László Moholy-Nagy’s

Light Prop as Design Fiction

Perspectives on Conservation and Replication

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Light Prop for an Electric Stage was presented in 1930 as a prototype for a new kind of mechanical theater that was meant to spark future partnerships between art and industry. Although it was never put into industrial production, Light Prop circulated as an early example of kinetic sculpture, as documented in a highly composed film, in photographs and in textual accounts. In 2016, the Harvard Art Museums and metaLAB (at) Harvard filmed Light Prop and its 2006 replica under highly controlled conditions. The resulting comparative media reveals how László Moholy-Nagy’s film served as the “design fiction” guiding the replication and conservation of Light Prop.

Light Prop for an Electric Stage (Lichtrequisit einer elektrischen Bühne) is one of László Moholy-Nagy’s most iconic works, frequently cited as a pioneering example of machine or kinetic art. Completed and exhibited in 1930, the rotating machine was built as the embodiment of a new kind of mechanized theater in which special effects could be produced by projecting light onto its varied surfaces composed of repurposed and newly fabricated metal, wood, plastic and glass components. Ideas of this kind (variously expressed in projects like Oskar Schlemmer’s ballets, the Walter Gropius/ Stefan Sebök Total Theater and Farkas Molnár’s designs) were bubbling up within the Bauhaus during this period. They were all part of an effort to supplant traditional, human-centered concepts of drama with an expanded notion of total theater, merging man, space and machine [1]. Moholy-Nagy stated that his initial inspiration for the work arose in the early 1920s, but this complex device—powered by an electric motor and interlocking moving parts—could only be built with industrial financing and technical expertise. The theater lighting division of AEG (Allgemeine Elektricitäts-Gesellschaft) funded the project, which allowed Moholy-Nagy to hire an architect, Sebök, to draft the technical drawings and conceptual renderings and a licensed mechanic to manufacture the prototype. The piece debuted as a part of the Werkbund exhibition at the Salon des artistes décorateurs de Paris [2] (Color Plate I.1).

Light Prop was initially shown in a box with a large aperture lined with colorful flashing lights, but Moholy-Nagy subsequently exhibited it without the enclosure. Photographic and schematic presentations of this work during his lifetime featured the machine on its own and in black and white (Color Plate I.2). Shortly after its initial unveiling, Moholy-Nagy filmed Light Prop in motion in A Lightplay: Black White Gray (Ein Lichtspiel: schwarz weiss grau). The film became one of the defining expressions of the work and is often taken as documentation of its operation. However, the silent film never reveals the machine in its entirety; instead it shows several tightly composed shots of specific elements interspersed with passages of manipulated film—positive-negative reversals, inversions, or double-exposed frames. Despite the range of effects captured, Moholy-Nagy took care to convey the smooth operation of the machine, reinforcing the perception that Light Prop was a kind of cinematic device—one that functioned flawlessly in his lifetime [3].

Despite its 200-pound bulk, the work accompanied Moholy-Nagy throughout his exile in London and Chicago. But the unwieldy machine had never operated particularly well, and its travels exacerbated numerous inherent mechanical problems. By 1937, a stiffening external frame had to be installed to reduce wobbling in the central rotating post. For much of Moholy-Nagy’s lifetime, the machine stood still, in disrepair, its movements described or captured on celluloid rather than performed. In 1956, after Moholy-Nagy’s death, his widow, Sibyl Moholy-Nagy, entrusted Light Prop to the Busch-Reisinger Museum, which is now part of the Harvard Art Museums [4].
CONDITION AND REPLICATION HISTORY

Nine years after its acquisition by the Busch-Reisinger Museum, director Charles Kuhn noted the “shocking condition” of Light Prop and wrote of his intention to re-chrome its rusting surfaces, replace deteriorating or missing components and “make the machine operable” [5]. The following moments in Light Prop’s postwar history chronicle its mechanical instability, but a constant challenge was posed by repairs that attempted to remain faithful to an original that was fraught with design flaws:

- Following Light Prop’s return from a loan to the Exhibition of Kinetic Art in Europe in 1965, Kuhn commissioned a major restoration in 1966 by the engineer, architect and kinetic sculptor William Wainwright, of Somerville, Massachusetts [6]. The curatorial and conservation records only documented the particulars of this restoration following a 1985 review and conversation with Wainwright.
- In 1969, Light Prop returned from being exhibited at MoMA in New York, where it had been rewired and run “excessively,” in violation of the terms of the loan agreement. The result was that Light Prop had been rendered “totally inoperable.” Conservator Arthur Beale advised limiting its operation and restricting all subsequent loans. Discussions among the Busch-Reisinger Museum and Sibyl Moholy-Nagy, Moholy-Nagy’s widow, regarding the fabrication of a functioning replica were reinitiated as a response to the ban. She had previously objected because of the impossibility of replicating the historical nature of the original.
- In late 1969 and 1970, Woodie Flowers—a doctoral candidate in mechanical engineering at MIT—produced two replicas commissioned by Sibyl with the financial support of Howard Wise, renowned champion of kinetic and light art. The project also involved the expertise of Nan Piene (née Rosenthal), who was an editor at Art in America and had written her master’s thesis at Harvard on Light Prop. Without access to Sebők’s original technical drawings, Flowers designed and fabricated his replicas by studying archival images, along with the original Light Prop. He modified the design to address issues of safety and functionality, and he worked with a machinist to fabricate the requisite parts [7]. One of the two replicas was shown at the Venice Biennial. The other was presented at an exhibition organized by the Howard Wise Gallery, which featured Light Prop alongside other works by Moholy-Nagy. These replicas are currently housed at the Van Abbe Museum in Eindhoven and the Bauhaus Archive in Berlin.
- In 1979, the original Light Prop was declared “unrestorable” [8], and the creation of a third replica was proposed by Rosenthal for use at the Busch-Reisinger Museum. That idea was ultimately not pursued.
- In 1985, Harvard Art Museums conservators Henry Lie and Arthur Beale examined and documented the condition of Light Prop and created the first truly comprehensive written reports and photographs of the work in preparation for a loan to Wellesley College. They refurbished the mechanisms, motor and surfaces.
- Later, on display at the Busch-Reisinger Museum in the late 1980s through the early 2000s, Light Prop experienced frequent jamming and slipping, as well as damage caused by visitors. The conservation of the sculpture was largely reactive, consisting of quick fixes and constant troubleshooting.
- Tate Modern sought to secure Light Prop for their 2006 exhibition Albers and Moholy-Nagy: From the Bauhaus to the New World, but the condition of the original and the two existing replicas were judged too fragile to travel. So Tate commissioned designer and fabricator Jürgen Steger to create a third replica for the purpose of the exhibition, acquired by the Busch-Reisinger Museum in 2007 [9]. Steger studied the original Light Prop, the Flowers replicas, Moholy-Nagy’s A Lightplay film and archival images and then created a fresh set of CAD drawings. Like Flowers, Steger made further design modifications to improve the work’s functionality and enhance its ability to travel, while striving to remain faithful to the appearance of the original [10].
- In 2015, conservators Henry Lie and Tony Sigel cleaned, lubricated and adjusted moving parts and fasteners. The original Light Prop was installed in the renovated Harvard Art Museums and is briefly activated once a month, during a popular gallery talk. Its movement remains erratic [11].

In the history of the care and replication of Light Prop, the issue of preserving its artistic intent has been repeatedly invoked. One of the reasons provided by Busch-Reisinger curator Peter Nisbet to justify the acquisition of the Steger replica was to “offer scholars and the public the opportunity for an experience closer to that intended by the artist.” It was further described by Nisbet as a nonart “device,” “a replica with no claim as a work of art in its own right;” and for that reason, it was declared that this piece will not be subject to the normal current standards of art conservation (reversibility, primacy of original materials, etc.), but will be treated as an engineering device whose function is most adequately and accurately to reflect the effects and intentions of Moholy’s original [12].

With the exception of written accounts of the machine’s malfunction in institutional records, there is very little documentation of the original Light Prop in action. Precisely for this reason, the description and justification of artistic intent relies heavily on Moholy-Nagy’s own writings, as well as on his film A Lightplay.

However, in their replica design and fabrication projects, both Flowers and Steger came to question whether the original Light Prop ever operated quite so fluidly. Flowers reached the conclusion that “the original had been changed so much...
that not only did it not work, but its appearance was quite different. I don’t think the motion was ever smooth, especially the 90-degree cam angles” [13]. Steger wondered whether Moholy-Nagy’s film A Lightplay truly captured the movement of Light Prop “because it ran too smoothly,” further speculating that the sculpture itself might have been manipulated for the film [14]. Both engineers diagnosed problems in the Sebök and Ball design, resolved through modifications in their own replicas. But they went far beyond correcting obvious mechanical flaws. The even, constant motion captured in their own replicas. But they went far beyond correcting obvi-
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As seen in the first set of moving images (Color Plate J.1), side-by-side comparison exposes some of the design strategies and mobile gestures shared by the original object (left) and its replica (right). Light Prop is divided into two clearly delimited design segments: an upper and a lower story. The lower story serves as a kind of backstage. It functions as a dark cast-metal support structure, with mounts and housings for a motor and a structure of planet gears, through which a chain drive translates the rotational motion of the central shaft to the animated structures above.

The base of the upper story assumes the form of a stack of wood-metal laminate disks, turned by the central shaft, which serve as armature for the planet gears, as well as support for the upper story. Each of the gears corresponds to one of three kinetic “actors” that perform in the upper story, or stage: an oscillating disk-and-ball assembly; a rotating stylized screw; and three flags that flap as a function of the circumvolution of the base.

While the similarities between the upper stories of the two objects are immediately apparent, the differences are notable as well. The stiffening external frame added in 1937 is not present in the replica. As the original Light Prop apparatus goes through its rotation, its halting movements are telegraphed by the spasmodic stutters that interrupt the path taken by the screw. Such stuttering is also evidenced in the rotation of the flags (Color Plate J.2). In the original, the flags were attached to spring-loaded brackets mounted at the top of the device to ensure a reciprocating motion as they trav-

The even, constant motion captured in Moholy-Nagy’s short became the ideal—however illusory—toward which the replicas strove, despite the fact that not once in the 60 years of extensive curatorial and conservation records at the Harvard Art Museums was Light Prop reported to be working smoothly.

The ideal of smooth operation that came to guide Flowers’s and Steger’s replicas of Light Prop was rooted in the filmic presentation of the machine in A Lightplay, a film that may be better understood not as a work of documentation but rather as a generative “design fiction.” To be sure, “design fiction” may seem like an anachronistic concept when applied to Light Prop, the Bauhaus and Moholy-Nagy’s oeuvre. The concept was promoted by science fiction author and design critic Bruce Sterling, who describes “design fiction” as a “di-
egetic prototype”: the proposition of an object embedded in a figured, fictional world, the narrative or formal elements of which offer suggestions for how such an object might perform in (and transform) real-world conditions [15]. As the condition history of Light Prop suggests, the film A Lightplay stages the machine within a fictional world, one in which flu-

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elled around the edges of the parallelogram-shaped aperture in the bottom plate. But the jerkiness is not entirely attrib-
tuable to the springs’ intrinsic slackness. The design of the aperture on the bottom plate impedes smooth operation. By contrast, Steger’s replica design subtly widened the curves of the parallelogram, which adds tautness to the springs. These alterations permit the flags to rotate smoothly against the inner lip of the aperture and allow for a rhythmic widening- and-narrowing oscillation. The smoother movement is the result of design and engineering choices, not a lack of wear and tear. The halting, uncertain movements of the original endow it with the personality of an experimental prototype, while the replica conveys the values of predictability and re-

VIDEO DOCUMENTATION AS THICK DESCRIPTION

Since the traveling replica of Light Prop was acquired by the Harvard Art Museums in 2007, it has gone out on loan to eight venues over nine years. An active program of mainte-
nance is required to sustain such an active exhibition sched-
ule. In advance of the Future Present exhibition, organized by the Guggenheim, The Art Institute of Chicago and LACMA, we worked to document the replica and the original in motion, both as a baseline for future treatment and to examine the key affinities and differences between the two. The animated GIFs presented, supplementing this article online, derived from which we include still images accompanying the print article, consist of three short, looping split-frame videos. They were produced from a series of long-take high-definition (4K) video sequences shot in the Busch-Reisinger gallery of the Harvard Art Museums (in the case of the 1930 Light Prop) and at Harvard Art Museums’ storage facility in Somerville, Massachusetts (in the case of the 2006 replica). While the spaces in which the objects were shot presented divergent lighting and architectural conditions, the shoot sought to normalize conditions—to the extent possible—to create a controlled setting in order to observe differences between the two. Like the videos from which they are gen-
erated, the animated GIFs provide a thick, media-based description of the two works. They reveal an upstairs/down-
stairs dichotomy in the design of the replica, with meticulous fidelity to the original, characterizing the upper section as an agenda of improvement. A contrasting program of in-
novation takes over below, intensifying the contrast between restoring a moment of art and engineering from the past and ensuring performance and practicality in the present.

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Through the midsection of the piece, we observe numerous differences between the two objects, chiefly in materials. The ball in the original is painted glossy black, but in the replica it is left to reveal its brown, sanded woodgrain (Color Plate J.3). Differences in the ball betray the fact that the replica is no reproduction, much less a counterfeit, but is a distinct iteration on and interpretation of the original. Other differences in the finish, quality and kind of material reinforce this distinction. The perforated metal plates in the restored original are highly polished, with surfaces that seem at once more reflective and charismatci than the matte surfaces of the replica, despite the fidelity with which they register the original’s age and wear. The matte metallic finish of the replica’s larger plate, which neither reflects light nor mirrors the object’s internal workings, seems less intended to instantiate Moholy-Nagy’s presentation of light-and-space modulation than to clinically demonstrate the relative motion and animation of the apparatus’s constituent parts.

When compared with the original, the upper portions of the replica reveal a suite of subtle adaptations aimed at yielding a device that works much more smoothly, as well as one that has a more clinical presence and performance, less attuned to cinematic or stage effects than to didactic exigencies.

The differences become far more pronounced when we scrutinize the lower portion of the object where the power train is located (Color Plate J.4). The full-view split-screen GIF reveals the lack of casters in the original and divergent motor mounts. Likewise, no attempt has been made to replicate the original motor and its associated circuitry; a contemporary circuit-board control system is employed instead.

When contrasting the replica with the original Light Prop, we observe very different choices in machining: selection of parts, finishes, and interlocking articulation of gears and chain; as well as far greater robustness of the replica’s components. The polished finish of the original gear housings—all three are uniform—seems more in keeping with the design of the upper story. The three assemblies of planetary gears in the original, on the contrary, seem pieced together as though improvised in the course of fabrication. The technical drawings for the original reveal few mechanical details and only hint at the triple-gear drive mechanism. Furthermore, each of the gears that stretch the chain and serve as tensioners is different on the original. When operating, they set in play mechanical conflicts that cause skipping and slippage along the chain, much like the “stripping” of gears familiar to cyclists as they shift on the fly. It is this mechanical conflict that produces the tremors and halting action of the original. The layout of the three gear assemblies in the replica, by contrast, is much more consistent, and the mechanism works faultlessly. The cleanly machined profiles and anodized matte finish of the components place the replica in direct dialogue with the aesthetic of the upper story, as if it is an integral piece of the stage machinery.

In comparison with the original, the 2006 replica operates quietly, smoothly and precisely, without chatter or creaking, achieving the “design fiction” put forward in Moholy-Nagy’s silent film A Lightplay. The differences between the two, especially when seen and heard in motion, are telling. In the replica, service to that design-fiction program is balanced with a design approach that focuses on the mechanical functionality of the piece, improving its operation while choosing materials that highlight the kinetic performance of the piece over its play with light. In the lower portion, we see that decisions made in the replication emphasize improvement of the mechanism over reproduction of the original. Taken together, both halves of the replica do not merely reproduce the original object. By treating the 1930 machine as a prototype and the film as generative design fiction, the 2006 replica realizes the original vision that Moholy-Nagy sketched out imperfectly with the technical, material and mechanical means at his disposal.

In the 1920s and 1930s, Moholy-Nagy envisaged experiments like Light Prop not as points of arrival but as stepping stones toward a future he imagined to be imminent: as catalytic gestures whose materialization would precipitate a forward leap. These works were speculative exercises, projective fictions that, despite their fragility and imperfections, soon came to assume a powerful solidity and sway over the imagination of subsequent avant-gardes. Recall that, among other attributes, Light Prop was born light deprived. Unaided by any internal source of light, its luminous effects depended entirely on external projections that it obstructed, reflected and refracted. The goal was the fulfillment of an unattainable promise, the advent of a total work, the Gesamtkunstwerk: an all-encompassing environment of light, space and machine that would effect a dreamed-of fusion between art, technology and industry. The divergences between Light Prop and its replicas, as documented in this article, testify to both the project’s enduring appeal and to its advancement through the process of replication. The 2006 replica, by means of its far more seamless integration of mechanical, theoretical and cinematic sources than the original, translates Moholy-Nagy’s design fiction into a present reality.

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References and Notes


same issue. Also available at <www.digi.ub.uni-heidelberg.de/diglit/form1930/0355>.


5 Charles Kuhn letter to György Kepes, 7 July 1965, Harvard Art Museums conservation file, BR56.5.

6 Wainwright’s account of the 1966 restoration was documented by the museum much later, in 1989, following conservators’ conversation with him. Referencing photographs, he dismantled the sculpture; stripped its surfaces of recent radiator paint, and uniformly re-chromed (described as three layers of plating: copper, nickel and chrome) metal elements; and added or replaced parts, such as new springs for the flag mechanism, a bicycle derailleur to protect the mechanism from jamming, and a radiator grill around the base “to keep children away.” He “probably” replaced the window screening and two plastic sheets. Harvard Art Museums conservation file, BR56.5.


8 Nan Piene (Rosenthal) letter to Emilie Dana, 16 April 1979, Harvard Art Museums curatorial file, BR56.5.


10 Angela Chang in conversation with Jürgen Steger, 8 May 2007, Harvard Art Museums conservation file, BR56.5.


13 Flowers [7].

14 Steger [10].


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