

OPTICAL PERFORMANCE

by

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Submitted to the Department of Architecture
on May 6, 1983 in partial fulfillment of
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ABSTRACT

The initial exploration of environmental art involved a study of light and color, which led to an examination of environmental performance and scenic projection techniques. Eventually, the thesis research resulted in the development of an environmental performance that integrates projected light, projection screens and live performance.

A variety of materials for screens were examined in order to determine their transparent and light reflecting qualities and to devise a transparent luminous surface. Among those examined were pelon, nylon, silk, fiberglass, plexiglas, vinyl, and aluminum netting. Included in the investigation was a review of projection equipment, lamp housings, projector bulb specifications, filament design and performance data. In an attempt to control sequence and to create movement of colored images, 16mm film projection, optical printing and cameraless animation techniques were utilized. Manipulation of stained glass and glass dyes resulted in a series of colored glass slides for still projection. Work with black film leader resulted in abandoning the traditional rectangular film frame, making it possible for light images to take on the shapes of various projection surfaces. The development of a multi-layered screen configuration followed, allowing the projected light images to be duplicated in space, by penetrating

one transparent screen after another.

Further exploration led to the design of a projection device that would become integral with the performance environment. Earlier research included experimentation with prisms and lenses. The final lighting design, consists of cylindrical tubes and small tungsten-halogen filament bulbs in conjunction with lantern slide projection.

Finally, the problems of interaction between live performer and stage environment and how to harmonize the three-dimensionality of the human performer with the projectors and inanimate objects in the performance environment became major concerns. A general survey of technical, historical and stylistic developments regarding this issue was helpful in solving these problems.

The thesis project is an original design which addresses this issue and demonstrates an original concept for spatial projection and human performance. The human performer interacts with the staged environment by becoming, at times, a prop, and at other times, a projection screen.

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General Project Description

The thesis project is presented as a environmental performance. It incorporates live performance, multi-layered projection screens, on-stage projectors and sound. It is designed for installation in a room or small auditorium; an interior space where projector, audience and stage occupy much of the same spatial confines. Performed primarily in an environment, without ambient light, the feeling is one of dark undefined space.

The performance basically consists of modifying and transforming the space with light. One component of the lighting equipment stands in the same space as the performer and is incorporated into the stage environment as prop and projector. An attempt is made to expand the traditional theatrical roles assigned stage props, sets, lights and performer.

The costume is designed to provide a screened surface which allows the performer to interact with light by creating projected images with shadows. At times, the costume becomes a structure,

enabling the live performer to appear as both inanimate prop and moving sculpture. Sound brings rhythm to the environment and assists in defining its space, setting the mood and reiterating and accentuating light and motion. The aesthetic objective is that of quiet, slow motion and captured time. Repeating action and repeating visual imagery is intended to capture time and allow the viewer to reflect on image. The performer's repeated motion together with repeated sound emphasizes this concept. In order to experience the space dimensionally, unrecorded local sound is included. Metal chimes, gong, and/or live flute provide fading layers of notes, allowing the audience to experience sound in space with decreasing intensity.

The spatial dimension of the performance environment is visually defined through use of multiple projected images. Here an inner penetration of space is achieved by duplicating the image on sequential transparent screens. The performer interacts with this setting and can optically

transform the environment by moving through it and creating kinetic patterns of light and shadow. Exploring the interaction between live performance, costume forms, stage props and the environment has proved to be an interesting and challenging area to investigate. What follows is background information describing the technical, historic and stylistic influences affecting the conceptualization and final design of the thesis project.

Background

The history of projection and the technical developments of projection equipment provide valuable information in formulating designs and conceptualizing the thesis performance.

In documenting the previous use of projected scenery and the technical advancements made in this field, the term "scenic projection" has been defined in its broadest sense. For the purposes of the thesis project the existence or absence of a slide is not critical to a definition of projection. Many projected images have been formed by arranging spotlights in such a manner as to build up patterns of light or by the insertion of "gobos" (single metal disks) into ellipsoidal-reflector spotlights or formed by projecting computer-generated laser light images. All these processes result in perceptable images. The New Concise Pocket Webster's Dictionary, published by Modern Promotions, New York, defines projections as "that which juts out: representation on a plane surface of a three-dimensional object, as a flat map of

the earth is a projection of the globe." A projector is defined as "an appliance made to throw a picture on a screen by reflecting light."

According to the text Lighting the Stage - Art and Practice, by William F. Bellman, scenic designers utilizing projection have basically followed either the Didactic Approach or the Integrated Scenic Approach. In the Didactic Approach, no attempt is made to blend the screen into the setting or to blend the projection visually into the rest of the visual environment. Multiple screens, variable picture size and shape and montage techniques may be used to bring visual material into ironic juxtaposition with the story, but the relationship between the actors and the projection remain direct and intellectual.

On the other hand, the Integrated Scenic Approach treats scenic projection as another element to be blended into the total scenic environment. This approach allows for an exploration of space and can facilitate visual transformation of both the actors and the props. One can optically

experiment with changing the apparent shape, color, size, texture and spatial location of objects. Utilized in this manner, projected images have been thrown onto three-dimensional objects, through layers of gauze and across ceilings and floors. It is this approach that is employed in the thesis production.

There are two basic types of projection machines: the direction shadow projector called a Linnebach Lantern and the slide projector called a Projection or Optical Effects Machine.

The direct shadow projector is used to throw a wide range of abstract forms with large details. Historically, the Linnebach Projector was an early device adapted from the Javanese Shadow Box (one of the first forms used to cast shadows of an object). In the early part of the 20th Century, Adolph Linnebach of Germany improved upon the idea of the shadow box by using the concentrated filament of an incandescent lamp. He housed the lamp in a conically-shaped box with a large glass slide mounted in front which permitted light rays to

pass through its image. However, no light source was small enough to produce a pin-point beam (needed for greater resolution of image), and the shadow (umbra) projected always has a partial secondary shadow projected around it (penumbra effect).

A modified Linnebach Projector called the Clavilux was created by Thomas Wilfred, an American pioneer in light art. This instrument utilized three slides positioned at different distances from the light source. The one closest to the lamp served as the background image (appearing largest with blurred edges). Today a similar device may be called the Direct-Beam Projector. This device, using spherical emanations, is usually equipped with a 2800-watt, 60-volt lamp. This lamp is used because it has the smallest filament dimensions for reasonably high light output.

The filament used in the Linnebach and Clavilux projectors radiates light in two directions. Equipped with a prefocus base, greater accuracy is allowed in positioning the lamp to the surface

plane of the slide.

Generally, the slide is placed as far from the light source and as near to the screen as possible. A large slide used with a small filament allows for a shorter distance of the slide to the screen and a sharper image. Slides placed close to the light source will result in a larger image with blurred edges.

These principles of optical projection formed the basis for important concepts employed in the thesis work. The task was to design an original projection system (without objective lenses) and to achieve a fairly clear and sharp image.

A miniaturized version of the Linnebach projector incorporates high-intensity lamps because of their small, highly-efficient qualities. These lamps come in a wide variety of light output and life ratings. For projection purposes, it is possible to operate them through a transformer at approximately 20% over voltage. This will result in a high-intensity concentrated light source that casts a strong image. According to the text,

Lighting the Stage-Art and Practice by William F. Bellman, this type of lamp will produce a sharp image that exceeds any other lens-less projector except Xenon.

These lamps need to be operated over the normal voltage and therefore results in short lamp life. Wiring should be heavy and runs kept short. Electronic dimmers cannot be used with these transformer-operated projectors. Clear quartz, small filament, low voltage bulbs used in airports and on locomotives can also be used in this context however, dimming with an auto-transformer dimmer is possible.

Another variable of the lens-less Linnebach projector is the Nagy Multi-screen scenery projector system. This system combines the Linnebach-type rear projection machine with translucent screens.

The projectors are cylindrical rear hanging forms similar in size and shape to a standard 8" Fresnel spotlight. They contain a socket for a T-10, 6-volt 18-amp concentrated filament projection lamp (PH/18ATIOP or ASA code No. CPR). The

slides are mounted on the rear body. The machines are placed one above the other as close as possible on an adjustable casted stand which also carries the step-down transformers. Dimming controls that boosted voltage for additional intensity is also available as auxilliary equipment. Units are available with 3 sizes of hood for "standard," "wide" or "extra wide" projection. Projectors are usually set from 4' to 8' behind the screen.

Translucent, flame-retardent Fiberglass (usually mounted on 1" aluminum pipe framework) is used for screen material. The pipes are joined together by standard scaffolding-type framing fixtures and are free standing and readily demountable.

Standard sizes (corresponding to different screen sizes) are 12" x 16", 16" x 16", 16" x 20", 1/16" clear plexiglas or .005" prepared acetate, mounted between two sheets of plexiglas. Acetate inks are used for slide painting. Plastic theatrical color filters (Cinnemoid, Cinabex) are also used for large color areas. The above specifications were taken directly from a report by

Charles Levy of the Research and Development Section, Century Lighting, Inc. and a member of the USITT Sub-Committee on Theatre Engineering (to whom the report was submitted for review in 1962). The entire report appeared in a text by Edward Kook entitled Images in Light for the Living Theatre, 1963.

Historical and Cultural Influences

It is interesting to note how other cultures have developed particular solutions in addressing the relationship between the performer as a three-dimensional entity and the performance environment. The period of Russian Constructivist activity and Bauhaus stage design provides important historical perspectives. Major issues addressed by these movements concern the use of stage space. Exciting explorations were attempted which focused on scenery and the three-dimensional aspects of the human body in space.

African and Japanese performance concepts provide special aesthetic appeal and historic insight. The Japanese Noh performance, for example, demonstrates how political development of costume design influenced the motions of the Noh dancer. Equally important is how the material structure of the costumes influenced the performer's physical interaction with space.

In African culture in general, the masked and costumed performer creates dynamic festival and

ritualistic performances (where the performer at times is transformed by the performance experience). Dogon rituals in particular provide an example whereby the performer (as oral historian) takes on particular attributes of solar bodies (both in costume and symbolic movement). The physical landscape: sun, moon, stars, and the earth itself become interrelated within the context of the performance structure. Dogon environmental earthworks offer another example of utilization of natural phenomena in response to environment. These conical and dome-like earthworks found on the landscape provide a historic and cultural context for the pillars of light as employed in this thesis.

Russian Influence - Constructivism in theatre set design

"...In 1922 Liubov Popova (1889-1924) designed the set for Vserold Meirkhold's 'The Magnanimous Cuckold' and marked the culmination of a radical change in the role of the artist in the theatre and in the nature of stage design... Many artists

collaborated with directors, actors, musicians or turned to directing themselves... Stage design became more than a decorative 'picture' but rather interrelated to movement, pace rhythm, dialogue and the other theatrical elements. The word scenery (dekoratsiia) was replaced with 'object formulation' (veshchestvennoe oformlenie) from the word veshch which means object or thing. A construction was a thing - a production was a veshch. The theatre gave artists an opportunity to realize on a large scale the constructions they designed in their studios."*

During the 1880's Russian stage design began to gain significance as an art form. Productions given by the Moscow Art Theatre attempted to create the real world on the stage. Artists like Sergei Sudeikin (1882-1946), Nikolai Sapunov (1880-1912) and Nikolai Yulanov (1875-1949) marked the beginning of experimentation with non-representational stage techniques. They began to remove some of the

* The Avant-Garde in Russia 1910-1930, edited by Stephanie Barron and Maurice Tuchman.

realistic details from their set designs and introduced more stylized settings. These artists and others began to show an appreciation for architectural form and lighting as an expressive medium for the stage.

Vsevolod Meierkhold (1874-1940) was a major innovative theatrical director and responsible for the staging of "Masquerade" and "The Magnanimous Cuckold." Each play had great significance - "Masquerade" marked the beginning of functionalism and machine art: theatrical constructivism.

Meierkhold's early productions (1906) experimented with eliminating the stage curtain, utilizing multiple stage levels and area lighting in an attempt to eliminate scene changes. Artists Vladimir Tatlin's costumes and Kazimir Malevich's cardboard costumes and paper mache heads suggested a new sense of volume and spatial form on the Russian stage around 1913. Vladimir Tatlin (1885-1953) was a member of the Russian avant-garde and laid the groundwork for theatrical constructivism. He was the son of a railroad engineer and initially

studied railroad engineering, painting and sculpture. Greatly inspired by Picasso, he began work on relief painting (1914). He became director of the Painting Department at the Moscow Svomas/Vkhutemas (1919-1920) and in 1921 was appointed Head of the Department of Sculpture at the Academy of Arts in Petrograd. During the mid-1920's he studied the theatre and cinema in Kiev. He returned to the Moscow Vkhutemas in 1927 to work in the Woodwork and Metalwork Department; during the 1930's and 40's he worked on several theatrical designs and figurative painting.

Kazimir Malevich (1878-1935) entered the Moscow Institute of Painting, Sculpture and Architecture in 1903. He was influenced by Neo-Primitivism, Cubism and Futurism. In 1913 his paper mache heads were used in the Futurist opera "Victory Over the Sun," text by Kruchenykh, prologue by Khlebnikov and music for a single out-of-tune piano by Matiushin. He arrived at a Suprematist style of work in 1915. In 1920 he took charge of the Vitebsk Art School following Chagall's director-

ship and he founded Psovis/Vnovis (a group of student artists). During the 1920's he worked on architectural models, textile design and porcelain design. In 1930 he returned to more figurative painting. He is celebrated as the first modern artist to enter into the realm of pure geometric simplification. Suprematist compositions are self-contained harmonies divorced from associated meaning. Malevich is probably best known for the painting: "Suprematism: White on White."

Another artist, Alexandra Exter (1882-1949) made major significant advances for constructivism. In collaboration with Alexandr Tairov (1885-1950) she produced a series of productions at the Kamerny Theatre in Moscow. Exter is historically noted as having been established as one of the foremost stage designers of the twentieth century. According to the text The Avant-Garde in Russia 1910-1930, Tairov's stated aim was to create "Scenic Atmosphere" that would harmonize physically with the actor's three-dimensional body and at the same time express the mood of the play through mass, line and

color. In the play "Famira Kifared," Exter created a blue-colored stylized stage and platform environment which was flanked by large blue stonelike cubes and severe black cones. She saw her costumes as non-objective constructions in motion within the overall stage design. In a sense, the actors became living sculpture. Some research into the background of Exter shows that she attended the Kiev Art School until 1907, and that she visited Paris and other Western European cities. She began her professional theatre work with Alexandr Tairov and collaborated with him on several works. In 1918 she founded her own studio where she and her pupils created huge Suprematist designs; she worked on textile designs and in 1923 began to work on her sets and costumes for the movie "Aelita," produced in 1924. That year she emigrated to Paris where she worked on stage fashion, interior design and book illustrations. Exter's paintings, textile designs, and marionettes were celebrated both in Russia and the West. In her costume design entitled "Dress 1924" the non-objective motifs are in geometrical patterns with stark background. The

simple shapes are designed to be animated by the human figure moving through space. Her theatrical designs appear true to constructivist ideals in emphasizing the use of industrial materials and concrete construction of space. For the film "Aelita," Exter emphasized geometric asymmetry, harsh black and white contrast and innovative juxtaposition of various media, i.e. aluminum, metal-foil and glass.

Another Russian artist and costume designer Liubov Popova (1889-1924), worked with Meierkhold to produce a constructivist set for the play "Cuckold." These constructions consisted of components that moved at key moments in the play. The kinetic quality of these constructed parts gave the actors something to play with and became the principle of "objects for play" that Meierkhold developed in further explorations of Constructivism.

Popova is especially renowned and considered to have had profound influence among the Russian avant-garde. She was a pioneer in Russian interpretation of Cubo-Futurism and she practiced

non-objective art early in her career. Following the Russian Revolution, Popova was in the forefront of the Constructivist style. Her wide range of interests included painting (concerned with line-as-color and line as spatial indicators of planes passing through space), stage design, photomontage and industrial design. Much of her dress illustrations indicate her interest in the material properties of the fabric and in patterns dictated by the human figure moving through space.

In the production entitled "Tarelkin's Death" (1922), Varvara Stepanova (1894-1958), designed special furniture intended specifically as instruments for play. Stepanova also designed costumes of gray-yellow canvas with blue-black patches and stripes to underscore the bending of the limbs and the movements of the different parts of the human body.

After 1923 Meierkhold began using real objects with specific functions in everyday life as part of his sets. The constructivist movement incorporates simplicity, functional designs, and the use of real objects. He also created a restructured

spectator-performer relationship by bringing the actors out from behind the footlights at times returning theatre to the public streets and to the concept of theatre in the round.

These aspects of Russian stage design are particularly significant in formulating some of the concepts attempted in the thesis staging. There is also particular concern with the design of costume elements that move with the performer's body in space; employing industrial screen mesh that creates patterns with the light.

The constructivist concept of simplicity, functional design and proportion relates to the lighting of the environmental performance. The objects provides geometric shapes and stand in the stage environment with simplicity of form. The forms provide a function (projections and stage elements). The performer's kinetic ability to move helps to alter and transform the static optical image. Since the human quality is important in the production (not machine-like), the three-dimensionality of the human body helps to create

a more dimensional optical image.

Bauhaus Influence - Costume and set design

The Bauhaus example provides another historical reference to the use of space, light and human form on the stage, and inspiration for the initial costume designs in this thesis project.

"...a theatre (including stage and auditorium) demands above all an architectonic handling of space; everything that happens in it is conditioned by space and related to it. Form (two-dimensional and three-dimensional) is an element of space; color and light are elements of form... Light is of great importance... Let us consider plays consisting only in the movements of form, colors and lights..."*

In response to a need to achieve a new productive cooperation between art and life, and in an attempt to stay clear of late Romantic Expressionism and academicism, Hermann Muthesius sought

* Excerpted from a lecture by Oskar Schlemmer, March 16, 1927.

a synthesis between "machine" style and "arts and crafts" movements. He founded the Deutsche Werkbund in Germany in 1907. Muthesius believed that mass production and division of labor must be made to produce quality. In general, the feeling was that form should follow function.

Walter Gropius, a young Werkbund leader, founded the Bauhaus. In 1918-1919, as head of the Weimar Art Academy, Gropius joined with the Weimar Arts and Crafts School to achieve a consulting art center for industry and the trades. At the school, modern artists were trained in science and economics and began to unite creative imagination with practical craftsmanship, resulting in a new sense of functional design. This sense was carried over into the "fine arts" and applied to architecture, city and regional planning, and theater.

The Stage*

"Theatrical performance, which has a kind of orchestral unity, is closely related to architecture. As in architecture the character of each unit is merged into the higher life of the whole, so in the theater a multitude of artistic problems form a higher unity with a law of its own.

In its origins a theater grew from a metaphysical longing; consequently it is the realization of an abstract idea. The power of its effect on the spectator and listener thus depends on the successful translation of the idea into optically and audibly perceptible forms.

This the Bauhaus attempts to do. Its program consists in a new and clear formulation of all problems peculiar to the stage. The special problems of space, of the body, of movements, of form, light, color and sound are investigated; training is given in body movements, in the modulation of musical and spoken sounds; the stage space and figures are given form.

The Bauhaus theater seeks to recover primordial joy for all the senses, instead of mere esthetic pleasure."

Stage Workshop[†]

"In weimar, where we had no theater of our own, we has to use one of the local stages for our productions. Now, however, in the new building at Dessau we are lucky enough to have our own theater.

We are interested in interior space treated as part of the whole composition of the building. Stagecraft is an art concerned with space and will become more so in the future. A theater (including both stage and auditorium) demands above all an architectonic handling of space; everything that happens in it is conditioned by space and related to it. For (two-dimensional and three-dimensional) is an element of space; color and

* Excerpted from "The Theory and Organization of the Bauhaus by Walter Gropius", Bauhaus 1919-1928, edited by H. Bayer, W. Gropius and I. Gropius, pg. 29.

light are elements of form.

Light is of great importance. We are predominantly visual beings and therefore purely visual experience can give us considerable satisfaction. If forms in motion provide mysterious and surprising effects through invisible mechanical devices, if space is transformed with the help of changing forms, colors, lights, then all the requirements of spectacle, a noble 'feast for the eyes', will be fulfilled.

If we go so far as to break the narrow confines of the stage and extend the drama to include the building itself, not only the interior but the building as an architectural whole—an idea which has especial fascination in view of the new bauhaus building—we might demonstrate to a hitherto unknown extent the validity of the space-stage, as an idea.

Let us consider plays consisting only in the movements of forms, colors and lights. If the movement is purely mechanical, involving no human being but the man at the switchboard, the whole

conception could have the precision of a vast automaton requiring a tremendous technical equipment. Modern engineering can produce such equipment; it is only a question of money.

But there is also the question of the extent to which such equipment would be justified by the effects obtained. How long can a spectator's interest be held by rotating, swinging, humming machinery, even if accompanied by innumerable variations in color, form and light?

Is entirely mechanized drama to be thought of as an independent genre, can it dispense with man except as a perfect mechanic and inventor?

Since at present no such mechanically equipped stage exists, and since our own experimental stage until now has had even less equipment than the regular theaters, the human actor continues to be an essential element of drama for us."

† From a lecture with stage demonstrations by Oskar Schlemmer, March 16, 1927. Bauhaus 1919-1928, edited by H. Bayer, W. Gropius and I. Gropius.

Japanese Influence - Noh costume design

The Noh costume designs provide a striking example of form and function. This influence from a non-Western culture comes from the Japanese. A task of the project is to provide geometric form on the stage and to design costumes that allow or induce the performer to move in a prescribed manner. The development of the Noh costumes' direct lines and simple majestic form exemplifies an aesthetic quality greatly desired in the designs for thesis costumes.

Noh Theatre is mysterious and graceful with severity and restraint. Noh stage art reached maturity after the actor-playwrights Kannami Kiyotsugu (1333-84) and his son Zeami Motokiyo (1363-1443) were "discovered" and given patronage by the Ashikaga Shogun Yoshimitsu in 1374.*

Noh plays are tragic and melancholy and basically deal with the past. The costumes give the appearance of characters from another world.

* Japanese Costume and Textile Arts, Seiroku Noma, 1965, 1974.

The performers seem to be possessed with a detached spiritual quality as if belonging to a world of phantoms. It is interesting to note how the development of traditional Noh costumes occurred. Early Noh performers without official patronage were poor and lacked elaborate costumes. When Noh became the ceremonial musical entertainment of the Samurai class, it is believed that Noh companies initially received used garments from the Shogun's household and wore them for Noh performances. The Samurai continued to cultivate Noh (as rival to the Imperial Court's ceremonial music Gagaku) and had Noh performed in contemporary costume (in Samurai dress). Early Noh performers were basically concerned with portrayal of the courts of earlier ages and they developed an extreme stylization of movement and gesture in order to counter the realistic effects of contemporary Samurai dress.

Eventually, during the later Momoyama period (second half of the sixteenth century), Noh actors started using costumes made specifically for Noh performances. Heavy weave Karaori was developed

for stage effect (the thick material allowed for simple straight lines and angles as opposed to complicated curved ones). When these costumes are worn, the lines of the body disappear. This stiff angular effect was suitable for the portrayal of ghosts and visions. Other costumes (Suikan and Kariginu) were made from tightly-woven thinner cloths in order to produce a stiff, straight-line silhouette.

Karaori, Surihaku, Nuihaku and Maaiinu are among the costumes used for female roles. Costumes for male roles include Kariginu, Choken, Mizugoromo, Happi, Sobatsugi, Atsuita, Noshime, Suo and Hangiri.

It is believed that the solemn, deliberate movement of Noh must have developed together with its stiff, bulky costumes.

As mentioned earlier, Noh costumes originated from garments worn in everyday life but gradually developed in the direction of a stylized costume. It is this stylization and mysterious, graceful, exaggerated movement of form that provides important background for the thesis work.

West African Influence - Dogan

Initially, a cone-like shape was utilized as the basic underlying structure for the project. This shape was employed in both the screen forms and in several of the original costume designs. Eventually, the conical form was abandoned in favor of a cylindrical form.

Conical and domical like shapes can be observed in nature on the earth's surface. In the form of ant hill mounds, these forms create miniature dwellings. Such a motif differing in scale but similar in form, is expressed in the thesis installation; the creation of a full-scale forest cluster of cylindrical columns provide a simple geometric structure which invites an interaction between light, shadow and human form.

The conical and dome motif also exists in West African landscape design. In the Mali Dogon culture the conical earth form is imbued with historical and symbolic meaning.

The fall 1982 Art Journal published by the College Art Association of American presents a

series of articles on "Earthworks Past and Present." Labelle Prussin discusses the 1981 National Gallery of Arts' exhibition entitled "The Four Moments of the Sun" in which an attempt was made to reintegrate art forms into the aesthetic framework of space. "...perhaps the most spectacular and certainly the most pervasive art form in ...West African savannah comes from ...the earth. Trees are scarce ...few surfaces are available for two-dimensional representation. The earth becomes a primary building resource in West African savannah. The first, almost imperceptible, distinction between the natural environment and its cultural modifications occur in the softly-rounded conical mounds from which the millet seedlings sprout... The same shape is reflected in the domical mound of the ancestor pillar. The ancestor's presence is communicated by the eastern pillar; it is the 'house' of one's ancestors."*

*"West African Earthworks" by Labelle Prussin, Associate Professor of Architecture at the University of Washington. Reference to 1981 exhibition at the National Gallery of Art.

The ancestor earthen pillar becomes a theological core embodying the most sacred and heavily taboo concepts of traditional African belief systems. The male ancestors are the basis for the conical ancestor pillar while the female ancestors are represented by the domical form. The Dogon also appear to structure their territorial organizations in an unfolding spiral format (as seen in garden planting patterns) and attribute the birth of their universe to a spiral unfolding from a center point. The direct relationship between the Dogon's physical reality (as seen in the grid-like gardens which spiral around a central water source) and their beliefs in a spiral-like creation is clearly expressed as a system of earthworks on the landscape.

Early designs for the thesis project provided a landscape of cone-like forms from which light could emanate. However, the final designs resulted in a vertical pillar/tubular format to create a "magic forest" of light. Perhaps viewers will attach some symbolic significance to the columns.

The columns house light and energy. In the performance, these columns represent a forest of light—a space of light. The performers quest for light (perhaps a quest for knowledge) becomes somewhat of a dance. The performers' attempt to tangibly handle and understand the light is expressed in dance and mime.

Specific Project Components

Stage environment

The stage becomes an interior landscape of vertical cylinders. The total environment consists of: 1) projectors, 2) multi-layered projection screens, and 3) performers.

The projection screens are formed from window screen wire and bridal netting. The netting receives the projected image on their front surface while allowing the light to penetrate from one screen to the next (duplicating each image dimensionally in space). Several screens are attached to wall mounts and are also carried by the performers. The vertical projection unit is a standing six foot extruded acrylic tube with mirrored base. Each tube has a 3 1/4 inch interior diameter with 1/8 inch wall thickness. The columns are equipped with one or more 150 watt quartz projector bulbs.

The projection is based on the concept of pin-hole lens. The circular opening of the cylinder

is the actual image that is projected. This circular opening also functions as a lens. The reflective interior surface of the cylinder wall creates rings around the original projected circle achieving a concentrated light pattern. Colored gels can be inserted in the tubes to create a variety of images and effects.

The tubes are covered with 100% cotton canvas mylar or film. When lit, these materials give the tubes a subtle translucent quality. Projection occurs from the top end of the vertical standing tube and from bulbs at the base of the columns. In addition to the projection bulbs it is possible to mount Neon tubes on the cylinders. A strong, dramatic exchange of light and shadow is also achieved by projecting direct lighting on the tubes.

The performance

Mime is perhaps the earliest medium of self-expression utilized by humans in rituals of religion and in depicting cycles of nature.

An investigation of mime has helped to shape and refine initial performance concepts concerning motion, rhythm and pacing. The performance is a dialogue between the human performer and light. Light shapes and defines the space—the performers provides additional surfaces for projection. Sound helps to structure transitions of light and movement. The movement of light and the movements of the performers are key elements. Each movement, each gesture is articulated clearly and deliberately. Within this environment, the qualities of mime make for unique possibilities.

Material and Equipment

Slide preparation

Early research resulted in experimentation with a variety of materials for projection purposes: hair, stained glass, cement, salt, sand, oil and other materials. In an effort to avoid a limited colorless image the importance of finding rich optical color became apparent. 3 1/4" x 4" lantern slides were used because they provide a large surface for painting and projection. The experimentation revealed the following information:

Use of 1/16" heat resistant and polished glass was best. Either alcohol is good to remove fingerprints.

Slides are held together and bound by black cloth tape with the bottom and top left free to allow the heated air to escape.

Glass thicker than 1/8" will not pass through most slide changers.

With a hard glass 2mm thick it has been determined that 14% heat is transmitted while 12% is light loss.

Silicone paints are most apt to adhere.

Recent experimentation with colored transparent stained glass paints have yielded excellent results in exploring painted glass images for the thesis production.

Vernis gras colores by Lefranc & Bourgeois did not provide brilliant colors.

Glass stain by Plaid Enterprises, Norcross, Georgia has good color and adhered well to glass.

DEKA transparent paint by Deka, made in Western Germany and distributed by Lambert Art Supplies, Commonwealth Avenue, Boston, Massachusetts, provided excellent color selection and permanence.

Alfred Haussman, Fabrik for Theatre-Malbedarf
2 Hamburg-Wandsbek 4 RUF 66 2564: "Reprolo
Projektionsfdlbe" produces marvelous, rich and deep transparent colors, thick and durable. Apparently these colors do crack over an extended length of time but they provide excellent colored glass slides. These may not be commercially distributed in the U.S. at this time.

Equipment list

6-8 painted glass slides
projection equipment
3 lantern slide projectors (without fan)
1 follow spot designed with lungster haloger
21 volt, 150 watt bulb
3 dimmers (2000 watt limit with 30' extension cord)
2 smaller dimmers (10 amp)
9 six-foot acrylic tubes (covered with translucent
plastic coat and red clear gel at base)
9 mirrored based attached to plywood frame and
joined with L-shaped brackets
375 feet bi-pole white electrical wire
20 yards fine elastic white bridal netting
10 quartzline tungsten-halogen small filament
projector bulbs (21 volts, 150 watts with
reflector hood)

Conclusion

The thesis performance was presented at the M.I.T. Center for Advanced Visual Studies on Friday, April 29th and Saturday, April 30th, 1983. The Friday night performance was followed by a discussion with the audience. Most of the audience were students and fellows of the center. The use of nine 6' vertical projector tubes was well received. Many viewers felt that this component was a strong element in the environment. The concentric circles projected on the ceiling of the room was felt to be a strong, beautiful image and should be used more in the performance and in conjunction with other visual images occurring on the screens.

Suggestions were made to explore placing the audience closer to the environment. This suggestion was followed for the Saturday performance and resulted in favorable responses.

The Friday night performance lacked a concrete storyline and simply depicted three performers moving (improvisationally) through the space. One

performer (white woman) was encaged in a cylindrical silverwire cage and moved with the cage throughour the performance. Another performer (a young white male) was moving slowly but freely through the environment. The third performer (a teenage black girl) was draped in thin nylon gauze and floated around the interior space.

Many viewers felt that an ambiguous story was evident but had not been developed. The presence of black and white ethnic performers evoked symbolic meaning and the piece needed to reflect some clear statement or handling of this symbol. In general the audience felt all the elements were present for a strong interesting environmental performance and more rhythmic pacing of the performers and their relationship to the screens and tubes of light needed to be clearly define. The Saturday night performance attempted to address this issue.

A younger black female child was included and all three children appeared together (family-like). The performance movements were slower than in the Friday night performance. The children, in response

to a gong sound began a slow walk into the environment. Once inside, they appeared to float and pass through invisible walls in an attempt to explore this new terrain. As the vertical tubes were lit the children stretched toward the light. This appeared to be a successful image and should be explored in further installations.

The use of three lantern slide projectors, five dimmers and nine tubes proved to be manually difficult for one or two projection operators. Automatic dimming or use of film (to move the image) should be developed, as this would allow for greater variations in image and smoother transition between one image and another.

The inner penetration of images on the screens was most effective on Saturday night with the use of diagonal and vertical patterned slides.

Bibliography

- Barron, Stephanie and Maurice Tuchman, ed. The Avant-Garde in Russia 1910-1930. Los Angeles County Museum of Art, Los Angeles, Calif., 1980.
- Beeler, Nelson F. and Franklyn M. Branley, Experiments with Light. Thomas Y. Crowell Co., New York, 1957, 1964.
- Bellman, William F., Lighting the Stage - Art and Practice. Chandler Publishing Co., New York and London, 1974, 2nd ed.
- Coe, T. Ralph, The Magic Theatre Art Technology Spectacular. The Circle Press, Kansas City, 1970.
- Edelson, Mary Beth, Seven Cycles: Public Rituals. 110 Mercer St., New York, 1980.
- Gregg, James R., Experiments in Visual Science. The Ronald Press Co., New York, 1966.
- Gropius, Walter, Die Buhne im Bauhaus. Bei Florian Kupferberg, Berlin, Germany, 1965.
- Held, M.W., A History of Stage Lighting in the United States in the Nineteenth Century. University Microfilms, Ann Arbor, Michigan, 1960.
- Lam, William, M.C., Perception and Lighting as Formgivers for Architecture. McGraw-Hill Book Co., New York, 1977.
- Loeschke, S. Maravene, All About Mime. Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1982.
- Noma, Seiroku, Japanese Costume and Textile Arts. Weatherhill Heibonsha, New York and Tokyo, 1965, 1974.

Pehnt, Wolfgang, ed., Encyclopedia of Modern Architecture. Harry N. Abrams, Inc., New York, 1964.

Pilbrow, Richard, Stage Lighting. Drama Book Specialists, New York, 1970, 1979, 2nd ed.

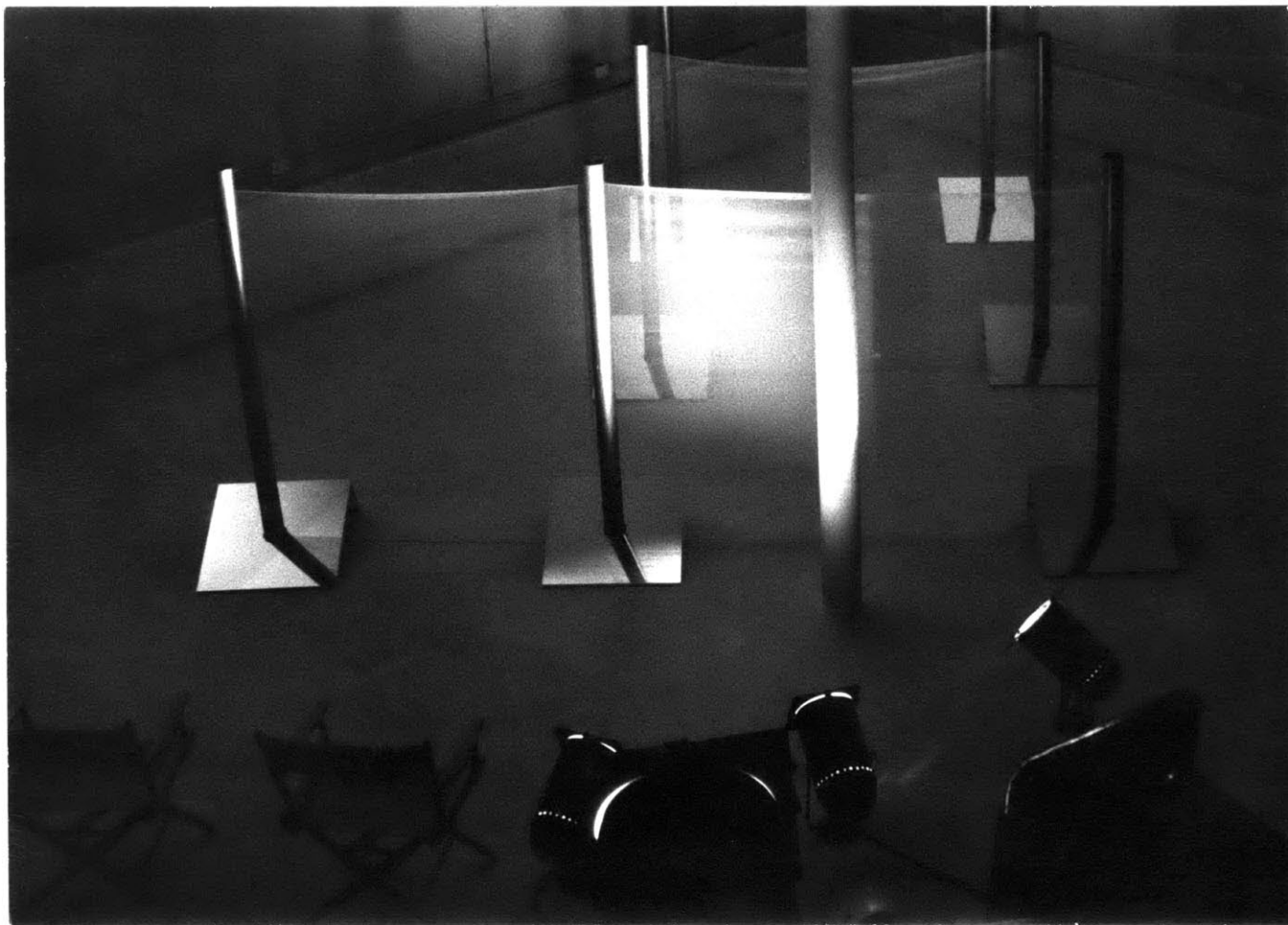
Rubin, J.E., The Technical Development of Stage Lighting Apparatus in the United States, 1900-1950. Thesis, Stanford University, Stanford, California, 1959.

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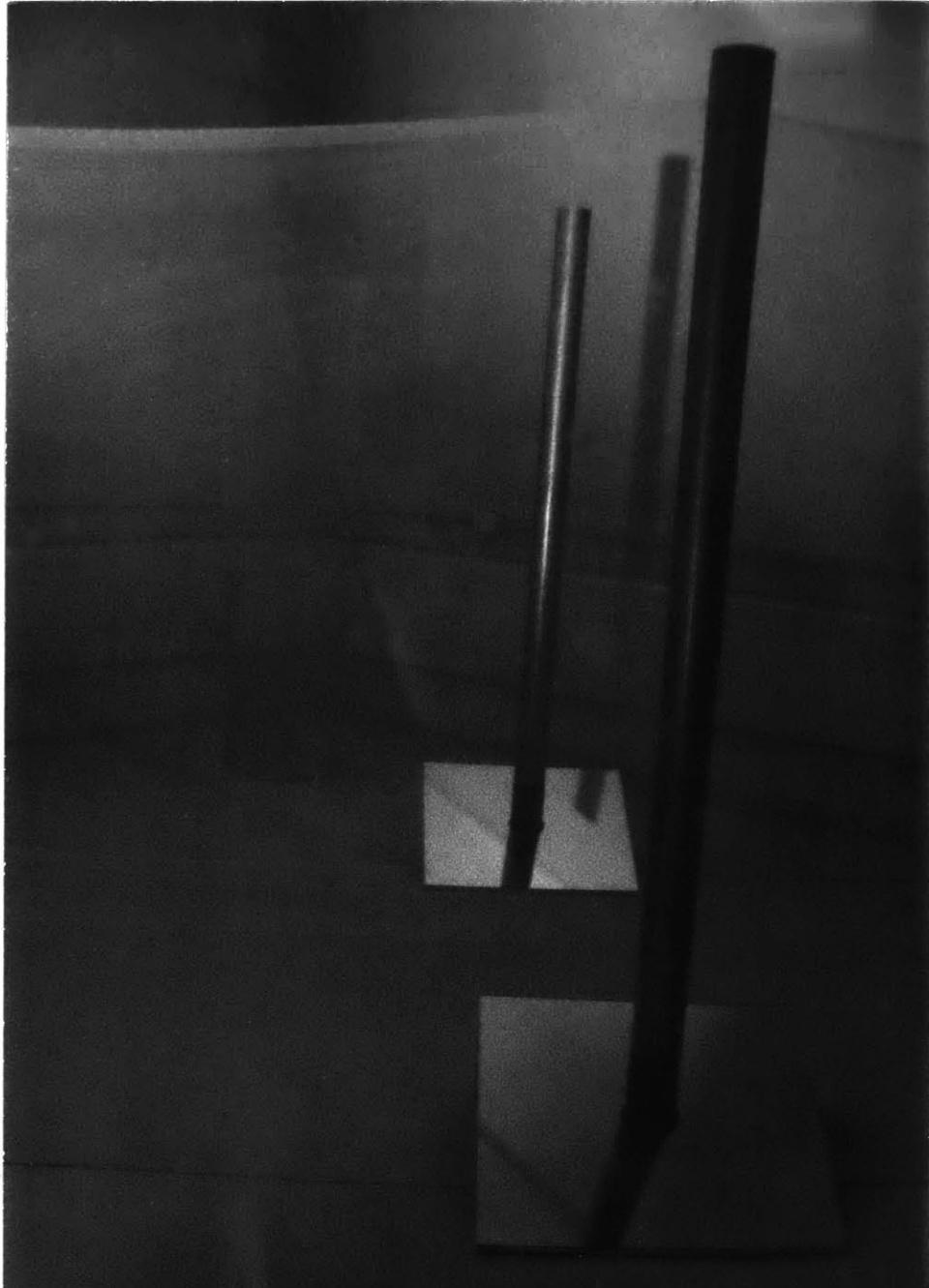
Thesis Installation

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