Hungarian Studies Review, Vol. XXXVII, Nos. 1–2 (2010)

"Vision in Motion":

THE *LICHTREQUISIT* (LIGHT PROP) OF MOHOLY-NAGY

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In late 1929 the German Foreign Office commissioned the Deutsche Werkbund to create a German section for the Exposition de la Société des artistes décorateurs français to be held in the Grand Palais in Paris the following May. This was the first opportunity since World War I for the recuperating nation to participate in this important international design event. A society of industrialists, architects, and designers founded in 1907 to strengthen Germany's position in the international marketplace, the Werkbund was a logical choice. Identified with the Bauhaus and functionalism during the late 1920s, the Werkbund sponsored innovative designs for industrial products and architecture through exhibitions and publications, and thus became the visible arbiter of a new "modern style" in Germany. Walter Gropius, founder of the Bauhaus and a leader of the Werkbund, was given the task to develop the German contribution to the exhibition. Gropius appointed three former Bauhäusler—László Moholy-Nagy, Marcel Breuer, and Herbert Bayer—to help him organize the five "German" rooms (Moholy and Breuer were in fact Hungarians), which ended up being the most developed and cohesive display to date of the goals of the Bauhaus under Gropius's tenure (1919-1928). In addition, the Paris exhibition offered

Moholy-Nagy, a former Bauhaus teacher and close friend of Gropius, the opportunity to realize his dreams of creating kinetic light art through the fabrication and display of his most important work, the *Lichtrequisit einer elektrischen Bühne* [Light Prop for an Electric Stage]. (fig. 16)

Later known as *The Light-Space Modulator*, the *Lichtrequisit* was displayed in the Paris exposition from May 14 to July 13, 1930, and it now resides in the Busch-Reisinger Museum (Harvard University Art Museums) in Cambridge, Massachusetts.[1] The work consists of a variety of metal, plastic, and wood parts in three vertical groupings, each of which is attached to a circular metal disk at the base. These three groups are set in motion as the disk rotates when activated by a motor housed in the base. Though the sculpture has undergone some changes during restorations over the years—chromed metal parts, an added stabilizing frame, the replacement of a glass spiral element with a metal one, changes to the base and motor, to name a few—one can still see the configuration and sizes of the disks, metal screens, and other parts as originally intended.[2] In the Werkbund installation in Paris, the *Lichtrequisit* was housed in a box lined with white and coloured lights. A circular opening in the box enabled the work to be glimpsed and reflected light to be projected when it was in motion. Moholy described its installation in an article in the Werkbund's journal *Die Form* in 1930, and a photograph published in that article provides us with further information on it.[3] (fig. 17)

Although the *Lichtrequisit* is discussed in most surveys of twentieth-century art and sculpture, it has curiously received only cursory attention. Exceptions to this are the pioneering essays written in the early 1970s by Nan (Piene) Rosenthal and Hannah Weitemeier.[4] Three decades later, the work is recognized for its contributions to kinetic sculpture, light art, and abstract film in the 1920s. Yet, how could a kinetic constructivist work of art represent the architectural ethos of the Bauhaus? Why did the German exhibition rooms in Paris have a section devoted to the Bauhaus experimental stage, the section in which the *Lichtrequisit* was displayed? Did Moholy conceive of the work as a sculpture at all, or more specifically as a light prop for the theatre as its title implies? Examining the development of Moholy's theory and work in sculpture, photography, film, and theatre during the 1920s provides insights into these issues and, in doing so, demonstrates the *Lichtrequisit's* centrality to both Moholy's work and to the goals of the Bauhaus. Moholy adapted his theories about kinetic sculpture and light art to stage design in the late 1920s and as a result was poised to capitalize on the opportunity the

Paris exhibition offered in order to realize this complicated and innovative marriage of engineering and art. Like Gropius, Moholy believed in bringing together various fields of creative endeavour, including architecture, to find new spatial relationships that could be used in building a humane environment in a technological era.

In terms of Moholy's own work, the *Lichtrequisit* was the most complete realization of his ideas about the creation of a new art incorporating modern technology, light, and kinetics. This art was founded on Moholy's concept of "Vision in Motion," the title of his last book and the theory that shaped the core of his artistic vision. (fig. 18) In the introduction to the book, published the year after his death, Moholy offered this definition: "vision in motion is a synonym for simultaneity and space-time; a means to comprehend the new dimension … is seeing while moving."[5] Simultaneous representation and the visual analogue of movement over time were rooted, Moholy explained, in Cubism, Italian Futurism, and Russian Constructivism. In addition, recent developments in science, including Einstein's theories of relativity, examined the movement of bodies and light through space. Mindful of these developments in art and science, Moholy directed his own ongoing experimentation with media and techniques toward the representation of motion, simultaneity, and space-time in his paintings, photography, films, and sculpture during the decade of the 1920s.

By 1921, a year after his immigration to Berlin, Moholy had developed his own style of geometric abstraction, utilizing overlapping, often transparent planes of colour that float on a solid coloured ground—a style clearly influenced by the Russian artists Kazimir Malevich and El Lissitzky. (fig. 12) Moholy also began to work in the medium of sculpture, first making relief assemblages on wooden boards and then polished metal sculptures. His sculpture *Nickel Construction with Spiral* of 1921, now in the Museum of Modern Art, New York, is the only surviving example of his metal sculpture from the early 1920s.[6] (fig. 46) Here Moholy combined vertical and horizontal elements in a stable, architectonic structure, but he upset its stability with the implication of movement created through the addition of a spiral attached from the top of the vertical form to the base of the sculpture. The geometric forms, spiral element, and highly polished metal in *Nickel Construction* indicate Moholy's interest in an abstract, non-static art in tune with the industrial age. When Moholy reproduced the sculpture in the English edition of his book, *Von Material*

zu Architektur [From Material to Architecture], published in 1929, his caption called it a "freeing of material from its weight."[7] (fig. 19) Exhibitions of Moholy's paintings and sculpture secured his prominence in Berlin as a leader of what came to be known as International Constructivism; it was this prominence that brought him to the attention of Gropius, who offered Moholy a position at the Bauhaus in late 1922.

The year after creating his *Nickel Construction*, Moholy turned to the medium of photography, and his first published photographs, the abstract photograms made without a camera, were experiments made to test and develop his theories concerning creating images with light. (fig. 47) These theories were outlined in the article "Production-Reproduction," written in 1922 with the collaboration of his first wife, Lucia Moholy.[8] The Moholys explored the idea of using new media—the phonograph, photography, and film—creatively, *productively*, rather than using them, as generally was the case, to *reproduce* recognizable objects or sounds from nature. They defined photography as the fixation of "light phenomena" on light-sensitive materials, and they argued that it should be used in new ways; therefore, many experiments needed to be conducted. The overlapping transparent planes and clean geometric forms—often floating in a seemingly infinite space—in Moholy's photograms relate directly to the forms in his paintings of the mid-1920s.[9]

However, for Moholy the photograms also served as an artistic analogy of the scientific world. They were created with a medium, photography, and a specific technique, the photogram, both used extensively in science.[10] Moholy emphasized this connection in his book, *Malerei, Photographie, Film* [Painting, photography, film], published in 1925, by employing scientific photographs, such as those of a starry sky and a spiral nebula, to substantiate his claim that photography was the most important medium of visual expression because it offered a new, modern way of seeing.[11] (fig. 20) Scientific photographs revolutionized the way people see the world, he argued, and could thus expand their awareness and knowledge of it. "Astronomical pictures (taken through telescopes) and X-ray pictures," he said, "were interesting forerunners in this field."[12] Other scientific photographs found in the book include one of a discharge of an electric current and three of lightning. The immaterial forms in these photographs were made with light, just as a star is an image of light projected through the vast space of the universe. In the same way, Moholy's photograms also depict light forms freed from gravity moving through an unlimited space.

Moholy's photogram experiments came at a time when the most prominent developments in science concerned the movement of light through space. In 1900, with the aid of newly developed spectroscopic equipment that could measure radiation, the German scientist Max Planck formulated the basis for Quantum Theory, that light was composed of quanta, or discrete increments of energy. In 1905 and 1915 Einstein published his theories of relativity in which he hypothesized that light particles moved in groups and could be affected by gravity. This controversial theory was tested in an experiment conducted in May of 1919 during a total eclipse of the sun, when photographs showed that light waves from stars were bent by the gravitational field of the sun. In 1907 the German mathematician Hermann Minkowski postulated that Einstein's model of the universe had a fourth dimension, that is, in addition to height, width, and length, there was a dimension of time that caused objects to change shape as they moved through space. The combination of time and three-dimensional space was commonly referred to as space-time, a term that appears repeatedly in Moholy's writings. The intense interest of both scientists and the public in such theories, and also in new conceptualizations of space travel, made an impact on a number of avant-garde artists who were trying to make their art relevant to this new age. Moholy responded to these developments in science by making light and kinetics the focus of his art.

After his arrival at the Bauhaus in the spring of 1923, Moholy's experiments with creating and recording light formations using the photogram technique undoubtedly benefited from exposure to the moving light displays of the students Ludwig Hirschfeld-Mack and Kurt Schwerdtfeger, in conjunction with master craftsman Josef Hartwig. The importance of their *Lichtspiele* [light plays or light displays] to his theories on the potentials of the film medium and on the use of light itself for creative expression can be seen in the attention he gave their work in *Malerei, Photographie, Film*. Produced independently of any specific course or workshop at the school, these kinetic coloured light experiments utilized cut-out templates through which moving coloured lights were projected onto a screen. Some of Moholy's photograms from the Dessau period have the appearance of light displays on a projection screen, an analogy Moholy made in *Von Material zu Architektur* [From material to architecture]. He captioned one of his photograms: "Photographic surface treatment by light: a 'photogram,' made without a camera. This is the recording of light as it hit a projection

screen—in this case, the sensitive layer of the photographic paper." In the accompanying text Moholy declared "from the standpoint of technical development—that a picture painted by hand is surpassed by the physically pure, 'unblemished' light projection."[13]

However, Moholy viewed his photograms as only an experimental step toward the creation of a more important new art form: abstract film. He thought that the future of visual expression would be found not in photography but in film because of the latter's potential for depicting the movement of light through space. In "Production-Reproduction," his first published essay on photography and film, he wrote that "the main task [of film] is the formation of *motion as such* … the most perfect works are those of Eggeling-Richter."[14] In 1922, the same year the article appeared, Moholy reproduced several drawings for abstract films by the Swedish artist Viking Eggeling and the German Hans Richter, both of whom were friends of the Moholys at the time, in the *Buch neuer Künstler* [Book of new artists], which he published with Lajos Kassák in 1922.[15] (fig. 21) He again turned to Eggeling and Richter in the section of *Malerei, Photographie, Film* entitled "Static and Kinetic Optical Composition," now discussing their work in terms of the artistic integration of light, motion, and time in film:

> In Eggeling's hands the original colour-piano became a new instrument which primarily produced … the *articulation of space in motion* [Moholy's emphasis]. His pupil Hans Richter has—so far only theoretically—emphasized the time-impulse even more strongly and has thus come near to creating a light-space-time continuity in the synthesis of motion. This beginning, long out-dated in theory, has so far failed to handle "light" … The next task: light films which could be shot continuously were introduced in the form of the photogram as made by Man Ray and myself.[16]

Moholy felt that Eggeling and Richter used film "productively," creatively, rather than "reproductively," in order to integrate light, motion, and time. However, they essentially used animation to set their hand-drawn geometric forms into motion. Instead, Moholy thought that film should build more directly on the photogram technique to capture the essence of motion without resorting to animation. As will be discussed below, Moholy was able to achieve his goal of creating and recording on film moving light displays with his kinetic sculpture the *Lichtrequisit einer elektrischen Bühne*.

Undoubtedly inspired by the Italian Futurists and the Russian avant-garde, especially Fortunato Depero, Vladimir Tatlin, and Naum Gabo, Moholy began to develop ideas for kinetic sculpture in the early 1920s. However, only a few drawings exist to document any works created in this area before 1929. As Loïs Relin has pointed out, the road for the creation of kinetic sculpture had been paved by the Italian Futurist sculptor Fortunato Depero in his now destroyed sculpture *Motorumorist Coloured Plastic Complex* of 1914-15 (fig. 22).[17] Constructed of industrial materials and parts, the sculpture was actually motorized, rather than merely referring to movement. Depero built the work as a study for the *Futurama*, a kind of mechanical fantasy park proposed by Depero and Giacomo Balla in their manifesto "The Futurist Reconstruction of the Universe" of 1915.[18] This early motorized sculpture takes the medium in a direction also advocated earlier by the leading Italian Futurist sculptor, Umberto Boccioni, in his "Technical Manifesto of Futurist Sculpture" (1912), but never realized. Boccioni proclaimed: "We cannot forget that the tick-tock and the moving hands of a clock, the in-and-out of a piston in a cylinder, the opening and closing of two cogwheels with the continual appearance and disappearance of their square steel cogs, the fury of a flywheel or the turbine of a propeller, are all plastic and pictorial elements of which a Futurist work must take account."[19] Although Moholy was probably unaware of Depero's sculpture or the manifesto he wrote with Balla, he was definitely familiar with Boccioni's ideas and art, as they were discussed and illustrated in various publications, including the *Buch neuer Künstler*.

In this book, Moholy and Kassák also published another, more clearly influential work involving geometric forms, mechanized movement, and film: Tatlin's 1920 model for the *Monument for the Third International*. This fantastic, obviously unrealizable vision of a building consisted of a spiral containing stacked geometric forms that would each house a specific governmental body and would rotate at different speeds. The news services located at the top of the *Monument* would project films into the sky. The great soaring height and the alignment of the moving parts with the length of a day, month, and year point to Tatlin's interest in the laws of the cosmos. Seemingly the paradigm of engineering, the *Monument* was projected to be taller than the Eiffel Tower. However, it was known in Europe primarily in the form of a rendering, and thus it could easily have served as a model for a sculpture much smaller than the *Monument* itself.

Equally pertinent to the development of Moholy's ideas about kinetic sculpture was the work of another Russian artist, Naum Gabo. Although Moholy and Gabo have often been discussed as two of the earliest sculptors to work with kineticism, Gabo's impact on Moholy needs more careful study.[20] Gabo's sculpture, *Kinetic Construction*, 1919-1920, now in the Tate Gallery, was included in the Erste russische Kunstaustellung [First Russian Art Exhibition] in Berlin in 1922 that Gabo helped to organize.[21] Gabo's sculpture consisted of a vertical rod attached to a box housing a motor. When the rod was set into motion, it created a virtual volume through the optical phenomenon of the rod's movement. Commonly known as Standing Wave, but shown in Berlin with the subtitle *Zeit als neues Element der Plastischen Künste* [Time as a new element of the plastic arts], Gabo's sculpture is often erroneously cited as the first abstract kinetic sculpture. Like Depero's work, Gabo's *Kinetic Construction* was created to illustrate a theory, specifically that laid out in the "Realistic Manifesto" written by Gabo in 1920. This manifesto was published in Hungarian in the periodical *Egység* [Unity] in 1922, and Moholy quoted it extensively in *Von Material zu Architektur* in 1929. "The realization of our perceptions of the world in the forms of space and time is the only aim of our pictorial and plastic art," Gabo proclaimed. "We affirm in these arts a new element, the kinetic rhythms as the basic forms of our perception of real time."[22] This excerpt indicates the influence of the contemporary debate about the space-time continuum on Gabo's artistic practice, as Gabo had clearly turned to physics for his sources. In 1910–1914 Gabo studied medicine, engineering, and physics in Munich, where he lived with his older brother Alexei Pevsner, who was studying physics as part of his education as a scientist.[23] Gabo said that he was very interested at the time in the properties of what in physics is referred to as a "standing wave," a type of wave movement seen when a stretched string is put into motion.[24]

Moholy himself seems to have turned his attention to kinetic art in 1922. His 1922 drawing *Kinetic Constructive System* now in the Bauhaus-Archiv in Berlin, offers direct parallels to Tatlin's schema in its spiral and diagonal axis. When seen in isolation, the purpose and meaning of the drawing are unclear, but seen in conjunction with the essay of the same title he published that year with the Hungarian artist Alfréd Kemény, the drawing becomes an exploration of an artistic theory.[25] Moholy later included the essay in a section of *Von Material zu Architektur* devoted to what is surely the earliest history of kinetic sculpture. The following passage sets out his own goals:

> … Constructivism means the activation of space by means of a dynamic-constructive system of forces, that is, the constructing within one another of forces actually at tension in physical space, and their construction within space, also active as force (tension)…. The first projects looking toward the dynamic-constructive system of forces can be only experimental, demonstration devices for the testing of the relations between man, material, power and space. Next comes the utilization of the experimental results for the creation of freely moving … works of art.[26]

The opportunity and the funding needed to realize Moholy's ideas about kineticism and light art suddenly arose in 1929 when he was asked by Gropius to install one of the five rooms devoted to German industrial products and architecture at the 1930 Exposition de la Société des artistes décorateurs in Paris. Moholy's "Room 2" included lamps designed in the metal workshop he supervised at the Bauhaus, photographs, theatre designs, and the *Lichtrequisit einer elektrischen Bühne*.[27] Moholy's designs for the *Lichtrequisit* and its installation were drawn up by István (Stefan) Sebök, a Hungarian architect who joined Gropius's office in 1927, and the sculpture itself was fabricated by Otto Ball in Berlin with financial support from the theatre department of the AEG, the Allgemeine Elektrizitätsgesellschaft [General Electric Company].[28] In the Paris installation Moholy placed the *Lichtrequisit* in a box approximately 1.2 meters on each side, with a large circular opening on one face (fig. 17). The sculpture was illuminated by coloured and white lights located around the opening and on the inside of the box.[29]

Like the works of Depero, Gabo, and Tatlin, the *Lichtrequisit* challenged the most basic concepts of traditional sculpture. It was not a solid mass rooted by gravity to its pedestal. As a kinetic sculpture made up of numerous parts, it was not an immediately comprehensible form. With this work, Moholy seemingly answered Boccioni's call to use "transparent planes, glass, sheets of metal, wires, outside or inside electric lights" to "indicate the planes, inclinations, tones, and half tones [sic] of a new reality" in a "sculpture of environment."[30] And the sculpture could have fit happily into Balla and Depero's *Futurama*. Yet the *Lichtrequisit* also fulfilled other, even more radical goals in keeping with the development of Moholy's ideas and art in the 1920s, as discussed above. The sculpture functioned as a vehicle for producing mobile light displays, and in doing so made it possible for Moholy to create his only

abstract film, *Ein Lichtspiel schwarz weiss grau* [A Lightplay black white gray] of 1930.

The surviving footage is only around seven minutes long, even though Moholy had created a script for a longer, more complex film.[31] Nevertheless, the film embodies Moholy's highest aspirations for art. In the film we are always aware of the *Lichtrequisit's* unique Constructivist forms set in motion—the sculpture is clearly the star of the film—but more importantly, the film can be seen as a veritable moving photogram. Moholy's use of what the Russians called *faktura*—the manipulation of materials with a variety of textures — to create a diversity of light effects, is the closest Moholy came to using film as a medium by which to record moving light forms.

Yet, rather than presenting the work as a kinetic sculpture or a machine to create kinetic light displays, at its inaugural exhibition in Paris, Moholy chose to identify the work with the stage. Its original title, *Lichtrequisit einer elektrischen Bühne*, identified it as an appropriate addition to the theatre section of his Room 2 in Paris. Likewise, his 1922 drawing, *Kinetic Constructive System*, had the following text, probably added later by another hand, on its verso: "Design for a Light Machine for Total Theatre." His interest in kinetics and light displays was thus also tied to recent developments in Russian and German avant-garde theatre, yet another area he could not resist expounding upon once immersed in the environment of the experimental Bauhaus stage. In his 1924 essay "Theatre, Circus, Revue," published in 1925 in the Bauhaus Book *Die Bühne im Bauhaus* [Theatre of the Bauhaus], Moholy discussed his ideas for a "Theatre of Totality," which he described as having "multifarious complexities of light, space, plane, form, motion, sound, man—and with all the possibilities for varying and combining these elements...."[32]

Moholy's involvement with the theatre at the Bauhaus was minimal, even though he discussed stage production and theatre design experiments by others in his publications. (He wrote his contribution for *Die Bühne im Bauhaus* little more than a year after he arrived.) Once again, it was his close relationship with Gropius that enabled him to expand into this area through his writings and his work outside the Bauhaus. Gropius was a staunch supporter of experimental theatre, and it is clear that at least in the beginning, Gropius was more than willing to have the theatre department play a major role in the school. In his 1923 essay "Theory and Organization of the Bauhaus," Gropius described the experimental stage as a place where "the special problems of space,

of the body, of movement, of form, light, colour and sound"—issues pertinent to architecture—could be explored.[33] Later, in his introduction to the English translation of *Die Bühne im Bauhaus* published in 1961, Gropius had the following to say about this unusual department's place in the interdisciplinary curriculum at the school:

> During the all too few years of its existence, the Bauhaus embraced the whole range of visual arts: architecture, planning, painting, sculpture, industrial design, and stage work. The aim of the Bauhaus was to find a new and powerful working correlation of all the processes of artistic creation to culminate finally in a new cultural equilibrium of our visual environment … Teachers and students as a working community had to become vital participants of the modern world, seeking a new synthesis of art and modern technology.[34]

Gropius went on to praise Moholy's "theoretical laboratory experiments at the Bauhaus."[35]

However, the driving force in this area was not Moholy but rather Oskar Schlemmer, through productions of his acclaimed *Triadic Ballet* and his leadership in the Bauhaus theatre department. Due to the lack of a suitable theatre in Henry van de Velde's Bauhaus building at Weimar, the Bauhäusler staged a number of productions in the theatre renovated in 1922 by Gropius in the nearby city of Jena. Gropius made sure to design a stage for the new Bauhaus buildings that opened in Dessau in 1926. In 1927 with his Hungarian assistant Sebök, Gropius also designed a "Total Theatre" for the director Erwin Piscator that incorporated a turntable stage, film projections, and flexible seating configurations.[36] This project was never realized, but Moholy included Gropius's plans and models for it, along with Schlemmer's costume designs for the *Triadic Ballet*, in his Room 2 of the Paris exhibition.[37]

By 1927 the importance of the stage to the Bauhaus curriculum was waning. This was due in no small part to the split between those interested in a mechanical theatre (including the three Hungarians Molnár, Moholy, and Andor Weininger, as well as Kurt Schmidt) and Schlemmer's continued interest in incorporating the figure into his productions. Nevertheless, through Gropius's connections, Moholy was able to find work in experimental Berlin theatres during the late 1920s, after he left the Bauhaus, including the State Opera (the Krolloper) and the Piscator-Bühne [Piscator Stage]. Of his realized designs, we now have only

photographs, such as those for Offenbach's opera *Tales of Hoffmann* of 1929 that were included in the Werkbund installation in Paris, to remind us of Moholy's inventive contributions to avant-garde theatre.[38] (fig. 23)

The theatre was only one area that demonstrated the potential for the realization of Moholy's vision of a new environment in tune with the latest developments in science and technology. Everywhere Moholy looked, it seems, he found inspiration for his kinetic light environments. The ingenious connections between his ideas and the urban environment can be seen in the illustrations to *Von Material zu Architektur* (later published in the English edition, *The New Vision*), for example in the photographs of fireworks and of what he called the virtual volume of a spinning carousel (fig. 24). Moholy explained his interest in such images:

> Ever since the introduction of the means of producing high-powered, intense artificial light, it has been one of the elemental factors in art creation, though it has not yet been elevated to its legitimate place. The night life of a big city can no longer be imagined without the varied play of electric advertisements, or night air traffic without lighted beacons along the way. The reflectors and neon tubes of advertising signs, the blinking letters of store fronts, the rotating coloured 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.[39]

In both *Malerei, Photographie, Film* and *Von Material zu Architektur*, he also included an image recording light patterns made by moving traffic lights at night.[40] In Chicago, toward the end of his life, Moholy made numerous colour photographic slides of the patterns of moving traffic and lit signs at night.[41] Moholy, the great synthesizer, was somehow able to integrate the essence of recent scientific discoveries, Bauhaus stage experiments, modernity, and his restless nature into a visionary art form for the future.

While the German rooms of the Paris exhibition generally received favourable reviews for their modernity—for the clean, sleek industrial forms—almost no mention was made of the *Lichtrequisit*. Moholy counteracted this lack of press by publishing an article on it in the Werkbund's journal *Die Form*.[42] However, in Germany the reaction to Gropius' exhibition was not unanimously positive and, in fact, was cause for a heated debate among Werkbund members at a meeting

in Stuttgart in October 1930.[43] The debate was symptomatic of the political division within the Deutsche Werkbund at the time between a conservative, nationalistic faction and a more liberal group, the latter the proponents of international modernism. The conservatives were enraged that in Paris the "Bauhaus style" should represent the Werkbund and indeed Germany as a whole. The irony of this debate is that the National Socialists appropriated the international style of architecture and turned it into the reactionary modernism of Hitler's regime, while at the same time they accused the Werkbund of "internationalism."

The importance of the *Lichtrequisit* to Moholy is underscored by the effort required of the Moholys to move the cumbersome object with them to London in 1935 when they fled Nazi Germany, and then to Chicago in 1937 when he became the director of the New Bauhaus. Indeed, the *Lichtrequisit* represents a kind of summa of the ideas the displaced Hungarian artist developed at the Bauhaus, where stage experiments provided the model for a new art integrating industrial materials and light. The sculpture also reminds us of his foresight in believing that the future of visual expression would be in kinetics, multi-media, environmental art, and film. Conceptualized as a kinetic sculpture, but first exhibited in Paris as a stage prop, it has now become a Constructivist sculpture. As the most impressive realization of László Moholy-Nagy's concept of "Vision in Motion," ironically the *Lichtrequisit* today stands mostly at rest in Harvard's Busch-Reisinger Museum, its structure too fragile to withstand frequent operation. Nevertheless, it still serves as an active if enigmatic reminder of that era of scientific discovery and artistic experimentation of the 1920s in which Moholy figured so prominently.

NOTES

[1] The original sculpture was given by Sibyl Moholy-Nagy, the artist's widow, to the Busch-Reisinger Museum at Harvard in 1954. Two replicas were built by Woody Flowers at MIT in 1968 and are now at the Bauhaus-Archiv in Berlin and the Stedelijk van Abbemuseum in Eindhoven, Netherlands. In 2006 a third replica, intended only for lending to exhibitions, was constructed for the Tate Modern's show, "Albers and Moholy-Nagy: From the Bauhaus to the New World." It is also stored at the Busch-Reisinger Museum. For the various dates and other names given to the work, including the *Light-Space Modulator* and the *Light-Display Machine*, see Lucia Moholy, *Marginalien zu Moholy-Nagy, Marginal Notes* (Krefeld: Scherpe Verlag, 1972), 79–84. The sculpture can

be viewed in motion on the website, *Extra Ordinary Every Day: The Bauhaus at the Busch-Reisinger*, Harvard University Art Museums, http://www.artmuseums.harvard.edu/sites/eoed/index.html.

[2] Some of the changes, such as the addition of the stabilizing frame and the metal spiral, were made before the *Lichtrequisit* came to the Busch-Reisinger. Other changes, such as the chroming of the surfaces, which obliterated the variety of textures of the original parts and subsequently altered the light reflections produced, were made by William Wainwright during a restoration of the work in 1966. From notes in the files of the Busch-Reisinger Museum, Harvard University Art Museums.

[3] "Lichtrequisit einer elektrischen Bühne," *Die Form* 5 (7 June 1930), 297–299.

[4] Nan Rosenthal, "Notes on the *Lichtrequisit*, a Motorized Construction of 1930 by László Moholy-Nagy," unpublished paper in the files of the Harvard University Art Museums (Busch-Reisinger Museum). Nan Rosenthal (Piene), "László Moholy-Nagy's Light-Space Modulator," gallery brochure, Howard Wise Gallery (New York, 1970). Hannah Weitemeier, *Licht-Visionen: Ein Experiment von Moholy-Nagy*, exhibition catalogue, Bauhaus-Archiv (Berlin, 1972). See also Krisztina Passuth, *Moholy-Nagy* (London: Thames and Hudson, 1985), 53–56.

[5] *Vision in Motion* (Chicago: Paul Theobald, 1947), 12.

[6] On Moholy's sculptural reliefs, see Oliver A. I. Botar, "Constructed Reliefs in the Art of the Hungarian Avant-garde: Kassák, Bortnyik, Uitz, and Moholy-Nagy," *The Structurist* 25–26 (1985-1986), 87–95. For illustrations of several of Moholy's lost metal sculptures, see Passuth, *Moholy-Nagy*, Plate 67, and Eleanor M. Hight, *Picturing Modernism: Moholy-Nagy and Photography in Weimar Germany* (Cambridge: The MIT Press, 1995), Plate 15.

[7] He did not use a caption in the first German edition of *Von Material zu Architektur*, Bauhausbücher no. 14 (Munich: Albert Langen Verlag, 1929), but added it for the subsequent English editions, translated by Daphne M. Hoffman, titled *The New Vision and Abstract of an Artist* (New York: Wittenborn, 1946), 44.

[8] "Produktion-Reproduktion," *De Stijl* 5 (July 1922), 98–100. English translation in Passuth, *Moholy-Nagy*, 289-290.

[9] For a more extensive analysis of the Moholys' article "Produktion-Reproduktion" and of the technique and imagery of Moholy's photograms, see Hight, *Picturing Modernism*, Chapter 4.

[10] During the nineteenth and early twentieth centuries scientists employed the photogram technique to record plant, animal, and microscopic forms. The German scientist Paul Lindner summed up current scientific applications of the photogram in his how-to-book *Photographie ohne Camera* [Photography without a camera], published in Berlin in 1920.

[11] *Malerei, Photographie, Film*, Bauhausbücher no. 8 (Munich: Albert Langen

Verlag, 1925), 56, 57. Revised edition, *Malerei, Fotografie, Film* (Munich, Albert Langen Verlag, 1927); reprint (Mainz and Berlin: Kupfenberg, 1968); English edition *Painting, Photography, Film*, translated by Janet Seligmann (Cambridge: The MIT Press, 1969), 4–65.

[12] *Painting, Photography, Film*, 31.

[13] *Von Material zu Architektur*, 89–90; The New Vision and Abstract of an Artist, 39.

[14] "Produktion-Reproduktion," 100. English translation in Haus, *Moholy-Nagy*, 47.

[15] László Moholy-Nagy and Lajos Kassák, *Buch neuer Künstler* [Book of new artists] (Vienna: MA Editions, 1922); facsimile edition, Budapest: Europa and Corvina Publishers, 1977, unpaginated.

[16] *Painting, Photography, Film*, 21.

[17] Loïs Relin, "Two Pioneering Sculptures by Balla and Depero, 1915," *Gazette des Beaux-Arts* 107 (February 1986), 81–85. See also, Gabriella Belli, *Depero Futurista: Rome-Paris-New York, 1915–1932 and more*, exhibition catalogue, The Wolfsonian, Florida International University, Miami Beach (Milan: Skira, 1999), 15–16, 36–37, 40–43.

[18] "The Futurist Reconstruction of the Universe," signed by Balla and Depero on March 11, 1915. English translation in Umbro Apollonio, ed., *Futurist Manifestos* (London: Viking Press, 1973), 197–200.

[19] Umberto Boccioni, "Technical Manifesto of Futurist Sculpture," first published on 11 April 1912. English translation in Herschel B. Chipp, ed., *Theories of Modern Art* (Berkeley: University of California Press, 1973), 303.

[20] The *Lichtrequisit* and other works by Moholy have been examined in relation to the work of Brancusi and Gabo. Kettle's Yard, University of Cambridge, *Immaterial: Brancusi, Gabo, Moholy-Nagy* (Cambridge, 2004).

[21] See Steven A. Nash and Jörn Merkert, *Naum Gabo: Sixty Years of Construction*, exhibition catalogue, Dallas Museum of Art (Munich: Prestel Verlag, 1985), Cat. no. 9, 205, with ill.

[22] Naum Gabo and Antoine Pevsner, "The Realistic Manifesto," published in 1920 in Moscow; reprinted in *Egység* [Unity], 2 (Vienna, 1922), 3–4, fig., 8; and in Chipp, *Theories of Modem Art*, 328–329. According to their brother Alexei Pevsner, Gabo wrote the manifesto in July 1920 and then Antoine asked that his name be put on it as well when it was printed and posted around Moscow in August 1920. Alexei Pevsner, *A Biographical Sketch of My Brothers Naum Gabo and Antoine Pevsner* (Amsterdam: Augustin & Schoonman, 1964), 24, 28.

[23] "Naum Gabo Talks about his Work," *Studio International* 171 (April 1966), 127–128.

[24] Naum Gabo, "The 'Kinetic Construction of 1920'," *Studio International* 178 (September 1969), 89.

[25] "Dynamisch-konstruktives Kraftsystem," *Der Sturm* 12 (December 1922), 186; Passuth, *Moholy-Nagy*, 290. Co-authored by Alfréd Kemény, who was most likely the principal author.

[26] *Von Material zu Architektur*, 162f. English translation from *The New Vision and Abstract of an Artist*, 49f.

[27] "Room 2", organized by Moholy, included work by a number of people from the Bauhaus: lamps designed in the metal workshop, which Moholy had supervised; plans, models, and photographs of Gropius' architectural projects; photographs by Moholy, Herbert Bayer, Lux Feininger, and Lucia Moholy; and photographs and drawings of stage and costume designs by Moholy and Oskar Schlemmer. Of the other rooms, the first was set up as a communal room for an apartment building Gropius was designing, the third focused on hotel rooms designed by Breuer, and the fourth and fifth, organized by Bayer, contained German products and furniture. *Deutsche Abteilung—Section Allemande—German Section*, exhibition catalogue for the German section of the Exposition de la Société des Artistes décorateurs français, Grand Palais, Paris (Berlin: Schriftleitung, Verlag und Anzeigenverwaltung, Ala Anzeigen-AG, 1930), unpaginated. In the collection of the Busch-Reisinger Museum (Harvard University Art Museums).

[28] Weitemeier, *Licht-Visionen* (Berlin, 1972), 5.

[29] Moholy described the creation of the sculpture in "Lichtrequisit einer elektrischen Bühne," *Die Form* 5 (1930), 297–299. English translation in Passuth, *Moholy-Nagy*, 310–311. The number of lights is unclear, since Sebök's drawing indicates 116, while Moholy's article in *Die Form* seems to indicate 150. In *Vision in Motion* he said there were 140 bulbs. *Vision in Motion*, 238.

[30] Boccioni, "Technical Manifesto of Futurist Sculpture," in Chipp, *Theories of Modern Art*, 302.

[31] For Moholy's film script, see *Moholy-Nagy*, "Light Display Film" and "New Film Potentialities" in Passuth, Moholy-Nagy, 316-318. The film can be viewed at *Extra Ordinary Every Day: The Bauhaus at the Busch-Reisinger*, http://www.artmuseums.harvard.edu/sites/eoed/index.html.

[32] Oskar Schlemmer, Farkas Molnár, and Moholy-Nagy, *Die Bühne im Bauhaus*, Bauhausbücher no. 4 (Munich: Albert Langen, 1925; reprint Mainz and Berlin: Kupferberg, 1964). Translated by Arthur S. Wensinger as *The Theater of the Bauhaus* (Middletown: Wesleyan University Press, 1961), 60.

[33] "Theory and Organization of the Bauhaus," English translation in Tim Benton, *Form and Function: A Source Book for the History of Architecture and Design, 1890–1939* (London: Crosby Lockwood Staples, in association with the Open University Press, 1975), 126. This essay was originally published as "Idee und Aufbau des Staatlichen Bauhaus in Weimar," in *Staatliches Bauhaus, Weimar, 1919–1923* (Munich and Weimar: Bauhouseverlag, 1923), 7–18.

[34] *The Theater of the Bauhaus* (Middletown, 1961), 10.

[35] *Ibid.*, 11.

[36] Winfried Nerdinger, *Walter Gropius*, exhibition catalogue, Busch-Reisinger Museum and the Bauhaus-Archiv (Cambridge, MA, and Berlin, 1985), Cat. no. 19, 94–99. For a discussion of Sebök's primary role in developing this innovative theatre design, see Karin Wilhelm, "Stefan Sebök e l'idea di 'Totaltheater,'" *Casabella* 52 (November, 1988), 34-45.

[37] The models and plans for Gropius's *Total Theatre* were listed, with a photograph of a model, under "Room 2" in *Section Allemande*, exhibition catalogue for the German section of the Exposition de la Société des artistes décorateurs français, Grand Palais, Paris (Berlin, 1930), unpaginated.

[38] *Ibid*. Moholy also included a photograph of his set for *Tales of Hoffmann* in *The New Vision*, fig. 42, 63.

[39] *The New Vision*, 50.

[40] *Malerei, Photographie, Film*, p. 53; *Von Material zu Architektur*, 170, 175, 176, 177.

[41] After the death of his wife Sibyl, Moholy's daughter Claudia gave the collection of colour slides Moholy created in Chicago, which were in Sibyl Moholy's teaching collection, to the University of California at Santa Cruz where Nan Rosenthal was teaching at the time. A duplicate set was given to SUNY-Stony Brook.

[42] "Lichtrequisit einer elektrischen Bühne," *Die Form* 5:11/12 (June 7, 1930), 297–299.

[43] For more on this debate, see "Die Ziele des Deutschen Werkbundes," in *Die Form* 23/24 (1930), 612–614; and Joan Campbell, *The German Werkbund: The Politics of Reform in the Applied Arts* (Princeton: Princeton University Press, 1978), 210, 214–216, 231.