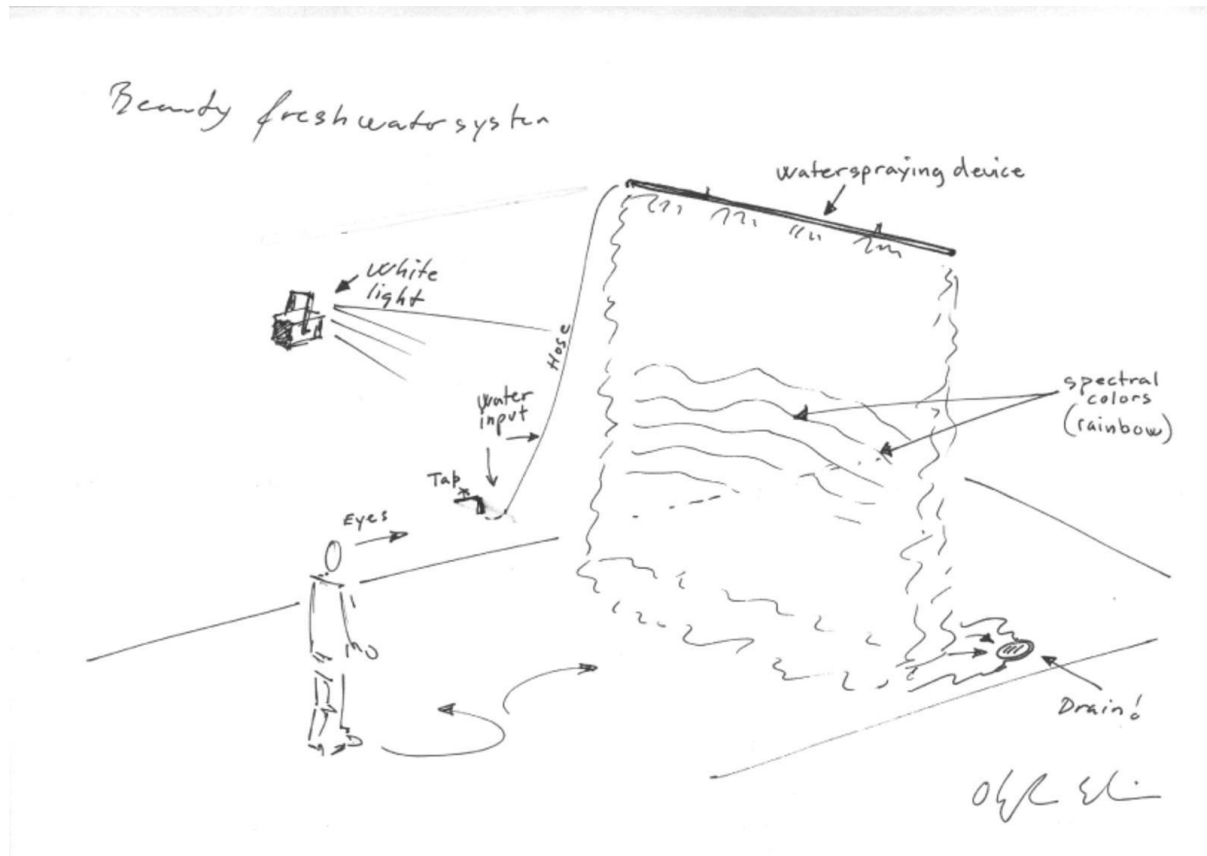


Figure 27: Olafur Eliasson, *Sketch for Beauty* (1993). Image olafureliasson.net



Figure 28: Olafur Eliasson, *Beauty* (1993), installed at Hara Museum of Contemporary Art, Tokyo, 2005. Photo from *Olafur Eliasson: Take Your Time*, 2007, Figure 5, pg 19

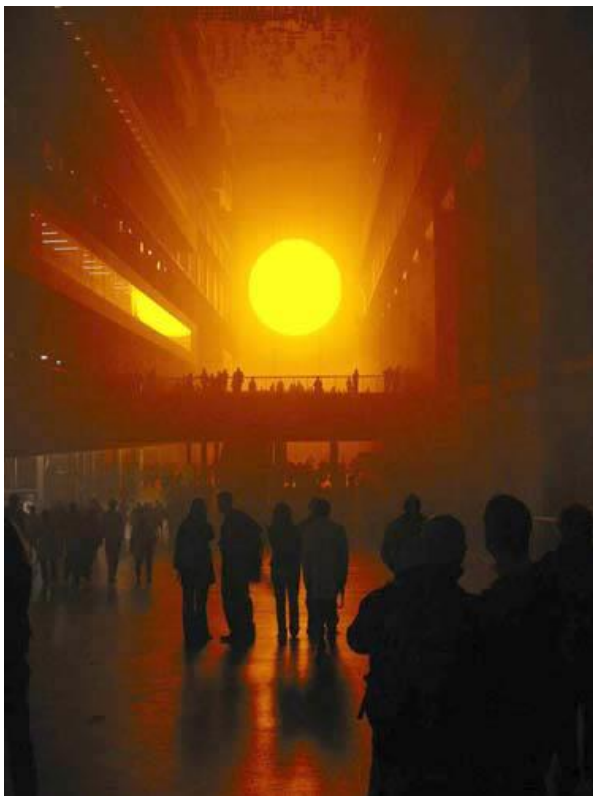


Figure 29: *The Weather Project* (2003) seen from the entrance to the Turbine Hall. Photo artnet.com



Figure 30: Eleco GR1 Low Pressure Sodium (SOX) lamps, the same technology used in *The Weather Project* suspended above the street in Southwark, London, 2004. Photo <http://www.lightgb.myfreeola.com/lights/england/london/Southwark/Southwark.htm>



Figure 31: *The Weather Project* (2003) mist installation. Reproduced from May, *The Weather Project*, pg 78

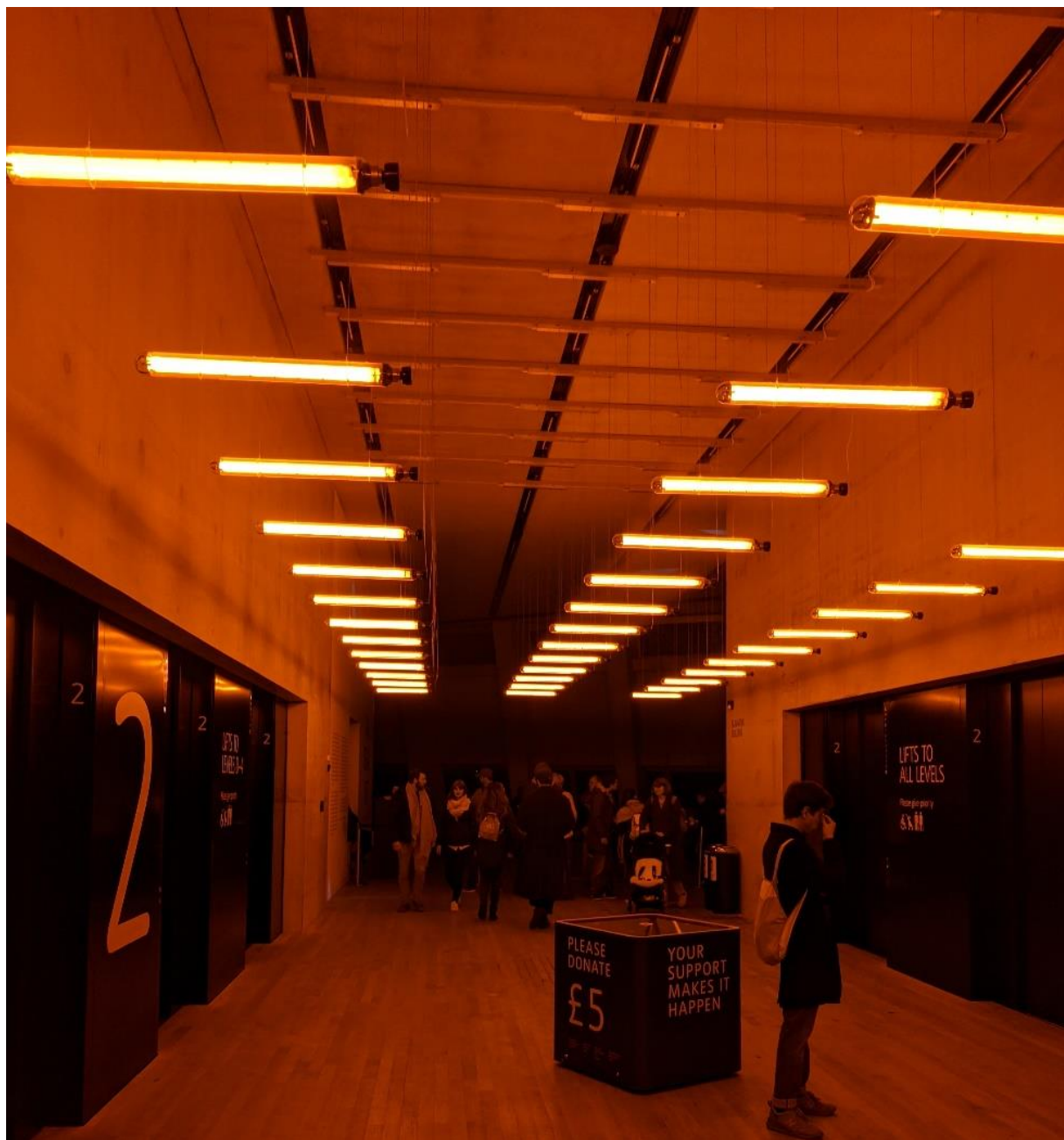


Figure 32: Olafur Eliasson, *Room for one colour* (1997), installed at the Tate Modern, London, as part of *Olafur Eliasson: In real life*. Photo G. Ruff, November 2019



Figure 33: Olafur Eliasson, *Room for one colour* (1997), installed at the Tate Modern, London, as part of *Olafur Eliasson: In real life*, 2019. Photo <https://gillianmobrien.wordpress.com/2019/07/29/exhibition-as-theme-park-olafur-eliasson-at-tate-modern/>



Figure 34: Olafur Eliasson, *Room for one colour* (1997), installed in the Danish Pavilion of the 2003 Venice Biennale. Photo <https://www.flickr.com/photos/halvorbodin/4365203613/in/photostream/>

Conclusion

What is aura, actually? A strange web of space and time: the unique appearance of a distance, no matter how close it may be...The peeling away of the object's shell, the destruction of the aura, is the signature of a perception whose sense for all that is the same in the world has grown to the point where even the singular, the unique, is divested of its uniqueness – by means of its reproduction.¹

It is not solely the power of technological reproduction which strips the aura from a work of art argues Benjamin: this is truly accomplished in the perception of the viewer – who is overwhelmed and finally unable to simply recognize that which is unique, that which penetrates, that which might hold a magical value.² Here is the lacuna in Benjamin's auratic theory which each of the apparatuses examined in this study fill – by turning attention from the immersive illumination produced by the work back to the relations between art and viewer, their separation, and the conditions of their mediation.

The critical engagement of the viewer, as exemplified in the three preceding case studies, obstructs the dissolution of the aura by forging a social or ideological connection with the particular technological apparatus of a work. Rather than detaching the object from its "sphere of tradition," the foregrounding of these apparatuses insists upon it, making the presence of specific technologies crucial to the work, even as they obsolesce. Asserting the aura produced by specific technology and its engagement with its contemporary viewer echoes Benjamin's argument that

...immersed long enough in such a picture [an early daguerreotype], one recognizes to what extent opposites touch, here too: the most precise technology can give its products a magical value, such as a painted picture can never again possess for us.³

Photography did not immediately strip the work of its aura; during the early years it was imbued through the lengthy process of exposure, the desire of early photographers to continue the legacy of painted portraiture, and the relation of the technology to those viewing its' production. Auratic loss

¹ "Little History of Photography," 1931 in Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media*, 285–86.

² Writing of early daguerreotypes, Benjamin asserts that the limitations of the medium allowed the subjects to "live their way into the moment," such that for the viewer, "Little History of Photography," in Benjamin et al., 280.

³ "Little History of Photography," in Benjamin et al., 276.

occurred as photography became commercial, as photographers recognized that something was missing (and simulated it through touch-ups) and attempted to widely distribute the results. “Now, ‘to bring things closer’ to us, or rather to the masses, is just as passionate an inclination in our day as the overcoming of whatever is unique in every situation by means of its reproduction,” wrote Benjamin.⁴ To cleanse the aura from his portrait photography Atget created images unmoored from their particular web of space and time: the antithesis of what the works presented in this study accomplish.

Uniqueness and durability of an original work with connection to a space and time defines its’ aura asserted Benjamin, who could not have foreseen that, as this study demonstrates, interaction with specific technology can become that original work, if deployed in a singular and persistent manner. Benjamin recognized the presence of the aura in early daguerreotypes in which elementary technology necessitated long exposure times, a quiet outdoor location, and the concentration of those being photographed, a procedure which “caused the subjects to live their way into, rather than out of, the moment.”⁵ Similarly, living one’s way into László Moholy-Nagy’s *Lichtrequisit einer elektrischen Bühne* (1930) meant a physical engagement with a whirring, clanking box of light, into which one must direct their gaze, and possibly stick their head, to confront not only the *Lichtspiel* but also the reflective, moving surfaces of its’ production. Living into Otto Piene’s early *Lichtballette* required stepping over power cords and manipulating electrical switches, or turning one’s focus from the artist and his flashlights to the walls and ceiling of the gallery space, visually tracing the light from source to projection. Living into Olafur Eliasson’s installations of *Room for one colour* (1997) means allowing eyes to adjust to the mono-frequency light, attending to the perceptual shifts that occur, and satisfying natural curiosity concerning the technological source of such light. In each instance, the aura, that

⁴ “Little History of Photography,” in Benjamin et al., 285.

⁵ “Little History of Photography,” in Benjamin et al., 280.

unique interweaving of space and time, hinges upon the viewer's presence and engagement with that configuration of the apparatus.

Chapter one demonstrated the similar aims of Bertolt Brecht and László Moholy-Nagy to experiment with apparatuses which would produce new effects and interactions rather than simply transmit or project the staid creations of others. In testing their hypotheses, both Brecht and Moholy-Nagy created new technological arrangements – Brecht wrote new works and theories for interactive radio and Moholy-Nagy designed and constructed the *Lichtrequisit einer elektrischen Bühne* (1930). These newly configured apparatuses were intended to “re-functionalize:” to transform an extant technology (in Brecht's instance of radio) or a nascent medium (Moholy-Nagy's projections of light) in such a way as to facilitate interaction with the viewer and foster the expansive act of production, facilitating social change. These goals hinged on the presence and actions of the apparatus, conceptualized as the physical technology and its attendant perceptual interactions.

An examination of Otto Piene's early *Lichtballette* works in chapter two revealed the potential of the apparatus to ideologically position and activate the viewer. As the *Lichtballette* evolved in both artistic vision and practicalities, so did the inherent ideology which was communicated to the viewer through apprehension of the apparatus. Early works, such as the *Archaisches Lichtballett* (1959), were predicated upon Piene's experience of the dangers of light during WWII; this association was communicated to viewers through Piene's central presence and controlled manipulation of handheld flashlights. This arrangement of a technological apparatus (flashlights and screen) within the larger dispositif of the entire work corresponds to Jean-Louis Baudry's description of the relation between the filmic apparatus and dispositif. As the *Lichtballette* evolved, the viewer was shifted from the passive position described by Baudry to that of the “activated viewer” who has a role in interacting with the work, as postulated by Claire Bishop. Piene's *Mechanisches Lichtballett* (1960) and *Please Turn* (1961) required that viewers physically interact with the work to create the moving *Lichtspiel*: illuminated with

freestanding spotlights, these second iterations of the *Lichtballette* also deployed light in a more powerful manner, shedding associations with the fears of war-time. Finally, chapter two illustrated Piene's turn from the activated viewer to the "social machine" as described by Jean-Louis Comolli through Gilles Deleuze through the example of *Please Turn* (1961), a work which, in its' original form, directed viewer interaction. Social before technological in construct, the art world moment of *Please Turn* – the machine in this instance – determined Piene's tools, his presentation, even the direction of the ZERO group, as Europe attempted to reconcile the trauma of war with the new reality of economic recovery. The machine of Comolli deployed the tools of post-war detritus (the salvaged media of *Please Turn*), in combination with the resurrecting art market (the 1962 *nul* show at the Amsterdam Stedelijk), with the motivating force being "social profitability; economic, ideological, symbolic."⁶

Chapter three concretized the multiple presences: of the apparatus, the museum, and the viewer, which are intrinsic to Eliasson's installations of light. The discussion framed such works as examples of Michel Foucault's *dispositif*: a "heterogeneous ensemble" incorporating physical elements, thoughts, practices, and power relations, created in response to a need determined by the artist, which constantly shifts in reaction to internal changes. Eliasson uses visible technologies as one of the major anchors within his *dispositifs*, as illustrated by this analysis of *The Weather Project* (2003), his renowned 2003 installation in the Tate Modern Turbine Hall. The complex *dispositif* of *The Weather Project* intentionally engaged with the ideology of the museum, the subjectification of viewers, and the commodification of the installation – the lines of force/the power relations of which, as explained by Gilles Deleuze, necessarily run through the physical apparatus. As a visible element of the largely incorporeal *dispositif*, the technology of *The Weather Project* provided a tangible connection to Eliasson's larger system of relations. The foregrounding of the apparatus contrasts Light and Space artists such as James Turrell, who create objectless spaces of immersive light suggestive of the sublime;

⁶ Comolli, "Machines of the Visible," 122.

instead, Eliasson emphasizes the apparatuses necessary for his work, an example of what David Nye terms the “technological sublime.” This is read through *Room for one colour* (1997), a work which Eliasson has installed in multiple locations with various configurations, in which the phenomenological effects of a specific lighting technology are a crucial part of the viewer’s experience.

The consequences of unpacking the variable meanings of a visible technological apparatus has particular relevance for the conservation and re-installation of such works. Research by InterMedia Art Institute Director Renate Buschmann and ZERO Archivist Tiziana Caianiello asserts that conservation and presentations of technology-based works must find a balance between “historical materiality of the work and its artistic conception,” and this study enriches both of these considerations.⁷ Furthermore, discussions of conservation in the late 1990s acknowledged that the materiality of “non-traditional art works” was more complex in terms of the meaning and importance in comparison to “traditional” works of painting and sculpture.⁸ A little more than ten years later, members of the International Network for the Conservation of Contemporary Art (INCCA) published a comprehensive analysis of the unique needs of installation art which proposes guidelines, standards, and decision-making models. Recognized as a “point of reference for the transmission of various kinds of codes and conventions of communication,” installation works are herein approached from perspectives of materiality and the larger web of

⁷ Renate Buschmann and Tiziana Caianiello, eds., *Media Art Installations Preservation and Presentation* (Berlin: Dietrich Reimer Verlag, 2013), 199.

⁸ A comprehensive discussion of these needs is found in the compendium *Modern Art, Who Cares?* (1999) which includes case studies and the proceedings of an eponymous symposium held in 1997. The terms “non-traditional” vs. “traditional” are here borrowed without discussion from the essay “Between Fetish and Score: the Position of the Curator of Contemporary Art” by D. H. van Wegen. I am not undertaking a critique of this nomenclature, hence the quotation marks. “The materiality of contemporary, non-traditional objects are in that sense not usually subordinate to the meaning contained in a representation...A major consequence of the changing role material and technique play in the meaning of a work is that, in the case of active conservation procedures which directly intervene with the material quality of the art work...there must be a constant check on what role the material of the affected part plays in the meaning of the work.” D. H. van Wegen, “Between Fetish and Score: the Position of Curator of Contemporary Art,” in IJsbrand M. C. Hummelen and Dionne Sillé, *Modern Art - Who Cares?: An Interdisciplinary Research Project and an International Symposium on the Conservation of Modern and Contemporary Art*, 2005th ed. (Antique Collectors Club Limited, 1999), 204–5.

relationships (dare I say *dispositifs*?) of which their physicality is a part. To this end *Inside Installations* begins with the assertion that

[t]he huge diversity of installations requires interdisciplinary analysis of the material as well as the ontological and axiological spheres, through an approach involving the history of art, philosophy and ethics as well as the theory and practice of conservation and restoration. It creates a background for defining the ideas and values embodied by the work as well as its character as seen from the point of view of its relations, processes, context and the meaning of the material.⁹

With an analysis of the physical technological apparatus which ideologically represents the artist and mediates the viewer's experience, this study answers the call for a multi-valent approach to works of installation. In a broad and inclusive view minutiae can be overlooked, and for that reason it is important to pair this study's analysis with scrupulous documentation, such as that outlined by ZKM Center for Art and Media Conservator Franziska Wagner, who offers a detailed description of how to accurately document and preserve the physical aspects of a light-based installation work. This includes the physical and electro-technical requirements of the space, the metered color and luminance of emitted light, and the specifics of all technological components; such systematic documentation captures a light based installation in a scientific manner which might facilitate its future re-installation.¹⁰ Read against the preceding call for interdisciplinarity, this objective approach alone would likely fail to reiterate the work in such a way that would repeat the auratic-technological moment, much as the reproductions of later photography "peel[ed] away the object's shell...divested [it] of its uniqueness – by means of its reproduction."¹¹ Optimistically, there is a movement within current museological practice to "document the occurrences...and well as the results (e.g. presentations) instead of the original state of the artwork."¹² Should this documentation follow the interdisciplinary prescription of the Monika

⁹ Monika Jadzinska, "The Lifespan of Installation Art," in Tatja Scholte and Glenn Wharton, eds., *Inside Installations: Theory and Practice in the Care of Complex Artworks* (Amsterdam: Amsterdam University Press, 2011), 27.

¹⁰ Franziska Wagner, "Light - A Hybrid Medium: Suggestions for the Documentation and Preservation of Artworks Based on Light Emitting Technology," in Scholte and Wharton, 198.

¹¹ "Little History of Photography," in Benjamin et al., *The Work of Art in the Age of its Technological Reproducibility, and Other Writings on Media*, 286.

¹² Buschmann and Caianiello, *Media Art Installations Preservation and Presentation*, 208.

Jadzinska (quoted above), with re-installations anticipated to vary based on how best to realize the artistic concept, the technologically based aura of such works might survive re-presentation.

Finally, this study demonstrates the importance of particular apparatuses, and asserts that shifting perceptions of original technologies are inherent to the artworks discussed. Will Olafur Eliasson's *Room for one colour* (1997) be as effective when viewers are no longer familiar with Low Pressure Sodium light? Using the case studies of Piene and Moholy-Nagy as reference points indicates that the meaning of the work will shift in the direction of the apparatus as artifact: *Room for one colour* will cease to connect museological space to the external "real world" in which LPS light illuminates highways. Instead, the work will present an obsolescent technology in a spectacular and possibly historical manner, much the same way that the *Lichtrequisit einer elektrischen Bühne* is now displayed at Harvard's Busch-Reisinger Museum as an art object in itself, to be activated once monthly.

In 1966, William Wainwright, architect and kinetic artist, was commissioned by the Director of the Harvard Busch-Reisinger Museum, Charles Kuhn, to undertake a restoration of the *Lichtrequisit*, which had been donated by Sibyl Moholy-Nagy in 1956. Wainwright's restoration was undermined by excessive wear during exhibitions in 1968 and 1969, and as a result, two replicas were commissioned in 1969 from Woodie Flowers, a doctoral candidate in mechanical engineering at MIT. A third replica was created by Jürgen Steger in 2006. The original *Lichtrequisit* continued to be conserved as necessary, until 2015, when Busch-Reisinger conservators Henry Lie and Tony Sigel once again cleaned, greased, and adjusted the apparatus before placing it on display at the Busch-Reisinger Museum (Figure 1). The *Lichtrequisit* is now activated once monthly during a "popular" gallery talk during which times it is given to habitually erratic movement.¹³

¹³ Tsai et al., "László Moholy-Nagy's Light Prop as Design Fiction: Perspectives on Conservation and Replication," 312.

The current display situation of the *Lichtrequisit* at the Busch-Reisinger Museum shows the work in the middle of the gallery, stationed directly on the floor, with its' mechanical underpinnings exposed. The box which enclosed the rotating metal and glass and held the myriad lights, as seen at the 1930 *Werkbund* exhibition, is missing (Figure 2). The conservation and display of the *Lichtrequisit* (or the *Light-Space Modulator* as it is now called) has been, for the most part, intentional and carefully considered, with involvement from Sibyl Moholy-Nagy and Hattula Moholy-Nagy, among others. Yet this occasionally operable object does nothing to achieve the active partnership or the productive role that both Moholy-Nagy and Brecht envisioned for the technological apparatus in the 1920s. Instead, the *Lichtrequisit* is now an artifact that is coaxed into spectacle on a monthly basis – and it is the mechanics and movement of the piece which are seemingly of greater interest today than its' reflections of light, an emphasis proven by the lack of dramatic spot lighting for the work to reflect.¹⁴

Conservators of the original *Lichtrequisit* have been successful in preserving physical presence, however, without the illumination of multiple light sources, the work is not fulfilling its' role as a light prop for an electric stage. There are three extant copies of the work, at the Bauhaus Archive in Berlin, the Van Abbe Museum in Eindhoven, and the Tate Modern in London. These reconstructions are shown explicitly as “exhibition copies,” and have included various sources of multi-colored lights and an enclosed base around the mechanics of the work (Figure 3) – but none include the original Trolit box and light rig. Critic Hilton Kramer's 1970 review of an exhibition copy shown at the Howard Wise Gallery (New York) incisively recognizes that this display of *Lichtrequisit* mistakenly centers on the apparatus, rather than “...bind[ing] our sense of the object and its luminous, moving projections into a single visual experience.”¹⁵ He concludes: “What we have in this new object is a fiction – a useful, instructive, even delightful fiction that illuminates the past without really restoring it to us.”¹⁶ 36 years later, a newer

¹⁴ “Light Prop For an Electric Stage – Past and Present,” 2019, Harvard Art Museum, <https://vimeo.com/343269811>

¹⁵ Hilton Kramer, “A Replica of a Classic,” *The New York Times*, November 8, 1970.

¹⁶ Kramer.

exhibition copy was included in “Albers and Moholy-Nagy: From the Bauhaus to the New World” (Tate Modern, 2006) and for critic Roberta Smith, the “reconstruction of [Moholy-Nagy’s] rotating magic-lantern sculpture” was “among the show’s high points,” and an “early example of kinetic art.”¹⁷ Clearly, neither of these exhibition copies succeeded in recreating Moholy-Nagy’s fifth and final form of sculpture: the dematerialization of the object to the extent that only movement and volume relationships are important.¹⁸ Smith’s evocation of the magic lantern in her review is particularly disappointing, as such devices were used to project images on screens, specifically directing viewer’s attentions away from the apparatus itself.

The mechanical reproductions of the original *Lichtrequisit* fail to recreate the aura because they are both altered and detached, albeit with the best intentions in mind, from the space and time of the original. The critical recognition of this difference points to the nuanced perception of the viewer: that despite mechanical similarities, the exhibition copies fail to provide the intended totality of experience in which the aura resides. This contradicts Benjamin’s assertion that reproduction will divest the object of perceived uniqueness, instead the reproductions assert the singularity of the *Lichtrequisit*, to an extent recognized by its conservators. Why else must the reproductions be exhibited as “exhibition copies” if not to underscore the unique properties of the original? It is also true that the original *Lichtrequisit* no longer creates the productive interaction between light, apparatus, and viewers that Moholy-Nagy envisioned, instead the productivity of the *Lichtrequisit* now resides in the work’s auratic communication of a historical moment.

More than a crucial technological component that emits light, the visible apparatus possesses an agency: as an experiment in socio-political potential, a physical cue for the location and positioning of the viewer, or as a tangible node in a complex dispositif. This study has described three distinct

¹⁷ Roberta Smith, “On the Paths of Two Giants, Voyagers in Modernism,” *The New York Times*, November 3, 2006, sec. E2.

¹⁸ Moholy-Nagy, *Vision in Motion*, 237.

functions of the apparatus, but by no means is this an exhaustive list, it is rather a suggestion of an investigative beginning point for other light-based works.



Figure 1: László Moholy-Nagy, *Lichtrequisit einer elektrischen Bühne*, 1930, as presently installed at the Harvard Busch-Reisinger Museum. Still of video from <https://www.harvardartmuseums.org/article/em-light-prop-for-an-electric-stage-em-past-and-present>



Figure 5: László Moholy-Nagy, *Lichtrequisit einer elektrischen Bühne*, 1930, as pictured in *Die Form*, 1930



Figure 6: László Moholy-Nagy, *Lichtrequisit einer elektrischen Bühne*, exhibition copy, 1970, at van Abbemuseum, Eindhoven.
Photo vanabbemuseum.nl

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VITA

Name	Georgina Elizabeth Ruff
Education	B.S. Marketing, Penn State University, State College, PA, 1997 B.A. Studio Art, University of Maryland, College Park, MD, 2002 B.A. Art History, Portland State University, Portland, OR, 2007 Ph.D. Art History, University of Illinois at Chicago, IL, 2020
Teaching	San Francisco Art Institute, San Francisco, CA Art and Technology Lecturer, 2016 School of the Art Institute of Chicago, IL Art History Lecturer, 2012-2013 Illinois State University, Normal, IL Art History Lecturer, 2011-2012 University of Illinois at Chicago, IL Art History Lecturer, 2011, 2013 Art History Teaching Assistant, 2009-2011
Fellowships and Awards	Dean's Scholar, University of Illinois at Chicago, 2014-2015 German Academic Exchange (DAAD) Fellow, 2013-2014 Staatliche Hochschule für Gestaltung, Karlsruhe, Germany Mellon Fellow: Seminar in Technical Art History, 2013 New York University, New York City, New York Research Travel Grant, University of Illinois at Chicago, 2011 Jane Kristoff Scholarship, Portland State University, 2007
Publications	"From <i>Please Turn</i> to 'Please Don't Touch' Finding the Embodied Viewer in Otto Piene's Early <i>Lichtballette</i> ," chapter in <i>Moving Images, Mobile Bodies: the Poetics and Practice of (Techno-)Corporeality in Performing and Visual Arts</i> , Cambridge Scholars Press, 2018 "The Consequences of the Apparatus: Technology and Otto Piene's <i>Lichtballette</i> ," <i>Acoustic Spaces 13: Archiving</i> , Fall, 2015 Co-author with Bahar Emgin, Matteo Serafini, Iytte Thorndahl, "Conference Report: Technology, the Arts and Culture," <i>ICON: the Journal of Record for ICOHTEC</i> , Winter 2013

"From Playground to Fetish: the Identity of (the) Mary Jane," *Mid America College Art Proceedings*, December 2012

"Fluorescent Paper Trail: Dan Flavin's Diagrams," *Shift Graduate Journal of Visual and Material Culture*, peer reviewed journal, October 2012

Presentations

"Der Apparat: Brecht and Moholy-Nagy," at The German Studies Association Annual Conference, Portland, October 2019

"If the Lights Turn Themselves Out, Are We Still Here? Tracking the Embodied Viewer in Otto Piene's Early *Lichtballette*," at Bodies in Between: Corporeality and Visuality from Historical Avant-garde to Social Media, Cluj, May 2014

"The Consequences of the Apparatus: Otto Piene's *Lichtballette*" at RENEW: Histories of Media Art, Science, and Technology Conference, Riga, October 2013

"The Consequences of the Apparatus: Otto Piene's *Lichtballette*" at the Art Institute of Chicago Mid-West Graduate Invitational Graduate Seminar, April 2013

"The Consequences of the Apparatus: Otto Piene's *Lichtballette*" at the (Re)Activating the Object: Social Theory and Material Culture Conference, Western University, London, Ontario, March 2013

University of Illinois at Chicago Art History PhD. Symposium, March 2013

"From Playground to Fetish: The Identity of (the) Mary Jane" at the Mid America College Art Association Conference, Detroit, October 2012

"Domestic Fluorescent: The Technological Illumination of the American Suburbs" at the International Conference on the History of Technology (ICOHTEC), Barcelona, July 2012

Scholars Seminar Participant, *Light Years: Conceptual Art and the Photograph 1965-1977*, The Art Institute of Chicago, 2011

Roundtable Participant, Rebecca Solnit, "River of Shadows: Eadweard Muybridge and the Technological Wild West," The Terra Foundation, 2011

Roundtable Participant, Elise Archias, "On Imitating As Precisely As Possible: Yvonne Rainer's Spiraling Down and a Model of Art for the Present," Gallery 400, 2011

"Light Art: Environments of Perception" at University of Texas, Conference 1968: A Perspective, 2009

Professional Service

Art Instructor, John Muir School, Ashland, OR, 2017

Copy Editor, New Media Caucus CAA Conference Edition, 2014

"Performativity and Spatiality" Panel Chair, Bodies in Between: Corporeality and Visuality from Historical Avant-garde to Social Media, Cluj, May 2014

Research Assistant, Dr. Hannah Higgins, 2012-2013

"Donald Judd: Credible Art" Organized UIC Roundtable with Dr. David Raskin, October 2012

UIC Art History Graduate Student Association, Graduate Symposium Panel Moderator, 2012

Travel Chair of UIC Art History Graduate Student Association, 2011-2013
Organized group travel to Indianapolis, Marfa, Farnsworth House

Chicago Humanities Festival volunteer, 2012

Contributor to *ChiCritics* and *ArtSlant-Chicago*

Guest writer for Co-Prosperity Sphere Artist Class, 2011

College Art Association volunteer, 2010-2011

Registrar Intern, Chicago Museum of Contemporary Art, 2009

Curatorial Assistant, Jane Addams Hull House, Chicago, IL, 2007-2009

Coordinator of monthly Art Fair, PosterGarden, Portland, OR, 2006-2007

Arts Writer, *Portland State Vanguard*, 2006-2007

Portland Contemporary Art Museum and Time Based Art Festival volunteer, 2004-2006

Portland Art Museum docent, 2003-2006

**Professional
Memberships**

UIC Art History Graduate Student Association
UIC Lecture and Events Committee
College Art Association
Mid-America College Art Association
German Studies Association
International Committee for the History of Technology
New Media Caucus

Languages

German (C1), French (A2), English (native)