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The Spotlight, the Reflector, the Electric Sign: Light Art and Technology in 1920s Germany

by

Amy Melissa Venator

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APPROVED, THESIS COMMITTEE

Graham Paul Bader, Chair
Chair, Department of Art History
Associate Professor of Art History

Gordon Hughes
Director of Undergraduate Studies, Department of Art History
Associate Professor of Art History

Scott Colman
Assistant Professor, School of Architecture

HOUSTON, TEXAS
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ABSTRACT

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This dissertation examines mechanical light art made in 1920s Germany by Raoul Hausmann, Nikolaus Braun, Ludwig Hirschfeld-Mack, and László Moholy-Nagy. It reframes Moholy-Nagy’s Light Prop for an Electric Stage, which begins most accounts of light art, as the last in a decade of sustained artistic engagement with electric light. Although these artists worked in different circles, in different cities, and over a span of ten years, each responded to Germany’s rapid electrification during the mid-twenties, a process symbolized by the streetlights and lighted advertisements of the nighttime metropolis. In reconstructing these lost works, I argue that artists’ encounters with light technologies inspired them to repurpose electric light as an artistic medium.

Here the similarities end, for the light arts were as different as the technologies that inspired them. Dada artist Raoul Hausmann’s optophone of 1921 was an unbuilt device that projected colored light and transformed it into corresponding sound using photoelectric cells. This technology and the science behind it proved light’s unstable materiality, the central theme of Hausmann’s optophonetic art. In 1923, November Group member Nikolaus Braun exhibited
his alternating light pictures, reliefs lit internally by hidden lightbulbs and inspired equally by his teacher’s light studies and his work in his father’s brilliantly lit cafés. His light art’s affinity with the café’s sculptural light fixtures engaged with contemporary debates about café culture. The same year, Bauhaus student Ludwig Hirschfeld-Mack premiered his color-light plays, pseudo-cinematic projections of moving colored shapes synchronized with music. The color-light plays used electric light to create the absorptive psychological state the artist experienced while making art and, in his late pedagogical work, observed in children at play. The final chapter returns to László Moholy-Nagy’s *Light Prop* at the 1930 Paris Werkbund exhibition. I argue that the *Light Prop* constituted Moholy-Nagy’s critique of the exhibition’s message of standardization, while also betraying the artist’s inability to come to terms with electric light’s commercial origin in lighted advertising. Despite their differences, Weimar Germany’s light artists shared a deep, often conflicted, relationship with electric light that spoke equally to its potential and limitations as an artistic medium.
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The development of new technical means has resulted in the emergence of new fields of creativity; and thus it is that contemporary technical products, optical apparatus: the spotlight, the reflector, the electric sign, have created new forms and fields not only of representation but also of color composition.

László Moholy-Nagy, 1925

My dissertation emerges from the surprisingly productive intersection of two exhausted clichés: modernism’s fixation on technology and artists’ love of light as both subject matter and object of study. Arguably, these clichés were never more exhausted than in the scholarship of the German Weimar Republic, that fifteen-year period between the First and Second World Wars in which a nineteenth-century colonial empire transformed overnight into a modern nation state. These conditions produced a society that defined itself through its rejection of the prewar past in favor of everything new, everything modern, with the metropolis of Berlin as its official and symbolic capital. German artists contributed to this revolutionary groundswell, abandoning, for the most part, the expressionism that had been so full of potential in the years before the war. Instead, they looked for new modes of expression in unexpected places, searching for self-consciously

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modern idioms appropriate for the world-historical events they had witnessed. This mindset produced artist writings like the epigraph above, in which László Moholy-Nagy described his excitement about new and newly disseminated light technologies—“the spotlight, the reflector, the electric sign.” Generations of art historians have written about Weimar’s cyborgs, its “Art in the Age of Mechanical Reproduction,” and its artist-engineers. Photomontages included pictures of machines, and paintings depicted the war wounded as man-machine hybrids. But in these examples, technology was secondhand, indirect, or metaphorical. Where were the “forms and fields” of technological art Moholy-Nagy saw in 1925?

Until now, the answer has been a few select motorized works from the interwar period celebrated for their singularity: Naum Gabo’s *Kinetic Construction (Standing Wave)* of 1919-20, Marcel Duchamp’s *Rotary Glass Plates (Precision Optics)* of 1920, and, later, Moholy-Nagy’s *Light Prop* of 1930. It isn’t simply that these works were unique in historical terms: with the exception of Duchamp’s spinning discs, they were also unique within the artists’ oeuvres. Neither Gabo nor Moholy-Nagy developed their technological art further. But in the footnotes of the major histories, passing references to other works appeared. Motorized kinetic sculptures like Fortunato Depero’s *Motorumorista* of 1914-15, Alexander Archipenko’s *Archipentura* of 1927, Alexander Calder’s *Dancing Torpedo Shape* of 1932, and Bruno Munari’s

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Useless Machine of 1933 joined early experiments with artificial light like Alexander Scriabin’s *Prometheus, the Poem of Fire* of 1915 and Thomas Wilfred’s *Lumia* of 1922 to suggest that a larger, international community of projects existed that used technology as artistic media. Survival was the factor that separated these lesser-known works from their more famous counterparts. We still have the originals or artist-authorized reproductions of Gabo, Duchamp, and Moholy-Nagy’s technological artworks. The others were lost, their artists deceased, and little documentation survived.

While some of these losses resulted from emigration and bombing during the Second World War, many of the artists like Gabo and Moholy-Nagy simply discontinued their technological experiments. This pattern of abandonment is strong enough to support Adrian Klein’s claim that technology in the interwar period was too primitive to meet artists’ needs. In the first history of light art, 1926’s *Coloured Light: An Art Medium*, Klein argued that the nascent state of lighting technology limited its use in art and, as of 1926, it had only recently advanced enough to permit the first experiments. Still, “the illuminating engineer is not an artist, and most artists are not engineers,” Klein wrote. Like Moholy-Nagy, he predicted that “one or two artists will arise who will be capable of intelligently making known their wants to those competent to meet them. Having then the right instruments, the works of art will soon follow.” With this dissertation, I argue that technological light art of the kind Moholy-Nagy

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4 Ibid.
conceived had already emerged as a broad-based phenomenon in Weimar Germany at the time of Klein’s writing. My examination of four artists’ adaptation of electric light as an artistic medium demonstrates its traction as a source of renewal in the 1920s.

My study begins with Raoul Hausmann’s optophone, a device that simultaneously projected colored light and converted it into a corresponding sound based on the premise that all forms of energy that traveled in waves were fundamentally exchangeable. Hausmann first proposed the optophone in 1921, which made it the earliest of the interwar light arts and his first major project following his departure from Berlin Dada the same year. Although Hausmann never built the optophone, he developed his ideas over a lifelong inquiry that lasted until his death in 1971. His design changed over the years but always hinged on the photoelectric cell, a device invented in the nineteenth century to convert light waves into electricity. This singularly unassuming technology also revolutionized scientific understanding of light. In 1921, the same year Hausmann invented the optophone, Albert Einstein won the Nobel Prize in Physics for explaining the science behind the photoelectric cell. To do so, he conceptualized light as a stream of subatomic particles called photons, a model incompatible with the prevailing wave theory of light. In the aftermath of this debate, we say that light exhibits ‘wave-particle duality’, a simplification that obscures light’s paradoxical, unstable, and unknowable materiality. This aspect of light, condensed in the form of the photoelectric cell, made it the ideal medium for
Hausmann’s optophone, which I interpret as an exploration of the limits of materiality in the visual arts.

The year 1923 brought the public premiere of the next two projects: Nikolaus Braun’s alternating light pictures (wechsende Lichtbilder) at the Great Berlin Art Exhibition and Ludwig Hirschfeld-Mack’s color-light plays (Farbenlichtspiele) at the first official Bauhaus exhibition. A student of the expressionist painter Arthur Segal, Braun rejected oil painting sometime in 1922 in favor of assembled reliefs, which he lit internally with incandescent light bulbs hidden in the works’ terraced structures. In his most advanced reliefs, the lightbulbs turned on and off automatically, using electric light as a medium with which to transform the surface appearance of the work. Braun arrived at this innovative use of electric light through an unusual combination of personal and professional influences. His teacher, Segal, was in these years newly engaged with the study of light viewed through a prism, a phenomenon Johann Wolfgang von Goethe first documented in 1792 and the philosopher Salomo Friedlaender, Segal’s close friend, resurrected in 1918. Braun assisted Segal in these studies while also managing the café attached to Berlin’s Kroll Opera House, one of several cafés his father owned. I argue that Braun’s alternating light pictures emerged equally from his daily light studies with Segal and his nightly work in his father’s cafés, theatrical spaces known for their elaborate, overly lit interiors. Braun’s reliefs engaged critically with the symbolic association of electric light within period debates about the social function of Berlin’s cafés and the larger mass entertainment industry they served.
Like Braun, Hirschfeld-Mack adopted electric light as an artistic medium, but his elaborate color-light plays demonstrate its flexibility. While Braun used his light sources to modulate the surface of the artwork, Hirschfeld-Mack developed a complex apparatus that projected colored light in geometric shapes that moved in time with music the artist composed and performed. He described his color-light plays as a new artistic genre that resembled abstract paintings set into motion. My reading grounds the color-light plays in the historical context of their production; namely, the Bauhaus of 1923, a turning point in the school’s history marked by director Walter Gropius’s mandate “art and technology: a new unity.” In this context, the color-light plays resuscitated the Gesamtkunstwerk, a central theme of the Bauhaus before 1923, by adopting technological means for artistic ends while also restoring the Wagnerian element of empathic spectatorship missing from earlier Bauhaus attempts at an architectural total work of art. Hirschfeld-Mack produced an immersive performance in which the abstract elements of color, form, movement, and music recreated for the viewer the same absorptive mental state he experienced while making art. After he left the Bauhaus, Hirschfeld-Mack continued this work as an art teacher and pedagogue, developing a theory of play-centered learning that identified psychological absorption as the essential component of the archetypal creative acts of art making and child’s play.

Braun and Hirschfeld-Mack continued to develop their respective light arts until the late twenties when they moved on to other activities. Braun followed

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Segal’s lead and returned to painting in a realistic style more conducive to then-popular *Neue Sachlichkeit*. Hirschfeld-Mack started a new career in art pedagogy. Hausmann alone continued his experimentation with light, although even he focused on photography and writing until his three late optophone essays published between 1929 and 1932. Yet, as Braun and Hirschfeld-Mack ended their projects, Moholy-Nagy chose that moment to debut his *Light Prop for an Electric Stage* (*Lichtrequisit einer elektrischen Bühne*) in the *Werkbund* rooms of the 1930 Salon of the Society of French Decorative Artists. The *Werkbund* committee—led by Gropius and with galleries curated by Moholy-Nagy, Marcel Breuer, and Herbert Bayer—used the exhibition to promote the idea of German superiority in the design of mass produced standardized goods for the home and office. I argue that Moholy-Nagy’s gallery and the *Light Prop* he designed for it challenged the exhibition’s dominant narrative, a critique based on his idea of design as an artistic rather than commercial activity. To that end, the *Light Prop*’s motor-driven sculpture and complex lighting liberated the machine and electric light, respectively, from their commercial exploitation in the manufacture and marketing of standardized goods by repurposing them as artistic media.

These interpretations show that artists’ experimentation with electric light in Weimar Germany was not the result of a simple process of influence and inspiration. There were points of contact between the four artists. Hausmann was a close friend of Braun’s teacher, Segal, and it is likely all three became interested

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in light due, in part, to their mutual friend Friedlaender’s revival of Goethe’s light studies. Likewise, Moholy-Nagy arrived at the Bauhaus in time to witness the premiere of the color-light plays and included a statement by Hirschfeld-Mack along with a demonstration score and photographs from a performance in his 1925 book *Painting, Photography, Film*, where Moholy-Nagy also praised the optophone’s ingenuity. In the small world of the German artistic avant-garde, we can assume that these artists knew of the others’ inventions. Yet, their projects exhibited none of the similarities we would expect to find if this flourishing of light art were merely a matter of direct influence. Instead, the differences between the inventions and their unique adaptations of electric light impress us most. Hausmann projected washes of colored light and converted it into sound, Braun wired electric lights into his reliefs, Hirschfeld-Mack shaped projected colored light and set it into motion, and Moholy-Nagy housed his reflective kinetic sculpture in a box with programmed light effects. There were broad similarities—Hausmann and Hirschfeld-Mack projected light while Braun and Moholy-Nagy used it to sculpt surfaces—but even these fall apart under the pressure of their specific applications. The optophone and color-light plays were light shows coordinated with music—both even shared film as a common reference—but Hausmann’s study of wave energy was a world apart from Hirschfeld-Mack’s psychology of absorption, etc. My point is not to chronicle the myriad intersections and divergences of the four projects, but to argue for their status as contemporaneous but largely independent responses to a common social historical phenomenon; namely, the domestication of lighting technologies from a magical
force to a familiar convenience of daily life. To conclude this introduction, I consider the progress of lighting technology in the world these artists inhabited.

Electric light arrived in Germany well before the First World War. It first appeared in the arc lights of street lamps, factories, and shipyards at the end of the nineteenth century. But arc lights were too powerful and dangerous a light source to use in the enclosed spaces of shops and homes, and the carbon filaments of the first incandescent lightbulbs burnt out quickly, an inconvenience that limited their use. It was only with the invention of the tungsten filament in Hungary in 1906 that incandescent light bulbs achieved the functionality necessary to challenge gaslight; even so, German bulb manufacturers continued to use the less desirable but locally developed filament material osmium until 1910. As a result, Germans did not realize the full advantages of electric lighting until four years before the outbreak of war. Nevertheless, electric lighting spread across Germany’s major cities and was especially associated with Berlin. The city’s historical strength in manufacturing meant it had adopted electrification early to power its machines and, consequently, on the eve of the war it was home to one of the world’s largest electric supply utilities, the Berliner Städtische Elektrizitätswerke (Bewag), and two of the world’s largest manufacturers of electrical machinery, Allgemeine Elektrizitäts Gesellschaft (AEG) and Siemens & Halske. As a result, the story of electric lighting in Germany is largely the story of electric lighting in Berlin, a

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situation that suits this study because Hausmann, Braun, and Moholy-Nagy were all Berlin residents when they invented their light arts. Hirschfeld-Mack, who lived in or near the city of Weimar until 1930, was the only exception to this rule.

Despite Berlin’s reputation as a leader in electrification, electric lighting remained a largely public and commercial phenomenon until the 1920s thanks to policies that charged private customers exorbitant prices. Only 6.6 percent of Berlin households were electrified in 1914. That statistic rose to 25 percent in 1925, the same year Gropius designed the Bauhaus Dessau main campus and faculty residences for electrification. So, for instance, Moholy-Nagy had electric lighting in his home when only one-quarter of Berliners enjoyed the same luxury. Of the other artists under consideration, only Braun could have afforded electricity service at home, which adds wealth as another factor contributing to his early development of electric-powered sculpture. By 1930, 68 percent of Berlin households were electrified. Although this statistic seems poor by modern standards, this meant that the percentage of Berlin households with electrification increased by 175 percent—from 25 percent to 68 percent—over a span of only five years. In real terms, this meant the majority of Berliners experienced the miracle of household electrification sometime during the 1920s.

Even if Berliners lacked household electrification, it was a long-established feature of public life. Streetlights, streetcars, and commuter trains had gone

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9 Also: AEG financed Moholy-Nagy’s Light Prop, which was built by AEG electrical engineers in AEG’s Berlin theater lighting workshop.
10 Statistics from Hughes, Networks of Power, 190; Peter Czada, Die Berliner Elektroindustrie in der Weimarer Zeit: eine regionalstatistisch-wirtschaftshistorische Untersuchung (Berlin: Colloquium Verlag, 1969), 156.
electric well before the First World War, and Berliners came to rely on the conveniences of nighttime shopping and reliable transportation. All of this changed during the war, when even Berlin’s famous electric supply, bolstered by generous state subsidies, proved inadequate. Temporary blackouts of civilian electric infrastructure that began in 1917 became permanent by the end of the year. As Frances Guerin observes, Berlin’s streets were dark for the first time since the installation of gas lighting circa 1850. Thus by war’s end, the restoration of public electric lighting, especially for Berliners, signaled their return from the wilderness of their grandparents’ time. Even better, the wartime spending on military production had dramatically increased the electricity supply—from 250 million kilowatt hours in 1914 to a peak of 475 million kilowatt hours in 1917—and led to refinements in incandescent lightbulb technology.\(^{11}\) All of this meant that at the end of the war, but especially after the end of hyperinflation in 1923, Berlin’s lighting engineers were more than able to meet residents’ demands for more and more sophisticated electrical lighting. In chapters two and four, I discuss the symbolic associations of café lighting and lighted advertisements, respectively, concluding that both were integral elements of Berlin’s street life. Equally if not more important were cinemas, which were not only screened by electric projectors, but whose façades were among the most brilliantly decorated in interwar Berlin. Although much more can be, and has been, said about the proliferation of electric light in Weimar Germany, this brief account explains in general terms why a technology from the first decade of the twentieth century had

\(^{11}\) Hughes, \textit{Networks of Power}, 190.
to wait twenty years to find its way into art. It was only when electric light had reached a state of technological maturity and experienced widespread applications in daily life that it became sufficiently domesticated for use by artists.
Raoul Hausmann’s Optophone

Figure 1.1 – Raoul Hausmann, *Optophone Diagram (Simplified)*, after 1964.

Raoul Hausmann made only one image of the optophone. He drew this diagram near the end of his life, more than forty years after inventing the device.
in 1921. Although it represents the optophone’s final form, it is a good place to begin. The process starts simply enough with a single lamp. Hausmann drew its light as a black line that travels through a slit and lens to a prism, where it refracts to strike a quartz plate. Here the first transformation takes place. The light arrives at a small plate of colored gelatin (shown in the diagram but not labeled) selected by the operator from ninety-nine others via a keyboard. The gelatin colors the light and returns it to the prism, where it refracts again and travels through a second lens. Here the process divides into two paths: one optical and the other acoustic. In the first, light projects on a screen as a wash of solid color. In the second, it strikes a photoelectric cell, which converts the light waves into an electric current sent to a speaker. The speaker then converts the current to sound waves and amplifies them.

Hausmann’s diagram ends leaving the viewer to imagine the optophone in performance. The setting would be a room like a movie theater, darkened and with a projection screen on the back wall. The lamp turns on, the operator strikes a key, and the performance begins. A series of colors spreads across the screen, one at a time, no two alike. As this happens, the audience hears an unfamiliar sound. It isn’t music in the normal sense of the word—it has neither melody nor harmony—but a sustained note that moves up and down in pitch and volume as the color changes. Modern viewers would recognize its pure sustain as electronic music. Would the audience notice the sound changing with the color? Would they sense a connection between the color and the sound? The program might explain it as Hausmann did in 1931. “Dear musicians, dear painters: you will see with
your ears and you will hear with your eyes and you will run mad!”12 This is the essence of the optophone project. Hausmann designed the optophone to produce light-sound (‘opto’-‘phonetic’) duality premised on his belief that all energies that travel in waves are aspects of the same natural phenomenon. Hausmann updated the optophone’s design over its forty-year evolution, but its purpose—to simultaneously project colored light and corresponding sound—never changed.

Here we confront a common misreading of the optophone; namely, that it converted light to sound and back again. The optophone was “an apparatus designed to transform sound signals into light signals and vice versa”13 according to Ina Blom and “a mysterious machine converting sounds into images and vice versa” for Marcella Lista.14 These scholars faithfully repeat the artist’s 1963 description of the optophone as “a device for transforming visual forms into sounds and vice versa.”15 He described a two-way machine that converts an image into a sound or a sound into an image. But Hausmann’s description contradicted the operation of the machine illustrated in the diagram, which converts white electric light into synchronized colored light and sound. His simplification benefitted unfamiliar readers but misrepresented the optophone’s true operation.

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These accounts of the optophone result from a lack of attention to the specifics of its operation. None of the authors examine the diagram or technical writings in detail. If they had, they might have corrected the misunderstanding Hausmann began. Because he never built the optophone, historians treat it like a cross between a literary exercise and a theoretical construct. Hausmann’s optophone essays present a rich network of ideas and invite discussions of neo-Kantian philosopher Ernst Marcus’s theory of perception\textsuperscript{16}, the Italian Futurist poet F.T. Marinetti’s theory of tactilism\textsuperscript{17}, or Dada photomontage and sound poetry.\textsuperscript{18} These studies provide valuable insight on the discourses that shaped the optophone without, however, addressing the device Hausmann describes or its place in his larger practice. Readers become experts on Marcus, Marinetti, or Berlin Dada, but lack basic knowledge of the optophone, the alleged object of study. Arndt Niebisch alone in his 2012 book \textit{Media Parasites in the Early Avant-Garde} examines the optophone’s material conditions and production. He argues that Hausmann and other avant-garde artists of the early twentieth century fed on the new technological media of their time like parasites. Although our projects differ, Niebisch’s careful attention to the specifics of Hausmann’s technologies offers a refreshing and productive methodological approach.

My examination challenges the conclusion that the optophone was a byproduct of Hausmann’s intellectual pursuits. His failure to build the device


\textsuperscript{17} See Lista, “Raoul Hausmann’s Optophone: ‘Universal Language’ and the Intermedia.”

signaled neither his disinterest nor a flaw in the design. The optophone Hausmann illustrated in the diagram and described in detail as early as 1923 was sound in theory. Attention to the optophone’s changing design shows that, although Hausmann frequently altered his method of projecting colored light—what I described above as the first path—his method of transforming the light to sound never changed. In this second path, the colored light strikes a photoelectric cell, which converts the light to electric current. This technology dates from the nineteenth century and, as such, is old and well documented. The optophone Hausmann illustrated in the late diagram was both functional and relatively simple by period standards. He would not have cultivated knowledge of light-sound technology and developed a working plan for a project if the optophone were only an intellectual exercise. Perhaps Hausmann never built the optophone for practical reasons; my examination argues that the optophone’s incompletion suited Hausmann’s artistic purpose better than its construction. I arrive at this conclusion by approaching the optophone on his terms—as a functional device—and by restoring technology to the center of the discussion.

The photoelectric cell played a central role in the optophone’s operation. It converted the light waves into electric current, which produced a corresponding musical pitch. This singularly unassuming device also revolutionized scientific understanding of light. In 1921, the same year Hausmann invented the optophone, Albert Einstein won the Nobel Prize in Physics by explaining the science behind the photoelectric cell. In so doing, he conceptualized light not as a mechanical or electromagnetic wave, but as a stream of subatomic particles called photons. This
new model of light became the quantum theory and established the field of quantum physics. It also inaugurated a still-unresolved debate on light’s fundamental character. We say that light displays the characteristics of both a wave and a particle—that it exhibits ‘wave-particle duality’. But this shorthand does not say what light is, because its quantum nature is inexplicable in classical terms. It describes light’s observed behavior without explaining its underlying source. Light, thus, became the site of a complex debate in the 1920s centered on its paradoxical, unstable, and unknowable materiality.

As this debate played out within the physics community, Hausmann engaged with a similar set of ideas around materiality in his writings and art. The optophone belonged to a series of projects in which Hausmann proposed an optical-acoustic duality through an art of unstable and paradoxical materiality. In exploring artistic materiality, Hausmann’s optophonic project resembled the conceptual art John Chandler and Lucy Lippard examined in their 1968 essay “The Dematerialization of Art.” Light and sound—the optophone’s Janus-faced outputs—first appeared as popular artistic media in the 1960s, when Chandler and Lippard’s artist protagonists of the “intermedia revolution” adopted them as tools in their campaign to deconstruct the traditional art object. They describe a kind of art “that emphasizes the thinking process almost exclusively”—an “art as idea” in which “matter is denied, as sensation has been converted into concept.”

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this chapter, I suggest that the optophone was conceptual art before the advent of conceptualism. Hausmann used electric light as a medium to create an art of light and sound that deconstructed materiality on several orders. Chandler and Lippard’s conceptual artists employed dematerialization as a strategy with which to erode the integrity of the art object, but Hausmann’s conceptualism did not reject materiality as such, but redefined it as an unstable spectrum of possible states, ranging from base physicality to its total lack. Light’s paradoxical materiality, harnessed in the photoelectric cell, made it the ideal medium for Hausmann’s optophonetic explorations.

1.1. Constructing the Optophone

Figure 1.2 – Raoul Hausmann, *Self-Portrait of a Dadasoph*, 1920. Collage and photomontage on handmade Japanese paper, 14¼ x 11 in. Private Collection.
In unpacking these claims, the first point to consider is the degree and nature of Hausmann’s engagement with technology, which predated his invention of the optophone. His Dada photomontages exemplified this tendency and, in revisiting these familiar objects, this examination concentrates on their relevance to the optophone. Photomontage’s recycling of mechanically produced sources, mostly photographic, made it an inherently technological medium. Yet, although many Berlin Dadaists made photomontages, Hausmann stood apart for his frequent use of machine iconography. In 1920, the year before Hausmann invented the optophone, he made the photomontage *Self-Portrait of a Dadasoph*. Dadasoph was Hausmann’s Dada alter ego, which confirms this image as a self-portrait of the artist, as its title suggests. Hausmann built the photomontage on a portrait of the disgraced former Defense Minister Gustav Noske from the cover of the *Berliner Ilustrirte Zeitung* for March 2, 1919. The portrait depicted Noske seated in a chair. His three-quarter view and frock coat recalled the visual conventions of official portraits of business executives and politicians. Hausmann included a label at the bottom right of the work that reads “Management r. hausmann,” humorously suggesting an alternate identity as a businessman. To this portrait, Hausmann added a set of anatomical lungs with a branching network of arteries and veins from a medical dictionary. In contrast, the head is entirely mechanical. Hausmann replaced it with a cluster of devices dominated by the

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22 Brigid Doherty reproduces the original source image; see Brigid Doherty, “Figures of the Pseudorevolution,” *October* 84 (1998): 72.
round dial of a fuel gauge. He surrounded the dial with smaller machine parts: the double reels of a film projector emerge above the back of the dial, while a pipe and meat grinder appears below.

Figure 1.3 – Huttenlocher fuel gauge advertisement. From *Motor: Monatsschrift für Kraftverkehrs-Wirtschaft und -Technik*, March/April 1919.

The dial might have come from any device; however, its printed face identifies it as a fuel gauge made by the Berlin-based Huttenlocher firm. In iconographic terms, its round face is an effective substitute for Hausmann’s own

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23 Doherty incorrectly identifies the fuel gauge as a pressure gauge, a mistake repeated in later studies by different scholars. Ibid., 75.
In procedural terms, it offers an unexpected insight into the kinds of journals Hausmann raided for his source images. The same Huttenlocher fuel gauge appeared in an advertisement that ran in the March/April 1919 issue of the journal *Motor*. A few details demonstrate that a black-and-white version of the same advertisement was Hausmann’s original source. The printed elements of the two faces—the spiral, increment notches, numbering, and lettering—are exactly the same, down to their placement. Both arrows point to one notch below the number six. The advertisement’s stylish design raises the question of its intended reader. The four-color image shows the motorized vehicles in which the fuel gauge might be installed—from the automobile in the foreground and the motor boat and cargo vessel in the ocean to the airplanes and zeppelin in the sky. This sophisticated presentation suggests that the advertisement appeared in a journal targeting a general audience; in fact, *Motor* was the official journal of Germany’s National Association of the Automobile Components Industry. Its readership likely comprised, firstly, its members—employees of automobile component manufacturers like Huttenlocher—and, secondly, automobile mechanics. In other words, *Motor* served a specialist audience. Hausmann may have sought out such specialist journals to harvest source images; after all, he wouldn’t find a large-format photograph of a fuel gauge in *Vogue*. However, it is more likely that what began as Hausmann’s visual interest in the images became a deeper engagement with the technical contents of the journal’s articles. This technological expertise is apparent in his optophone writings.
The self-portrait’s mechanical head has a second implication for the optophone. It demonstrates Hausmann’s particular interest in a technology-assisted sensorium; that is, technology used to improve the human senses. In the self-portrait, Hausmann concentrated the mechanical interventions in the figure’s head, the site of four of our five senses—sight, hearing, smell, and taste—and of course, of the brain that process them. In addition, the technologies he selected appeal to the senses. The film projector and fuel gauge replace his sense of vision,

while the meat grinder and pipe as pseudo-orifices allude to taste. Within the context of a self-portrait of Hausmann, the dial takes on a more specific association as the monocle he habitually wore in his left eye. He wore it for a photographic portrait August Sander took in 1929, but it also appears in photographs from ten years earlier. The monocle is an example of the technologically aided sensorium I want to propose, what Matthew Biro describes as “technologically augmented vision.”

As a corrective lens, it improves the wearer’s vision. The *Self-Portrait of a Dadasoph*, then, offers an allegory for Hausmann’s use of technology as a tool for the improvement of his senses. This claim became the centerpiece of his optophone writings.

Hausmann first hinted at the optophone in his essay “Art and Time” published in May 1921 in a November Group journal, the last in a trio of essays he wrote that year calling for a postwar renewal of art and society. Culture, once the exclusive property of the ruling classes, now belonged to the proletariat. “We are witnessing the beginnings of a new man,” Hausmann wrote, “and his new disposition to the world in optics.” This new man with his new optical disposition called for a new art, which, unsurprisingly, resembled Hausmann’s own at the time. It abandoned “paint and plaster” in favor of “real materials, wood, glass, paper” that engaged with the real world. And there was nothing more

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25 Ibid., 47.
real than light, the medium that connects us to the world through vision. At the conclusion of the essay, he imagined what form the optical art of the future would take. One possibility was the “electric forms of the American Wilfred’s moving colors,” a reference to Thomas Wilfred’s electric light organ, called the Clavilux. Hausmann’s reference to Wilfred’s light art in 1921 is precocious. Wilfred invented the Clavilux in 1919, but its public debut didn’t take place until 1922. Hausmann described his first encounter with Wilfred in 1920 when “I came across an article in an illustrated New York periodical about Thomas Wilfred’s Clavilux.”

Lest too much be made of Hausmann’s familiarity with Wilfred, the Clavilux and optophone’s differences are numerous. Apart from the mechanics, which were completely different, Wilfred focused exclusively on the projection of colored light in shifting organic shapes. Unlike other color organ inventors, he had no interest in color-sound correspondence and performed the Clavilux in silence. From Hausmann’s brief reference, it is unclear if he fully understood Wilfred’s project; however, Hausmann’s discovery of the Clavilux interested him in the possibilities of mechanical art and introduced electric light as the ideal vehicle for his first technological foray.

Hausmann developed his ideas for a light art machine further in fall of 1921 in his essay “PRÉsentismus,” the first in a series on the ideology of presentism.

Here Hausmann codified the relationship between technology and human

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28 Ibid., 11.
sensation he hinted at in “Art and Time.” Presentism defined awareness of the present as a bodily act involving all the senses. Here, Hausmann’s debt to neo-Kantian philosopher Ernst Marcus is clear. He cited Marcus’s 1918 book The Problem of Eccentric Sensation and its Solution by name, and the model of perception he described is consistent with Marcus’s worldview. The present comprised all five senses—sight, sound, smell, taste, and touch—and a sixth sense Marcus called the perception of time-space. The visual arts appealed to sight, music appealed to sound, but, Hausmann observed, there was as yet no art that engaged the remaining four senses.

Marcus led Hausmann to a second observation: technology defined man’s experience of the present. Machines like airplanes and the telegraph changed daily life. Hausmann cited urban street lighting as an example of this transformation. In contrast to the nineteenth century’s “vast twilight,” the modern city street offered “light that penetrates all bodies.” “The eternal fluctuation of big-city streets in light” symbolized the city’s nighttime dynamism and transformed the street with “haste and movement.” Art had not kept up with the present. Artists continued to use outdated media and depict outdated themes. In response to this state of

31 This aspect of Hausmann’s philosophy and its relation to the optophone is a frequent subject of inquiry. Lista and Blom both address it in part, but the most complete treatment is in Niebisch. Hausmann had ample access to Marcus’s writings through his friendship with architect Johannes Baader, who knew Salomo Friedlaender as early as February 1915. Friedlaender’s research on Marcus resulted in his his 1930 book Der Philosoph Ernst Marcus als Nachfolger Kants (Essen: G.D. Baedeker, 1930). Ernst Marcus, Das Problem der exzentrischen Empfindung und seine Lösung (Berlin, Ger.: Verlag Der Sturm, 1918). For more on the relationship with Friedlaender, see Raoul Hausmann, Scharfrichter der bürgerlichen Seele: Raoul Hausmann in Berlin 1900-1933., ed. Eva Züchner (Berlin: Berlinische Galerie, 1998).
32 Hausmann, “PRÉsentismus,” 27.
affairs, Hausmann wanted to “update the respective realities of mental life, the so-called arts and sciences, to the present.”

Technology solved art’s twin problems of anachronism and visual bias. For one, technologizing art updated it for a mechanized society. Artists “yearn for conformity with the mechanical working process,” so they can participate in the machine revolution. Art should “emerge from the factory,” not the studio.

Hausmann proclaimed: “We demand electric, scientific painting!!!” He proposed a new machine to make art that stimulated sight and sound. It would “direct sound waves through giant transformers” in order to “transmit them in aerial spectacles of color and music.” According to Hausmann, the machine captured ambient noise—what he poetically described as “all our haptic emanations.” At night, transformers converted the noise into colored light projected into the black sky. In daytime, natural light overwhelmed these light shows. Instead, loudspeakers projected the noise, converted into sound, for public enjoyment to “make the atmosphere ring.” Thus, Hausmann’s first proposal for a new device—still unnamed and without a detailed description—converted the noise of the city into projections of color or sound, depending on the time of day.

This also essay contained the first of Hausmann’s many declarations of the equivalence of light waves and sound waves. “Waves of sound and light and electricity differ from each other only in their length and frequency,” Hausmann wrote. “Following the successful research into dynamic free-floating color forms

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34 Ibid., 26.
35 For this and the following quotes, Ibid., 27–28.
of Thomas Wilfred in America and the sound experiments of American and
German radio stations it is a small thing to exchange these waves using suitable
transformers for colorful or musical air displays of enormous size.”36 In this first
optophone, as in those that followed, electricity bridged light and sound and made
possible super-sensorial experience (amplified music, aerial color shows) as an
aide to man’s natural senses. According to Hausmann, the optophone helped the
viewer recognize the hidden scientific connection between light and sound.

However, Hausmann still provided no practical information about the device.
His vague discussion of transformers and aerial light shows—none of which were
possible with existing technology—betrays his lack of technical expertise.
Hausmann’s treatment of the device turned toward the technical in 1922. Starting
with “Optophonetics,” Hausmann named the device the optophone and described
it in terms of specific existing technologies. Before the performance, the artist
recorded a soundtrack optically onto cinematic film stock using the following
process. Sound entered a microphone attached to an arc lamp.37 The lamp
transmitted the sound waves visually as the fluctuating arc and acoustically as
compression of the surrounding air. To record the sound, the modified arc light
shone on a selenium cell. This early photoelectric cell converted the fluctuating
light into electric current, which powered a high-frequency light bulb, whose

36 Ibid., 27.
37 Arc lamps were a form of electrical lighting that predated the enclosed incandescent bulb. The
lamp consists of two electrodes, normally made of carbon, attached to a battery. When activated,
an electric current arcs between the electrodes, producing a strong light. Even following
improvements, arc lamps were too bright for domestic use and were mostly used to light factories,
for searchlights, and in movie projectors. See Wolfgang Schivelbusch, Disenchanted Night: The
flickering light traveled through a slit onto undeveloped film. As the film advanced, it recorded the light bulb’s flickering as a series of horizontal alternating stripes. The film’s banded pattern, “sometimes narrower, sometimes wider, sometimes lighter, sometimes darker,” thus encoded the original sound and its visual equivalent, the flickering light, in a single object. In performance, the film projected onto a standard screen. At the same time, the light struck a second selenium cell. This cell transmitted the resulting electric signal to a loudspeaker, which played back the original soundtrack. The result was a synchronized abstract visual and musical composition in which the original soundtrack appeared as image and sound. The film superficially resembled early abstract films like Viking Eggeling’s Diagonal Symphony or Hans Richter’s Rhythm 21, but its patterns weren’t explorations of moving shapes. They were the photographic index of the light waves hitting the film. The alternating bands recorded the original sound as a strengthening and weakening of signal. The progression of stripes from white to black resembled waves of different greys when animated—an evocation of the wave structure electric current, light, and sound shared. Hausmann made visible the primal wave that first led him to the optophone.

39 In fact, the singing arc lamp was unnecessary—Hausmann could achieve the same effect using just the microphone and lightbulb. This oversight reflects Hausmann’s imperfect understanding of optical sound technology.
Hausmann’s sudden expertise in arc lights, selenium cells, and film is precipitous given his total lack of technical specifics in “PRÉsentismus,” written only months earlier. And, although Hausmann eventually mastered such technical details, his first great leap forward resulted from appropriation, not invention.

Hausmann’s optophone was largely identical to Ernst Ruhmer’s photographophone, an early optical sound device debuted at the Berlin Polytechnic in 1901 that recorded sound on cinematic film stock such as the one above, reproduced in *Scientific American*. This film is equivalent to the one Hausmann described in “Optophonetics.” “It is truly a wondrous process,”

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40 The best English-language description is available in Ernst Walter Ruhmer, “The ‘Photographophone,’” *Scientific American* 85, no. 3 (July 20, 1901): 36.
Ruhmer wrote. “Sound becomes electricity, becomes light, causes chemical
daction, becomes light and electricity again, and finally sound.”
Ruhmer also published widely on the selenium cell and its practical applications. Hausmann
remembered owning a book by Ruhmer in 1905—probably 1902’s Selenium and its Importance for Electrical Technology, which included a section on the
photographophone. Ruhmer invented the photographophone to record and
reproduce sound in competition with Thomas Edison’s wax cylinders and
Valdemar Poulsøn’s magnetic recordings. As early as 1901, he predicted the
photographophone’s use in sound film. Of course, Hausmann had a different
purpose in mind for the optophone. He appropriated it to produce art that
demonstrated the equivalency of sight and sound. He wanted to use the film to
produce sound and image.

Hausmann followed “Optophonetics” with “From the Sound Film to
Optophonetics,” published in the inaugural 1923 issue of the constructivist art
journal G. For this abbreviated treatment of the optophone—the essay is only a
few paragraphs long—he updated the photographophone’s nineteenth-century
singing arc lamp with the newest optical sound technology, the Tri-Ergon process.

An early success story in sound film, Tri-Ergon debuted in a public performance
in Berlin on September 17, 1922. Tri-Ergon operated on the same principles of
the photographophone, with a few improvements. The main difference was that

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41 Ernst Walter Ruhmer, Drahtlose Telephonie. (Berlin: self-published, 1907), 29.
Tri-Ergon wedded the sound recording with the cinematic recording so that a single strip of film carried both sound and image using a new, patented device that ensured perfect synchronization. In the wake of the Tri-Ergon’s invention, optical sound film enjoyed a brief resurgence of popularity. Its debut in 1922, widely reported in the press, brought optical sound film to Hausmann’s attention.\textsuperscript{44}

To summarize, the optophone’s appearance and rapid evolution over a series of writings dating from 1921 to 1923 suggests the following observations. Even before Hausmann’s technological turn in “Optophonetics” and “From Optophonetics to Sound Film,” he conceived of the optophone in terms of coordinated displays of light and sound. This correspondence was based in part on the interrelatedness of the senses, as espoused by presentism, and in part on the scientific equivalency of all energy that travels in waves, with electricity acting as an intermediary. This pattern of duality—artistic light-sound duality correlating to perceptual optical-acoustic duality correlating to scientific light wave-sound wave duality—characterizes Hausmann’s optophonetic project. Further, at the level of process, his construction of the optophone as a pastiche of existing technologies is a direct application of his photomontage process, with actual technologies substituting for photographic fragments. The machine head of \textit{Self-Portrait of a Dadasoph}, with its cluster of interrelated parts, is a visual analogue of this

\textsuperscript{44} In fact, Hausmann was not the first to use the name optophone. That credit belongs to Fournier d’Albe, whose 1910 invention translated printed text into a sound alphabet for the blind. Arndt Niebisch, \textit{Media Parasites in the Early Avant-Garde: On the Abuse of Technology and Communication} (New York: Palgrave Macmillan, 2012), 162.
process, suggesting a connection between the photomontage and optophone based on process, technology, and sensation.

Before continuing my examination, I should pause to acknowledge that the optophone Hausmann described in the essays of the early 1920s was very different than the optophone of the diagram. The differences between these two stages—the first and last—demonstrate how Hausmann’s plans for the device changed over forty years. For this reason, it is perhaps better to discuss ‘optophones’ in the plural to indicate these different objects. But, as the preceding discussion has made clear, despite their technical differences, these optophones performed the same function; namely, the conversion of projected light into sound. This part of the process did not change from the early to the late optophones. In both, the projected light struck a photoelectric cell that generated an electric current, which then arrived at an amplifier and speaker. In other words, two aspects of the optophones remain constant: the idea of light-sound duality and its production via the photoelectric cell. The photoelectric cell was not only the technology that made this light-sound duality possible; its science lay beneath Hausmann’s optophonetic project.

1.2. The Photoelectric Cell and Light’s Wave-Particle Duality

Photoelectric cells take many forms, but their basic composition is the same: a metal cathode placed inside a vacuum tube attached to an anode. When exposed to light, the cathode emits electrons that travel to the anode and produce an electric current directly proportional to the light’s intensity. From the first German
patent in 1876 by electrical engineer Werner von Siemens until the 1920s, all photoelectric cells conformed to this type and used a cathode made of selenium—hence their more common name of selenium cell. It was the only chemical element known to conduct electricity when exposed to light.\(^{45}\) However, because of selenium’s slow return to a resting state, its current did not accurately correspond to fluctuating light exposures. This limited the selenium cell’s application, especially in optical sound film.\(^{46}\) The French inventor of the photocinematophone, Eugene Augustin Lauste, explained his frustration with the selenium cell in a 1923 *Scientific American* article. “This mineral [selenium] is somewhat sluggish in its response to light variations, and that sluggishness is often sufficient to interfere with successful results.”\(^{47}\) Photoelectric cells developed in the mid-1920s substituted potassium to correct this flaw—a potassium cell contributed to Tri-Ergon’s success. However, selenium remained the only material available for photocells until potassium’s discovery.

Photoelectric cells operate through the photoelectric effect, a phenomenon in which an active element (selenium or potassium) produces electric current when exposed to light. German physicist Heinrich Hertz first discovered the photoelectric effect in 1887 ten years after Siemens invented the first photoelectric cell. While conducting an experiment with two metal electrodes, Hertz observed a change in the voltage of the electric charge when exposed to

\(^{46}\) Ibid., 10.
\(^{47}\) Quoted in Geduld, *The Birth of the Talkies*, 79.
light. This would only happen if energy transferred from the light to the electrodes; however, the wave model of light precluded such energy transfer. Hertz could not explain why the transfer took place. The mystery of the photoelectric effect inspired Albert Einstein’s paper “On a Heuristic Point of View Concerning the Production and Transformation of Light.” It was the first of three annus mirabilis papers Einstein wrote in 1905—the other two explained Brownian motion and the general theory of relativity. In the light paper, Einstein proposed that light comprised subatomic particles he called light quanta, now known as photons. Photons possess energy, but not mass. This theoretical assumption explains the photoelectric effect: photons penetrate the selenium at the subatomic level, transferring energy to an atom, which ejects an electron to maintain its charge. These electrons make up the electric current generated by a photoelectric cell. Einstein considered his paper on the photoelectric effect to be more “revolutionary” than his paper on general relativity published the same year because it challenged hundreds of years of light science. His colleagues agreed. Physicists’ resistance to Einstein’s photon was such that Max Planck, his most outspoken advocate, dismissed it in an otherwise glowing letter of 1914 recommending Einstein for the position of the director of the Kaiser Wilhelm Institute of Physics. Planck cited Einstein’s quantum theory of light as a rare case

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where Einstein “missed his target in his speculations,” before continuing that this “cannot really be held against him [Einstein],” considering his other successes.\textsuperscript{50}

Physicists’ resistance was understandable. The wave theory predicts light’s most common behaviors, while the quantum theory explains only a few. It was so preposterous that few experimental physicists took an interest in Einstein’s hypothesis. One was the American Robert Millikan, who was so convinced of Einstein’s error that he spent a decade trying to disprove it. To his consternation, Millikan’s findings, published in 1914 only a few months after Planck dismissed Einstein’s theory, confirmed the photon’s existence and earned Nobel Prizes for both Einstein and Millikan in 1921 and 1923, respectively. The experimental confirmation of Einstein’s quantum theory of light finally explained selenium’s light conductivity, but the discipline then had to confront the quantum theory’s incompatibility with the wave theory. Everyone, including Einstein, believed the wave and quantum theories were mutually exclusive—it was inconceivable that light could be both a wave and a subatomic particle.

Photons explained the photoelectric effect, but did not account for refraction, reflection, or interference. The wave theory efficiently explained these common phenomena. Logic mandated that light could not be both wave and particle, but experiments proved it was. Around 1910, Einstein began work on a model of light that unified both theories. This idea gained momentum after the photon’s experimental confirmation in 1914 and, starting in 1921, authors in

correspondence with Einstein attributed to him a dual model of light in which photons travel in directed waves. But the problem was far from solved. A student reporter wrote in response to Einstein’s 1921 lecture series at the College of the City of New York that the physicist described his theory of relativity as “a very logical exposition of fundamental principles […] whose main outlines were simple and definitely established in Einstein’s own mind.” In contrast, with the quantum theory “we saw a great mind grappling with problems not yet definitively solved.” ⁵¹ At the 1921 Solvay Congress on quantum theory, Niels Bohr delivered a paper in which he reported that Einstein’s photons presented “difficulties that appear insurmountable.” ⁵² Einstein himself summed up the problem best in a 1938 co-authored book. “But what is light really? Is it a wave or a shower of photons?” His answer captures the existential stakes of the debate. “We have two contradictory pictures of reality; separately neither of them fully explains the phenomena of light, but together they do.” ⁵³ This contradictory state defines light’s true but unknowable nature.

This indeterminacy—light’s wave-particle duality—centers on the question of materiality. According to the wave theory, light has no physical substance; it resembles sound, which exists as a column of vibrating air. Light, like sound, has

no existence independent from its vibrating medium. According to the quantum theory, light is a stream of subatomic particles. This implies light has physical substance; but, in reality, the photon’s materiality is itself subject to question. Einstein demonstrated by mathematical equation that photons have no mass or matter—they are pure energy. Instead of billiard balls, it is more accurate to imagine them as packets of energy. Physicists now realize the question ‘is light a wave or a particle?’ is a false dichotomy. Light is neither a wave nor a particle. Its materiality is not a stable, static property, but—as with so many of Einstein’s theories—a function of the relativistic frame in which it is studied. Seen from the perspective of the photoelectric effect, light is a subatomic particle; seen from the perspective of refraction, it is a wave. What you see when you look at light depends on how you look at it. This model conceptualizes light’s materiality as an unstable spectrum ranging from insubstantial to material. Hausmann’s materialist inquiry—an aspect of his early practice that is the subject of the following section—ultimately led him to use light as an artistic medium in the optophone.
1.3. Materiality and the Optophone

Figure 1.6 – Raoul Hausmann, *Poster Poem*, 1918. Letterpress print on green laminated paper, 12¾ x 18¾ in. Centre Georges Pompidou, Paris.

Consider Hausmann’s phonetic poems, a genre of sound poetry he invented in response to the work of Hugo Ball and Richard Huelsenbeck. Hausmann’s phonetic poems were sequences of letters arranged to achieve a desired phonetic, rather than linguistic, effect. In performance, they sounded like nonsense or babble, the better to appreciate the abstract shape of the sound. As a performance art, sound poetry introduced time-based and ephemeral art—that is, immateriality—into Hausmann’s practice. However, unlike Ball and Huelsenbeck’s sound poems, Hausmann’s included a physical component. He accompanied his phonetic poems with posters printed with the poem’s text, as in 1918’s *Poster Poem*, normally referred to by its first few letters OFFEAH. This
poster was integral to the experience of the poem. It provided the audience with a visual reference for its sound, inviting them to consider the relationship between the sound of the letter and its visual form. By suggesting equivalence, Hausmann embeds the ephemeral sound in the material form of the printed letter. In 1955, Hausmann wrote that his phonetic poems “emerge from the poet’s inner vision and ear, materializing as the power of sound, noise, and tonal form, anchored in the very act of language itself.”\(^{54}\) But in OFFE AH, he erodes the certainty of the relationship between visual and sound elements in an act of sabotage expressed in the imperfect printing of the poster’s letters, clearest in the ‘j’ on the bottom line. This faded patchiness symbolizes instability between the poster poem’s visual form and sound. It is easy enough to imagine the performance of the top line of letters—especially of the onomatopoetic ‘O’ that resembles the shape of the mouth as it forms the letter—but on the second line, Hausmann introduces characters with no sound equivalent. The pictograph of a downward-pointing hand might direct the reader to lower his voice in volume or pitch. But what about the two commas that follow? What does a comma sound like? It is an element of written language with no equivalent in speech. “Spiritual vision, spatial form, and material sound form are not poetry in themselves,” Hausmann wrote, “but they all make up the poem.”\(^{55}\) He described poetry as a fusion of image and sound, material and immateriality. Passages like the commas highlight the limits of this fusion and, in so doing, assert each element’s individuality. These fissures focus

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\(^{55}\) Ibid.
attention on the coexistence—sometimes harmonious, sometimes dissonant—between the phonetic poem’s material and immaterial elements.\textsuperscript{56}

This detour to Hausmann’s phonetic poems demonstrates the continuity of optical-acoustic duality as a central theme of his oeuvre. The poems’ presupposition of a fusion between the shape of a letter and its sound relates to the optophone’s color-sound correspondence. Indeed, Hausmann later referred to works like Poster Poem as optophonetic poetry, adding the prefix ‘opto-’ to designate the physical, hence visual, component. But, if the optophone and phonetic poems are two expressions of the same practice, what relevance does his description of the phonetic poem as a three-way fusion have for the optophone? Two of the three elements, the letter’s “spatial form” and the sound’s “material sound form” compare, respectively, to the optophone’s projected colored light and amplified sound. It’s missing the third term—the artist’s spiritual vision. In performance, Hausmann acted as an intermediary by reciting the poem: that is, by reading the printed poem, deciding on an interpretation, and delivering it in performance. In optophonetic terms, the sound poet is an intermediary who, like the photoelectric cell, transforms the visual material into ephemeral sound, thus achieving simultaneous duality.

Along the same lines, I conclude this brief tour of Hausmann’s optophonetic practice with his photomontage ABCD of 1923-24. I have already compared the

\textsuperscript{56} Niebisch argues that these non-phonetic passages prevent the phonetic poems from operating as optophonetic art. Their “signs that cannot be pronounced” block the “simultaneous presence of a visual and an acoustic impression.” Niebisch further defines optophonicism as synesthesia, a limiting concept that contributes to his reading of the phonetic poems as a failed optophonetic art. Niebisch, \textit{Media Parasites in the Early Avant-Garde}, 76.
optophone’s pastiche of existing technologies to Hausmann’s photomontage process. In *ABCD*, this comparison extends from the realm of process to that of content and iconography. For this reason, I interpret *ABCD* as the first visual representation of the optophone, predating by forty years the diagram of the 1960s. That historians normally interpret *ABCD* as a representation of Hausmann performing a phonetic poem only reinforces the connection between the two. It also bestows upon the mechanical optophone device the status of an artist-surrogate, or, to be more specific, a surrogate for Hausmann.

Figure 1.7 – Raoul Hausmann, *ABCD*, 1923-24. India ink and collage of magazine illustrations cut out and pasted on paper, 15¾ x 11¾ in. Centre Georges Pompidou, Paris.
ABCD suggests that the optophone acts as a technological artist-surrogate that transforms light and sound the same way Hausmann transformed image and voice in his phonetic poems. A photographic portrait of Hausmann, mouth open in a silent scream, dominates the composition. His name and the word ‘merz’ appear below the portrait, as if it were a newspaper caption. On the left, letters spelling voce, Italian for voice, lead up to Hausmann’s right ear. A black line connects the word to Hausmann’s eyes, which stare out at the viewer. He drew a wheel diagram on his left eye, replacing his signature monocle. His mouth issues two emissions. The first is the eponymous letter sequence ‘ABCD’, which recalls the similar passage “AHBDCBD” from OFFEAH. The second is a parabola-shaped astronomical photograph of a night sky. The parabola has a richly equivocal appearance that invites readings as a ray of speech issuing from the artist’s mouth or a phallus that penetrates it (a reading reinforced by sexual imagery elsewhere in the work). The starry night evokes Hausmann’s description in “PRÉsentismus” of colored light shows in a night sky. Hausmann extended the cut-away part of the parabolic night sky on the left, behind ‘voce’, leading up a trail that ends at his ear. The repetition of night sky on both left and right of the head strengthens the impression of penetration, as if it flows in a continuous stream from Hausmann’s ear through his mouth and into space. The passage of Hausmann’s mouth thus presents letters and starry night as a single utterance. It is the visual equivalent of Hausmann’s description of the optophone, which simultaneously broadcasts image and sound. But in ABCD, the artist replaces the optophone. Like the

57 Hausmann took this from a flyer El Lissitzky designed for Hausmann and Kurt Schwitters’s 1923 tour of Prague.
optophone, Hausmann accepts a stream of input through his right ear and eyes, processes it, and transmits it through his open mouth.

Figure 1.8 – August Sander, *Inventor and Dadaist* [Raoul Hausmann], 1929, printed 1990. Gelatin silver print on paper, 10⅛ x 7¾ in. Tate and National Galleries of Scotland.

If *ABCD* conflated Hausmann and the optophone as light-sound transformers, it is true that Hausmann embraced the consequences of his machine surrogate in constructing his professional identity. This examination has concentrated on defining the parameters of the optophone in technological terms. It reveals, among other things, the strangeness of the optophone as an artwork and the distance between the optophone writings and other artist statements. This
difference returns in Sander’s 1929 portrait of Hausmann. The portrait is conventional enough. Hausmann sits in a chair turned to his left and looks directly into the camera lens. His pose reminds the viewer of Noske’s in *Self-Portrait of a Dadasoph*, made a decade earlier. The difference lies in Sander’s title: *Inventor and Dadaist*. Technically, Hausmann was neither in 1929. He left Berlin Dada in 1921 and had yet to patent any inventions. But it accurately reflects Hausmann’s identity in these years. He achieved his greatest fame as a Dadaist, and that label followed him the rest of life. Meanwhile, in the late 1920s, he devoted most of his energies to seeking patents for the optophone and other inventions. Only one of his many patent applications was approved, in 1936 in England for a “device for combining and transmitting a plurality of factors” using a photoelectric cell.58 The Second World War forced Hausmann to sell the rights to his only patent. His many failed attempts to patent his inventions demonstrate his desire to become an inventor, even as he encountered failure. It also makes perfect sense in the context of the optophone project. As an inventor, Hausmann educated himself about new technologies by staying current on research published in industry journals. He used this knowledge to design devices that solved problems and then sought patent protection for his designs. But, even when a patent is awarded, there is no guarantee the design will achieve production. The vast majority of patented devices are never built, just as architects design buildings than are never constructed. Interestingly, this professional model also describes Einstein’s work as a theoretical physicist. He used mathematics to find plausible solutions for

58 Quoted in Donguy, “Raoul Hausmann and the Optophone,” 217.
unexplained phenomena, like the photoelectric effect’s phantom electron. He proposed the existence of the photon not to discredit the wave theory of light, but because it was the only possible explanation. It took an experimental physicist nine years to design and execute an experiment to confirm Einstein’s hypothesis. The theoretical physicist, inventor, and architect trade in ideas, but ideas of a particular type that complicate the simple opposition between material and its absence. These ideas, although abstract, possess the quality of latency. They lack physical substance but propose to amend the real world with a new model of nature, a building, or an invention. While observing the importance of drawings in “ultra-conceptual art,” Chandler and Lippard called this type of idea “unmaterial art,” as opposed to immaterial or conceptual art. Immateriality describes the absence of physical substance; unmateriality describes a proposed but unrealized relationship with the material world.

According to these terms, Hausmann’s optophonetic practice engages with the concept of materiality in all its complexity. His photomontages and phonetic poems are footholds in the material realm, physical and visual representations that lead the viewer to consider the possibilities and limitations of physical artistic media. The diagram and writings are also physical, but their status as illustrations of an unrealized design suggests they make more sense as unmateriality. Finally, the optophone encodes immateriality in equally complex measures. It is, of course, immaterial in the orthodox sense that projected colored light and sound lack physical substance. But the optophonetic project of light-sound duality also

59 Chandler and Lippard, “The Dematerialization of Art,” 34.
thematizes a sort of concrete immateriality; in other words, light and sound occupy the border between materiality and its lack. They are substantial enough to trigger sensations: the imagined audience sees the optophone’s colored light and hears its sound. These are real phenomena that stimulate sensations as surely as does a painting or sculpture. Yet they lack true physical substance in a way that is tangible and intuitive for the viewer. According to this model, materiality is a contingent and complex spectrum that opens a vast space between the polar extremes of object and idea.

It would seem that Einstein’s quantum theory of light, with its dramatic implications for the status of materiality at the subatomic level, would delight Hausmann. In fact, he seems alternately unaware of or actively hostile toward Einstein and his theories. This is, perhaps, to be expected. After all, the physics community struggled well into the postwar period to articulate the implications of Einstein’s theory for their understanding of light. Hausmann had greater familiarity with technical matters than did the public, but it is unlikely even he would have fully comprehended the theory and its ramifications. He provided us only one mention of the quantum theory. In the late optophone essay “On Color Organs,” Hausmann repeated his assertion that “light and sound reproduce as electricity” before criticizing “false scientific theories” that “sound and light waves are different physical natures.” Of course, this was precisely Einstein’s claim, so we can assume that Hausmann had gained a basic familiarity with

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quantum theory by 1932. He feared quantum theory would invalidate his belief in light-sound duality on the basis of their shared wave form. Despite his apparent rejection of the quantum theory, Hausmann had no problem accepting light as a material medium. In his subsequent optophone essay, “The Overly Sophisticated Arts,” also of 1931, Hausmann insisted on light’s materiality. The optophone, he explained, expressed musical tonality “through the medium, the material of light.”61 Without realizing it, Hausmann inscribed light’s materiality at the center of his optophone project through the photoelectric cell that prompted Einstein’s quantum theory of light.

The optophone mediated between material and immaterial on multiple levels. At the simplest, it captured light waves and sent them through a series of transformations. The resulting art was an indexical representation of its process—a physical interaction between photons and film—and its elemental wave form. But Hausmann never built the machine. Instead, he rendered the physical object in conceptual terms through a series of essays that read as proposals for an unfunded invention. Hausmann was an inventor without an invention, an artist without art, and a Dada after Dada’s end. His optophonic practice revolved around the appearance of substance and lack thereof. Light’s mercurial nature offered the perfect medium for his technological ambitions.

1.4. Excursus: Einstein, the Dadaist

Einstein and Hausmann never met, nor is it clear to what degree Hausmann understood Einstein’s theories; however, one byproduct of this examination of light and the optophone is a collection of historical anecdotes, recounted here, about interactions between Einstein and the arts in 1920s Berlin. They demonstrate not only Einstein’s affinity for the arts, but also a tendency in this period to analogize his revolutionary scientific theories with revolutionary art—especially Dada—and politics. The scientist’s unexpected popularity within the German artistic avant-garde is not directly relevant to this chapter’s argument; however, it suggests an affinity between the scientific and arts communities in the post-revolutionary period that contributes to this study’s underlying premise of exchange between disciplines.

The first set of anecdotes originate from Einstein’s writings and correspondence, which make clear his appreciation for and curiosity about the arts in both professional and personal capacities. He counted numerous artists among his friends, including Walter Hasenclever, an experimental playwright and editor of the journal Menschen. Hasenclever and Einstein’s friendship prompted the editor to ask Einstein to contribute a short piece on the relationship between the newest art and science. “For me,” Hasenclever wrote, “the current efforts in painting and poetry contain an intuitive foreshadowing of your discoveries.”62 In

his reply, Einstein described “the realm of art and science […] where the world ceases to be the scene of personal hopes, wishes, wants, where we face it as free creatures, admiring, questioning, beholding.” Both art and science served a higher purpose: to interpret the natural world using the means proper to its discipline.

The following year, filmmakers Viking Eggeling and Hans Richter asked Einstein to write a letter of support for their abstract films. His was one contribution to a letter-writing campaign that tried, unsuccessfully, to convince the UFA film studio to continue its support, which it had withdrawn in September 1920. The filmmakers solicited respected artists and intellectuals to testify to their project’s value. Einstein joined Adolph Behne, Peter Behrens, Hans Poelzig, and film industry representatives for the campaign. The other letter writers emphasized the importance of Eggeling and Richter’s project in transforming film from a commercial to an artistic medium—an argument that probably only compounded UFA’s reservations. Einstein’s letter repeated this basic claim, but he offered a more specific and thoughtful interpretation of Eggeling and Richter’s filmmaking. He called it an “inquiry” that “transfer[s] the character of melody, and in particular of polyphonic melody, to the field of vision.” Eggeling and Richter’s films and melody were both “artificially generated structures”—notes

and chords in music, forms in film. “So it is with the two artists’ use of drawn structures, whose temporal progression should lead to a new kind of artistic experience.” Einstein’s comparison of abstract film to music naturalized it with a familiar, even desirable, context—polyphonic music—while asserting its innovation as “a new kind of artistic experience.” He also suggested that Eggeling and Richter’s animated shapes achieved a sort of equivalency with music that was comparable to the optophone’s light-sound duality.

Figure 1.9 – Portrait of Albert Einstein. From the cover of Berliner Illustrierte Zeitung (December 14, 1919).
Although Einstein was a scientist uniquely aware of the connections between art and science, his sympathetic outlook was probably not the main factor motivating Hasenclever, Eggeling, and Richter’s requests. During the years of these exchanges, circa 1921, Einstein enjoyed a level of notoriety unprecedented for theoretical physicists. This celebrity stemmed from the dramatic confirmation of his theory of relativity in late 1919 following the publication of Arthur Eddington's astronomical observations. The effect electrified scientists and the public alike. The popular press, desperate for affirmational stories, widely reported Einstein’s victory. His vindication represented the survival of German intellectual achievement despite humiliating defeat, occupation by foreign powers, material deprivation, and internal violence. Within Germany, he achieved a celebrity normally reserved for politicians and actors. He appeared on the cover of the *Berliner Illustrierte Zeitung*, the country’s most popular illustrated weekly magazine with a circulation in the millions. The cover’s caption conveys the incredible stakes of Einstein’s discovery: “A new eminence in the history of the world: Albert Einstein, whose theories signify a complete revolution of our understanding of nature and whose insights equal in importance those of a Copernicus, Kepler and Newton.”

After an initial period of euphoria, Einstein soon became a complicated figure in public life. He used his newfound platform to support socialism, pacifism, and

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Zionism. And there was the problem of nationality: he wasn’t even a German citizen. Although born in Germany, Einstein renounced his citizenship in 1896 at the age of seventeen and attended university in Switzerland to avoid compulsory military service. In 1901, he received Swiss citizenship, which he kept after returning to Germany in the teens (to accept the position at the Kaiser Wilhelm Institute for which Planck recommended him). That he was also Jewish only compounded his conflicted popularity. In 1920, following Foreign Minister Walther Rathenau’s assassination by members of an anti-Semitic ultranationalist group, Einstein withdrew from a League of Nations scientific committee on the grounds he could not represent a people who did not recognize him as their representative. His complicated identity as an internationalist German-born Jewish Swiss citizen combined with the bewildering nature of his theories made him an outsider despite his celebrity.

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68 Buchwald et al., “Introduction to Volume 10.”
Figure 1.10 – Hannah Höch, *Cut with the Kitchen Knife Dada through Germany’s Last Weimar Beer-Belly Cultural Epoch*, 1919-1920. Photomontage and collage with watercolor, 44⅞ x 35⅞ in. Staatliche Museen zu Berlin, Nationalgalerie.
Einstein’s conflicted status as a public figure contributed to a unique set of exchanges with Berlin Dada in 1920 that coincided with the height of Hausmann’s technological photomontages like Self-portrait of a Dadasoph. Given Einstein’s celebrity in 1919-1920, it is not surprising that Hannah Höch included him in her cultural satire, Cut with the Kitchen Knife Dada through Germany’s Last Weimar Beer-Belly Cultural Epoch of the same years. For this photomontage, Höch combined newspaper clippings of Weimar celebrities, from dancers to politicians. Einstein was the only scientist, and Höch singled out his portrait as the largest of all, taken as was Noske’s from the cover of the BIZ. She
substantially altered Einstein’s portrait with applied collage. Animals, machines, and text orbit around his cutout head like satellites of a planetary body. Jula Dech and Hanne Bergius have identified the source images in their studies of this complex work. A large earwig covers Einstein’s forehead while a draught horse and bottle-fed lion cub appear on the left. Above his head are a pulley and locomotive, and a ball bearing and high-voltage transmission tower sit below. To the right appear two different depictions of the first president of the Republic, Friederich Ebert, and machine parts that lead to a massive gear. Höch pasted two small gears over Einstein’s right eye resembling an infinity symbol, which recalls the monocle Hausmann wore in his left eye.69 The text elements arrayed around Einstein suggest his sympathy with the Dada cause. “Dada”, “dada victory,” “invest your money in dada,” and “ha, ha, young man, dada is no art movement,” are humorous but share in the Dada spirit, especially in contrast to the “anti-dada” slogans on the opposite side of the composition. The proximity of Ebert, whom the Dadaists, Höch included, frequently ridiculed, complicates Einstein’s place in the Dada worldview the composition represents. It is possible the president’s emergence from Einstein’s head comments on the socialist government’s exploitation of his discoveries for diplomatic purposes or on Einstein’s outspoken support of Ebert’s socialist government.

69 Höch and Hausmann jointly developed their photomontage practice in 1919 and frequently collaborated during these years, in addition to being romantic partners. For a complete iconographic analysis, see Jula Dech, Hannah Höch: Schnitt mit dem Küchenmesser Dada durch die letzte Weimarer Bierbauchkulturepoche Deutschlands, Kunststück (Frankfurt am Main: Fischer Taschenbuch Verlag, 1989), 32–55; Hanne Bergius, Montage und Metamechanik: Dada Berlin, Artistik von Polaritäten (Berlin: Mann, 2000), 101–4.
The tiny text Höch pasted onto Einstein’s forehead provides a more specific context for his role in the composition. The earwig holds a scrap of paper that reads “S. Friedlaender: The Balance-Keeper of the World.” It refers to the philosopher Salomo Friedlaender, who also wrote grotesques published in expressionist journals under his pseudonym Mynona. Friedlaender has already appeared once in this chapter, as the source via Johannes Baader for Hausmann’s familiarity with Ernst Marcus. Hausmann and Höch both admired Friedlaender’s writings and developed a personal friendship with him through their attendance at the monthly salons of painter Arthur Segal. Segal and Friedlaender were close, and their intellectual exchanges contributed to Nikolaus Braun’s alternating light reliefs, the subject of the next chapter. To return to Cut with the Kitchen Knife Dada, “The Balance-Keeper of the World” was the title of an 1915 essay by Friedlaender that constituted an early study for his masterpiece, 1918’s Creative Indifference. In this essay, Friedlaender used the mathematical infinity symbol to represent a new and specifically modern subjectivity, which he contrasted with objectivity, represented by ‘0’ or null. Friedlaender envisioned the world as a field of polar oppositions, what Hubert van der Berg helpfully calls “relativities.” This required man to develop a subjectivity premised on the state of indifference at the “balance point” of the polar opposites. Einstein’s theory of relativity, the confirmation of which catapulted him to celebrity in 1919, popularized a

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newfound appreciation for the relativism of experience, as well as natural
phenomena. This removes Einstein from the general context of a controversial
public figure to his more specific relevance for Friedlaender’s theory of
indifference, with which many Berlin Dadaists engaged.

Höch was not the only person who claimed Einstein for Dada. His celebrity
introduced a broad audience to his theory of relativity—an idea so controversial
that when Einstein received his Nobel Prize in 1921, the award committee
specifically requested that he deliver his prize-winner lecture on the subject of
quantum theory to avoid the perception that the committee endorsed relativity.
(Einstein ignored the committee’s request and dedicated his entire lecture to the
forbidden topic.) Berlin became ground zero for a short-lived anti-relativity
movement whose members accused Einstein of “scientific Dadaism.” Einstein’s
theory of relativity and ensuing celebrity triggered a reaction in two camps:
conservative scientists and members of right-wing nationalist political parties.
The scientists, who believed Einstein’s theory of relativity was incomprehensible,
denounced Eddington’s findings on procedural grounds. The right-wing activists,
who enjoyed growing political power following the failed Kapp Putsch of March
1920, resented the widespread acclaim heaped on Einstein. These activists, led by
Paul Weyland, exploited the sincere if reactionary scientific challenges to
relativity to campaign against Einstein on the stage of public opinion.

72 Jeroen van Dongen, “Reactionaries and Einstein’s Fame: ‘German Scientists for the
Preservation of Pure Science,’ Relativity, and the Bad Nauheim Meeting,” Physics in Perspective
9, no. 2 (June 2007): 312–30.
It began in August 1920, when Weyland advertised a series of public anti-relativity lectures sponsored by the official-sounding Society of German Naturalists and Physicians. The first lecture took place on August 24 at the Berlin Philharmonic with Einstein in attendance. Following a scientific address by spectroscopist Ernst Gehrcke, Weyland accused Einstein of staging his theory of relativity as a publicity stunt, in keeping with Germany’s debased “intellectual, ethical and moral qualities” instilled by the bankrupt Weimar media apparatus. This illness afflicted not just science; it was also evident in modern politics and art. Weyland’s chief example was Dada, whose artists “denounce every progressive thought in their outlook on art and the world.” He concluded: “Ladies and gentlemen, no one will wonder that a movement has been formed against this scientific Dadaism with the purpose of explaining to the public what Einstein’s theory of relativity really is and what is meant by scientific advances.”

Einstein publicly rebutted Weyland’s accusations, but the event weakened his already damaged faith in the German scientific community. Colleagues eventually convinced him that leading theoretical physicists supported relativity, even though they feared its consequences. No further lectures came to fruition after a journalist discovered that Weyland had fabricated the society. The anti-relativity lectures quickly disappeared from the public record. However, Weyland’s accusation points to a popular belief that Einstein’s science was as absurd as Dada’s antics. If German science had an avant-garde in the 1920s, Einstein would have been its

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undisputed leader. In his field, Einstein was a radical and revolutionary whose improbable theories entered the mainstream through experimental confirmation. The *BIZ* caption’s use of the term “revolutionize” was not hyperbolic. The anti-relativity lectures were a success, however briefly, because in the summer of 1920 Weyland’s premise that Einstein and Dada shared an attack on past scientific and artistic conventions resonated with the average German.

In fact, there was at least one notable occasion when *Albert* Einstein was confused for a true member of Berlin Dada—*Carl* Einstein, an art historian and communist who co-edited to Berlin Dada journals *Der blutige Ernst* and *Der Pleite*. Carl’s communism and writing placed him in closest contact with Dadaists George Grosz, John Heartfield, and Wieland Herzfelde; however, he also knew Hausmann. The confusion between the two Einsteins is not just an entertaining anecdote; it demonstrates Albert Einstein’s strong association with leftist Weimar politics among an educated public outside of Germany. Without Albert’s political reputation, no one would have entertained the notion of his complicity in Carl’s communist propagandizing. In 1920, physicist Paul Ehrenfest of the University of Leiden sought funding and approval to name Albert as special professor, a post that would bring him to Leiden for a few weeks every year to deliver a lecture series and consult on Ehrenfest’s research. The University Fund approved the creation of the chair on February 9 and sent their recommendation to the trustees for final approval. During their review, the trustees (appointed by the Dutch royal
family and disapproving of their new republican neighbor) raised concerns regarding Albert’s “political principles.”

They referenced a recent event. Earlier that week, Albert suspended his physics lectures at the University of Berlin in retaliation for student protest of his admission of unregistered students in the lecture hall. That this relatively minor event was widely reported despite the political violence that plagued Berlin (only one month before the Kapp Putsch) testifies to Albert’s celebrity. Public interest was such that Albert published his own account as an editorial in Berlin’s 8-Uhr Abendblatt on February 13, 1920. He accused the protesting students of anti-Semitism directed toward both him and the unregistered students, many of whom were Russian Jews fleeing Soviet persecution. Foreign papers reported the scandal, including a Dutch daily newspaper article that also referenced Albert’s support of the November Revolution and self-admission as a democrat and pacifist. It was this account that troubled the trustees.

At around the same time, Albert’s nomination came to the attention of the Office of the Attorney General, which issued a memo to the board of trustees. The memo cited intelligence dating from June 1919 that “Dr. Einstein and Countess Olga von Hagen […] have both lived in Brussels for about three years […] where Dr. Einstein has repeatedly tried to provoke the revolution among the Belgians.”

What neither the attorney general nor the trustees realized is that their intelligence

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74 Quoted in Buchwald et al., “Introduction to Volume 10,” xlv.
76 Buchwald et al., “Introduction to Volume 10.”
was on *Carl* Einstein, who served as a German soldier in Belgium during World War I. Carl was a revolutionary in the true sense of the word. While stationed in occupied Brussels, he accepted an executive position with the Soldier’s Council that governed Belgium between the November Revolution and the withdrawal of the last German troops. Dutch secret intelligence on Carl was accurate—while Albert was revolutionizing scientific understanding, Carl dedicated himself to communist revolution in Europe. The trustees reviewed the accusations in March 1920 and finally told the physics faculty of their findings against Albert.

Ehrenfest, Albert’s friend as well as a colleague, notified the trustees of their mistaken identification, and the trustees eventually approved Albert’s nomination. However, the incident demonstrates that Albert Einstein’s celebrity combined with his willingness to speak out against injustice earned him a reputation as both a scientific and political revolutionary. There is also a matter of timing. Einstein appeared on the public stage in late 1919, around the same time the press had begun to take an interest in Berlin Dada. This interest reached its peak in the spring of 1920, when the antics of the First International Dada Fair achieved maximum publicity. The simultaneity of Einstein and Berlin Dada’s rise contributed to their perception as fellow travelers in the cultural revolution.
Nikolaus Braun’s
Alternating Light Pictures

Figure 2.1 – Nikolaus Braun, *Alternating Light Picture II*, 1924. Lost.
In 1923, November Group artist Nikolaus Braun exhibited a new series of wall-mounted reliefs, which probably resembled *Alternating Light Picture II* of the following year. These works stunned their audiences, but not for their abstraction or assemblage, both of which were common enough in 1920s Germany. What set Braun’s reliefs apart was his use of electric light as an artistic medium in the form of incandescent light bulbs hidden within the works’ layered structures. Braun experimented with electric lighting for the next five years. In his simplest works, light transformed the reliefs’ shallow space with complex dimensionality. In others, like the one above, different lighting configurations alternated to create dynamic patterns of light and shadow. Still others were sculptures in the round that resembled artful table lamps or architectural models. This, the first comprehensive examination of Braun’s light art, asks simple questions. Why did Braun experiment with electric light? Does he use light as an artistic medium, and, if so, what effect does it have on the experience of the work? Why is Braun’s light art absent from the historical record?

The last question is the easiest to answer. In 1938, Braun destroyed all of his studio contents—the work of eighteen years—in a bonfire. Unable to bring his art with him into exile, he chose destruction over abandonment. Following his immigration to Budapest, he disappeared entirely and broke off all written correspondence with friends and colleagues. He reappeared a decade later, in 1949, to teach at Chicago’s Institute of Design, only to commit suicide in New York the next year. Had he lived longer, he might have documented his own lost work or been caught up in the postwar reappraisal of the interwar avant-gardes.
As it stands, fragmentary and secondhand sources inform any reconstruction of Braun’s light art. Reproductions of eleven works survive in publications dating from 1924 to 1927. Braun also published two essays: 1924’s “Salvation in Light,” a one-paragraph artist statement; and 1925’s “Concrete Light,” a longer essay that appeared in the self-published booklet Problems of Light in Visual Art. He also received two notable reviews: by Ludwig Hilberseimer in 1923 and by Richard Blümner in 1926. Memoirs and correspondence from Braun’s teacher, expressionist painter Arthur Segal, and ex-wife, fellow Segal student Anneliese Ratkowski, provide limited additional information.

A picture emerges from these sources. When Braun debuted his light art in 1923, he was twenty-three years old, had studied art for three years, and had exhibited publicly for two. His light art represented a radical change from his early expressionist paintings; however, it coincided with Segal’s own move from his equivalence paintings to his prismatic paintings of 1923, a change motivated by Segal’s newfound interest in observed light effects. Braun’s light art emerged, in part, from these ideas about light he encountered in his teacher’s studio. However, Segal’s influence does not explain why Braun rejected painting to work directly with electric light. Braun’s second life provides that answer, for he was not a full-time artist. Braun split his time between the studio and his father’s café empire where he worked as manager of the restaurant attached to Berlin’s Kroll Opera House. Heinrich Braun owned cafés, restaurants, and dance halls in

77 Reproductions of all known light art by Braun are included as an appendix at the end of the chapter.
Berlin’s most fashionable entertainment districts. These lavish spaces were flooded with light by dozens of custom fixtures that made up complex electric lighting schemes. On a practical level, Braun’s light art emerged from the material conditions of these spaces. His café work gave him the expertise and supplies to wire electric lights into an artwork. His works’ café origins are also evident in their forms, which evoke the sculptural light fixtures found in these cafés.

Braun’s double life and subsequent interest in electric light provide insight into the complex sociological function of Berlin’s cafés and electric light’s symbolic role in these spaces. Heinrich Braun’s cafés belonged to an entertainment industry that also included pleasure palaces, theaters, and cinemas. Cultural theorist Siegfried Kracauer criticized these mass entertainments as a symptom of capitalist oppression. He symbolized this oppression in these sites’ abundant electric lighting that “blinds more than it illuminates.” Braun’s light art suggests an alternate reading. Braun, like Kracauer, acknowledged the artifice of electric lights. Unlike Kracauer, he suggested that artifice did not have to deceive. The lights of the café interiors did not blind their inhabitants, but extended the daylight into spaces that allowed authentic social interactions to combat the impersonal nature of urban life and work.

2.1. Arrival

Figure 2.2 – Photographer unknown, [Nikolaus Braun], 1920. Photograph, 8⅞ x 6¾ in. Anne Ratkowski-Wanger Collection, Leo Baeck Institute, New York.

Figure 2.3 – Photographer unknown, [Nikolaus Braun and Anneliese Ratkowski], 1920. From Jörn Merkert and Carolin Förster, Anne Ratkowski: eine vergessene Künstlerin der Novembergruppe (Berlin: Berlinische Galerie, 1996) 70.
Braun was born in Berlin in 1900. He and his future wife, Anneliese Ratkowski, began private lessons with Segal in 1920, just after Segal’s return from Ascona, Switzerland, where he spent the First World War to avoid compulsory military service.\(^7\) Over Segal’s thirteen years in Berlin—he emigrated to Mallorca in 1933—he and Braun became more than student and teacher. Segal’s letters to the Brauns reveal a close professional and personal relationship.\(^8\) It was Segal who convinced Braun to continue working for his father rather than become a full-time artist—advice prompted by Segal’s lifetime of financial struggle. Segal’s art theories, philosophical outlook, and professional relationships guided Braun’s early artistic development.


\(^8\) Anne Ratkowski-Wanger papers, Leo Baeck Institute, New York. The LBI also houses Arthur Segal’s papers. Both collections are digitized in their entirety and published on the LBI website: https://www.lbi.org/.
Given the many unknowns surrounding Braun, it is surprising to learn that an early painting survives in the collection of the Berlinische Galerie. It dates from 1921—only a year after he began lessons with Segal. *Berlin Street Scene* demonstrates the degree to which Braun absorbed Segal’s expressionist sensibility. It is a conventional oil painting of a shopping district at night. The throng from the street spills onto the sidewalk, which Braun filled with cynical urban vignettes. Busy shoppers hurry past a barefoot boy selling newspapers; an old man, probably hungry, begs in front of a well-stocked butcher’s window; and a loiterer leans against the streetcar stop. Despite all this street-level activity, the tall buildings dominate the composition. A wall of shops four stories high dwarfs the people below, blocking out the night sky. As if by x-ray, the viewer sees the events within the shops on the building façades.
Braun captured Berlin’s energy as the proverbial city that never sleeps. His garish colors and torqued pictorial space produce a funhouse effect. In this regard, Braun’s painting resembles Ludwig Meidner’s pictures of city streets. Meidner’s 1918 *Street in Kreuzberg* depicts, like Braun’s painting, towering buildings that flank a canyon-like street. As in Braun’s painting, the street is a crowded space of pedestrians, streetcars, and buses. Meidner symbolized Berlin in this vortex of activity. He also described frenetic city life his 1914 homage to urban expressionism “An Introduction to Painting the Metropolis.”

“A street isn’t made out of tonal values,” Meidner wrote, “but is a bombardment of whizzing rows of windows, of screeching lights between vehicles of all kinds and a

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thousand jumping spheres, scraps of human beings, advertising signs, and shapeless colors.”

Meidner described the city as a collage of abstract sense fragments produced by ceaseless activity in which light played a central role. “Between high rows of houses a tumult of light and dark blinds us,” he wrote. “Simple planes of light rest on walls. Light explodes over a confused jumble of buildings.” Light’s unpredictability creates this disoriented experience of the city street.

This short digression suggests a few thoughts on Braun’s artistic development leading up to his light art. First, it establishes his origins in an expressionist milieu he absorbed as Segal’s student, but that is more in keeping with Meidner’s Großstadtxpressionismus, or urban expressionism, than with Segal’s landscapes and biblical scenes. Second, Berlin Street Scene touches on themes—especially light, but also Berlin’s nighttime culture—that Braun continued to explore in his light art. Braun built the composition around electric light and its effects. As Meidner suggested, light plays an essential role in the pedestrian’s experience of the city. Braun expressed this in the brightly lit shop windows that dominate the composition—including a light fixture showroom located on the upper floor of the right-hand building, just below a rooftop advertisement for Osram-brand lightbulbs. He set the painting at night in a Berlin shopping district—a familiar setting given his café work. It establishes his general interest in the urban

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83 Ibid.
environment and particular concern for nighttime leisure activities. This theme of nighttime urban illumination provides an unexpected point of continuity between *Berlin Street Scene* and the very different light reliefs that soon followed.

*Berlin Street Scene* probably entered the Berlinische Galerie’s collection as a purchase from Braun’s early exhibitions in 1921 and 1922.\(^8^4\) The following year, in 1923, Segal secured Braun’s membership in the November Group, which Segal himself had joined on his arrival in Berlin. It is unclear when Braun first made his light art, but its debut came in the November Group rooms of the 1923 *Great Berlin Art Exhibition*.\(^8^5\) According to the exhibition catalogue, Braun exhibited four works: *Light Construction no. 2, Light Picture no. 4, Material Construction no. 2*, and *Light Rhythm (dynamic)*.\(^8^6\) Unfortunately, no photographs of these works survive. Only three of the 1923 works include ‘light’ in their titles. Of these, two—*Light Construction* and *Light Picture*—suggest static light configurations. *Light Rhythm (dynamic)* was sufficiently novel to elicit more detail from the critics. Art critic and architect Ludwig Hilberseimer described it as a work unlike any other with “moving forms and alternating lights,” confirming that this work used a motor along with the expected light bulbs.\(^8^7\) Lacking

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\(^8^4\) Merkert and Förster, *Anne Ratkowski*, 30; Helga Kliemann, *Die Novembergruppe, Bildende Kunst in Berlin 3* (Berlin: Mann, 1969), 22. The exhibitions took place at Berlin’s Fraenkel & Co. Gallery, which frequently exhibited Segal’s art and was the site of the first annual November Group exhibition in 1919.


additional information, it is unclear what parts moved and how. However, no accounts after 1923 mention movement, so Braun likely eliminated that element.

The November Group display that year was particularly notable. In addition to showing art by its members, the group invited fellow travelers from Russia, Hungary, and the Netherlands to exhibit. The guest artists included leading proponents of early international constructivism. El Lissitzky contributed his *Proun Room*, László Moholy-Nagy exhibited his transparent paintings, Theo van Doesburg prepared a three-part wall painting, and Hans Richter and Werner Graeff screened abstract films. Given this heady collection of avant-garde masters, it is striking that Hilberseimer praised Braun’s *Light Rhythm* as the exhibition “showstopper.” In his review, Hilberseimer interpreted *Light Rhythm* as a German development of the same international pursuit of “elemental means: formal and material” he saw in the art of Lissitzky, Moholy, Van Doesburg, and Richter. Hilberseimer was not alone in interpreting Braun’s light art as constructivist. The next year, in May 1924, Herwarth Walden invited Braun to show his light art at the Sturm Galerie in a two-person exhibition with Hungarian constructivist Lajós Kassák. In support of the exhibition, Walden’s *Der Sturm* journal published the first images of Braun’s light art.

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88 For this and the following quotes in this paragraph, Ibid., 451.
With the Sturm exhibition, Braun’s titles changed again. He named three of the four works *Alternating Light Picture*, implying that the integrated lights turned on and off automatically. *Alternating Light Picture Phase 1* shows how this might have worked. Like the other two alternating light pictures, it is an assemblage of painted wood and metal elements arranged in a square box. Unfortunately, Braun’s colors are impossible to reconstruct. Hilberseimer compared Braun’s light art to “begalischés Lichter,” or Bengali lights, an early term for fireworks. Assuming Hilberseimer was right, Braun painted these early works in vibrant colors and may have even used colored lights. Segal’s paintings of these years, which bordered on garish, also support the assumption of a bright color scheme.

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89 Hilberseimer, “Berlin: Große Ausstellung 1923.”
Having already projected color onto the black-and-white photograph, we must further imagine the effect of the lights hidden within the relief. To aid the reader, *Der Sturm* published two lighting configurations for *Alternating Light Picture* (hence the qualifier *Phase 1* and *Phase 2*) on subsequent pages. Here they appear side-by-side. At first glance, the differences are subtle. The effect is most pronounced in the upper left corner, center right, and center bottom of the composition (marked in the diagram below for clarity). In these areas, the alternating lights cause compositional elements to advance and recede. In the upper left corner, the large rectangular shape with a curved top expands in the second configuration, transforming into an irregular ‘L’ shape that extends to the frame.

Figure 2.7 – Nikolaus Braun, *Alternating Light Picture Phase 1 and Phase 2*, 1924. Lost.
As no light sources are visible, Braun must have hidden the bulbs within the composition. According to Braun’s fellow student Mordecai Ardon (then known as Max Bronstein), Braun built his light art using ducts that housed the bulbs. When the bulbs turned on, the light shone from the open end of the duct.\textsuperscript{90} Braun’s choice of ‘alternating’ implies there were only two settings, a conclusion the two phases of Alternating Light Picture supports. Braun probably set the automatic timing for regular intervals that allowed the viewer to study the new configuration—not fast enough to produce a stroboscopic effect. As such, they were like successive studies for a painting, with each (automated) flip of a switch altering the composition. Light transformed the articulated surface of the work by modifying colors, distorting shapes, and casting shadows. The additional functionality of alternating lights emphasized light’s transformative capacity. The

\textsuperscript{90}Wulf Herzogenrath and Mordecai Ardon, “Interview with Mordecai Ardon (Max Bronstein),” in \textit{Arthur Segal, 1875-1944} (Berlin: Argon, 1987), 124.
two phases of *Alternating Light Picture* show how light distorts the colors and forms—sometimes dramatically. This aspect of light inspired Richard Blümner to praise Braun’s light art as the first self-lighting art, liberated from the tyranny of unpredictable gallery lighting.\(^9^1\)

Braun’s light art is, in other words, an experiment in light’s visual properties and potential. In this regard, it complemented a constructivist line of materialist inquiry. Braun’s 1924 exhibition with Kassák at *Sturm* confirms this affinity. The two artists had no association prior to their joint exhibition. Kassák was thirteen years older than Braun and Hungarian. He was more famous as a poet than as an artist, literary origins seen in his editorship of several avant-garde journals. One, *MA*, was the unofficial organ of activism, an art movement that combined cubism and dada with Russian futurism, constructivism, and communist politics.\(^9^2\) Given Kassák’s established reputation as one of constructivism’s earliest proponents outside Russia, the Sturm Galerie exhibition framed Braun’s light art as constructivist.

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\(^9^1\) Rudolf Blümner, “Licht und Schatten,” *Der Sturm* 17, no. 9 (December 1926): 129–35.

The plausibility of a constructivist reading of Braun’s light art is symptomatic of constructivism’s pluralism at that moment—a pluralism Kassák’s blend of...
geometric abstract tendencies epitomized. The flying oblique forms of Kassák’s *Dynamic Construction* resemble a plate from El Lissitzky’s *Proun* portfolio published by Hannover’s Kestner Society in 1923. De Stijl’s planar and modular aesthetic appears in an untitled linoleum cut of rectangles. Its simple arrangement balances black and white elements to capture the figure-ground ambiguity of Vilmos Huszár’s woodcut cover design for the journal *De Stijl*. Despite Kassák and Braun’s different allegiances, Walden’s decision to pair the two artists made intuitive sense. Both shared a common language of geometric abstraction and reductive composition. A visitor would immediately see the similarities between the two artists. Braun’s materialist inquiry into light and his geometric abstraction were overtures to constructivism. Even so, Braun’s light art is primarily a product of the ideas about light he encountered in the late-expressionist milieu of Segal’s studio.

2.2. Segal’s Studio

When Braun began lessons with Segal in 1920, Segal was preoccupied with his equivalence paintings—so-named because they visualized pictorially the abstract concept of equivalence. Segal’s engagement with equivalence dated from a conversation he had in 1916 with fellow war exile Viking Eggeling. Segal asked Eggeling for feedback on a landscape whose surface Segal had dotted all over with flecks representing sunlight. Eggeling criticized the flecks because, he

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claimed, they scattered the composition. Eggeling believed all paintings required a focal point—something to concentrate the viewer’s attention—and that the artist should subordinate the secondary elements to this focal point. Segal was at that time preoccupied with the war. Eggeling’s comments spurred Segal’s belief that ‘focal point’ thinking, applied to human interactions, was the source of all conflict. When one person’s needs were elevated above another’s, like the focal point in a painting, disagreements resulted—a conclusion Segal reached with help from naturist friends at Ascona’s Monté Veritá community. From that point on, Segal “searched for the form that symbolized equivalence.”

Figure 2.11 - Arthur Segal, *Heligoland*, 1923. Oil on canvas, 46 ⅞ x 58 ¼ in. Berlinische Galerie, Berlin.

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By 1923, Segal had developed a set of pictorial strategies he used to “symbolize equivalence.” They all appear in *Heligoland*, which depicts an island in the North Sea where he spent a week in the summer of 1923. Segal subdivided the canvas into smaller parts to reduce the importance of the center. Each cell of the grid became a single unit that balanced against the others. He also extended the composition onto the frame. This eroded the frame’s function as the boundary between the work of art and the real world, symbolizing the interaction Segal believed existed between theory in art and life. Segal wrote, “The frame doesn’t enclose,” but leads outside itself—creating the connection to the universe.”

But Segal’s peculiar handling of color stands out as the most unusual strategy of his equivalence paintings. In *Heligoland*, Segal broke objects into facets and painted each in a spectrum of color shifting from white to color to black. This is an extraordinarily direct interpretation of how Goethe described color in *Theory of Color*. He claimed that colors were mixtures of light and dark. “Light and its absence are necessary for the production of color,” Goethe wrote. “Next to the light, a color appears which we call yellow; another appears next to the darkness, which we name blue.” Segal’s reference to Goethe was not random. Philosopher Salomo Friedlaender—Segal’s close friend—cited this passage in an essay on Goethe’s color theory that appeared the same year Segal began his equivalence

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Goethe’s claim of color’s origin in a primal synthesis of light and dark fascinated Friedlaender. One way to understand Segal’s unusual handling of color in *Heligoland* is as a visualization of Goethe’s theory. Segal illustrates how color sits at a midpoint between white and black.

![Heligoland](image)

Figure 2.12 – Detail. Arthur Segal, *Heligoland*, 1923.

Alternatively—or additionally—Segal’s treatment of color in *Heligoland* also resembles shading. But, if that were the case, the highlights would conform to a consistent light source in the scene—a consistency *Heligoland* lacks. The white highlights and black shadows follow no discernible pattern. The inconsistency of Segal’s color-as-shading is especially clear in the building-block town with its identical houses, each shaded differently. While this inconsistency might discourage a reading of *Heligoland*’s color treatment as shading, in fact, Segal

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included within the composition a source for inconsistent lighting. On top of Heligoland sits a lighthouse, whose powerful lantern emits two cones of light that shine as wedges from opposite sides of the lantern. The light rays travel in continuous paths across the gridded composition until they dissipate at the frame. The lighthouse’s spinning rays of light offer an alternate explanation for Segal’s color shading. The spinning light endlessly hits the surrounding buildings, bathing them in bright light then darkness. Segal’s painting assembles snapshots of this effect at different moments in a single scene.

Figure 2.13 – Nikolaus Braun, *Alternating Light Picture Phase I*, 1924. Lost.

It is an effect the viewer doesn’t have to imagine because Braun recreated it in his light art. *Alternating Light Picture* repeats Heligoland’s color shading courtesy of both paint and real light. It demonstrates how changing light sources transform a static picture through their effect on color. Braun created in real time
the lighthouse’s endless back and forth rotations. If Segal adopted alternating light as the theme of *Heligoland* in the form of the lighthouse and inconsistent shading, Braun literalized it by using real alternating light.

![Figure 2.14 – Photographer unknown, [Segal (seated) and Braun in Segal’s studio], 1923. From Wulf Herzogenrath and Pavel Liska, *Arthur Segal*, 1875-1944 (Berlin: Argon, 1987) 120.](image)

Braun’s decision to work with real light appeared as Segal abandoned equivalence for a new concern with observable light phenomena. Evidence for Segal’s transformation comes from an unusual source. The only photograph of Braun and Segal together was taken in 1923 in Segal’s studio. Segal sits in front of *Heligoland*, while Braun stands over his left shoulder. They study a large sheet of paper held between them. Segal points with his index finger at a passage on the paper. The casual gesture, the cigarette in his mouth, suggests Segal has paused
mid-sentence to clarify a point. Braun looks intently at the spot Segal indicates, his right hand hovering near Segal’s. There is also a silent exchange between the painted space of *Heligoland* and the studio interior. The ray of light emitted from *Heligoland*’s lighthouse travels to the edge of the painting where Segal’s gaze and pointing hand continues its trajectory to end at the drawing he holds. This spot commands not only Segal and Braun’s attention, but also that of the surrounding paintings.

![Figure 2.15 – Detail. Photographer unknown, [Segal (seated) and Braun in Segal’s studio], 1923.](image)

It is hard to make out what they are looking at. A close-up reveals what appears to be a diagram—not the sketch expected in an artist’s studio. Below the spot Segal indicates, we see a large outlined triangle bisected by two curved lines. They show the bending passage of light as it travels through a prism. The photograph’s inscription confirms that the drawing represents the results of experiments Segal conducted on the behavior of light. The specific nature of
Segal’s light experiments in 1923 not only transformed his painting practice, it also provided the immediate artistic context for Braun’s light art of the same year.

Figure 2.16 – Arthur Segal, *Prismatic Composition*, 1923. From Arthur Segal and Nikolaus Braun, *Lichtprobleme der Bildenden Kunst* (Berlin: [self-published], 1925).

Segal’s experiments resulted in a new cycle of six paintings he premiered at the 1923 *Great Berlin Art Exhibition*—the same exhibition where Braun debuted his light art. Segal named the cycle *Prismatic Composition*, and it included the most abstract painting he would ever make, now known simply as *Prismatic Composition* after the cycle. The cycle also included more traditional still lifes, like *Still Life – Fruit and Jar*. In these paintings, Segal dispensed with the grid-like division of the canvas and stopped painting the frame. But his treatment of color is perhaps the most striking change. Segal replaced *Heligoland*’s color shading with a new kind of spectrum. In *Prismatic Composition*, the abstract shapes radiate swathes of rainbow-like bands in green and blue or red and yellow. The same colors dominate the still life, with jug and fruit clothed in a swirling pointillist rendition of *Prismatic Composition*’s colored bands. Even the shadows cast on the table are alive with color. Segal scholars cite this color application as the defining feature of the prismatic paintings. They explain it as a symptom of Segal’s newfound commitment to light, expressed as the spectral colors of light split through a prism.\(^\text{101}\) While this is true, there is a more specific explanation for Segal’s idiosyncratic use of the color pairs green-blue and red-yellow. These colors and their placement refer to an early essay by Goethe on color, published twenty years before the more famous *Theory of Color*.

*Contributions to Optics* related Goethe’s findings from a series of experiments with a standard glass prism.\(^\text{102}\) Unlike Newton, who famously split sunlight

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\(^\text{102}\) Reprinted and translated in Goethe, *Goethe’s Color Theory*. 
through a prism to study the resulting spectrum, Goethe looked through a prism to study its effects on vision. To aid his research, he developed a set of test patterns. In *Contributions*, Goethe invited the reader to confirm his findings by performing the same experiments at home. The publication included a set of playing cards that reproduced the test patterns for the reader to consult. It was one of Friedlaender’s favorite texts. “In his vest pocket,” Hans Blüher remembered, “Friedlaender carried a prism that he sometimes whipped out whenever there was doubt about the validity of Goethe’s color theory.” Friedlaender probably brought Goethe’s prism experiments to Segal’s attention. Segal, in turn, faithfully reproduced the optical effects Goethe observed in the prismatic paintings.

What do you see when you look through a glass prism? Mostly you see what you would normally see without the prism. In addition, the prism produces colors at edges parallel to the axis of the prism. In other words, when you look at a piece of white paper through a prism held horizontally, you see the paper as well as colors that radiate from the top and bottom horizontal edges. When you turn the prism vertically, colors radiate from the vertical sides of the paper. Goethe called these effects colored shadows because they cling to an object’s edge like a shadow. He designed his test patterns to learn the conditions that governed whether colored shadows appeared, the order of the colors in the shadow, and the shape of the colored shadows.


What is most important for Segal’s prismatic paintings is that Goethe saw shadows of only two color combinations: red-yellow and purple-blue. Which combination appeared depended on the bordering colors. In the test patterns above, a rectangular field is divided vertically into upper and lower halves. When white is on top and back is below, the colored shadow that appears where they meet is purple-blue. When black is on top and white is below, a red-yellow shadow appears. In Prismatic Composition, Segal adopted the same color
combinations with one substitution: he replaced purple with green. Goethe’s findings provided the method behind Segal’s choice of color. The black monolith in the center of the composition shows how this worked.

Figure 2.19 – Left: Detail. Arthur Segal, *Prismatic Composition*, 1923. Right: Test pattern. From Goethe, “Contributions to Optics,” 1793.

At the bottom of the monolith, its black form appears against a white ground—black is on top and white is below. Following Goethe’s formula, there is a red-yellow colored shadow. At the top of the monolith, the white ground appears above the black form—white is on top and black is below. Where they meet is a blue-green colored shadow, consistent with Goethe’s observations modified by Segal’s substitution of green for purple. Segal applied this scheme consistently throughout the painting. His choice of colors and their correct application was too specific to be a coincidence. The prismatic paintings’ conspicuous use of colored shadows shows that Segal looked to Goethe’s *Contributions* to chart a new course for his painting, one with a greater emphasis on observable light phenomena.
In Segal’s writings, light took on a new and special prominence that complemented its role in the prismatic paintings. Segal’s most complete expression of his light theory appeared in “Painting’s Light Problems” published in Braun’s 1925 booklet *Light Problems of Visual Art*. This text documented Segal’s newfound focus on light as a central artistic problem, from which resulted not only his prismatic paintings, but also Braun’s light art. Segal dedicated his essay to Friedlaender and opened it with a Friedlaender-ean explanation of painting. “Painting is the expression of the optical perceptions of difference in the everyday world.”\(^\text{104}\) According to Segal, light creates this difference. Through shadows and color modulation, it defines objects in the world. Segal continued to retell art history as a series of aesthetic approaches to light. In each art historical period, artists elevated one pictorial element above all others: Medieval light, Renaissance form, Rembrandt’s tonality, Impressionist colored light, and Neoimpressionist color. This hierarchical elevation of one pictorial value above all others constituted *the* battle of art history. Like all battles, this one was destructive. The solution to this problem, Segal argued (without apparent irony), was to find one element on which all of these elements depended and adopt it as the true goal of art. Unsurprisingly, he identified light as that primal pictorial element. “Light is the factor,” Segal wrote, “that makes us first aware of form and color.”\(^\text{105}\) Light was the glue that bound them together.


\(^\text{105}\) Ibid., 3.
Also unsurprisingly, Segal took his argument directly from Goethe. “The eye sees no form,” Goethe wrote in *Theory of Color*, “inasmuch as light, shade, and color together constitute that which to our vision distinguishes object from object, and the parts of an object from each other.” Goethe continued, “From these three, light, shade, and color, we construct the visible world, and thus, at the same time, make painting possible, an art which has the power of producing on a flat surface a much more perfect, visible world than the actual one can be.”

This passage from Goethe led Friedlaender to the same conclusion in a 1923 essay Segal commissioned as editor of a catalogue for the Collection Gabrielson. “Painting is light art,” Friedlaender wrote, “purely optical, a synthesis of light, color, form in pure creations of light.”

Friedlaender’s evocation of “pure creations of light” brings us to Braun, whose essay in *Light Problems in Visual Art* demonstrated how his light art advanced Segal’s newfound interest in observable light phenomena. In “Concrete Light,” Braun agreed with Segal that “color, form, and light” were the “three fundamental factors of the visual arts.” Here, rather than repeat Segal’s teleology of light, Braun turned to the ‘concrete light’ of his essay title. He described how his artistic interest in light led him to explore light as a “mode of expression.” “I add electric light,” Braun wrote, “as a solid element to my works,

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thus giving them a more real light—the ability to give off their own light.” Braun concluded that light had as much expressive potential as form or color. Light—“an eminently mobile, highly suggestive material of inexhaustible potential”—could take on a variety of appearances. It changed how forms and colors appeared; it could even transform a color entirely. Moving lights multiply these effects and “cause constant adjustments,” Braun wrote, “not just in the relationships among visual objects, but also in the relationships between the objects and the image as a whole.” The word ‘real’ appears throughout Braun’s statement. It was essential for him that his light art use real light to create real light effects. This desire for real-world connections also appears in Segal’s prismatic paintings. Segal, too, wanted to bring his painting in closer contact with the visible world, even if filtered through the artifice of the prism. In fact, the prismatic paintings were the first in a series of new work that ultimately led Segal back to realism.

Although Segal’s prismatic paintings must have encouraged Braun’s interest in light, they do not wholly predict his radical embrace of electric lighting. To start, it fails to explain why Braun abandoned painting as a medium. Segal was a dedicated painter; as late as 1921’s *Berlin Street Scene*, Braun followed his teacher’s lead. Yet Braun rejected oil painting for assemblage only a year later. Braun attributed this development to light’s expressive potential; however, his life outside of the studio offers an intriguing alternative explanation. Braun’s employment in his father’s cafés—spaces famous for their abundant artificial
light—provided the material conditions for Braun’s light art. This real-world experience compelled Braun to experiment with real light.

### 2.3. Café Interiors

![Figure 2.20 – Left: Photographer unknown, [Nikolaus Braun], 1920. Photograph, 8¾ x 6¾ in. Anne Ratkowski-Wanger Collection, Leo Baeck Institute, New York. Right: Photographer unknown, [Heinrich Braun, owner of the Kaffee Piccadilly, Berlin], 1927. From Wide World Magazine.](image)

The scant details Segal and Ratkowski offered of Braun’s biography don’t convey the scale and historical significance of Braun’s family enterprise. The elder Braun’s first documented property was the Café Colosséum on Beuthstraße, which he owned as early as 1910. From there he expanded to at least six additional properties. They were: the Restaurant Kroll at the Kroll Opera House, which Nikolaus managed; Café Piccadilly at the Haus Postdam (hereafter called Kaffee Vaterland, its name after 1915); Café des Westens on the Kurfürstendamm (also known as Café Größenwahn); Kaffee Tauentzien-Palast in Charlottenburg’s
Tauentzien Palast movie theater; Café am Alexanderplatz; and Pavillon Europa, a Potsdamer Platz dance hall. It is possible he owned more—these are the properties for which evidence of ownership is available.

Heinrich Braun’s properties were not typical cafés, even by Berlin’s standards. He specialized in establishments associated with major entertainment districts and performance venues, like the Kroll Opera House, movie palaces, and pleasure palaces. These cafés were nighttime destinations for Berlin’s workers. Not only was there abundant light—itself a novelty in the days before widespread household electrification—the fixtures themselves were theatrical, designed to delight. Segal’s interest in light planted the seed for Braun’s light art, but Braun’s nightly work in these spaces sculpted by light effects led him to conceive of electric lighting as an artistic medium.

Of these pleasure palace cafés, the Kaffee Vaterland was the largest and grandest. It was located in a massive pleasure palace attached to the Potsdamer train station. Known as Haus Potsdam from 1912 until 1928 and Haus Vaterland thereafter, the six-story building originally housed offices (including the headquarters of UFA, Germany’s largest film company), a movie theater, and ballroom. In 1928, the building owners reopened it as Berlin’s largest pleasure palace, complete with themed restaurants and bars. Kaffee Vaterland anchored the complex. It occupied a central location and seated a staggering 2,500 customers,

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earning it a reputation as the largest restaurant in the world. Kaffee Vaterland entertained not only Berlin’s workers; it was also, and primarily after the 1928 reopening, a destination for tourists to Haus Vaterland. A series of postcards Heinrich printed for his various properties documented this tourist trade. The postcards follow the same formula: the front bears a photograph of the café’s main dining room with a caption to identify the scene. These postcards offer a rare glimpse into the café interiors where Braun grew up. Kaffee Vaterland’s particularly well-documented interior is typical of Heinrich’s approach to café décor.

Figure 2.21 – Postcard of Kaffee Vaterland, 1928.

111 Ibid., 212.
112 Heinrich Braun’s name appears as owner on Café Piccadilly postcards from 1912 to 1914. No owner’s name appears on postcards after 1915, and the café’s name unofficially changes from Piccadilly—unpopular because Germany was at war with Great Britain—to Vaterland. Despite the uncertain ownership, Piccadilly/Vaterland postcards dating from 1912 to 1928 show the café interior remained fundamentally unchanged.
Kaffee Vaterland was housed in a cavernous two-story space on a ground floor corner of Haus Vaterland. Large windows on two sides flooded the rectangular room with natural daylight and provided spectacular views of busy Potsdamer Platz. It is easy to imagine visitors marveling at the square’s hordes of pedestrians, cars, buses, and streetcars. A veritable army of light fixtures flooded the dining room with light after sunset. In addition to the three massive chandeliers in the center of the room, there were smaller mezzanine chandeliers, swags of bulbs on the balconies, and wall sconces on the ground floor pillars. The back and side walls were faced with floor-to-ceiling mirrors, and mirrors also appeared as wall décor and in the sconce backings. These materials amplified both natural and artificial light.
Reviews of these cafés suggest their customers cared more about interior design than the quality of the coffee they served. In 1914, the socialist journal *Die Aktion* lampooned one such review—coincidentally, of the opening of Heinrich’s Kaffee Tauentzien-Palast, part of a new movie palace on Tauentzienstraße. The original author wrote his review as a first-person account. “Immediately upon entering the rooms, one is flooded by a sea of light from on high,” he wrote, “so extravagantly bright that one is initially quite dazzled.” He continued breathlessly, “The gleam of mother-of-pearl, gold-bronze, marble, and mirrors combine to create an overall impression that, with its nobility and finely structured architecture, is shown off at its most resplendent by the magnificent lighting.” As if that were not enough, as the reviewer “becomes accustomed to the sunny illumination” he “perceives with astonishment how the architect has brought back

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to life in Greater Berlin the magnificence of ancient Byzantium." His powerful—if amusingly hyperbolic—evocation of light and luxury applies equally to Kaffee Vaterland. The Die Aktion critic predictably censured the Tauentzien-Palast’s shameless displays of wealth and called the reviewer a “snob” who spouted “intellectual diarrhea.” However, the reviewer’s richly evocative description captures the fantastical interiors customers demanded from these establishments. These elaborate cafés boasted multi-story dining rooms—the café at the Tauentzien-Palast had three stories—live music performed by a full orchestra, and richly decorated interiors. It was a fairyland atmosphere produced, as the reviewer suggests, by extravagant artificial lighting.

Comparing the photographs of Vaterland and Tauentzien-Palast, one element that stands out in both are the massive central chandeliers that loom over the dining rooms like electric suns. These chandeliers point to the importance of sculptural light fixtures as design focal points in the cafés where Nikolaus Braun worked. Braun would have studied these fixtures, observed their installation, and overseen their maintenance. Early incandescent light bulbs had short lives. Such heavily lit interiors required frequent bulb replacement and a well-stocked storeroom. Braun’s work at the Restaurant Kroll gave him access to the light fittings and bulbs he needed for his light art. Even if Braun lacked the expertise to wire his works, the cafés provided him with electricians whom he could easily contract. The overly lit café interiors not only inspired Braun to use electric light

\[114\] Ibid.
\[115\] Ibid., 205.
as an artistic medium, they also provided him with the technical means and materials he needed.

Figure 2.24 – Photographer unknown, *Europa-Tanz-Pavillon* from the portfolio *Berlin im Licht*, 1928. Photograph, 6½ x 8¾ in. Stadtmuseum Berlin.

Figure 2.25 – Postcard of Tanz Pavillon Europa, undated.
However, the Biedermeier chandeliers of Vaterland and the Tauentzien-Palast don’t look like Braun’s terraced light reliefs of 1924. For this first generation of light art, Braun looked to expressionist painting as a model. Like paintings, the reliefs are rectangular, framed, and hung on a wall to be viewed from the front. In compositional terms, the reliefs’ geometric shapes are easily imagined as abstract paintings, a resemblance that would have been heightened by their brightly colored painted surfaces. Starting in 1925, Braun adopted a new look for his light art that struck a balance between painting and the café’s light fixtures. They still have little in common with the Vaterland’s monumental confections; but, some light fixtures—like the one installed in Heinrich Braun’s Europa Tanz Pavillon—were more modern. The Europa fixture was a cluster of frosted glass rectangular prisms lit from within and installed on the ceiling like art deco stalactites. It isn’t exactly the same as Braun’s later light art, but it demonstrates the variety of fixtures installed in Berlin’s entertainment venues.
Light Sculpture suggests that Braun’s later light art had more in common with light fixtures than those he exhibited in 1924. The first of Braun’s two sculptures, Light Sculpture appeared in 1925’s Light Problems of the Visual Arts. Light Sculpture may not exactly resemble the café chandeliers, but it could easily be confused for an artful lamp. The addition of a third dimension invited even greater possibilities for light effects. Light emanates from its deep recesses to model the sculpture’s curving surfaces.
Braun’s light art published in *Der Sturm* in 1926 displayed a markedly different approach to composition and materials. In *Light Picture*, Braun created a simple composition of a circular disc flanked by two oblique panels mounted in a shallow box. The elements appear to be either polished or enameled metal, but the ground is made of wood with visible wood grain. Braun appears to have hidden light sources behind the disk and the deep frame. In another work of the same title, Braun dispensed with the relief format all together and mounted the compositional elements directly to the wall. He assembled several rectangles made of different materials, including transparent glass and wood, in overlapping layers. The absence of ‘alternating’ from the title implies that both may have had
fixed, rather than alternating, light configurations. Like *Light Sculpture*, Braun’s later light art is elegant in its simplicity and more reminiscent of modern light fixtures than paintings.

As early as 1926, a scholar with no knowledge of Braun’s family business suggested a connection between Braun’s light art and commercial lighting. Rudolf Blümner, an actor and poet who frequently published in *Der Sturm*, was the only critic who wrote at length about Braun’s light art. His essay “Light and Shadow: On the Alternating Light Pictures of Nikolaus Braun” mostly concerns Braun’s critical engagement with the format of sculpture. Sadly, it’s a dry and pedantic text with little reference to the actual works. However, at the end of his essay Blümner noted the potential benefit of Braun’s light art for display windows, signs, and shop fronts. By studying Braun’s work, advertisers and architects might transform their lighted advertisements—“not illumination (*Beleuchtung*),” Blümner exclaimed, “but enlightenment (*Erleuchtung*)!”


Figure 2.28 – From Hugo Häring, “Lichtreklame und Architektur,” *Architektur und Schaufenster* 24, no. 8 (1927).
Like Blümner, architect Hugo Häring framed Braun’s light art as reform advertising—in his case, with the lighted advertisements on building façades. In his 1927 essay “Lighted Advertisements and Architecture,” Häring compared a building façade redesigned by Arthur Korn to Braun’s *Alternating Light Picture I.* He hoped to convince other architects to follow Korn’s lead. Häring worried about the growing problem of signs. “It is a fact that commercial buildings don’t have architectural façades anymore,” Häring wrote, “their skin is merely a scaffolding for advertising signs, and lettering, and luminous panels.” Unless the government passed laws regulating illuminated advertisements—which was unlikely—signs were here to stay. Architects, Häring believed, should embrace lighted advertisements, not reject them. By approaching signs as design elements, architects could restore order to city streets. “At present,” Häring wrote, “the nighttime streetscape presents a farrago of the most variegated illuminated advertising.” He continued, “The early stage of chaotic activity will be succeeded by one featuring a more concerted approach to illuminated advertising, and more rational organization of this exceedingly expensive activity.” An integrated approach to façade design would also give the façade a new life at night. Lighted advertisements let the architect design a 24-hour façade. Here, Braun’s light art was useful as a means with which to demonstrate the spectrum of effects possible

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with the placement of lights on an articulated surface. Architects could build models like Braun’s to study different lighting configurations in order to visualize both daytime and nighttime appearances.120

Blümner and Häring’s articles demonstrate the thin boundary between artistic and applied light in interwar Berlin. Braun’s use of electric lighting made this distinction especially porous. His light art reminded its interpreters from outside of the visual arts—people like the actor Blümner and the architect Häring—of practical light applications in other contexts. Braun was in some ways as much an outsider as Blümner and Häring. He trained as an artist, identified as an artist, yet spent most of his time managing a café. Far from diminishing Braun’s artistic accomplishments, it suggests a life experience at the root of an otherwise inexplicable change in his practice. Braun’s identity as a café-world insider and the importance of artificial lighting within that environment helps explain the stakes of his appropriation of light as an artistic medium.

2.4. Illuminating Light

Electric lighting not only provided the dominant impression for visitors to Heinrich Braun’s cafés, it also extended to the broader entertainment industry to which his café-empire contributed. According to Berlin tour guides, artificial lighting was one of the city’s main attractions. The author of a 1931 guide observed that the “real character” of Berlin’s entertainment districts “reveals itself best in the artificial light of the evening.” “This whole section of the city glows at

120 Ibid., 453.
night with bright, multicolored, neon lighting,” he continued, “and the mainly ugly houses disappear in the twilight or light up in a mysterious and romantic way in the harsh strip lighting.”¹²¹ The entertainment district came alive at night, when its lights beckoned the tourists like signposts. In the Guide through ‘Licentious’ Berlin, another author described how the Berliner at the end of the workday “craves the sea of light” of the entertainment districts. “Even a stroll under the neon advertising signs is like an invigorating shower,” he wrote, “which gives him a lift, bringing vitality, expectation, and hopes of new experience and adventure.”¹²²

This last excerpt hints, perhaps not too subtly, at the dark side of the entertainment industry’s allure. The author described a worker so bored by his daily routine that he “craves” his evening adventure like a drug. The worker’s everyday existence compelled him to find “something sensational,” the author wrote, “for sensationalism is an imperative for modern man.”¹²³ Although the author offered no moral indictment of this situation, others took a dimmer view. Philosopher Ernst Bloch imagined impoverished Berliners who “roam the streets, through long, rain-soaked neighborhoods, observing the prosperity, the New

¹²³ Ibid.
Objectivity.”¹²⁴ They witnessed “the overly lavish lighting of which you have heard so much, the new cafés, the theaters, Berlin as the leading edge,” concluding “so what?”¹²⁵ For Berlin’s poor, the lights of the entertainment districts offered neither mystery nor vitality—only small fortunes used to power electric advertisements rather than feed the hungry or house the homeless. These accounts show the degree to which popular imagination linked artificial lighting and Berlin’s entertainment industry—for better or worse. Neon signs symbolized the cafés and dance halls they advertised as well as a typically Berlin lifestyle of daytime industry followed by nighttime ‘licentiousness’. The authors’ attitudes toward this lifestyle determined their descriptions of its light. Such was artificial light’s malleability that it appeared variously as romantic, spectacular, or corrupt.

Cultural theorist Siegfried Kracauer offered a detailed sociological analysis of the relationship between light, the entertainment industry, and capitalism in *The Salaried Masses* of 1929. His subject was Berlin’s white-collar working poor—department store clerks, typists, and bank tellers who exchanged minimal skills for low wages. They worked unsatisfying, repetitious jobs on the lowest rung of an oppressive corporate hierarchy with no job security or hope for advancement. When their workday ended, they went home to rented rooms in smoky, dark, and overcrowded apartments with no electricity or running water. Deprived of either meaningful work or habitable home, they returned to the city streets in search of

¹²⁵ Ibid.
distraction. The cafés provided the salaried masses with everything they wanted and lacked—luxurious and comfortable surroundings where they temporarily forgot the misery. Like Bloch, Kracauer used artificial light to symbolize the spectacular entertainments that distracted the salaried masses. “The light blinds more than it illuminates,” Kracauer wrote, “and perhaps the abundance of light pouring out lately over our large towns serves not least to increase the darkness.”126 Heinrich Braun’s cafés were essential components of an extensive compensatory system—a glittering nightlife to distract from workday monotony. As the pleasure palaces became more luxurious and their entertainments more spectacular, the disparity between daytime reality and nighttime fantasy grew.

![Figure 2.29 – Photographer unknown, Haus Vaterland from the portfolio Berlin im Licht, 1929. Photograph, 6½ x 8¾ in. Stadtmuseum Berlin.](image)

126 Kracauer, The Salaried Masses, 89.
Kracauer may have been thinking of the Haus Vaterland, a literal beacon that anchored Potsdamer Platz and housed the largest café in Europe, Heinrich Braun’s Kaffee Vaterland. While he wrote *The Salaried Masses*, the newly renovated pleasure palace reopened. It brought together a cinema, dance hall, bars, and cafés under the same roof. Haus Vaterland offered its customers “a breath of the wide world,” a reference to its popular travel-themed restaurants, including a Bavarian beer hall, Wild West saloon, and Turkish coffee house.¹²⁷ Like a permanent world’s fair, Haus Vaterland transported its guests to every corner of the globe, a marketing slogan visualized in the monumental globe in its entrance hall. It worked: Haus Vaterland was a major tourist destination for visitors to Berlin and the undisputed leader among the city’s many pleasure palaces. If, as Kracauer claimed, the masses wanted to forget their hopeless daily

¹²⁷ Ibid., 91.
existence, the Haus Vaterland offered them the perfect solution. For little money, they traveled to Istanbul, Texas, or Barcelona without leaving Berlin.

Figure 2.31 – Photographer unknown, [Turkish Coffee House, Haus Vaterland], date unknown. Bildarchiv Preussischer Kulturbesitz.

Figure 2.32 – Postcard of the Wild West Bar, Haus Vaterland, 1929.
These spaces offered what the salaried masses wanted—an artifice that simulated the authentic and fulfilling lives they lacked. Management went to great lengths to make the simulations convincing. The dining room of the Rhine Terrace restaurant, below, imitated an open-air patio at an imaginary vineyard on the banks of the Rhine. The customers sat beneath a tented awning draped in faux vines. A panoramic mural of the Rhine Valley occupied the back wall. To heighten the illusion of outdoor dining, management staged thunderstorms during every dinner service. Flashing lights and sound effects simulated lighting and rain.

Figure 2.33 – Photographer unknown, [Rhine Terrace Restaurant, Haus Vaterland], date unknown. Bildarchiv Preussischer Kulturbesitz.

In his analysis of Berlin’s pleasure palaces, Kracauer wrote, “the real power of light is its presences.” Light was immaterial, yet so powerful it convinced the viewer of its absolute existence. “It alienates the masses from their habitual flesh,” Kracauer wrote. “Through its mysterious force glamour becomes
substance, distraction stupor.” The Rhine Terrace’s nightly thunderstorms wouldn’t have convinced anyone of their reality; however, they did create an enchanting dinner theater for patrons unused to such luxuries. Artificial lighting, itself still a luxury for Haus Vaterland’s clientele, created the illusion of a full and comfortable, rather than small and miserable, lifestyle.

*The Salaried Masses* is a damning account of both the pleasure palaces and the society that produced them. Heinrich Braun’s cafés contributed to this economy of deception. According to Kracauer, artificial light symbolized these spaces, not just because of its abundance, but because electric light and pleasure palaces performed the same social function: they provided artificial simulations that substituted for a missing reality. Artificial light simulated natural light after sunset—the Kaffee Vaterland’s massive chandeliers functioned as nighttime suns. The Rhine Terrace used luxurious surroundings and special effects to simulate the leisure activities of the wealthy for low-wage workers—meals in opulent surroundings, exotic vacations, and plenty of time to enjoy it. In Kracauer’s reading, these simulations deceived and stupefied customers. If Braun’s light art emerged from the material conditions of this café culture, did it also participate in this narrative? The themes of artifice and simulation have already appeared in this examination of Braun’s light art. Even as Häring recommended that architects emulate Braun’s light relief, he presented it as little more than an electrified architectural model with which to simulate real light effects. At the same time, to interpret Braun’s light art as complicit in the entertainment industry’s artifice

128 Ibid., 93.
ignores its status as art. In “Concrete Light,” Braun repeatedly emphasized the authenticity, the reality, of electric light. It produced real, rather than simulated, light effects. Further, his use of light was restorative, not deceptive. According to Braun: “using light as a concrete element permits the harmonious interplay of all three factors [color, form, light] resulting in an integrated whole.”

It is interesting, then, to examine Braun’s light art in the context of his personal engagement with café culture and accusations of its corrosive social influence. Such an account begins by challenging Kracauer’s analysis. Other primary sources suggest a more sympathetic reading of the social function of Berlin’s cafés. They emerge from these texts as sites for authentic social interactions where workers met friends and strengthened social bonds. They were, in other words, a vital antidote for the cold and isolating environment Kracauer so perceptively described. In this reading, the café’s lights transform from garish to inviting. Like the lighthouse in Segal’s Helgoland, the café protection Berliners from the impersonal and anonymous city.

When cafés first appeared in Berlin at the end of the nineteenth century, they responded to residents’ needs for a public place to socialize. The Café Bauer was among Berlin’s first large cafés. An 1892 travel essay described its enormous space that, like Heinrich’s Tauentzienpalast, was decorated with the “choicest materials” and murals painted by Anton von Werner. But what separated the

129 Braun, “The Concrete Light,” 89.
Café Bauer from the *Konditoreien*, or cake shops, it replaced was the astonishing variety of entertainments it housed. “In the upper story,” the author wrote, “was the very best equipment for billiards, convenient card-tables, and a reading-room of such ample variety as had never been dreamed of.” 131 The Café Bauer’s superior amenities and late hours fueled its popularity, and imitators sprung up across the city.

\[131\] Ibid.
Further evidence of the café’s social function appears courtesy of the postcards Heinrich Braun printed for his properties. Although Heinrich intended the postcards as advertising, the fact that his customers actually sent them demonstrates the durability of the café’s social function, even when the friend was absent. On June 5, 1927, Fritz Menzel sent his friend Heinz Eichwald of Chemnitz a note on the back of a postcard of Restaurant Kroll, the property Nikolaus Braun managed. Like all postcard notes, Fritz’s message is short and formulaic. “From an early concert,” he writes, “we send you all our heartfelt greetings” before reproaching his friend for not staying in touch. The postcard, and others like it, reinforced the café’s identity as a site of social engagement. Even when friends were far away, like Heinz in Chemnitz, the café represented a place to reconnect.
Social exchange remained the activity at the heart of the café. In 1930, the *Hamburger Illustrierte Zeitung* asked its readers to complete the sentence “we go to cafés because…” At least one respondent ignored the café’s glamorous surroundings to highlight its social role. His comments provide a firsthand account of how an actual customer used the café. “If one is in a German city,” he wrote, “one needs to telephone friends, with whom one makes an appointment in a coffee house, and thus the wheel of intellectual or social conversation comes full circle.” It was an activity “without which, in my opinion, one cannot live,” at least in part because “the coffee house spares us from the apartment.” That the writer must be “spared” from his apartment supports Kracauer’s perceptive observation about the inadequacy of most city workers’ housing; however, it was not the main motivation for the outing. The writer described an atmosphere where friends gathered to exchange ideas and gossip.

133 Ibid.
The atmosphere the writer described was less Rhine Terrace and more Ludwig Meidner’s *Literary Café*. In the foreground, two men sit in conversation on the brink of a sea of talking heads. The vast space of the café is packed with people who gather beneath a sky of artificial suns, including one that seems to imitate the man in the moon. The writer’s reference to intellectual conversation challenges Kracauer’s accusation that the café interiors stupefied its inhabitants who willingly succumbed to the fantasy. Instead, the café became a pressure valve for
an otherwise stultifying existence—the place where friends met to discuss issues that mattered, personal or otherwise. In this reading, the café offered a unique social space where Berlin went to strengthen social ties.

These conflicting accounts of Berlin cafés show the diversity and richness of these institutions in the city’s social life. Kracauer’s condemnation of the deceptive quality of the pleasure palace and its light is perfectly suited to the spectacular artifice of Kaffee Vaterland or the Rhine Terrace’s evening storms, but they seem out of place in the Kroll’s open-air dining room or Meidner’s literary café. Tourists and locals visited Kaffee Vaterland to be dazzled by the opulent interiors. In contrast, Kroll was somewhere to enjoy dinner before a modern opera or to have a drink with friends and dance to live music on a summer’s evening. Meidner’s literary café was the site for all-night discussions of weighty intellectual matters. Heinrich Braun’s café empire encompassed the full spectrum of possibilities. Kaffee Vaterland and Tauentzien-Palast, attached to major movie palaces, served major mass entertainment sites. The more sedate Café Colosséum and Café am Alexanderplatz, in town but outside of tourist areas, likely served locals. Café des Westens and Restaurant Kroll were, because of their history and location, respectively, gathering points for artists and intellectuals in the style of Meidner’s literary café. Café des Westens was, of course, the meeting place for Berlin’s leading expressionist writers and artists in the years before the First World War, when it was nicknamed Café Größenwahn, or Café Meglomania. Segal, Friedlaender, and Walden frequented the café during these years, and, in 1915, it was the site of Hausmann’s introduction to Segal, Hans
After the war, now under Heinrich Braun’s ownership, Café des Westens became an unofficial meeting place for Berlin Dada. It was there, in 1918, that Kurt Schwitters approached Hausmann to request admission to Dada, famously denied by Richard Huelsenbeck. This shows that the Café des Westens remained an important gathering point for Berlin’s artistic avant-garde well into the interwar period. The Restaurant Kroll was attached to the State Opera House at the Platz der Republik, Berlin’s venue for modern opera after 1924 and especially under Otto Klemperer’s leadership after 1927. While its outdoor dining area, which adjoined the popular Tiergarten, would have been a natural meeting place for tourists and park visitors during the day, in evenings it served opera audiences. This cultural environment probably encouraged Heinrich to name Nikolaus, his artistic son, as its manager. Not a true literary café in the spirit of the Café des Westens, the Kroll property nonetheless had an influential clientele that included Berlin’s patrons of new and modern art. This digression into the diverse ecosystem of Berlin’s cafés helps to contextualize their contradictory accounts and to demonstrate how Nikolaus Braun’s café experience made him uniquely qualified to appreciate these distinctions.

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135 Ibid., 105.
136 Klemperer commissioned Moholy-Nagy to design the sets for the Kroll Opera’s production of *Madame Butterfly* in 1931.
From top center, clockwise: Arthur Segal, Salomo Friedlaender, Ernestine Segal, Raoul Hausmann, Herwarth Walden.

Figure 2.36 – Raoul Hausmann, *The Table at Segal’s on June 14, 1921*, 1921. From Wulf Herzogenrath and Pavel Liska, *Arthur Segal, 1875-1944* (Berlin: Argon, 1987).

The social importance of intellectual exchange was something Braun would know well, both from his work at the Restaurant Kroll and from Segal’s studio. Segal was not Berlin’s most successful artist, but he may have been the most convivial. He was famous for the salons of intellectuals and artists he hosted in his studio on the first Sunday of the month. Segal’s salons were institutions for an ever-growing crowd throughout the 1920s. It began with expressionist

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137 Kliemann, *Die Novembergruppe*, 41.
colleagues from before the war: Friedlaender; architects Adolf Behne and Hilberseimer; writer and gallerist Walden; and countless artists. To the expressionists, Segal added Dada friends he met at Zurich’s Cabaret Voltaire and Berlin’s Café des Westens. Richard Huelsenbeck introduced him to Raoul Hausmann and Hannah Höch, with whom he became particularly close. These salons were the settings for historic events in the Berlin avant-garde. Hausmann first met Viking Eggeling at one; Eggeling later invited Segal to attend the first private screening of Symphonie Diagonale in November 1924. Forty years later, Hausmann wryly remembered these evenings “where most of these intellectuals wanted only to bask in their own light,” a memory he captured in a 1921 sketch of an evening he spent with Segal, his wife, Friedlaender, and Walden. Segal’s biographer, Pavel Liška, describes wide-ranging discussions of politics, philosophy, and religion, in addition to the more expected topics of the visual, literary, and performing arts. These gatherings not only introduced the young Braun to Berlin’s leading artists and thinkers; they also presented him with a particular image of what it meant to be an artist. Artists were intellectuals who had informed opinions on a wide range of topics. Further, they shared these opinions with their peers in social gatherings that centered on intellectual debate.

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142 Liska, “Arthur Segal - Leben und Werk.”
Hausmann’s sketch of the gathering at Segal’s on June 14, 1921, brings together many of the figures who defined Braun’s artistic horizons at that point. Segal was his teacher, an experienced and respected painter with deep ties to Berlin’s avant-garde arts community and a commitment to intellectually engaged art. Friedlaender represented that intellectual voice—a philosopher and writer who valued the arts and was in that year at the height of his popularity thanks to his book *Creative Indifference*, a product of his extensive study of Goethe’s color theories. Herwarth Walden provided Braun with his first major professional opportunity—an exhibition at Sturm Gallery—itself part of Walden’s larger campaign to promote constructivism in Berlin. But the most interesting figure at the table is one who has received little attention in this chapter—Raoul Hausmann. He first wrote about his optophone in the same year as the gathering, and, like Segal and Friedlaender, he was preoccupied with the structure of light and its potential as an artistic medium. Anneliese Ratkowski-Wanger, Braun’s former wife, remembered that she and Braun met Hausmann, as well as Friedlaender, Schwitters, Hilberseimer, and others, at Segal’s salons. His introduction to Hausmann may have encouraged Braun to conduct his own light experiments, but the differences between their projects rule out anything more. Braun’s light reliefs lacked Hausmann’s technological and scientific ambitions. Instead, Braun used electric lighting to create a new kind of light art that, like

Berlin Street Scene, spoke to the material conditions and experience of Berlin at night.

2.5. Excursus: Braun after Light Art


Here the story of Nikolaus Braun’s light art ends; however, given the absence of scholarship on Braun, I offer this brief account of his later life. Braun continued to make light art until 1928, when he abandoned it in favor of painting in a representational, naturalistic style, evident in the self-portrait above. Segal, whose prismatic paintings marked the start of a return to realism, preceded Braun in this change. It also corresponded with the advent of Neue Sachlichkeit and the widespread emergence of realism across all arts. An exhibition checklist from late
1929 advertises two paintings by Braun—a landscape and landscape in snow—signaling his break with light art.144

Braun, a Jew, stayed in Berlin until 1938. After anti-Semitic laws passed in 1933 prevented his public exhibition, he showed in small, unofficial spaces organized by the city’s Jewish Museum and Jewish Cultural Association. When escalating persecution forced him, finally, to leave Berlin, he marked his flight with a grim ritual. Unable to bring his art into exile, he transported it to the nearby Grunewald forest where he burned it in a bonfire.145 Thus, only two artworks by Braun survive—Berlin Street Scene and a wartime drawing. Braun spent the Second World War in Budapest, possibly because his family had ancestral ties to Hungary. The Allgemeine Künstlerlexikon identifies him as German-Hungarian despite his Berlin birth and lists “Miklós Béla” as an alternate personal name.146 Evidence of his Hungarian ethnicity remains unknown, but Braun’s emigration east rather than west suggests a missing Hungarian connection.

144 Reproduced in ibid., 240.
145 Merkert and Förster, Anne Ratkowski, 78.
146 K.G. Saur Verlag, Allgemeines Künstlerlexikon, 9.
Figure 2.38 – Nikolaus Braun, untitled, [1944-1945]. Yad Vashem Art Museum, Jerusalem.

Figure 2.39 – Nikolaus Braun, Berlin Street Scene, 1921. Oil on masonite, 29¼ x 40½ in. Berlinische Galerie, Berlin.
A drawing from Braun’s years in Budapest credited to Miklós Béla Braun survives in the collection of Jerusalem’s Yad Vashem Art Museum. In it, Braun depicts soldiers of the Arrow Cross Party, which led a short-lived totalitarian puppet regime installed by the National Socialists in 1944. The soldiers point their rifles at frightened men, women, and a child whose bare feet and Star of David patches mark them as residents of the Budapest ghetto. A comparison with *Berlin Street Scene* reveals stylistic similarities between the two works despite the twenty years that separate them. The figures, especially, share a simplified handling that borders on caricature and an almost exaggerated attempt to communicate inner states via the body—for instance, in the loiterer’s slouch. The earlier work also contains a moral element that relates it to the later work. In the far distance of *Berlin Street Scene*, where the two buildings meet, a horned red devil floats in the halo of a streetlight in the shadow of a church spire. The devil points at the street below, where a woman holding a baby stands in the path of an oncoming horse-drawn carriage. The brim of the woman’s straw bonnet and her full blue skirt give her the appearance of the Virgin Mary. Although only a detail hidden in a complex painting, this theme of virtue and innocence threatened by evil resonates with the tragic events of Braun’s drawing, the events of which he likely witnessed as a resident of the Budapest ghetto. Braun left Budapest in 1949 for the United States, perhaps to teach at Chicago’s Institute of Design. The following year he committed suicide in New York. He was fifty years old.

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147 Ibid.
Chapter 3

Ludwig Hirschfeld-Mack’s Color-Light Plays

At the 1955 opening of Ulm’s School of Design, art historian Hans Maria Wingler met founding Bauhaus director Walter Gropius. Their introduction began a remarkable project to recover Bauhaus art lost during the Second World War. Gropius convinced Wingler to write a book about the school, which led in 1960 to Wingler’s creation of the Bauhaus Archive in Darmstadt. Germany’s postwar partition separated the exiled artists and architects in the West from the school’s Weimar birthplace and Dessau campus in the East. With Gropius’s help, Wingler contacted the Bauhäusler who survived and documented the history they preserved. He followed the diaspora of artists to locations as distant as Australia. There he found Ludwig Hirschfeld-Mack, who studied and taught in the print

workshop from 1920 to 1925. In 1923, Hirschfeld-Mack premiered his most ambitious project to date: the *Farbenlichtspiele* or color-light plays, pseudo-cinematic projections of moving colored shapes synchronized with music. In 1925, Hirschfeld-Mack described the color-light play as, “a fugue-like, firmly articulated color display” on “a specific theme of colored form.” It was no less than a “new artistic genre,” that would “build a bridge of understanding between the many who remain bewildered in the face of the painters’ abstract pictures and the new aspirations in every other field, and the new views from which they have sprung.”

In 1964, Wingler commissioned Hirschfeld-Mack to perform the color-light plays at the Bauhaus Archive, one year after the fortieth anniversary of their premiere. Hirschfeld-Mack began the painstaking task of recreating the projection apparatus and performance scores, which he lost during his immigration to England and subsequent internment and deportation to Australia. The materials Hirschfeld-Mack made survive in his archive at the University of Melbourne. One week before the performance, Hirschfeld-Mack traveled to Darmstadt to oversee the rehearsals. The performance was a success, but the physical stress contributed to Hirschfeld-Mack’s death a few months later and the subsequent cancelation of all future performances. Wingler did not save the reconstructed apparatus and filmed only one color-light play—in black and white and without sound. That

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film, a dozen photographs, and the performance scores in Hirschfeld-Mack’s archive are the only documentation of the color-light plays that remains.

Hirschfeld-Mack’s color-light plays are the subject of this chapter. In this undertaking, Peter Stasny’s unpublished dissertation—the only comprehensive account of Hirschfeld-Mack’s youth and Bauhaus years—is invaluable. Stasny dedicated a chapter of his dissertation to the color-light plays and researched the surviving documentation. He was particularly interested in the color-light plays’ operation and their relationship with Hirschfeld-Mack’s other interests and activities in the 1920s. He stayed faithful to the artist’s writings by proposing the color-light plays were an extension of Hirschfeld-Mack’s twin interests in color theory and theater. Mine is a more speculative addition to Stasny’s documentary account. Of course, he is right: Bauhaus discourses on color shaped Hirschfeld-Mack’s invention, but that is only part of the story. These discourses alone do not predict the color-light plays’ mechanical nature, novel combination of media, or even the artist’s ambitious claims. My examination connects the color-light plays’ emergence from the Bauhaus’s 1923 technological turn to Hirschfeld-Mack’s post-Bauhaus career as an educator specializing in child art pedagogy and play-centered learning. I propose that his early interest in the psychological effects of abstract stimuli like color, shapes, movement, and sound—an idea at the heart of the color-light plays—was the basis for his later pedagogical study of the

\[\text{Stasny’s dissertation is available in the library of the Bauhaus-Archiv, Berlin. Peter Stasny,}
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\[\text{“Ludwig Hirschfeld-Mack (1893-1965): Bauhausgeselle in Weimar” (Universität Wien, 1993); He also published a substantial portion of his research in Andreas Hapkemeyer and Peter Stasny,}
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\[\text{Ludwig Hirschfeld-Mack: Bauhäusler und Visionär (Ostfildern: H. Cantz, 2000) This catalogue is the only monographic work on Hirschfeld-Mack.}\]
psychology of children’s play. The color-light plays also inaugurated Hirschfeld-Mack’s lifelong work to create novel artworks that served double functions as both teaching aides and aesthetic objects. They were not just immersive multimedia performances; with the color-light plays, Hirschfeld-Mack hoped to produce in his viewer the same spiritually fulfilling psychological state of total absorption he experienced while making art.

The color-light plays emerged at a transitional moment in the Bauhaus’s history when scientific approaches to color study promoted by the newly arrived Vasily Kandinsky replaced an expressionism advocated by the outgoing Johannes Itten. The first section of my chapter interprets Hirschfeld-Mack’s color projects of 1922-23 as attempts to reconcile expressionist color theory with the new call for scientific and technological collaboration. This transformation played out in the abrupt juxtaposition of art and technology in Hirschfeld-Mack’s color projects from these years, including color charts, the optical color mixer, and the color-light plays. The second section examines Hirschfeld-Mack’s claim that the color-light plays synchronized the abstract compositional elements of color, light, movement, and sound to express a unified theme. By invoking the model of the Wagnerian Gesamtkunstwerk and its rich history at the Bauhaus, I argue that Hirschfeld-Mack reinterpreted Wagner’s total artwork of the future to produce in his viewer a psychological state of absorptive spectatorship. I demonstrate how this works in a scene from the color-light play Color Sonatina II (Red), in which Hirschfeld-Mack used abstract means to convey the feeling of expansion and contraction pictured as the sight and sound of a wave. Hirschfeld-Mack credited
his first experience of a film, in 1912, as the inspiration for his interest in the absorptive capacity of moving shapes and sound. His insistence on psychologically absorptive experience became, in an unexpected twist, the focus of his post-Bauhaus art pedagogy. First in Germany and later in England and Australia, Hirschfeld-Mack championed a play-based model of art education I explore in the last section of the chapter. Key to Hirschfeld-Mack’s theory was the importance of psychological absorption in the archetypal creative acts of artistic production and child’s play. Both the artist and the child focus so completely on their tasks that they retreat into their inner life; in other words, like the viewers of the color-light plays, they are physically and psychologically absorbed in their sensations.

3.1. Color-Light Plays

Figure 3.1 – Photographer unknown, [Color-light play apparatus], 1964. Bauhaus-Archiv, Berlin.
Faced with a motley assortment of photographs, diagrams, grainy film, and cryptic scores, it is hard to imagine the experience of the color-light plays. Hirschfeld-Mack described them as “direct colored light projected on a transparent screen,” in “colors of the most glowing intensity.” In performance, the audience sat in a darkened room facing a screen. Colored shapes appeared on the screen—squares, rectangles, triangles, and circles—that grew, shrunk, and moved in deliberate paths. The shapes multiplied and overlapped in diagonal cascades, seen in the still from Cross Play above, produced by the use of multiple light sources and characteristic of all the color-light plays. They would also have changed colors as they moved, with their colors mixing in areas of overlap to produce new colors. Hirschfeld-Mack gave his color-light plays musical titles—like Color Sonatina II (Red)—and modeled their structure on music. He scored the plays down to the smallest detail and organized them as a sequence of

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movements lasting from thirty seconds to several minutes each. The shapes’
movements and color transformations proceeded slowly and deliberately in time
with the accompanying music, so that they appeared to dance along with the
music, pausing when it paused. As the music grew louder or softer, the colors
brightened or dimmed; as more shapes appeared, the music became more
complex; as the music slowed, so did the shapes.

Figure 3.3 – Hirschfeld-Mack (right) and the color-light plays apparatus, 1923. Ludwig
Hirschfeld-Mack Papers, University of Melbourne.

The backstage activities were considerably less magical. The shapes and
colors were reverse projected, so that the screen hid the projection box and small
army responsible for its operation from the audience. The projection box itself
was a simple mechanism. It opened at both ends, with as many as eight movable
lamps at the back and slots for templates at the front. Individual casings housed
the lamps and hooked onto a system of horizontal cables that allowed two
operators to move them up, down, and sideways. Each lamp casing included a slot
in its front for colored glass plates that changed the color of the lamp’s light. Resistors let the operator dim each lamp independently or as a group. The templates shaped the light into the desired shapes. Made of thin wood or cardboard, they slid into slots cut into the sides of the projection box. Because of their design, these templates could only move sideways in their tracks, although it was simple enough to replace templates during the performance.


As this technical description shows, the color-light plays were labor intensive to perform. The apparatus required a team of at least three and ideally five individuals—one or two each for the lights and templates, and one for the musical accompaniment—who needed not only extensive training but also minutely detailed scores. Hirschfeld-Mack’s musical accompaniment, then, served a double purpose. It enhanced the experience for the audience, but it also synchronized the silent work of the four operators, providing them with timing and cues. These
requirements limited performance opportunities and later led Hirschfeld-Mack to work with an engineer to design, without success, a single-operator apparatus. This technical examination of the apparatus also introduces a note of caution into our imaginative reconstruction. Hirschfeld-Mack wrote hyperbolically of vibrantly colored shapes that moved absolutely free of all limitations. In fact, the apparatus allowed a relatively limited range of motion. All movement originated from changes to the lamps or to the templates, which limited the number of movements that could occur in any given moment. On top of this, the templates could only move side-to-side. The lamps were more flexible, but also more complicated. It took time to replace glass color filters, adjust the resistor, or move a lamp. And when one lamp changed, it effected all the shapes equally. If the operator changed a white lamp to blue, all the shapes changed to blue. There was no way to restrict color changes to a specific shape. The play’s movements helped Hirschfeld-Mack mitigate these limitations; the pauses between movements gave operators a short break to execute major changes. But while the movement was in progress, only small changes were possible. This lent the color-light plays a deliberate and episodic nature that had the advantage of giving the viewer the time to observe developments.

The apparatus’s technological limitations would not have detracted from what must have been an exceptionally novel experience for audiences in the twenties. There was much to remind the viewer of seeing a film—the darkened room, the moving shapes on a screen. Indeed, Hirschfeld-Mack’s color-light plays coincided with a brief vogue in abstract film and they opened the first all-abstract public
film screening in Berlin in 1925. However, the color-light plays had some features that films lacked. For one thing, they offered color rather than the black and white of film; for another, they boasted a synchronous sound track. The color-light plays were vibrant. Hirschfeld-Mack compared them to abstract paintings by Paul Klee and Kandinsky, his mentors at the Bauhaus, set into motion. The synchronized music extended the visual themes organically into the realm of sound. So, while film constituted an essential context for the color-light plays’ production and reception, a relationship I explore in the second section of this chapter, and while the similarities between the two genres justify describing the color-light plays as pseudo-cinematic, it is also true that film does not wholly explain the color-light plays. Their unique synthesis of theater, film, and painting in a new technological genre was, however, typical of the contemporary atmosphere at the Bauhaus.

### 3.2. Color Science

Even the most cursory account of Hirschfeld-Mack’s Bauhaus years reveals his overriding interest in color theory. My purpose here is not to repeat what Peter Stasny has already so convincingly shown; namely, that the color-light plays originated from Hirschfeld-Mack’s deep engagement with a particular lineage of color theory he learned from Adolf Hölzel and Johannes Itten. Instead, I propose that this narrative of continuity glosses over the project’s unusual details. If the

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color-light plays were products of expressionist color theory, why did Hirschfeld-Mack resort to such complicated technological means? Why use light at all? The answer, I suggest in this section, has less to do with the expressionist source of Hirschfeld-Mack’s interest in color than with his reaction to the 1923 reorientation of the Bauhaus familiarly known by the slogan “Art and Technology: A New Unity” after Gropius’s speech of the same title.\(^{153}\) Again, this is not the place to repeat familiar stories, so I will instead recommend Éva Forgács’s account of this well-chronicled chapter in Bauhaus history.\(^{154}\) It is no coincidence that Hirschfeld-Mack premiered his color-light plays at the 1923 Bauhaus Week, the opening of which was the occasion of Gropius’s now-historic speech. Hirschfeld-Mack’s projects from this time, the color-light plays chief among them, are unusually literal efforts to achieve Gropius’s directive to merge art and technology.

Nowhere is this more evident than in the origin story Hirschfeld-Mack told to explain how he conceived of the color-light plays.\(^{155}\) In the summer of 1922, while still a student, Hirschfeld-Mack prepared a shadow play as entertainment for the Lantern Festival, an annual school-wide party that brought together faculty and students. Kurt Schwerdtfeger, who collaborated on the play, remembered its title, *Days of Genesis*, came from God’s command in the Book of Genesis “let


there be light.” During rehearsals, one of the acetylene lamps burnt out and its replacement produced light that was cooler than the original. Instead of a continuous field of light, the two lamps produced a discontinuous field of two distinct colors. Entranced by this effect, Hirschfeld-Mack imagined a shadow play of kaleidoscopic brilliance made with many colored lamps. That summer he started to develop the color-light plays. Two aspects of this event stand out. The first is light’s thematic prominence, both as the technological basis and subject matter (“let there be light”) of the shadow play and in the larger context of the Lantern Festival, which featured light in many forms. This event introduced Hirschfeld-Mack to artificial lighting’s potential for artistic applications. Indeed, Hirschfeld-Mack preserved the color-light plays’ shadow play origins in his apparatus, whose projection box resembled a miniature shadow play stage, substituting templates for puppets. Yet, the shadow play was a festival entertainment, whereas Hirschfeld-Mack described the color-light plays as abstract paintings set into motion. I propose that he meant his claim quite literally. Hirschfeld-Mack combined the artificial lighting technology and shadow play-inspired apparatus with the pictorial elements of paintings by Klee and Kandinsky to create “a new unity” of art and artificial light—a clever yet completely misdirected response to Gropius’s productivist call for commercially viable applied arts.

This abrupt juxtaposition of art and technology in a single artwork was a pattern in Hirschfeld-Mack’s Bauhaus projects after 1922. His prints and drawings, rarely cited in connection to the color-light plays, featured pictorial elements taken from color charts, wheels, and other diagrammatic visual aids the artist made as part of his color studies. Although color charts aren’t technology, strictly speaking, they are systematic and, in this case, resulted from an aspirational, pseudo-scientific mentality that Hirschfeld-Mack and others associated with technology. In the winter semester after the 1922 Lantern Festival, while he developed the color-light plays, Hirschfeld-Mack taught an

Figure 3.5 – Ludwig Hirschfeld-Mack, *Color Chart (208 colors)*, 1922. Collage and tempera on paper, 27¾ x 38 inches. Bauhaus-Archiv, Berlin.
informal seminar on the topic of color. The purpose of the seminar was, he later wrote, “to discover the reactions of individuals to certain proportions, linear and color compositions.” Students and faculty, including Kandinsky and Klee, participated, and Kandinsky used the seminar activities as research for his essay “Color Course and Seminar” for the 1923 Bauhaus exhibition catalogue. Under Hirschfeld-Mack’s leadership, the curriculum focused on the problem of elementary color systems, with an emphasis on color charts. About a dozen Hirschfeld-Mack made survive, including a spectacular example at the Bauhaus Archive with 208 colors. The charts served a didactic purpose. Seminar participants used them to study the interaction of colors and the tonal progression of hues—as in Hirschfeld-Mack’s large chart. During the seminar meetings, the participants studied the color charts and discussed their individual reactions to discover universal laws.

159 The opportunity arose thanks to a hole in the teaching schedule. Itten had just left the school; Paul Klee, who frequently lectured on color theory, wanted to paint; and the newly arrived Kandinsky was busy organizing the 1923 Bauhaus Week. Hirschfeld-Mack stepped into this vacuum. Hajo Düchting, Farbe am Bauhaus: Synthese und Syänisthesie, Neue Bauhausbücher (Berlin: Gebr. Mann, 1996), 49.
162 Düchting, Farbe am Bauhaus, 49.
Figure 3.6 – Paul Klee, *Battle Scene from the Comic-Fantastic Opera “The Seafarer”*, 1923. Oil transfer drawing, graphite, watercolor, and gouache on paper, 13½ x 19¾ in. Kunstmuseum Basel.


These color charts present an interesting challenge. On one hand, as study materials their formulaic appearance is no different than those made by artists for
centuries. On the other hand, Hirschfeld-Mack saved his charts, partly to use in his art classes and as studies, but also and especially between 1922 and 1925, as collage material for finished works. He was not the only seminar participant who integrated the visuals of the color chart into his art. The charts’ most characteristic features—their tiled grids and incremental color changes—appeared in unexpected places, like the prismatic ground of Klee’s *Battle Scene from the Comic Opera the Seafarer*. Klee’s use of the color chart is so subtle that a viewer unaware of Klee’s participation in the color seminar would be unlikely to attribute the *Seafarer*’s ground with a color chart. Yet, this visual trope appears in many works Klee made in late 1922 and early 1923—too many to be a coincidence. Klee’s example offers a useful counterpoint for Hirschfeld-Mack’s art from the same period. His mixed media *Red, Fixed* looks blunt in comparison. Where Klee borrowed the color chart’s formal elements as a ground pattern, Hirschfeld-Mack excerpted entire unaltered passages as pictorial motifs. Is *Red, Fixed* an artwork or a study of the gray scale? Probably both: the red is applied gouache while the scales are collage elements cut directly from a chart. It, like all of Hirschfeld-Mack’s art from 1923, gives the impression of assembled bits and bobs. This disjuncture—so different from Klee’s subtlety—expressed visually the unity of dissimilar elements Gropius called for in the new Bauhaus.
Figure 3.8 – Ludwig Hirschfeld-Mack, *Color Sonatina in Three Parts (Ultramarine Green)*, 1923. Lost. Ludwig Hirschfeld-Mack Papers, University of Melbourne.

Hirschfeld-Mack’s color chart-inspired art provides an unexpected point of reference for the color-light plays. The color chart’s tiled grids and incremental color changes resemble the color-light plays’ characteristic repeated shapes. The formal similarities are especially pronounced in scenes comprised of rectangles like the one Moholy-Nagy reproduced in 1925’s *Painting, Photography, Film*. For this scene, six lamps arrayed in a diagonal line produced six diagonal repetitions. Where the shapes overlapped, the light brightened and the colors gradually changed, as in the color chart. And the color-light plays didn’t just look like Hirschfeld-Mack’s color chart art; they also recreated it using the additive color mixing of light rather than the subtractive color mixing of pigments.

In the color seminar, Hirschfeld-Mack reserved his highest praise for Wilhelm Ostwald, a Nobel Prize-winning chemist who turned to the question of color
harmony as the central problem of his retirement.\textsuperscript{164} Ostwald’s *The Color Primer* (1917) was the definitive reference for color science in interwar Germany along with the subsequent *The Color Atlas* (1918), *The Atlas of Color Standards* (1920) and the five-volume *Color Theory* (1918-1922).\textsuperscript{165} Ostwald’s research single-handedly brought color science into the public and scientific limelight and established him as Germany’s leading color scientist in the years of Hirschfeld-Mack’s most intense study of color. Hirschfeld-Mack’s admiration of Ostwald was such that as late as the 1960s he lamented to his students in Melbourne that Ostwald’s books were not available in English translation.\textsuperscript{166} Ostwald’s project to develop a universal system of colors—something akin to the Pantone system—captivated Hirschfeld-Mack. An amateur painter, Ostwald wanted to make a three-dimensional model (a color solid) of every possible color for use as a master color chart. Hirschfeld-Mack endorsed this project. “There are recognized international laws in music life with a fixed G,” he observed, “and musicians and musical instrument makers have no difficulty in working together on the pitch of the tuning of their instruments.”\textsuperscript{167} Color lacked the universal standard that made international music collaborations possible. The artist called for “a world

\textsuperscript{166} Ludwig Hirschfeld-Mack, “General Colour Theory” (Lecture, 1941_1965), 13, 4/3/1, Ludwig Hirschfeld-Mack Papers, The University of Melbourne Archives, Australia.
\textsuperscript{167} Ibid., 4.
conference of artists, architects and scientists together with chemists to fix color scales and color disks internationally, so that it will be possible to find a technical basis from which to work together.”

Ostwald searched for just such an international color system as a means to discover a mathematical relationship between colors of optimal harmony.

Figure 3.9 – Ludwig Hirschfeld-Mack, *Optical Color Mixer*, 1961. Ludwig Hirschfeld-Mack Papers, University of Melbourne.


168 Ibid.
Hirschfeld-Mack’s early interest in Ostwald’s universal color systems appeared in his design for one of the Bauhaus’s few commercially viable products: a pedagogical toy he named the optical color mixer. It was a large top with seven paper discs threaded on the spindle. The discs were multi-colored and, as the child spun the top, the colors mixed into a new color. The colors delighted the child, while demonstrating the basics of subtractive color mixture. In the example above, Goethe’s six-part color circle turns grey when spun. Hirschfeld-Mack's optical color mixer was licensed for commercial sale in 1924 and became one of the Bauhaus’s most popular toys. Hirschfeld-Mack may have been the first person to present the optical color mixer as a toy, but he did not invent the device. That credit belongs to James Clerk Maxwell, who was the first scientist to document its use in 1855. Hirschfeld-Mack probably encountered Maxwell’s

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169 No original color mixers survive, but the Bauhaus Archive reissued it in 1961 in conjunction with the opening exhibition of the Darmstadt Bauhaus Archive. A modern edition is available for purchase through the Bauhaus Archive. Düchting, Farbe am Bauhaus, 50–51.
color mixer in the first volume of Ostwald’s *Color Theory.* As its name implies, optical color mixers originated as scientific tools for measuring color. Maxwell used the mixer to calculate a color’s composition in order to reproduce it reliably in experiment. The top Maxwell referred to in his “Manuscript on the Comparison of Colors Using a Spinning Top” is the same as Hirschfeld-Mack’s toy.\(^\text{170}\)

Maxwell’s spinning top became a common experimental tool for scientists working with color. Measurement tools like Maxwell’s optical mixer made possible projects like Ostwald’s universal color system, which Hirschfeld-Mack so admired.

Hirschfeld-Mack’s color-light plays, color charts, and optical color mixer all appeared in or around 1923, a period when the Bauhaus moved away from the expressionist vision of the school’s founding toward a constructivist emphasis on scientific and technologically minded art and design. Although the change was announced at a specific event—Gropius’s opening speech for the 1923 Bauhaus Week—it took place over a period of years during which the original students and faculty negotiated their individual responses. Some left the school, others stayed but resolutely continued on their old paths, and others fully embraced the new ethos. Hirschfeld-Mack’s color projects proposed a compromise solution. He preserved his essentially expressionist interest in color theory, which he studied under Itten and Hölzel, but rearticulated it using scientific rhetoric and technological means. Color theory became color science, a transformation enacted

through a series of hybrid art objects that combined elements of both art and technology. His prints and drawings integrated the systematized layout of the color chart into their matrix. The optical color mixer repurposed a scientific device as a mass-produced educational toy. In both, the two registers—art and science—resisted integration, sitting side-by-side in a bifurcated unity that drew attention to their double presence. But the color-light plays were the most elaborate of Hirschfeld-Mack’s many experiments. They combined the artistry of abstract painting and music with the science of psychology and technology of electric lighting.

### 3.3. Gesamtkunstwerk and Absorption

This environment of the Bauhaus in 1922-23 provided Hirschfeld-Mack with a second set of ideas that are essential to my interpretation of the color-light plays—that of the Wagnerian Gesamtkunstwerk. When Hirschfeld-Mack arrived at the Bauhaus in 1920, only months after its opening, the architectural Gesamtkunstwerk of the Gothic cathedral Gropius espoused epitomized the Bauhaus ideal. It was so central to the school’s identity, it even survived Gropius’s 1923 rejection of expressionism, with which the Gesamtkunstwerk was closely associated. Hirschfeld-Mack developed the color-light plays at a time when Bauhaus students and faculty redefined the Gesamtkunstwerk in modern, technological terms. For this reason, it is productive to think about the color-light plays as a technological Gesamtkunstwerk. This interpretive approach invites questions about how the color-light plays’ compositional elements—light, color,
form, movement, and sound—interacted, what role technology played in this interaction, and what unified expression, if any, they produced.

Figure 3.12 - Lyonel Feininger, Cathedral (Kathedrale) for Program of the State Bauhaus in Weimar (Programm des Staatlichen Bauhauses in Weimar), 1919. Woodcut, 12 x 7½ in. The Museum of Modern Art, New York.

The Gesamtkunstwerk—visualized as a cubo-futurist Gothic cathedral in Lyonel Feininger’s Cathedral of Socialism—represented the Bauhaus’s highest aim and guiding vision at the time of its founding. “A universally great, enduring, spiritual-religious idea will rise again,” Gropius announced in a June 1919 lecture, “which finally must find its crystalline expression in a Gesamtkunstwerk.”¹⁷¹ This Gesamtkunstwerk would be a “cathedral of the future” that “shine[s] with its

abundance of light into the smallest objects of everyday life.”

This cathedral-as-*Gesamtkunstwerk* enshrined two closely related ideals: collaboration between the arts and the creation of a synthetic art—that is, one made up of different media—that contributed to an architectural whole. “The Bauhaus strives,” Gropius wrote in the 1919 manifesto (which reproduced Feininger’s woodcut on the cover), “to reunify all the disciplines of practical art—sculpture, painting, handicrafts, and crafts—as inseparable components of a new architecture.”

Gropius realized his vision through several building projects starting with the Sommerfeld House of 1920-21, a private residence he designed and furnished out of the school’s workshops. He revisited the house-as-*Gesamtkunstwerk* in 1923’s Haus am Horn, a model home built as a display for the 1923 Bauhaus exhibition and offered as validation of the city of Weimar’s investment in the school. Then-student Georg Muche designed the house, and the workshops provided the furniture and decorations, as they did for the Sommerfeld House.

Gropius’s campus at Dessau also epitomized his concept of the architectural *Gesamtkunstwerk*, even if he would never have described it in such unfashionable terms in 1925. But, ultimately, these architectural projects only serve to demonstrate how impoverished Wagner’s idea of the *Gesamtkunstwerk* had become at the Bauhaus. Based on the evidence of these three projects, it meant little more than a bringing together of the visual and applied arts within a

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172 Quoted in ibid.
building. Visitors to these spaces would be hard pressed to identify what, if any, unified expression the furnished rooms conveyed, beyond that of coordinated interior design.

After Gropius announced the Bauhaus’s new emphasis on technology, all discussion of the Gesamtkunstwerk disappeared from his speeches and writings. Herbert Hübner has argued that the Gesamtkunstwerk and technology are fundamentally incompatible. Engagement with technology leads inexorably to functionalism, specialization, and optimization, all values at odds with collaboration and synthesis. Yet, after 1923, references to the Gesamtkunstwerk appear where we least expect to find them—in writings by Bauhaus students and faculty who identified as constructivists. Werner Graeff, who attended lectures by Theo van Doesburg in Weimar in 1922, published an essay in *De Stijl* in which he promoted the creation of a new Gesamtkunstwerk that combined “architecture and painting and sculpture (along) with industry and technology, life.” For Graeff, the expressionist ideal of the Gesamtkunstwerk gained a new legitimacy when he redefined it with technological means more suited to constructivism’s technophile credo. The Bauhaus’s arch constructivist, László Moholy-Nagy, further developed this idea of the reformed Gesamtkunstwerk in his 1925 book *Painting, Photography, Film*. “What we need,” Moholy writes, “is not the Gesamtkunstwerk alongside and separate from which life flows by, but a synthesis

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of all the vital impulses spontaneously forming itself into the all-embracing *Gesamtwrk* (life) which abolishes all isolation.” Annette Michelson, among others, cites this passage as evidence of Moholy-Nagy’s rejection of the ideal of the *Gesamtkunstwerk*. But is the *Gesamtwrk* Moholy proposes really so different? Both created a new whole out of previously fragmented parts—the *Gesamtkunstwerk* from different art forms and the *Gesamtwrk* from daily life. Graeff and Moholy-Nagy’s reformed *Gesamtkunstwerk* preserved the act of synthesis at the heart of Gropius’s architectural *Gesamtkunstwerk*.

This idea of artistic synthesis has become synonymous with the common usage of *Gesamtkunstwerk*: the *Oxford English Dictionary* defines the *Gesamtkunstwerk* as an “ideal work of art in which drama, music, and other performing arts are integrated and each is subservient to the whole.” In practice, this simplification of Wagner’s concept encourages its improper application to any and every multimedia artwork. Of course, artistic synthesis was essential to Wagner’s original concept. In *The Artwork of the Future*, he writes how the *Gesamtkunstwerk* “must gather up each branch of art to use it as a mean [… ] for the common aim of all.” For Gropius and many others, this artistic synthesis was the final aim; for Wagner, the collaboration of poetry, dance, and

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music served the higher purpose of dramatic reenactment. His goal, he claimed, was the objectification of reality—literally, the creation of an aesthetic experience that embodied lived experience. Art “upholds to Life the picture of its own existence, and lifts unconscious Life to conscious knowledge of itself.”\(^{182}\) It accomplished this through the staging of stories about universal human experiences centered on the actions of a hero, with whom artists and audience members empathized. Wagner’s Bayreuth Festival Theater provided an architectural setting that used spatial devices—the hidden orchestra, the double proscenium—to maximize the audience’s empathic identification with the drama onstage.\(^{183}\) For Wagner, synthetic art symbolized and made possible the unification of the artist and the audience through the experience of the performance. This element of the *Gesamtkunstwerk* is missing from Gropius’s formulation. Graeff and Moholy-Nagy restore it, indirectly, by framing life as an art practice, but in doing so, they pointedly reject art as the legitimate vehicle for that connection.

Having introduced the *Gesamtkunstwerk* and its conceptualization at the Bauhaus, I now return to Hirschfeld-Mack’s color-light plays. First, the color-light plays qualified as *Gesamtkunstwerk* because of their synthetic nature. They combined image and sound to produce a single artistic whole that, because it was performative, was more true to Wagner’s *Gesamtkunstwerk* than was Gropius’s architectural model. In fact, the biggest difference between Hirschfeld-Mack’s

\(^{182}\) Ibid., 82.

color-light plays and Wagner’s Bayreuth spectacles was that they replaced Wagner’s actors with technological surrogates, something Wagner would have abhorred even if it had been possible. Hirschfeld-Mack’s adoption of technological means thus aligned him—unexpectedly, given his expressionist loyalties—with the constructivist reformers Graeff and Moholy-Nagy. Like them, Hirschfeld-Mack updated the *Gesamtkunstwerk* for the twentieth century. His novel projection apparatus, anchored by electric lights and resistors, harnessed technology to create a mechanical version of Wagner’s staged dramas. But most strikingly, Hirschfeld-Mack retained something of the epic mission Wagner bestowed upon his *Gesamtkunstwerk*. Hirschfeld-Mack wrote how the color-light play “with its powerful physical and psychological effects, is capable of evoking pure and profound tensions from the experience of color and music.”

This effect brings to mind the aesthetic empathy ascribed to viewing performances at Wagner’s Bayreuth Festival Theater. But while Wagner objectified life using dramatic and narrative means, Hirschfeld-Mack resorted to abstract means. His description of the color-light plays’ “powerful physical and psychological effects” inferred his belief that these abstract means could imprint themselves on the viewer’s feelings and emotions. If so, his project subtly corrects Wagner’s mission. Rather than present his audience with epic depictions of love and loss, Hirschfeld-Mack objectified the elementary sensations of life—color, shapes, movement, and sound—and showed how sense perceptions, even those broken down to the metaphorically cellular level, trigger emotional response.

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But, is the kind of empathetic response Hirschfeld-Mack described possible? Even with access to an accurate live reconstruction of the color-light plays, this question would be impossible to answer if only for the fact that individuals respond differently to the same stimuli—a recognition that ultimately led Heinrich Wölflin, Theodor Lipps, Wilhelm Worringer, and Bertolt Brecht to discount the Wagnerian model of empathic spectatorship, as Juliet Koss explains. Yet, the surviving documentation of the color-light plays suggests that, even if Hirschfeld-Mack based his project on faulty assumptions, he nevertheless succeeded in using his abstract compositional elements to produce a unified artistic expression that exceeded the sum of its parts. How this worked in concrete terms isn’t always clear, a difficulty exacerbated by the fact that none of the plays survive with a complete set of performance scores (comprising a master score and part scores for lights, templates, and music). Cross Play, the one play filmed during the artist’s lifetime, had no musical accompaniment, and the tape on which Hirschfeld-Mack recorded the music for the Darmstadt performance is lost, so original scores for two pieces from the 1920s provide the only evidence of the musical accompaniment. Despite this patchwork evidence, the second movement of Color Sonatina II (Red) provides some sense of the kind of unified expression Hirschfeld-Mack was able to achieve. In it, he evokes the sensation of wavelike expansion and contraction.

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185 Koss, Modernism after Wagner, 67–72.
The Darmstadt lamp and template scores help us imagine how the 47-second movement would have appeared. It featured two shapes that fit together in upper and lower parts. The upper shape had two curves, like a camel’s humps, while the
lower part dipped down to form a half circle. Although the shapes look like they would separate along their diagonal equator, developments in movement three showed that the template split vertically, so that a rectangle appeared where the two pulled apart (see photograph above); however, the shape remained unbroken in the second movement. The score indicates the operator began with the shape exposed and then closed it from the left to the split, before opening it from the left and closing it from the right simultaneously. Words are poor substitutes for moving abstract shapes; however, description aside, the shape Hirschfeld-Mack used for the second movement was certainly wavelike. The upper half evoked the crest of a wave, while the lower curve resembled its trough. The template’s back-and-forth movement, shown in the score by a double-headed arrow, produced a serpentine motion, as the operator slowly revealed and hid the curve.

Figure 3.15 – Ludwig Hirschfeld-Mack, lamp score for Color Sonatina II (Red), 1964. Ludwig Hirschfeld-Mack Papers, University of Melbourne.
The lamp placement, movement, and colors only strengthened the impression of the rise and fall of a wave. *Color Sonatina II (Red)* called for six lamps, numbered one to six and colored in order grey, white (but with a small aperture to sharpen the focus), red, yellow, pink, and dimmed white. The first three lamps (grey, white, and red) were on one resistor, and the last three (yellow, pink, and white) were on a second resistor. These resistors acted like dimmers, but also allowed all three lamps to turn off or on simultaneously, which is what Hirschfeld-Mack called for in the pause before the second movement. In the first movement, only the first three lamps were on; in the pause between the two movements, the operator turned off those lamps and turned on the second set of lamps. This switch resulted in colors that were both less intense—grey to yellow, red to pink, and strong white to dim white—and less sharp—the first lamps were placed in the center of the visual field while the second were spread out, resulting in more diffuse light. In other words, Hirschfeld-Mack watered down both the color and the intensity as he replaced strong colors for weak ones and bright shapes for dim ones. At the same time, the yellow and white lamps “move[d] slowly up and down” in opposite directions, making the yellow and white shapes rise and fall in opposition to each other, evoking again the rise and fall of the wave’s crest and trough. Interestingly, Hirschfeld-Mack avoided what might have been a simplistic equation of the wave with the color blue, which only appeared later in the composition. Instead, he combined the weakening of the colors and movement of the lights to convey a sense of rise and fall.
In case the shapes and colors left any doubt, Hirschfeld-Mack also built the wave theme into the music he composed for the second movement. He translated this theme of wavelike expansion and contraction as a series of alternating crescendos and decrescendos. The sequence opened (see the score above starting at the circled number two) at the dynamic forte, diminished to piano, and built back up to forte. The pattern repeated three times, its ebb and flow setting the pace for the rise and fall of the shape on the screen. In addition, the melody rose and fell along with the dynamics. The notes dropped in pitch as the music grew
quieter and rose as it grew louder. So, we see that Hirschfeld-Mack expressed the wave’s theme of rise and fall in the notated music. An accomplished pianist, he considered music integral to the color-light plays; Hirschfeld-Mack described it as interwoven with the color and form. The elements of the color-light play “develop synchronously,” he wrote, so that “the color-form theme corresponds rhythmically and dynamically to the development of the musical composition of a sonatina’s movement.”

Alexander László, a composer interested in the history of color organs and Hirschfeld-Mack’s contemporary, addressed the issue of form-music correspondence in his 1925 book *Color-Light Music*. He included a chart in which he translated abstract linear designs into corresponding melodies. His wave music exhibited the same melody of rising and falling pitch as Hirschfeld-Mack’s score.

This close reading of the second movement of *Color Sonatina II (Red)* shows the kind of unified expression Hirschfeld-Mack achieved with the color-light plays. He coordinated shape, color, light, music, and movement to convey the theme of the wave. But—thinking here of the different steps in this reading—a wave is too simplistic for what Hirschfeld-Mack expressed. It is more accurate to say he conveyed a visceral feeling of expansion and contraction that he visualized as the rise and fall of a wave. My reading has necessarily progressed as a series of observations, treating each element—shape, color, movement, and music—independently before considering the next. In performance, all of these

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187 László, *Die Farblichtmusik*. 
transformations occurred simultaneously, which compounded their effect. This may seem a modest accomplishment given Hirschfeld-Mack’s claims for the color-light plays’ “powerful physical and psychological effects,” yet it is not so far from his objective to “[evoke] pure and profound tensions from the experience of color and music.” To evoke a sense of expansion using only colored moving shapes of light and music is no small thing and testifies to Hirschfeld-Mack’s ambition to communicate using abstract means.

Hirschfeld-Mack would not have had to look as far back into history as Wagner to encounter such ideas of empathic spectatorship. His ambitions for the color-light plays overlapped heavily with Kandinsky’s interests and theories following his return from the Soviet Union in 1922 to accept a teaching position at the Bauhaus. Kandinsky’s experience in the state making that followed the communist revolution profoundly affected his theories on art. Painting, no longer a conduit for emotions, became an experimental medium of perceptual and affect psychology—in Kandinsky’s words, an opportunity to study “the experience of the person perceiving the work, i.e., in his psyche.” He had always considered color to be one of, if not the most, decisive compositional elements of painting. After his return to Germany, he abandoned his previous ideas about color’s inherent spirituality in favor of scientific rhetoric. He focused

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189 This change is clearest in Kandinsky’s writings. See Vasily Kandinsky, *Kandinsky: Complete Writings on Art*, ed. Kenneth Clement Lindsay and Peter Vergo, 2 vols., Documents of Twentieth Century Art (Boston: G.K. Hall, 1982).
on color’s physiological effects. “We know,” he wrote from the Soviet Union, “the powerful and invariable effect of different colors (proven by experiment): red (in a color bath) increases the activity of the heart, which is expressed, in turn, by the acceleration of the pulse; blue, however, can lead to partial paralysis.” 191 By extension, artists’ deliberate use of colors in their paintings would produce a complex set of physiological responses in their viewers, which the brain translated into emotion. This was simple enough for red and blue. One hundred years earlier, Goethe wrote that the color red excited viewers while blue calmed them. The scientific experiments Kandinsky cited only served to provide the physiological evidence supporting Goethe’s intuitive observations. But from these simple cases—color baths of blue or red—the matter became more complicated. Does a small patch of blue in a painting have the same physiological effect on a viewer as the color bath? Is the response less effective, or does it disappear entirely? What about other colors—purple or green, or light blue, for that matter: do they have measurable effects on human physiology?

These questions demonstrate the affinities between Hirschfeld-Mack’s “powerful physical and psychological effects” and Kandinsky’s “powerful and invariable effect of different colors.” But the connection between the two was even stronger. I propose that the color seminar activities—the color charts and group discussions—were de facto psychology experiments. Their purpose was not just to study the appearance of shades between red and pink, but also and primarily, to answer the very questions posed here. Hirschfeld-Mack and

191 Ibid., 459.
Kandinsky worked to create a universal table of correspondences between specific colors and affective responses. Kandinsky suggested this in his essay “Color Course and Seminar,” which appeared in the catalogue for the first Bauhaus exhibition of 1923. In it, he described the need to “investigate color from various points of view,” those being the “physics and chemistry” or “the nature of color”; the “physiology” or “external perception” of color; and the “psychology” or “internal effect” of color. According to Kandinsky, because color was a fundamental compositional element of most visual and many performing arts, artists should educate themselves about all three aspects of color.

Figure 3.18 - *Color Questionnaire*, 1922-23. Lithograph, pencil, and colored crayon on paper, 9¼ x 6 in. Bauhaus-Archiv, Berlin.

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Hirschfeld-Mack’s color seminar was not the only forum for the testing of Kandinsky’s theory. It was in this context that Kandinsky and his students in the wall painting workshop conducted their famous color questionnaire experiment. Its subject was the perception of correspondence between three forms—a circle, square, and triangle—and three colors—red, yellow, and blue. The questionnaire is a familiar story, which I will not repeat here. What is relevant for this examination is Hirschfeld-Mack’s wholehearted belief in its findings, which he described in his 1963 book *The Bauhaus: An Introductory Survey*. “We sent out about a thousand postcards to a cross-section of the community,” Hirschfeld-Mack remembered, “asking them to fill in three elementary shapes […] with three primary colors.” The postcards returned. “The result,” according to Hirschfeld-Mack, “was an overwhelming majority for yellow in the triangle, red in the square, and blue in the circle.” For Hirschfeld-Mack, the experiment not only uncovered previously unrealized color-form relationships; it also showed that abstract compositional elements like color, line, and form conveyed psychological meaning. In a lecture he delivered in the 1960s, he confidently reported, “we made research experiments with many 100 people [sic] and the reactions to colors

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195 Ibid.
are very similar indeed,” remembering, no doubt, the postcard experiment.\textsuperscript{196} His enthusiasm for the project provides a broader context for his belief in the power of abstract compositional elements to have an authentic psychological effect—that is, to produce emotions—in his viewers.

In the same catalogue in which Kandinsky’s “Color Course and Seminar” appeared, he also published the essay “Abstract Synthesis on the Stage,” a second point of reference for the color-light plays, but this time in the context of the \textit{Gesamtkunstwerk}. Kandinsky did not use the term in his essay, an omission consistence with a general rejection of expressionism, but the content of the essay amounted to a call for the restoration of the \textit{Gesamtkunstwerk} value of artistic synthesis. He advocated the creation of an abstract theater that combined the elements of painting (color), music (sound), and dance (movement) in a single production—a \textit{Gesamtkunstwerk} by any measure, and one unusually consistent with Wagner’s original conception.\textsuperscript{197} His synthetic abstract theater would correct what he perceived as a trend in the individuals arts to “uncompromisingly dissect their own means […] and weight those means, consciously or unconsciously, upon an inner scale.”\textsuperscript{198} In so many words, Kandinsky observed the same development Clement Greenberg later described as medium specificity, a discipline’s “use of characteristic methods […] to criticize the discipline itself, not in order to subvert it, but in order to entrench it more firmly in its area of

\textsuperscript{198} Ibid., 506.
Kandinsky countered that medium specificity was, in some regards, a healthy and purifying process, but only insofar as the reformed disciplines joined together to create a new, more perfect synthetic art of abstract theater. His rationale for such a synthetic art’s superiority sounded eerily Wagnerian. It resided in theater’s unparalleled capacity for absorptive, read as empathic, spectatorship. He described a “magnet concealed within the theater” whose “capacity for absorption is unlimited.” “By its extreme tensions, it is able to communicate all the powers of all the arts to the expectant rows.” What Kandinsky described was a physically immersive and psychologically enthralling space of sensation in which the viewer wholeheartedly entered the artistic environment onstage.

It was the same absorptive spectatorship Hirschfeld-Mack created in his color-light plays, inspired, so he claimed, by film. In a 1925 essay, Hirschfeld-Mack recalled seeing his first movie in 1912 as a young man. He vividly remembered the experience. The “plot of the movie was insipid,” he wrote, but the “abrupt changes from sudden to slow movements, of a multitude of light in a darkened room, the transformation of the light from the brightest white to the darkest black” transfixed him. In particular, he observed music’s important role in creating a magical atmosphere. The silent film was accompanied by live music, which the young Hirschfeld-Mack recognized had no relationship to the film’s narrative.

The music existed merely to entertain the audience and prevent their attention from wandering off-screen. Nonetheless, pauses in the musical accompaniment produced “in the audience […] a growing restlessness,” he noted, “while my own uneasiness finally developed into an intolerable depression which gave way only after the music was reintroduced.” Hirschfeld-Mack described a reaction still experienced today—the uncomfortable shuffling of a modern audience confronted by a truly silent film. But, what Hirschfeld-Mack described goes beyond mere boredom. He remembered real discomfort and, worse, an “intolerable depression.” This anecdote recounts what might have been Hirschfeld-Mack’s earliest experience of the power of abstract elements to trigger affective response in viewers. In this case, the trigger was not the presence of a stimulus, but its absence. Silence—the cessation of music—was enough to produce within him a feeling of depression.

His perceptive observations inspired him to improve the absorptive capacity of the color-light plays through the development of formal strategies that encouraged empathic spectatorship by heightening their reality effect. If the absence of music produced depression, then his music would not only be continuous but, unlike the film music he remembered, it would be synchronous. Music that corresponded to the images on the screen strengthened the viewers’ empathic spectatorship. We have already seen how this worked in the rising and falling melody of the second movement of Color Sonatina II (Red), and further evidence for the validity of Hirschfeld-Mack’s musical strategy comes from the

\(^{202}\) Ibid.
realm of synchronized sound. When films first introduced synchronized sound, it was the ultimate reality effect—a fulfillment of the filmic image’s unrealized promise of total verisimilitude. “Live sound actualized the image,” Norman King writes, “and, merging with it, emphasized the presentness of the performance and the audience.”

In silent film, as Hirschfeld-Mack observed, the musical accompaniment was often unrelated to the story; it existed only to fill the existential void of silence. Synchronized sound reinforced the image on the screen and brought it closer to reality. It transported the viewer into the fictional narrative. This was the basis of Rudolf Arnheim’s *criticism* of synchronized sound. By increasing film’s verisimilitude, he argued, sound film reduced its expressive possibilities. A film that successfully simulated reality was enslaved to that function.

But Hirschfeld-Mack’s reality effects didn’t stop with sound. The color-light plays’ cascading shapes provided him with the perfect opportunity to achieve an illusion of reality unprecedented in two-dimensional film. Using an optical illusion called the kinetic depth effect, he created the appearance of depth where none existed, giving the impression that his shapes hovered in front of the screen. He used the kinetic depth effect most successfully in *Cross Play*, the only play for which a lifetime film survives. *Cross Play* was different from the other color-light plays. Running at fewer than five minutes, it was short. It called for white light—fortuitous since it survives as a black-and-white film. Hirschfeld-Mack never

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204 See Rudolf Arnheim, *Film Essays and Criticism*, Wisconsin Studies in Film (Madison, Wis.: University of Wisconsin Press, 1997).
composed music for *Cross Play* and performed it in silence. This absence of potentially distracting elements—complexity, color, and music—framed *Cross Play* as a concentrated exploration of moving shapes in white light. In other words, it was the ideal demonstration piece for the optical effects possible with moving, layered shapes of light.


In *Cross Play*’s final sequence, all the shapes disappeared except a single cross made of four slender bars. Six lamps lit the cross to produce six overlapping
crosses. At first, the crosses arrayed in a diagonally descending line. Slowly, they started to rotate counterclockwise as if around an invisible central axis. The rotation transformed the viewer’s perception of the crosses. What appeared flat when still took on volumetric depth in motion. Experimental psychologist Hans Wallach coined the term kinetic depth effect in 1953 to describe the induced perception of three-dimensional depth by rotating two-dimensional shapes. Kinetic depth provided the viewer with an unsettling sense that the shapes inhabited real space. A critic for the Berlin Börsen-Kurier praised the “telescoping action” of the displaced planes. His choice of the word ‘telescoping’ captured how—as is so evident in Cross Play—the layered shapes appeared to project out into the audience only to disappear into the darkness of the screen. Another reviewer of a 1925 performance in Leipzig emphasized the color-light play’s uncanny space. “The play achieved a high point in the pictorial representation and relationship of space. Ever wilder applause.” The superimposed, transparent planes of color created the impression of depth where none existed. This sense of volume was so pervasive, a final reviewer reported that Hirschfeld-Mack “used geometric and stereometric bodies as artistic means.” I suggest that Hirschfeld-Mack used devices like synchronous sound and the kinetic depth effect to reduce the separation between the performance and

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its reception. In other words, he wanted the viewer to enter a contemplative psychological state best described, in the spirit of Kandinsky’s synthetic theater and Wagner’s *Gesamtkunstwerk*, as absorption. The same interests motivated his later work as an art teacher and pedagogue.

### 3.4. Play and Pedagogy

After leaving the Bauhaus in 1925, Hirschfeld-Mack began a second career as a teacher of art, design, and art pedagogy. For four years, he taught art at the Wickersdorf Free Parish School, a prominent education reform school inspired by the teachings of Hermann Lietz. Lietz delivered a lecture at the Bauhaus in 1920, a few months after Hirschfeld-Mack's arrival, on his proposal for an ideal educational environment that integrated life, work, and play in a non-hierarchical community—a description that applied equally to Wickersdorf and to the Bauhaus.  

In 1930, Hirschfeld-Mack left Wickersdorf for a position at the newly established Pedagogical Academy in Frankfurt, which housed Germany’s first dedicated program for training art teachers, before continuing to Kiel’s Pedagogical University. In 1933, the National Socialist government closed all three schools (as well as the Bauhaus) as part of a national campaign against education reform. Hirschfeld-Mack continued to teach in Germany until 1936, mainly for composer Carl Orff at the School for Musical Instrument Construction that was part of Berlin’s Günter School. Art education remained Hirschfeld-Mack’s primary occupation after his immigration to England in 1936 and

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internment as an enemy alien in 1939. While an internee, he led art activities for local programs serving the children of working-class families. After the British government deported Hirschfeld-Mack and 2,000 other German internees to Australia in 1940, the headmaster of the Geelong Grammar School petitioned for his early release and hired him as art teacher on the strength of his Bauhaus experience and the Quaker friends Hirschfeld-Mack had made in England. As Australia’s most prestigious boarding preparatory school—known as much for its progressive approach to education as for its famous students—Geelong offered Hirschfeld-Mack resources and encouragement to continue his pedagogical research. Well into retirement, he was a leading figure in the Victorian Association of Art Educators, delivering lectures on abstract art, color and design theory, and materials studies.²¹⁰

Over thirty years teaching in Germany, England, and Australia, Hirschfeld-Mack stayed true to the German education reform movement’s tenets and endorsed a play-based approach to early childhood art education. He particularly criticized exam-driven pedagogy—that is, education defined as exam preparation—because it deadened children’s natural love of learning. “No wonder so many boys and girls are glad to leave school,” he lamented. “For them learning is associated with unhappy experiences.”²¹¹ In his pedagogical writings, Hirschfeld-Mack stressed the importance of providing a good education. He publicly blamed the failure of German society on the values instilled by its

²¹⁰ Geelong, just outside of Melbourne, is located in the Australian state of Victoria.
educational system, which he described as “militant and based on the strictest obedience in home, school, and economic life.” This produced “an autocratic people” who were easily led. In contrast, at Geelong he developed a curriculum that would, he hoped, create future generations of Australians “who have the logical and truthfully working brain of an engineer and at the same time the soul and mind of an artist.”

The key, he felt, was in children’s vast stores of creativity, which they expressed through play. “If you observe children playing,” he writes, “you will find they are enthusiastic, concentrating intensely, and so much united that they seem almost in the same psychological state as the artist, concentrated on one objective of creativeness, from which expression and serenity spring.” He described play as a complex psychological state centered on the creative act and, thus, equivalent to the psychological state of artistic creativity. His statement on play also evokes the psychological state he created with his color-light plays, in which the audience, “concentrating intensely,” are “so much united that they seem almost in the same psychological state as the artist.” Granted, the color-light plays’ spectators were not creating anything in the manner of playing children or artists—an important distinction. But with the color-light plays, he produced not only an immersive environment of sensory stimulation, but one in which each audience member experienced the same affective response—in other words, a

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214 Ibid.
psychological state—determined by the artwork. If so, Hirschfeld-Mack’s post-Bauhaus pedagogical career was less a departure from his artistic practice than a deepening of his commitment to themes he first explored in the color-light plays. This meant that his pedagogical theories spoke as much to artistic creation as they did to childhood development. He believed that childhood was the time in a person’s life when creativity dominated, but that conventional schooling starved the child of play and punished creativity. Hirschfeld-Mack argued that teachers should preserve that state of untrammeled creativity as long as possible by designing play-based curriculum. In play, “the driving forces are intuition, imagination, and fantasy,” Hirschfeld-Mack wrote. “The constant training of these forces is important to building up the future of a spiritually alive society.”

Figure 3.20 – Photographer unknown, [Ludwig Hirschfeld-Mack with student ensemble of color chords], date unknown. From “Music Class Learns Harmony with Colors,” *Popular Science* 135, no. 2 (August 1939): 45.

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215 Ibid.
In closing this examination of the color-light plays, I want to introduce another of Hirschfeld-Mack’s inventions that, despite obvious differences, shared with the color-light plays their examination of color-form correspondence. At Carl Orff’s music instrument school in Berlin in the mid-1930s, Hirschfeld-Mack taught students how to make their own simple instruments—mostly recorders, drums, and percussion instruments—and even compiled instructions for various instruments in an unpublished textbook still preserved in his archive. A product of his play-centered curriculum, homemade instruments introduced children to the mechanics of sound production, basic music theory, acoustics, and performance. He continued this project in England, where the lack of classroom funds favored such low-cost arts activities. But some children were too young to make even the simplest instruments, and others with disabilities lacked adequate manual
dexterity. For them, he invented a new instrument that allowed children with limited means and no musical training the opportunity to perform relatively complex songs in an ensemble setting. He called it the color chord.

The idea behind the color chord was simple. He mounted a trio of strings tuned to a specific chord on each side of a four-sided sound box mounted on a pole that served as a foot. The foot stood on the floor, and the child held the instrument’s top with one hand and played it by strumming or striking the strings, thus producing a perfectly in-tune chord. By turning the box on its foot, the child could easily play any of the four available chords. This produced an instrument with which an unskilled player could reliably produce a relatively complex sound. The design also scaled easily to higher and lower registers. While in England, Hirschfeld-Mack assembled color chord orchestras with soprano, tenor, and contrabass instruments. But while the design made it easy for every child to participate, the real challenge Hirschfeld-Mack faced was the development of a system of conduction and timing, so that the children knew what side of the color chord to play and when to play it. Standard letter notation might work, but he instead labeled each side with a color that corresponded to the chord. Using an ingenious peddle-operated conducting station, he signaled the children with colored cards and accompanied on accordion.

The color chord’s novelty attracted international press attention, as is evident by a short article published in the August 1939 issue of *Popular Science* that
included the photograph above. In this coverage, Hirschfeld-Mack described the color chord in terms similar to those he used for the color-light plays ten years earlier. The color chord was more than a child’s musical instrument. “I am making great experiments and inventions over here,” Hirschfeld-Mack wrote, “not only with sounds but with colors and the relation between them. The psychology of the two is akin: you use the word ‘tone’ [f]or both. Also the psychology of shapes has an affinity with color and sound.” Although the color chord would not have been able to produce the same kind of psychological response as that of the color-light plays, it gave young children the means with which to engage in a communal creative act. It is also striking that Hirschfeld-Mack emphasized color and sound’s capacity to affect psychological state. The fact that major and minor chords have long been linked with emotional states—happy for major and sad for minor—suggests that Hirschfeld-Mack may have had in mind a more complex examination of sound-color correspondence based on psychological criteria.

The color-light plays and color chord also shared color as an essential element in their composition. Color was the subject of Hirschfeld-Mack’s earliest art lessons with Adolf Hölzel, and they survived in the color chord’s conducting system. Hirschfeld-Mack’s adoption of color as the medium of communication with children recognizes the universally important role color plays in child

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development. Children—even babies—delight in color. Color names are among the earliest words children learn. This primal connection to color, the same connection that made color the perfect means with which to cue color chord performances, found surprising support in the form of Walter Benjamin’s early essays on toys and color. Writing in 1915, Benjamin observed that children’s favorite games are alive with color effects. “Soap bubbles, tea games, the damp colorfulness of the magic lantern, India ink, decal pictures,” Benjamin wrote, “color was always as blurred as possible, dissolving, nuanced in an entirely monotonous manner.”

According to Benjamin, children responded to a particular kind of color defined by its formlessness—colors that bled into each other with no respect for boundaries. This formlessness signaled to Benjamin the child’s love of color as such, free from its adult attachment to the world of form. In daily life, color is a property of an object in the world. The sky might be blue, but blue does not have an independent physical existence. We cannot trip over a blue or see it in a tree. In contrast, color in children’s games separates itself from its dependence on the phenomenal world. Better still, children imbue color with an objecthood defined by its intrinsic formlessness, a magical state of affairs. Benjamin called color’s special identity in children’s games ‘pure’ color. For him, pure color was a product of the child’s psychological state. Children loved colors because color transported them into an imaginative, dreamlike state—a state they entered through the process of play. For children, the play-dream was a form of Platonic anamnesis, a reawakening of the pure state of existence that preceded

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birth and that persists in adulthood in the altered consciousness of dreams. “If anything remotely similar to the Platonic anamnesis actually exists,” Benjamin wrote, “it would take place in the lives of children, for whom picture books are paradise.” Benjamin saw the pure color of Platonic anamnesis “in the colored glow, the colored brilliance, the ray of colored light.” In “The Rainbow Dialogue on Fantasy,” Benjamin’s fictional character complained that, although she couldn’t imagine blue while awake, in her dreams she saw it as a limitless cloud. The essay’s eponymous rainbow symbolized this fantasy of pure color. Its atmospheric effect, created by water and light, simulated the unboundedness of pure color in a dream.

These two images—the ray of colored light and the rainbow—approximate the quality of color in the color-light plays. In fact, Benjamin even included the color-light plays’ ancestor, the magic lantern, in his list of colorful children’s games. Projected colored light is the closest thing to pure color that exists in the phenomenal world. In a strictly scientific sense, color is colored light; that is, a ray of light oscillating at a particular frequency. In the color-light plays, the colored light isn’t projected onto a shape, but is itself shaped by the templates. Overlapping shapes bleed into each other to produce new colors. If Hirschfeld-

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Mack’s use of color in the color chord acknowledged the child’s special relationship with color, the color-light plays injected its childlike brilliance into waking adult life.
Chapter 4

László Moholy-Nagy’s
*Light Prop for an Electric Stage*

4.1. Standardized Goods and the 1930 Paris *Werkbund* Exhibition

László Moholy-Nagy debuted his *Lichtrequisit einer elektrischen Bühne* (*Light Prop for an Electric Stage*) in the *Werkbund* rooms of the 1930 *Salon des Artistes Décorateurs Français*, an annual decorative arts exhibition in Paris. As the first display of German design in France since the First World War, the 1930 Paris *Werkbund* exhibition signaled improved relations between the former enemies.\(^{222}\) For the designers and manufacturers whose wares it featured, the exhibition also opened the French marketplace to German goods. It could not

have come at a better time. Germany’s invitation arrived one month before the devastating New York stock market crash of October 1929. By the time the exhibition opened in May 1930, American banks had suspended the loans that stabilized the still-recovering economy. German retail and manufacturing sought access to foreign markets better positioned to withstand the new economic crisis.\(^{223}\) This threat to German industry played an unexpectedly formative role in the *Werkbund* exhibition’s form and content.

Walter Gropius and his exhibition committee—Moholy-Nagy, Marcel Breuer, and Herbert Bayer—were keenly aware of the exhibition’s financial stake because it affected them personally.\(^{224}\) All worked as self-employed architects and designers who relied on Germany’s business elite for commissions following their resignations from the Bauhaus in 1928. The exhibition offered them the opportunity to strengthen their professional reputations outside Germany. Of course, there are different ways to build a reputation. Model interiors for a ten-story residential block designed by Gropius and furnished by Breuer dominated the *Werkbund* display and interested French urban planners who faced persistent housing shortages. Certainly, most of the exhibition critics focused on the far-reaching implications of the semi-communal lifestyle Gropius and Breuer

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\(^{223}\) The exhibition where it debuted took place in Paris’s Grand Palais from May 14 to July 13, 1930. Germany’s invitation was a diplomatic coup. It was the first invitation the *Société* had issued to a foreign country to participate in their salon, which was normally reserved for members only. It was the first exhibition, at France’s invitation, of German art in the French capital since 1910. See Yvonne Brunhammer and Suzanne Tise, *The Decorative Arts in France, 1900-1942: La Société Des Artistes Décorateurs* (New York: Rizzoli, 1990), 157.

proposed in their model interiors. However, a second leitmotif declared German superiority in the design and mass production of standardized goods for the home and office.

![Figure 4.1 – Photographer unknown, [Utensils in Room 4], 1930. Herbert Bayer, Room 4, 1930 Werkbund exhibition.](image)

Organizers and critics repeated this theme of standardization early and often. “The exhibition,” wrote the anonymous author of the official catalogue, “will […] show pieces produced in series and through a scientific conception, which nonetheless show a concern for beauty. The exhibitors believe that they have reached a milestone in the alliance between aesthetics and technology.”

Although consistent with Bauhaus ideology during Gropius’s directorship,

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225 Walter Gropius and Herbert Bayer, *Section allemande: exposition de la Société des artistes décorateurs.* (Berlin: Verlag H. Reckendorf, 1930); Quoted in Brunhammer and Tise, *The Decorative Arts in France, 1900-1942*, 182.
standardization also represented mainstream Werkbund values in 1930. Some of its members had advocated design for mass production as early as the Muthesius-van de Velde standardization (*Typisierung*) debates of 1914. Following Germany’s economic recovery in 1924, standardization gained popularity in the Werkbund’s divided membership. Gropius’s call in 1923 for the Bauhaus to work towards “art and technology: a new unity” was one expression of strengthening pro-standardization sentiment among Werkbund members.

But the 1930 Werkbund exhibition’s promotion of mass production wasn’t simply an expression of current thinking among German designers; it was also a canny strategy that validated their accomplishments while overlooking weaknesses. The Société des artistes décorateurs represented the highest achievement in exquisitely finished handcrafted luxury goods. At their best, German designers never challenged French historical dominance of the luxury goods market. Postwar hyperinflation devastated domestic demand for luxury

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228 The 1930 Werkbund exhibition’s message of mass production was not simply a product of immediate financial pressures and sales strategies. Bauhaus designers (the exhibition committee chief among them) had worked towards the development of mass-produced wares since at least 1923 (or earlier in the case of Breuer). For more on the relationship of the 1930 Werkbund exhibition and the Bauhaus, see Paul Overy, “Visions of the Future and the Immediate Past: The Werkbund Exhibition, Paris 1930,” *Journal of Design History* 17, no. 4 (2004): 337–57.
goods and ensured German examples would look poor indeed alongside those of the French. Hardship had forced German designers to satisfy basic needs and work creatively with inexpensive materials. Protective of their reputation, the Werkbund leadership turned this necessity into a virtue. Unwilling to compete against the Société on their home turf in their traditional strength of luxury goods, the exhibition committee adopted the theme of standardized goods. This strategy ensured that the German designers stood out for their legitimate accomplishments in industrial design, not for the inadequacy of their products. It also vested the ideology of standardization with an overdetermined importance in the exhibition design.

The exhibition catalogue quoted above described standardized goods as the result of a design process that combined artistic beauty, engineered functionality, and technological manufacture. For Gropius and his committee, this triad was an inherently worthy aim and the bedrock of design reform. But the ideology of standardization also entailed a moral imperative to make quality goods available to the working classes—like the factory workers who made them. French and German critics alike cited this populist motivation, although the organizers omitted it from the catalogue essay, perhaps out of diplomacy. Only the very wealthy could afford the French luxury goods displayed at the Salon. In contrast, the German standardized goods were—in theory—affordable for the working classes.\textsuperscript{229} When André Salmon wrote about the Werkbund exhibition that “there

\textsuperscript{229} In practice, the goods were not affordable for the working poor, despite the designers’ populist rhetoric.
is not a single thing that the traveler could not find tomorrow in the window of some German shop,” he underscored that the goods were both available readymade and affordable for ordinary people.\textsuperscript{230}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image1}
\caption{Figure 4.2 – Herbert Bayer, Room 4, 1930 Paris Werkbund exhibition. From Wilhelm Lotz, ed., \textit{Die Form} 5, no. 11/12 (1930).}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image2}
\caption{Figure 4.3 - Herbert Bayer, Room 4, 1930 Paris \textit{Werkbund} exhibition. From Wilhelm Lotz, ed., \textit{Die Form} 5, no. 11/12 (1930).}
\end{figure}

Herbert Bayer’s striking display of household goods likely inspired Salmon’s imagined shop window. In Room 4, Bayer faced the challenge of exhibiting a wide range of mass-produced goods, from porcelain to utensils and textiles. His solution was to transform the center of the room into a massive glassed-in vitrine with passages around all four sides for visitors. Inside the vitrine, household items densely packed waist-high tables. It unmistakably resembled the visual vernacular of Salmon’s shop window. By emulating this familiar retail environment, Bayer emphasized that these dishes, unlike the china in the nearby French model dining rooms, might be purchased readymade in a local department store. In doing so, Bayer also visualized the economic consequences of standardization’s moral imperative to use mass production to benefit the working classes: standardized goods only work when mass production and mass consumption work in tandem. Standardized goods connected the factory where they were made, the space of production, indelibly with the department stores and shops where they were bought, the space of consumption. The Paris Werkbund exhibition recreated the standardized good’s double identity as product and commodity by including model retail sites alongside the more familiar model interiors. If model interiors provided visitors with spaces that inspired them to imagine new modes of living, then the model retail sites simulated new modes of consumption. What is interesting about the Werkbund exhibition is that its model interiors famously heralded an unconventional communal lifestyle that became the subject of critical and popular debate. Yet, in contrast, nothing about Bayer’s shop window was particularly revolutionary; the vitrine was as unremarkable as the shop window it
emulated. Returning to the exhibition at large, Bayer’s vitrine was the most overt element of a sustained program of exhibition design that imbricated the real space of the exhibition with the simulated space of retail and the real act of viewing with the simulated act of windowshopping. In other words, the Paris Werkbund exhibition not only showcased standardized goods, it modeled the physical environments through which they circulated, further inscribing the ideology of standardization into the exhibition’s logic.

Figure 4.4 - Marcel Breuer, *Man’s Sitting Room*, Room 3, 1930 Paris Werkbund exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).
If overabundance defined Bayer’s vitrine, austerity marked Breuer’s his-and-her bedrooms. All model interiors share a peculiar emptiness owing to their artificial nature; however, Breuer exaggerated this innate austerity by playing with scale. Despite their large size, his rooms contained very little furniture, and all of it was made of lightweight materials. In the man’s bedroom, the desk and armchair groups seemed to occupy different rooms, neither acknowledging the other and with ample space in between. A wall-length stretch of double shelving sat invitingly empty. A dozen books, a telephone, and a globe were the only accessories. Marcel Roux-Spitz’s Administrative Office, a French contribution to the Salon, appeared jam-packed by comparison. A built-in sofa, club chair, and coffee table crowded together in a conversational arrangement with only the minimum of clearance in between. Numerous small decorative items—including cut flowers, a potted plant, and smoking accessories—as well as office-
appropriate piles of paper completed the staging. Further, Roux-Spitz’s lavish use of reflective lacquer and mirrored finishes, as well as patterned and textured upholstery and floor coverings, produced a visually active space. In comparison, Breuer’s bedroom resembled a modernist monk’s cell.

Figure 4.6 – Floorplan of the 1930 Paris *Werkbund* exhibition.

Breuer’s apartment was more than austere. It radiated an emptiness that invited the visitor to fill the space imaginatively with the goods exhibited nearby in Bayer’s model shop window. The circulation of the exhibition, traced out in the dotted line in the floor plan above, encouraged this reading, for it prescribed a winding path that led the visitors from model interior to showroom and back again. The exhibition began in Gropius’s communal rooms [1], complete with lounge [1.1], library [1.4 upstairs], swimming pool [1.3], gymnasium [1.2], and niches for writing, listening to the radio, and playing cards [1.4 downstairs]. From there, they entered Moholy-Nagy’s showroom [2], only to exit into Breuer’s model apartment [3]. The apartment led to Bayer’s dead-end showrooms [4, 5],
before circling back to Breuer’s apartment [3] and exiting. This back-and-forth between showroom and model interior encouraged a participatory interplay, inviting the viewer to select a favorite china pattern or chair with which to fill the empty rooms. In other words, it encouraged windowshopping.

The Paris Werkbund exhibition was a complex site of multiple narratives. One of these narratives, driven by macroeconomic and historical factors, framed the exhibition as a model retail environment. The exhibition’s content, layout, and publications conveyed a message of standardized goods as not only innovative designs, but also as commodities available for purchase. In the same way Breuer’s model bedroom simulated a new environment for living, Bayer’s model shop window simulated an imagined retail encounter the organizers hoped would influence visitors’ purchasing habits in the real world. Mass production presumed mass consumption, which was as central to the Werkbund exhibition as the standardized goods it championed—with one notable exception.

**4.2. Room 2**

Moholy-Nagy’s Room 2 housed a series of displays that were spatially proximate but thematically incongruent with each other and, I argue, with the exhibition’s leitmotif of the mass production and consumption of standardized goods. Moholy-Nagy engaged critically with the theme in the displays that started and ended Room 2 before rejecting it outright in the theater display at the heart of the gallery. In the final analysis, the standardization ideology at work at the Paris Werkbund exhibition presented the machine as a tool to benefit the masses. The
machine’s specialization—its precise repetition of exact movements—produced identical goods to meet the identical needs of its identical consumers. In Room 2, Moholy-Nagy conceived of the machine as a tool defined by its versatility. Gropius and Breuer used the machine to meet basic needs, in the form of the standardized good, but Moholy-Nagy used it as a tool for creative and artistic expression. The fragmented displays of Moholy-Nagy’s Room 2 dramatized the dialectical opposition between these two paradigms of the machine.

Figure 4.7 – Axonometric floorplan of Room 2, 1930 Paris Werkbund exhibition.

Moholy-Nagy designed Room 2 as a series of distinct display areas that lacked a unifying theme. The content of the displays were, in order of circulation:
light fixtures and lamps [1], photographs of costumed actors from Bauhaus stage productions [2], slides of German industry and leisure [3], theater arts [4], the history of German design [5], and a standard post office counter [6]. Even this brief account establishes the lack of internal cohesion between the displays. If Room 2’s fragmentation has thus far escaped critical attention, it is due in part to Moholy-Nagy’s unifying display aesthetic. He installed the visual material in a continuous horizontal band, visible in the exhibition architecture rendered in the axonometric diagram above. The band was a literal band—an unbroken ribbon of black Trollit, the German brand name for the plastic Americans call Bakelite, on which Moholy-Nagy mounted two-dimensional objects and signage. Referred to by one scholar as a filmstrip, this visual trope gave the disparate installations a superficial unity.  

A second reason why the fragmentation of Room 2 is easy to overlook is the resiliency of early suggestions that Moholy-Nagy organized his gallery around the unifying theme of light. Moholy-Nagy never wrote about his gallery as a whole, so the sentiment is not directly attributable to him. Instead, period press accounts gave this interpretation traction. Siegfried Giedion’s review is representative in this regard and popular among scholars for its rare attention to detail.  

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232 Consider Kai-Uwe Hemken’s description: “‘Light and Lighting’ was the theme of the following room, which was installed by Moholy-Nagy. Serially produced lighting was presented to the viewer in the original state or in photographic reproduction. Theater and stage models, Oskar Schlemmer’s theatrical figurines [sic] and the Light Prop for an Electric Stage were further evidence for the scope of modern lighting, while also documents of the innovative creations of the
Giedion’s passage on Room 2 here in full because—despite its brevity—it is the most complete firsthand account of Moholy-Nagy’s installation.

Moholy-Nagy, who was in charge of all lighting, from reading lamps to theater illuminations, demonstrated a great number of different lighting effects through the skillful use of a variety of standardized German lighting fixtures, from bedside lamps to large reflectors. In one place one sees the effect of light upon a sensitized surface (photography); farther back, light used as the animating element in a theater (Moholy-Nagy displayed a mobile lighting apparatus—the light modulator); finally one can see an actual theater (the model and plans for Walter Gropius’s famous Total Theater, 1926; figures from Schlemmer’s Triadic Ballet, 1923; Moholy-Nagy’s stage settings from the Tales of Hoffmann and other productions). In the center of the community area is a self-operated projector which shows pictures of the New Germany. This is shielded from light by three walls of a new material (Trolit).

Giedion’s conscription of light as the theme of Moholy-Nagy’s Room 2 only worked because of his selective treatment of the diverse displays, which I discuss in detail below. He ignored the history of German design and the standard post office displays entirely and misrepresented photographs of costumed actors as studies of light effects, etc. In other words, while light was in Room 2 to find, it constituted one theme among many. Instead, of perpetuating this myth of unity, it is far more interesting to acknowledge Room 2’s thematic fragmentation, not least because its variety challenged the standardization ideology that dominated the rest of the exhibition. A tour through Room 2 demonstrates how this critique played out at the levels of display and object.

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Exiting from Gropius’s lounge, the visitor first encountered a model of Gropius’s steel apartment tower (*Stahlwohnhaus*), for which Gropius and Breuer planned their model interiors. The architectural model signaled the
transition from the immersive simulation of Gropius’s lounge to the real space of Moholy-Nagy’s showroom. Immediately after the model, Moholy-Nagy used the opportunity of a hallway connecting the lounge and Room 2 (off-map on the Room 2 floorplan above but visible in the exhibition floorplan) for a display of ceiling-mounted light fixtures that replicated elements of a retail showroom setting. Moholy-Nagy installed the fixtures in a row so visitors could compare styles, but housed each in its own booth to allow examination in semi-isolation. Photographs illustrated additional models to give the visitor a sense of different styles, and signage listed designer and manufacturer information. The fixtures continued to the end of the hall where they wrapped around the corner as a display of table lamps.

Figure 4.10 – László Moholy-Nagy, photography display (left) and lamp display (right), Room 2, 1930 Paris Werkbund exhibition. From Wilhelm Lotz, ed., Die Form 5, no. 11/12 (1930).

Based on the left-hand photograph, it does not appear that the fixtures depicted in the photo band correspond to the fixtures installed above. This is corroborated by the right-hand photograph, in which a single close-up stretches across multiple partitions.
The photograph of the table lamps reveals, however, that light fixtures were not the only objects displayed in the hallway. On the opposite wall, Moholy-Nagy exhibited a series of photographs depicting costumed actors from Bauhaus theater productions directed by Oskar Schlemmer. On one hand, this subject matter made sense for its location. The wall on which Moholy-Nagy installed the photographs separated the hallway from Gropius’s gymnasium and pool. Depictions of the human form in dynamic motion reinforced the gymnasium’s theme of physical exercise. They also formed a conceptual bridge to Moholy-Nagy’s theater display located along a visual axis at the opposite end of the room. Nevertheless, the abrupt juxtaposition of a gallery-style photographic exhibition undermined the illusion of the lighting display as a model retail showroom.
Moholy-Nagy conducted a similar act of retail sabotage in the two displays that ended Room 2. He dedicated half of his total wall space to *German Design* (Gestaltungsarbeit Deutschlands) a didactic exhibition on the evolution of *Werkbund* design “from one-off designs to type-ware, from crafts handicraft to
industrial factory production,” according to Breuer.235 Based on content alone, this should have been the most retail-oriented display in Room 2. However, rather than illustrate his German design teleology through representative objects—an option surely available for a Werkbund-sponsored exhibition—Moholy-Nagy favored photographic reproductions and overly long blocks of didactic text. Such retail vernacular as survived Moholy-Nagy’s installation appeared in the three vitrines mounted into the Bakelite band, here reimagined as a freestanding wall. The vitrines were shrunken distant cousins of Bayer’s shop window, and the comparison—both displays of German standardized goods—demonstrates the gulf that separated the two designers’ approaches. While Bayer appropriated the vernacular of the shop window, Moholy-Nagy’s historical account more closely resembled the didactic display of a science or history museum. Moholy-Nagy’s installation dismantled whatever retail messaging may have inhere to its content.

Room 2 ended in a standard post office counter designed by Robert Vorhoelzer. At first, Vorhoelzer’s counter might seem to resist retail messaging—after all, post offices sell little more than stamps. Reviewers interpreted the post office’s inclusion as the apotheosis of *German Design*’s narrative of standardization. Although technically accurate—Vorhoelzer designed his counter to be replicated across Germany—it was nonetheless a sudden change from the household goods on the final panels of the design history display. More importantly, Vorhoelzer’s post office played an unusually practical role at the Paris *Werkbund* exhibition. The organizers used it as a bookstore for the official exhibition catalogue—available at the price of five francs, according to the signage in the photograph. As such, it provided an unexpectedly direct site of retail sales and, for that reason, reinforced the exhibition’s overall message of mass consumption. For the exhibition catalogue included, along with explanatory
essays, floorplans, and photographs, an index of participating designers and manufacturers. It doubled as a retail and exhibition catalogue.

The oddity of the post office’s presence, of its privileged site at a transition between galleries, and of its appropriation as a bookstore points to the troubled status of the theme of the mass production and consumption of standardized goods in Moholy-Nagy’s Room 2. *Die Form* editor Wilhelm Lotz singled out what he considered the post office’s misuse in his exhibition review. “It is a shame,” Lotz writes, “that this post office counter can’t be appreciated for its own merits because books are placed there for sale.” In other words, visitors could not evaluate the post office counter’s success as a standardized design because of its misappropriation as a bookstore. But Lotz’s seemingly mild reproach was, in fact, a more damning accusation in light of the importance of standardized goods at the Paris *Werkbund* exhibition. According to Lotz, standardization’s importance derived from its moral imperative. “In Germany, we are so much occupied with the question of satisfying the needs of the broad masses in as good a style as possible,” Lotz wrote, “that when we speak of economic necessities we always have in mind the broad masses and the unfortunately extremely low standard of living set up by the average German.” In short, German designers collaborated with industry to develop functional and stylish goods that could also be cheaply manufactured for the masses. This strategy was only as successful as the design, for there was no merit in providing the poor with useless or shoddy

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237 Ibid., 295.
goods. Standardization, then, offered an optimal—“scientific,” according to the exhibition catalogue—design solution for a specific need. To return to the example of the standard post office counter, Vorhoelzer designed it to provide the simplest, most resource-efficient, and (therefore) best stamp-buying or parcel-posting experience for both consumer and employee. Moholy-Nagy’s repurposing of the counter to sell exhibition catalogues sabotaged the assumption at the heart of standardization’s specialized designs. Teacups aren’t used as planters, nor should post offices sell exhibition catalogues.

Lotz’s critique of Room 2 didn’t end there. After his comments about the post office counter, he warned exhibition designers to address “concrete tasks” or risk producing “scattered exhibits” that “lack the impressiveness and inner content”—a vagueness he saw in Bayer and Moholy-Nagy’s “supplementary rooms.” For Lotz, Moholy-Nagy’s Room 2 was an object lesson in such risks. Although he commended the Bauhaus for generating “leads for new problems and questions, […] it is now time to create energetic and practical things”—implying (correctly) that the Bauhaus had not. Lotz found evidence of the Bauhaus’s superficiality in Moholy-Nagy’s Light Prop, which proved to him that the designer was more concerned with producing interesting light effects than with examining light’s influence on stage design. Lotz further accused Moholy-Nagy of placing greater value on the appearance of light fixtures than on their functional solution to specific lighting problems (e.g., shaving). Lotz’s criticism demonstrated how far the displays in Moholy-Nagy’s Room 2 differed from the rest of the exhibition and its ideology of function and utility.
4.3. Reluctant Industry Collaborator

Broadly speaking, Lotz’s analysis of Moholy-Nagy’s display was accurate from the perspective of standardization. According to Moholy-Nagy’s own statement published in the same journal, the Light Prop was “an apparatus for the demonstration of special lighting and motion effects,” not a solution to a practical problem.\textsuperscript{238} Lotz’s criticism and the evidence of Moholy-Nagy’s light fixture, German design history, and post office displays demonstrated Moholy-Nagy’s less than wholehearted embrace of standardization. This is perhaps to be expected given Moholy-Nagy’s status as a Werkbund outsider. Gropius and Breuer had been active with the Werkbund for years and primarily worked as architect and product designer, respectively. Even Bayer originally trained as an architect before turning to graphic and advertising design. In contrast, Moholy-Nagy’s path to design was more haphazard. He demonstrated no particular interest in design before his arrival at the Bauhaus in 1923. He first encountered ideas of standardization when Gropius hired him as form master of the metal workshop (despite his lack of expertise in that field) to fill Johannes Itten’s vacancy. Nevertheless, Moholy-Nagy’s artistic interest in light and early experiments with metal sculptures designed to reflect light proved a fortuitous connection. Light first led Moholy-Nagy to design and its overdetermination in his artistic practice contributed to its eventual eruption as a site of resistance as the Light Prop.

Figure 4.15 – László Moholy-Nagy, *D IV*, 1922. Oil on canvas, 37¼ x 30 in. Albright-Knox Art Gallery, Buffalo.

Figure 4.16 – László Moholy-Nagy, Untitled [photogram], 1922. Gelatin silver print. Museum of Fine Arts, Houston.
By 1930, Moholy-Nagy’s reputation as a light artist was already well established. After arriving in Berlin in 1921, his first successful works were oil paintings, prints, and photographs in which transparent shapes simulated projected light. He wrote essays about light as an artistic medium as early as 1923’s “Light—A Medium of Plastic Expression,” in which he documented the ideas that inspired his photograms of 1922. When Moholy-Nagy wrote in that essay about “the possibility of ‘light-composition’, whereby light would be controlled as a new plastic medium,” critics and historians found the unifying logic of his diverse practice. “From the first,” Giedion wrote in 1935, “he [Moholy-Nagy] recognized that light in itself must be regarded as a medium of form.”

Although Giedion referred specifically to Moholy-Nagy’s photographs and films, later scholars like Oliva María Rubio have discussed Moholy-Nagy’s “aesthetic theory of light: light as the matrix of art, art as the art of light.”

Although such totalizing characterizations of Moholy-Nagy’s artistic practice are hyperbolic, the artist and his intimates encouraged them in his own lifetime.

The lamps and light fixtures designed by students in the Bauhaus metal workshop under Moholy-Nagy’s leadership might seem to translate his artistic interest in light to a design context.

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241 Although Moholy-Nagy’s documented interest in light surely contributed to the metal workshop’s specialization in lamps, a second, more practical, factor may also have come into play. Moholy-Nagy became form master of the metal workshop on the eve of the 1923 exhibition celebrating the Bauhaus’s first five years of operation. Gropius conscripted all the workshops into the preparation and assigned the metal workshop special responsibility for providing light fixtures
examined the workshop under Moholy-Nagy attribute its lamps to his direct influence. Further, the Bauhaus lamps would also seem to establish Moholy-Nagy’s commitment to and success in soliciting industrial contracts for designs. According to one frequently cited fact, between 1928 and 1932, the company Körning & Mathiesen sold 50,000 Bauhaus-designed lamps under the trade name Kandem. The lamps Moholy-Nagy inspired were rare success stories in the Bauhaus’s ideological and financial campaign to design standardized goods. They also fueled claims for Moholy-Nagy’s enthusiastic engagement with industry and strong business acumen. “It was above all Moholy-Nagy,” according to Christopher Green, “[…] who made a reality of Gropius’s unofficial motto for the school […]: ‘art and technology: a new unity.’” Green goes on to describe how Moholy-Nagy’s “less than wholehearted socialist collectivism of the early 1920s had given way to a business-friendly pragmatism, appreciative of the benefits to the school of royalties from the sale of prototypes to industry.” Green’s account conforms to the self-portrait Moholy-Nagy created in his writings about his leadership of the metal workshop. It also agrees with Gropius and Giedion’s

for the Haus am Horn. This initiative produced the first lamp designs and set a precedent for Bauhaus lighting fixtures. He again called on the metal workshop to provide the light fixtures for the new building at Dessau—a much larger project—and provided the workshop with new machines for that purpose. In other words, Gropius’s economy in furnishing the school with student-designed and -built products ensured that the metal workshop was frequently required to produce practical and effective lamps and fixtures suitable for residential, office, and workshop use. For more about lamps at the Haus am Horn and the Dessau Bauhaus building, see Klaus Weber, “‘Von Weinkrug zur Leuchte’ die Metallwerkstatt am Bauhaus,” in Die Metallwerkstatt am Bauhaus (Berlin: Bauhaus-Archiv, 1992), 9–41.


243 Weber, “‘Von Weinkrug zur Leuchte’ die Metallwerkstatt am Bauhaus,” 22.


245 Ibid.
memories of Moholy-Nagy. But it contradicts Moholy-Nagy’s critique of
standardization I have read in the content and layout of Room 2 and, indeed, of
Moholy-Nagy’s lifelong and well-documented commitment to painting and
sculpture.

Further, this characterization of Moholy-Nagy even contradicts evidence from
the history of the metal workshop, which instead shows Moholy-Nagy’s
ambivalence toward industrial collaboration. Claims that Moholy-Nagy
concentrated the metal workshop’s efforts on light fixtures specifically and
designs for industry in general following his 1923 appointment as form master
originated from Moholy-Nagy’s writings and from the workshop’s real output of
light fixtures. Indeed, industry was, apparently, foremost in Moholy-Nagy’s mind.
“It took quite a while,” he remembered in 1938, “to get under way the kind of
work which later made the Bauhaus a leader in designing for the light fixture
industry.” However, no list credits Moholy-Nagy as designer of any lamps and
he seems never to have himself produced an original lamp design. As a product
designer, Moholy-Nagy was tepid at best. From 1928 until his death in 1946 he
frequently worked closely with manufacturers (normally as a graphic designer),
yet he produced only one patented design—a desktop pen holder for Parker Pen
Company that never went into production. He supported industrial design in
theory but was disinterested with it in terms of his personal practice and
ineffectual in the practical business of bringing designs to production.

247 Engelbrecht, Moholy-Nagy-Nagy, 638.
The commercial success of the lamps is a case in point. There is no evidence Moholy-Nagy negotiated even a single successful contract for any metal workshop design during his five years as form master. The great success of the Kandem lamp contract was entirely attributable to Moholy-Nagy’s most accomplished student, Marianne Brandt. She first contacted Körting & Mathiesen in 1927, probably from professional interest in their recently deceased technical director Paul Heyck’s advocacy of functional fixtures designed to maximize light output. Brandt’s overture and the Bauhaus’s functionalist approach to design met Körting & Mathiesen’s need for more stylish designs without compromising Heyck’s engineering-inspired commitment to functional simplicity. The first Bauhaus contract for lamp production thus resulted not from Moholy-Nagy’s efforts to find commercial partners, but from the junior Brandt. Her overture led to a contract in February 1928; Moholy-Nagy had submitted his letter of resignation the previous month. This left Brandt, whom Hannes Meyer appointed as Moholy-Nagy’s successor, to steward the contract, which continued until 1932.

Having removed the Kandem contract from Moholy-Nagy’s list of achievements, evidence for his industrial design success is now thin on the ground. The rationale he gave for his resignation supported this image of Moholy-Nagy as a reluctant industry collaborator. Although his numerous and chronicled

249 Ibid., 24.
250 Ibid., 25.
disagreements with Meyer may have been the primary catalyst, in his resignation letter, Moholy-Nagy cited his dissatisfaction with the metal workshop’s all-consuming directive to deliver designs to market. “We are in immediate danger,” Moholy-Nagy wrote, “of becoming exactly what we fought as revolutionaries: a vocational training school, which evaluates only the final product and ignores the student’s holistic development.”

Education, not business, was his primary concern as the metal workshop form master. If Meyer wanted someone who prioritized profits—perhaps thinking here of the Kandem negotiations—they would have to find someone else. This anecdotal evidence falls short of a comprehensive account of Moholy-Nagy’s attitude towards industrial design; however, it highlights his approach to design as a creative, rather than commercial, practice. Moholy-Nagy’s theater display provided the clearest evidence of his conflicted relationship with industrial design.

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4.4. Theater Arts

Figure 4.17 – László Moholy-Nagy, screening room, Room 2, 1930 Paris Werkbund exhibition. From Wilhelm Lotz, ed., Die Form 5, no. 11/12 (1930).

Figure 4.18 – László Moholy-Nagy, stills from Deutschland Reportage, 1930 Paris Werkbund exhibition. From Walter Gropius and Herbert Bayer, Section allemande: exposition de la Société des artistes décorateurs (Berlin: Verlag H. Reckendorf, 1930).

Moholy-Nagy’s light fixture, design history, and post office displays—the ones that undermined the exhibition’s standardization ideology—appeared at the
entrance and exit to Room 2. These were liminal spaces of transition between Moholy-Nagy’s gallery and that of the exhibition proper, specifically, of Gropius and Breuer’s model interiors. The theater display at the heart of Room 2 was fundamentally different because it bore no trace of the theme of the mass production and consumption of standardized goods. Instead, it presented a different paradigm of machine production based on artistic creativity and originality opposed to the machine as a specialized tool of mass production.

After the lighting display, visitors arrived at a three-sided screening room with seating for an automatic slide show. Although the slide show is lost, Bayer preserved some of its pictures in a layout in the exhibition catalogue. These surviving pictures bear little relation to standardization. Images of a water treatment plant, telescope, airplane, and baby furniture showed how technology pervaded German life and industry. Others, like the picture of a baby and beachgoers, were humanizing depictions of Germans at home and leisure. According to the exhibition catalogue, the slide show presented a “cross section through the totality of contemporary German culture,” perhaps as a public relations tool to introduce French audiences to “the new Germany,” as Giedion phrased it. The slide show represented a turning point in Room 2’s narrative arc. On one hand, it provided visitors with a thread of continuity with the light fixtures that preceded it. Automatic slide projectors were new technologies in 1930, as evidenced by the

252 Gropius and Bayer, *Section allemande*.
253 Quoted in Giedion, *Walter Gropius*, 50.
bulky two-part projector and carrier apparatus suspended from the ceiling. The self-advancing slide show was sufficiently novel that one critic had to specify that the apparatus was “automatic, without any operator” to make his meaning clear. Consistent with his generally dim view of Moholy-Nagy’s displays, Lotz criticized the slide show for valuing the “interesting technical apparatus” over “what it shows, especially when a projection wall is used that completely contradicts new technological advances;” that is, for exhibiting technology for technology’s sake. Lotz’s comment about the wall likely referred to Durand-Dupont’s complaint of the projected images as “meager” and “hard to see” on the Bakelite projection wall. Whether a public relations effort or a demonstration of new slide presentation technologies, the slide show was first and foremost a stand-in for a model cinema—from its grouped chairs to its large-scale projection. As such, it provided a complete break from the exhibition to that point. In physical terms, the chairs offered the only place for visitors to rest within the Werkbund exhibition. Following the brilliance of the lighting display, the darkened screening room, seating, and diverse images signaled their entry into a new kind of space.

254 As a historical point of reference, Kodak patented the familiar carousel slide projector in 1965.  
From left to right: model of Moholy-Nagy’s set design for *The Tales of Hoffmann*, Moholy-Nagy’s *Light Prop*, model of Gropius’s *Total Theater*, Oskar Schlemmer’s costumes for *Triadic Ballet*.

Figure 4.19 – László Moholy-Nagy, theater arts display, Room 2, 1930 Paris *Werkbund* exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).

Figure 4.20 – László Moholy-Nagy, theater arts display, Room 2, 1930 Paris *Werkbund* exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).

Rested from the slide show, the visitor proceeded to the heart of Room 2, the theater arts display. Three costumes from Oskar Schlemmer’s *Triadic Ballet*, one on a rotating base, anchored the space. Moholy-Nagy continued the Bakelite band
with a wall display of production photographs and theater diagrams lining the far end of the gallery. He also included two large freestanding vitrines housing Gropius’s architectural model of the *Total Theater* and his own *Light Prop*. Upon entering the theater display, the visitor left all traces of retail messaging and standardized goods with the table lamps. The *Light Prop*, the object Moholy-Nagy custom designed for the exhibition, exemplified the display’s disruptive function.

### 4.5. Excursus: Reconstructing the *Light Prop*

The installation photographs illustrate the curious fact that, although it is the most studied object in Room 2, the *Light Prop* disappeared into its gallery setting. Schlemmer’s costumes and Gropius’s theater dominated the installation. In contrast, the *Light Prop* has to be pointed out: it was housed in the black box to the left of Gropius’s theater. This understated presentation contributed to its absence from exhibition press coverage. Only German reviewers who knew Moholy-Nagy addressed the *Light Prop*, and, even then, their reviews repeated verbatim the artist’s own description. This visual and critical invisibility problematizes efforts to reconstruct the *Light Prop*’s original appearance. This excursus provides a new reading of old documentation that ultimately suggests the *Light Prop*’s alternative identity as a mechanical theater of electric light.
The photographs of the *Light Prop* dating from 1930 tell a confusing story. To start, there is the paradoxical photograph Moholy-Nagy published to accompany his article on the *Light Prop* that appeared in *Die Form*. It is paradoxical because it shows the incomplete *Light Prop* in its workshop, even though the same journal
included installation shots of the exhibition. Why didn’t Moholy-Nagy include a photograph of the apparatus \textit{in situ}? It may partly have been for reasons of clarity: the \textit{Die Form} photograph shows the box in its exploded form, lidless, offering the reader access to the mechanical sculpture in the center and the box that housed it. Although Moholy-Nagy described this set up in detail in his essay, scholars habitually interpret the \textit{Die Form} photograph as the \textit{Light Prop}’s final state. They overlook the fact that the \textit{Light Prop} as illustrated was incomplete based on Moholy-Nagy’s description. What did the finished \textit{Light Prop} look like?

![Figure 4.23 – István Sebők, schematic for \textit{Light Prop for an Electric Stage}, March 21, 1930.](image)

Starting with the incomplete \textit{Light Prop}, the finished one included an additional plate inside the box Moholy-Nagy described as “parallel to the front side, […]” also provided with a circular opening, which is also provided with
electric bulbs of various colors ranged around the opening.” Little was known of this interior plate until Oliver Botar published a technical drawing of the *Light Prop* prepared by engineer István Sebök on March 21, 1930. It shows the front elevation (*vorderansicht*), cross-section (*schnitt*), and ground plan (*grundriß*) of the apparatus. The ground plan shows two interior plates jutting out from the sides of the box like the one Moholy-Nagy described. Each plate had an aperture cut in its center, rendered in the front elevation as dashed lines, to accommodate the sculpture within. In the next section over, Sebök included a detail front elevation and cross-section of an interior plate. It comprised two layers: flashed glass (*überfangglas*) that shielded a backward-facing matrix of incandescent lightbulbs. Thus, the interior plates provided an additional indirect light source inside the box to reflect off the back half of the sculpture invisible to the viewer looking through the front aperture.

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260 Botar misinterprets Sebök’s detail of the inner plate as a detail of the *outer front* plate, based on Sebök’s inscription “seite n.ach d. [er] Zuschauer” (side facing the viewer). Based on this misreading he argues that the front aperture was shrouded with the darkly translucent *überfangglas*, which in turn contributed to the invisibility of the *Light Prop*’s aperture in the installation shots. An understandable conclusion, however, Sebök’s drawing provides no evidence that Moholy-Nagy covered the front aperture.
The finished Light Prop also included three separating walls installed between each of the three segments of the rotating mechanical sculpture. Sebök’s exploded axonometric view of the Light Prop shows both the interior plate and separating walls missing from the Die Form photograph. He numbered the separating walls in the ground plan, labeling the material for each in a nearby legend. Cheesecloth (Siebstoff) separated segments A and B, flashed glass separated segments B and C, and the final wall between segments C and A was labeled “undurchsicht.[ig],” an unknown opaque material.261 The separating walls isolated the three segments

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261 The English translation of Moholy-Nagy’s Lichtrequisit essay translates Siebstoff as ‘transparent gauze’; however, Moholy-Nagy knew no English in 1930, so he cannot have personally authorized the accuracy of the translation. Flor is the correct word for gauze. Moholy-Nagy, “Lichtrequisit einer elektrischen Bühne,” 300.
from their neighbors, like the booths that housed the ceiling fixtures leading to Room 2.


Figure 4.26 – László Moholy-Nagy, theater arts display, Room 2, 1930 Paris *Werkbund* exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).
Returning to the two installation shots of Room 2, Moholy-Nagy housed the *Light Prop* inside a second, outer box of black Bakelite. The revolving circular plate and axle that powered it is visible in the top photograph under the right-hand segment of the long black case. The front aperture faced the model of Gropius’s *Total Theater*, perpendicular to didactic text and a technical diagram that showed the viewer “toutes les phases” of the mechanical sculpture. Label text just visible through the glass of the *Total Theater* vitrine establishes that the *Light Prop* was viewed from that side.²⁶²

²⁶² It is possible Moholy-Nagy did not photograph the aperture *in situ* because the *Light Prop* was not working. Durand-Dupont strongly implies a mechanical failure in his review of the Paris *Werkbund* exhibition. His comments on the theatrical display conclude “some [objects are] interesting, some passé, some impossible to criticize because they don’t work [*manches unkritisierbar, weil nicht funktionierend*].” Durand-Dupont, “Der Deutsche Werkbund im Salon des ‘Artistes-Décorateurs’, Paris,” 198. Only two elements of the theater display were mechanical and thus might be said to ‘not work’: the *Light Prop* and the rotating pedestal for the middle Schlemmer costume. If the rotating pedestal were the broken element, Durand-Dupont would be unlikely to notice the mishap since it would have appeared as a fixed—if over-engineered—pedestal. That leaves only the *Light Prop*. Given the novel nature of the *Light Prop*, it is entirely
This reconstruction of the Light Prop’s construction and installation helps address the sticky problem of its presumed function. Critics and scholars typically explain it as a device for the production of theatrical light effects. After all, in 1938, Moholy-Nagy described the Light Prop as a “kinetic sculpture […] designed for automatic projection of changing chiaroscuro and luminous effects.”

Moholy-Nagy’s success as a set designer after his resignation from the Bauhaus reinforces this reading and suggests why he would include a theater display at all. He made sure to include evidence of his recent triumph with the Kroll Opera’s production of Tales of Hoffmann in the form of Lucia Moholy-Nagy’s photographs, which captured Moholy-Nagy’s creative use of light. There possible it broke down during the exhibition. If so, a mechanical failure might explain why there are no photographs of it in operation as well as its absence from contemporary reviews.

are general similarities between Moholy-Nagy's *Tales of Hoffmann* lighting design and the *Light Prop*; namely, his bold use of high-contrast light projected through perforated plates and metal structures to produce a photogram-like patterned shadow.

Figure 4.29 – László Moholy-Nagy, unknown theatrical model, Room 2, 1930 Paris Werkbund exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).

Figure 4.30 – László Moholy-Nagy, unknown theatrical model, Room 2, 1930 Paris Werkbund exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).
If anything, this return to the *Light Prop*’s installation at the Paris Werkbund exhibition provides new evidence to support the *Light Prop*’s identity as a theatrical prop. In the installation shots, it appears to share its Bakelite case with what looks to be a model set, visible behind clear glass on the left of the *Light Prop*. It is impossible to identify the production based on the single grainy detail available, but two critics described a stage set among the other contents of the theatrical display. Giedion wrote of “Moholy-Nagy’s stage set from the *Tales of Hoffmann*,”264 and Durand-Dupont described “models of stage designs by Moholy-Nagy.”265 The convergence of this unidentified three-dimensional model set with Durand-Dupont’s choice of the word *Modelle* (models) suggests that the model set might plausibly be of Moholy-Nagy’s *Hoffmann*. It is exciting, then, that the one element of the model visible in the grainy detail is its strong source of light shining from the right side of the set; that is, from the *Light Prop*. To take this creative reconstruction further, Moholy-Nagy may have included the model to simulate what the *Light Prop*’s light effects might have looked like in an actual production. Although speculative, this scenario is an unexpectedly literal application of the *Light Prop*’s function as a real theatrical light prop.

Even so, the model set is awfully small; enlarged to life size, the *Light Prop* would dwarf not only the set, but the entire theater as well. The fact remains that the *Light Prop* would have been a terrible theatrical light prop, especially from the front aperture that served as its frame. The aperture was large enough to frame the

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mechanical sculpture, but too small to see much of the box’s interior. The separating walls, especially the opaque one, blocked both ambient light and the view of segments other than the one in front of the aperture. Further, Moholy-Nagy mounted the colored light bulbs on the back of surfaces to shield them from the viewer. This limited the visible light effects to reflections on the surface of the sculpture with only a small amount of projected light. All of these design features focused the viewer’s attention on the rotating sculpture, a detailed description of which occupied the bulk of Moholy-Nagy’s *Die Form* essay. Sebők referred to the three distinct sections of the mechanical sculpture as segments, but Moholy-Nagy described them as *Bewegungsspiel*, a neologism that translates as movement-play. 266 “The movement-play of the first sector:” he writes, “three rods move in swinging curves […] along an endless track. Various materials, such as transparent gauze, parallel horizontal rods, and wire netting are mounted on the three rods.” 267 Moholy-Nagy’s emphasis on the visual specifics of the rotating sculpture at the center seems out of place for an apparatus ostensibly designed to produce light effects. In addition, the light emitted from the front of the *Light Prop* would have been negligible at best. If anything, light’s greatest contribution was its play on the rotating polished metal elements of the sculpture. The polished surfaces disappeared into a shifting pattern of reflections made active by the blinking, differently colored lights.

266 The German original appears in both English and French translations. For the English version, the translator translated “*Bewegungsspiel*” as ‘moving picture’, which bears cinematic connotations absent from the German. My preferred ‘movement-play’ is an unusual but accurate rendition of Moholy-Nagy’s love of neologisms. 267 Moholy-Nagy, “Lichtrequisit einer elektrischen Bühne,” 299.
If the *Light Prop* was, as I suggest, poorly suited for the production of light effects *à la Hoffmann*, what other identity might it have had? Moholy-Nagy suggested an alternative in his *Die Form* essay when he called the front aperture of the box the *Bühnenöffnung*. This word appeared in the English translation as “the opening towards the stage,” and most scholars take it at face value—as if the aperture were a lens, through which the light effects projected. This translation, however, contradicted Moholy-Nagy’s parenthetical observation, later in the same paragraph, that the *Light Prop*’s back wall could be removed to project its colored shapes into a darkened room. This option, which Moholy-Nagy specified was a modification of its normal operation, was surely the kind of light effect—moving patterned projections resembling animated colored photograms—most viewers imagine when they read descriptions of the *Light Prop*.

Instead, I propose a more literal translation of *Bühnenöffnung* as stage opening. “Where the curtain has opened,” Lothar Schreyer wrote, “there remains an invisible transparent wall that inexorably separates the stage from the house: the stage opening.” If the aperture was a stage opening, then the box becomes a stage and the rotating mechanical sculpture its actor; in other words, the *Light Prop* might legitimately have functioned as a self-contained mechanical theater. Sebök inadvertently suggested this identity when he mistakenly wrote the project title as “model for a mechanical theater” (*Modelle zu einer mechanischen Bühne*) in the schematic title block. The viewer looked through the aperture, now reconceived as a stage opening, to view a series of *tableaux mécaniques*, each of the three segments comprising a single, dynamic tableau. As the plate rotated, each segment appeared and disappeared, its moving parts changing arrangement by the time they returned. The alternating colored lights transformed the shapes with their flickering pattern.

### 4.6. Machine as Productive Technology

How does this reading of the *Light Prop* as a mechanical theater of electric light intersect with its debut at the Paris *Werkbund* exhibition? In this chapter, I have interpreted Moholy-Nagy’s Room 2 as a critique of the exhibition’s collusion with mass consumption. It is further my position that this critique emerged from Moholy-Nagy’s understanding of design as a creative, rather than commercial, practice. His rejection of market-driven design led to his resignation

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from the Bauhaus in 1928; there is no evidence he had fundamentally changed his position by 1930. Room 2 was a complex expression of his oppositional stance: lamps faced off against costumed actors, the history of standardization was told through text and images, and a post office operated as a bookstore. His overtures to unification fell apart under the slightest scrutiny. Within it all, Moholy-Nagy installed a display of the theater arts—questionable subject matter for a decorative arts exhibition, at best—and he placed at its center the Light Prop, a kinetic sculpture he first conceived in 1922. In its guise as a mechanical theater, the *Light Prop* was an unusually overdetermined site for Moholy-Nagy’s simultaneous interest in the machine and rejection of its exploitation for commercial purposes.

Moholy-Nagy’s history of artistic engagement with the machine started in 1922, soon after his arrival in Berlin. It was something of an *annus mirabilis* for the artist. He made his first photograms, published *The Book of New Artists*, sketched the device that later became the *Light Prop*’s mechanical sculpture, and wrote “Production-Reproduction.”269 In this frequently cited essay, Moholy-Nagy’s position was simple. “Creative endeavors are only valid if they produce new, as yet unfamiliar relationships.”270 New sensory experiences helped viewers develop their faculties; thus, artists should work towards production—defined as “productive creativity”—rather than reproduction. He further suggested artists should work with technological media originally developed for reproduction and “open them up to productive ends.” Rather than capture music on a record, the

270 Ibid.
artist should make new music by engraving a blank one. His telephone paintings from later the same year and the next were part of this larger project of mechanical production. By commissioning an enamel sign manufacturer to make a series of artworks according to his specifications, Moholy-Nagy transformed a reproductive advertising medium. The Light Prop performed the same act of productive transformation with the machine as its subject. Moholy-Nagy ‘opened up’ the machine, until then treated as a tool for the mass manufacture of goods, to ‘productive creativity’. The Light Prop was the metonym for his resistance to standardization’s paradigm of the machine in mass production.

Within standardization, the machine acts as a specialist. A mechanic configures it to complete a specific task in the manufacturing process with precision and speed. An anecdote from the metal workshop illustrates this paradigm of the specialized machine. While at Weimar, the workshop lacked all but the most basic equipment. When it began to design for industry, the lack of in-house machinery presented a dilemma. How do you design for mass manufacture when you have no access to even the simplest machine? The solution was to make prototypes by hand, emulating the machine’s precision while contracting out the fabrication of hard-to-duplicate components. As a result, the workshop had to price prototypes as luxury goods to break even. When the metal workshop moved to Dessau, Moholy-Nagy used the opportunity to secure two essential machines: a lathe and a press.\(^{271}\) As machine tools, the lathe and press are actually quite flexible. They perform the basic functions necessary to machine almost any metal

\(^{271}\) Weber, “‘Von Weinkrug zur Leuchte’ die Metallwerkstatt am Bauhaus,” 25.
object, but only after the mechanic configures them for the specific workpiece. Once configured, the machine produces identical workpieces indefinitely. This paradigm of the specialized machine provides standardization with its essential feature. The machine’s repeated motions create a chain reaction that radiates from the machine to its identical mass-produced products and the masses who purchase them.

Figure 4.32 - Photographer unknown, [Utensils in Room 4], 1930. Herbert Bayer, Room 4, 1930 Werkbund exhibition.

Consider the forks in Bayer’s model shop window. They are perfectly suited to the standardization ideology articulated in its clearest form by Hermann Muthesius in his ten theses of 1914: designers should develop standard forms for
machine production in large quantities for commercial export. Forks fit this design paradigm wonderfully. Everyone needs one, and everyone uses one the same way for the same purpose regardless of age, gender, or nationality. Even better, forks are a simple form, well adapted to the machine’s limitations. Bayer’s installation in his model shop window translated the machine’s repetition into display form. He lined up identical salad forks, followed by identical knives, above identical dinner forks. In their straight rows, they might almost sit on invisible conveyor belts. The photographer’s oblique close-up gave the impression that the utensils expanded without limit, a testament to the precision, regularity, and abundance of German industry.

Figure 4.33 – István Sebők, exploded axonometric view of the Light Prop for an Electric Stage, 1930. Watercolor, ink, and graphite on cut-out circular paper, mounted on board, 20½ in. diameter.

Moholy-Nagy’s *Light Prop* opposed this paradigm of the machine in dialectical terms. In standardization, the lathe and press responsible for the standardized goods hide from view; indeed, their invisibility is part of the capitalist effort to mystify the real process of production. In contrast, the *Light Prop* framed the machine, in the form of the rotating mechanical sculpture at its center, as an artwork. Arguably, Moholy-Nagy hid some elements of the machine—notably the motor—from view. But, Moholy-Nagy’s concern to represent what he obscured—the exploded diagram on the signage, *Die Form*’s detailed description—mitigated this suppression. Further, unlike the fork’s specialized lathe and press, versatility defined the *Light Prop*. Moholy-Nagy described it as only a “first step” designed to prepare viewers for the coming world of colored projected light. Its “countless optical discoveries” presented a “path to design with light and motion.”

273 In practical terms, this anti-standardization versatility crystallized in Moholy-Nagy’s repurposing of the post office counter-cum-bookstore. Likewise, the *Light Prop* had multiple possible uses: to produce light effects for a theatrical production or for home entertainment, or as a mechanical theater. He famously went on to use the *Light Prop* to make the film *Lightplay Black White Grey* and exhibited it as the *Light-Space Modulator*, a freestanding kinetic sculpture. This creative repurposing was,

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If anything, consistent with his advice in “Production-Reproduction” to approach existing media creatively to produce new sensory experiences.  

It also reveals the most profound difference between standardization’s paradigm of the machine and Moholy-Nagy’s; namely, the matter of the machine’s use. Factory workers use the lathe and press to produce forks. The tools’ value derives from their manufacturing capability. Tepid claims for theatrical applications aside, Moholy-Nagy used the Light Prop in all its guises for artistic ends—to produce aesthetic experiences for its viewers who leave with nothing more than a memory of their encounter. His insistence on the primacy of the aesthetic experience brings to mind his anxieties around industrial design at the Bauhaus. He did not oppose standardization’s call to supply designs for mass manufacture—indeed, he vocally championed industrial manufacture both while director of the metal workshop and after his resignation. But his support only lasted as long as the designer behaved like an artist. He lobbied for the new machines because he felt the workshop should continue to produce its lamps in house, retaining the designer’s connection to production. Even with the new machines, the workshop would never be able to make items at the volume required for the smallest commercial order. Gropius recognized that the only way the workshop would achieve real success was by providing designs to industry. When it did so, beginning with the Kandem contract, Moholy-Nagy soon left. This avoidance of commercial transactions might help explain why Moholy-

Note that the Light Prop shares this versatility with Gropius’s Total Theater, so named because its stage area could convert to deep stage, proscenium, or arena format.
Nagy’s most successful design work came in the form of typography and book design, where sales paraded as strategies for effective visual communication. By reframing the machine in the *Light Prop* as an artwork, and especially in its most effective application as a mechanical theater, Moholy-Nagy liberated the machine from its utilitarian associations with commerce to ‘open it up’ to production.

**4.7. Electric Light as Lichtreklame**

The only question remaining to consider is the role of light, which has been lost to some degree in the discussion of standardization. In fact, light is what differentiates the *Light Prop* from its later reincarnation as the *Light-Space Modulator*. Rather than rely on ambient light, for the *Light Prop*’s Paris debut Moholy-Nagy housed the sculpture in an elaborate light box, even though the box’s construction complicated, perhaps fatally, the overall project. Additionally, remember that light played no apparent role in the incarnations of the *Light Prop* before 1930. The renderings and schematics Sebök drafted between 1922 and 1928 titled *Kinetic-Constructive System* emphasized the structure’s rotational movement as its most important element. Even the exploded axonometric diagrams of 1930 omitted reference to the light bulbs. Why add the element of light for the Paris *Werkbund*?

I suggest it has something to do with the *Light Prop*’s status as an incarnation of Moholy-Nagy’s opposition to standardization. Namely, with the *Light Prop*, Moholy-Nagy rehabilitated not only the machine—symbolic of standardization’s reliance on mass production—but also electric light—which in 1930s Berlin
meant the lighted advertisement and symbolized standardization’s reliance on mass consumption. As the Light Prop liberated the machine from its exploitation in manufacturing, it also liberated electric light from its enthrallment to conspicuous consumption.

Urban electric lighting was synonymous with lighted advertisements in contemporary Germany, especially Berlin, the city where Moholy-Nagy lived at the time of the Paris Werkbund exhibition. Its ubiquity generated years-long debates within the architectural community. Were the lighted signs good or bad? When it became clear the city would pass no new laws to regulate lighted advertisements, some architects wondered if it would be better to integrate them into building designs to mitigate their haphazard effect. Meanwhile, commercial districts like Potsdamer Platz, above, were flooded with the light of monumental advertisements. For most residents, Berlin’s lights constituted a distinctive and
beloved feature that symbolized Berlin’s modernity and Germany’s urban renewal following the founding of the republic.

The many light festivals that sprouted up around Germany starting in 1925 showed the lighted advertisement’s enduring popularity. Berlin’s light festival was, fittingly, the largest and grandest. “Berlin in Light” (Berlin im Licht) was a weeklong citywide festival of lights that took place in October 1928 and was collectively organized by more than 155 independent business groups associated with lighted advertising. By then, Moholy-Nagy had already resettled in the city and would have experienced the festival firsthand. “Berlin in Light” was also unusual among the German light festivals because, unlike smaller events, it was well documented. The festival organizers published a portfolio of 108 nighttime photographs of displays from around the city, providing an unusually complete picture of architectural illumination in Berlin in 1928. What becomes immediately apparent is that advertising messages made up the vast majority of Berlin’s nighttime lighting—lighted shop windows; slogans, products, and brand names (usually several) on building façades; and spotlighted posters. Important monuments like the Brandenburg Gate and Victory Column received special treatments for the festival, but the kind of architectural lighting achieved with flood- and spotlights synonymous with American skyscrapers was largely absent from nighttime Berlin. The Berlin in Light portfolio makes the point that light

276 The portfolio is reproduced in Nentwig, Berlin im Licht.
architecture in Berlin was largely synonymous with light advertisements. The medium of architectural lighting was for that reason also synonymous with commercial messaging.

Moholy-Nagy’s use of electric light in the Light Prop prompts the curious fact that, although he built his professional identity on light as a creative medium and found early, if unwarranted, recognition for the Bauhaus lamps, there is no evidence Moholy-Nagy ever designed a lighted advertisement. This is especially odd given lighted advertisement’s ubiquity in Berlin, and the architectural avant-garde’s guarded engagement with lighted advertisements. Compare Moholy-Nagy’s disinterest to Herbert Bayer’s active engagement with the medium. Unlike Moholy-Nagy, Bayer had no special interest in using electric light as an artistic medium. Instead, he distinguished himself as a graphic designer and typographer (as well as a photographer, painter, and printmaker). Yet, years before the exhibition, Bayer produced a series of drawings for advertising structures—kiosks, theaters and the like.278 They expressed Bayer’s curiosity about the integration of the graphic arts into the urban environment. “I was personally interested in the esthetic incorporation of communication media, especially lettering, into the city-scape,” Bayer wrote. “I refer to my ideas for newspaper kiosks, trolley car waiting stations, outdoor advertising, exhibition structures.”279

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279 Herbert Bayer, “Future Lecture ‘On Environment’” (lecture notes, n.d.), Herber Bayer Collection and Archive, Denver Art Museum; Quoted in Gwen Finkel Chanzit, Herbert Bayer:
Figure 4.35 – Herbert Bayer, *Design for an Illuminated Advertising Sphere*, 1924. Black and red inks, gouache, collage element, and graphite traces on tan card, with incising and pin holes, 20⅝ x 19¼ in. Harvard Art Museums/Busch-Reisinger Museum, Cambridge, Mass.

Figure 4.36 – Marcel Breuer, *Man’s Sitting Room*, Room 3, 1930 Paris *Werkbund* exhibition. From Wilhelm Lotz, ed., *Die Form* 5, no. 11/12 (1930).

Among them he included a concept for a lighted advertising fixture he called an *Illuminated Advertising Sphere*. This monumental structure stood almost forty feet high and resembled the globe Breuer included as an accessory in his man’s sitting room. Paul Overy, among others, interprets the globe as a gendered differentiator whose opposite is a record player in the woman’s bedroom: the woman listens to music at home while the man travels to other countries. Globes have long symbolized territorial power, authority, and education. Within Breuer’s bedroom, they evoked an occupant who was metropolitan and learned.

In his advertising sphere, Bayer transferred the globe’s symbolism—domination, authority, status—onto the corporate logo displayed. An arrow indicates that the advertising sphere rotated, while its sieve-like surface suggests light bulbs blanket the sphere to spell out the commercial message.

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Figure 4.37 - Citroën advertisement on the Eiffel Tower, designed by Fernand Jacopozzi, 
*Exposition des arts décoratifs*, Paris, 1925.

Figure 4.38 – Left: Kupferberg Gold incandescent light tableau, 1907. Right: 
Scharlachberg Meisterbrand incandescent light tableau, *Geschäftshaus Kurfürstendamm* 
from the portfolio *Berlin im Licht*, 1928.
This technique of massing programmable bulbs in a large field to create a dynamic advertisement produced some of the more elaborate and decorative lighted advertisements in Berlin. The lighted advertising trade called these mass displays incandescent light tableau (*Glühlampentableau*), which, along with lighted letters, universal letters, and neon, constituted the basic technological means available to lighting designers in 1930. Unlike the other means, primarily used for text, the tableau created text and images and simulated movement through the rhythmic alternation of bulbs. The most famous example of the tableau was Fernand Jacopozzi’s 1925 installation that transformed the Eiffel Tower into a Citroën advertisement. Berlin lacked anything so grand; however, some incandescent light tableaus were familiar landmarks. One of the oldest, the Kupferberg Gold tableau, featured a glass that slowly filled with the advertised sparkling wine. The Scharlachberg tableau, one of the largest in the city, had a decorative cornice that filled and emptied with light.

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The incandescent light tableau, then, was the form of lighted advertisement that offered the most design flexibility, for its programmability and ability to simulate movement. Further, its light field required a relatively large surface, thus making it the most inherently dramatic and monumental of all the commercial lighting technologies. These features must have contributed to Moholy-Nagy’s decision to adapt the incandescent light tableau technology for the *Light Prop*. In his *Die Form* essay, Moholy-Nagy described the lighting configuration in detail, even including light plots. The lighting plan consisted of seventy small incandescent bulbs in white, yellow, blue, green, and red. The majority of these bulbs were installed on the reverse of the front plate, with fewer on the reverse of the interior plate. The light plot shows that the bulbs alternated every two seconds.
in a series of thirty-one configurations, so that the entire light cycle repeated every two minutes.\(^{282}\) Here again we have an instance where Moholy-Nagy adapted existing technologies to unconventional applications. The *Light Prop*’s lights are technologically the same as the incandescent light tableau, but, rather than advertise a product, Moholy-Nagy used them to create indirect light effects on the surface of the mechanical sculpture. The lights’ programmability, responsible for the dynamism of the bubbly champagne glass in the Kupferberg Gold tableau, here created coordinated washes of color, presumably to demonstrate how different colors produced different effects.

Although Moholy-Nagy never designed lighted advertisements, he referenced them periodically in a series of writings dating from 1925 to 1946. What began as a hopeful prediction for the creative possibilities of electric light ended with his acceptance that the medium was mired in its commercial origins. “The development of new technical means has resulted in the emergence of new fields of creativity,” Moholy-Nagy wrote in 1925’s *Painting Photography Film*, “and thus it is that contemporary technical products, optical apparatus: the spotlight, the reflector, the electric sign, have created new forms and fields not only of representation but also of *color composition*.\(^{283}\) As in “Production-Reproduction,” Moholy-Nagy saw in the new lighting technologies proliferating around him a limitless potential for creative renewal. In 1929, the year before the Paris *Werkbund* exhibition, he repeated his prediction with more specificity. “The

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nightlife of a big city can no longer be imagined without the varied play of
electric advertisements,” he wrote in The New Vision (Von Material zu
Architektur), “[…] the reflectors and neon tubes of advertising signs, the blinking
letters of storefronts, the rotating colored electric bulbs, the broad strip of the
electric news bulletin are elements of a new field of expression, which will
probably not have to wait much longer for its creative artists.”284 Four years had
passed since his first prediction of the electric sign’s creative potential. His
concluding call for the electric light artists of the future begs the question: who
would be more suited to such a project than Moholy-Nagy? If Berlin’s lighted
advertisements inspired him, why didn’t he pursue the opportunity himself? He
answered this hypothetical question in his last major publication, the
posthumously published Vision and Motion of 1947. Sixteen years after the Paris
Werkbund exhibition, his disillusionment with lighted advertising was complete.

“Today there are more technological sources for light painting than at any other
period of human history,” but, “this is not yet the age of light painting. It is only
the hour of light advertising, serving publicity, to catch the eye; to shorten an
interval; to fill mental gaps.” Even worse, “light is still used without planning, as
in crossfires, of searchlights, sky projections, and neon light extravaganza.” Here
Moholy-Nagy’s utopian hopes for lighted advertising transformed into a
technological dystopia whose new sensory experiences were superficial and
disorienting—even worse, commercial—rather than creative. Nevertheless, “the
existence of even such light forms holds promise for the future. […] And as we go

forward from painting with brushes and pigments toward painting with instruments and light, there must be confidence that the achievement will not impair the directness nor lower the spiritual level of painting. More than twenty years after his original prediction, Moholy-Nagy still could not bridge the gap between the lighted advertisement and light painting. It was always a dot on the horizon, a *terra incognita* for others to discover. Although Moholy-Nagy is often described as an artist of light, the *Light Prop* was his first and only project that used electric light as an artistic medium. His writings suggest that, for him, the medium was inextricably linked to the tainted commercial environment from which it emerged.

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References

Chapter 1: Raoul Hausmann’s Optophone


———. “The ‘Photographophone.’” *Scientific American* 85, no. 3 (July 20, 1901): 36.

Chapter 2: Nikolaus Braun’s Alternating Light Picture


Chapter 3: Ludwig Hirschfeld-Mack's Color-Light Plays


**Chapter 4: László Moholy-Nagy's Light Prop for the Electric Stage**


Appendix A:
Nikolaus Braun’s Biographical Timeline

1900  Born in Berlin to the established restauranteur Heinrich Braun. He had a younger brother named Richard. Nothing is known of his mother.
1920  Braun and his future wife, Anneliese Ratkowski, begin private art lessons with Arthur Segal.
1921  Exhibits with Ratkowski at the Kunshandlung Fraenkel & Co., Berlin.
1923  Exhibits in the annual Novembergruppe exhibition, which requires membership.
1924  Exhibits in the First German Art Exhibition, Moscow. May 1924 Exhibits with Lajos Kassák at Sturm Galerie, Berlin.
June 1924 Artist statement “Erlösung im Licht” appears in Der Sturm.
1925  Braun and Segal co-author and self-publish Lichtprobleme der Bildenden Kunst.
1925-30 Exhibits in annual Novembergruppe exhibitions.
1927  Participates in a group exhibition of Segal students at the Kunstheim Twardy, Berlin.
1930  Segal publishes his theory of “New Naturalism.”
1935  Braun co-founds the artist group Neue Naturalisten.
1936-37 Braun and Ratkowski separate.
1937  Braun and Ratkowski burn their art in the Grunewald because they can not bring it with them into exile.
1938  Braun and Ratkowski divorce.
1949  Braun immigrates to Budapest.
1950  Braun immigrates to New York.
Appendix B: Nikolaus Braun’s Light Art

Reproduced in Der Sturm 15, no. 3 (June 1924)

Wechselndes Lichtbild 1 (Alternating Light Picture 1), n.p. [132-133].
Also in Segal and Braun, Lichtprobleme der Bildenden Kunst (Berlin: [self-published], 1925) n.p. [15]

Wechselndes Lichtbild 2 (Alternating Light Picture 2), n.p. [140-141]
Lichtbühne (Light Theater), n.p. [148-149]
Also in Segal and Braun, Lichtprobleme der Bildenden Kunst (Berlin: [self-published], 1925) n.p. [25]

Left: Wechselndes Lichtbild Phase 1 (Alternating Light Picture phase 1), n.p. [164-165]
Right: Wechselndes Lichtbild Phase 2 (Alternating Light Picture phase 2), n.p. [164-165]
Also in Segal and Braun, Lichtprobleme der Bildenden Kunst (Berlin: [self-published], 1925) n.p. [17, 19]
Reproduced in Segal and Braun, *Lichtprobleme der Bildenden Kunst* (Berlin: [self-published], 1925)

Left: *Wechselndes Lichtbild Phase I* (Alternating Light Picture phase 1), n.p. [21]
Right: *Wechselndes Lichtbild Phase 2* (Alternating Light Picture phase 2), n.p. [21]

*Lichtplastik* (Light Sculpture), n.p. [27]
Reproduced in Der Sturm 17, no. 9 (December 1926)

*Lichtbild (Light Picture)*, p. 133

*Lichtbild (Light Picture)*, p. 134

Untitled sculpture