

Moholy = Nagy

AN ANTHOLOGY

edited by

Richard Kostelanetz

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Frontispiece: Laszlo Moholy-Nagy, Brighton, England, 1936.
Photo Serge Chermayeff.

To the Memory of Sibyl and Claudia Moholy-Nagy

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Any object may be considered a light modulator, for as it reflects the light it also modulates or changes the rays which strike it. It reflects some rays, absorbs others, possibly permits others to pass through if it is transparent while refracting them to some degree, or if the substance is translucent, it diffuses the rays that are neither reflected nor absorbed.

The human face is the best-known of all light modulators, and certainly it ranks near the top of the list in complexity. Straight lines are few; flat surfaces, if any, are small. Surfaces and lines are nearly all curved and there are very few surfaces of plane curvature—curving in only one direction as on a cylinder, for most are compound curves. Surface texture and color vary with the person's age, for the skin of a baby is vastly different from that of a patriarch, and there are countless degrees of difference between. Add to these natural differences the "war paint" of the cosmetic counter, and you really have a study in surface textures as well as colors.

Then there are the eyes, which present, in addition to their general expression of personality, the specific light-modulating problem of a variation of surface textures, shape, and even of the nature of substance.

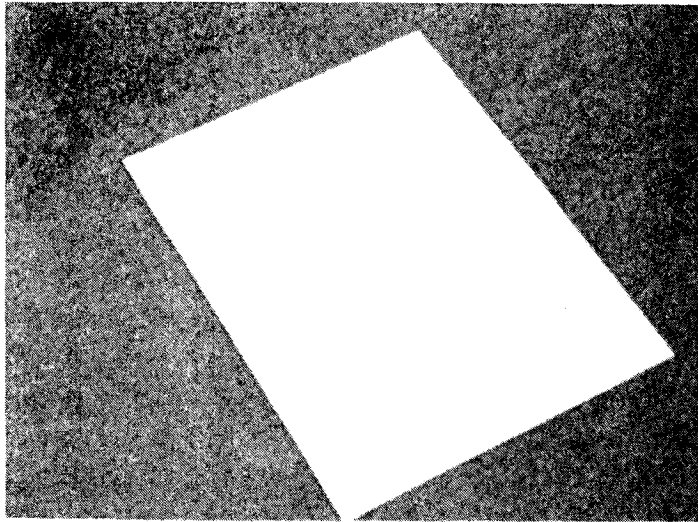
The mustache was decried by a famous movie actress as a den of microbes in alarming proximity to the kiss, but to the photographer it presents a problem in light modulation and in such space relationships as depth quite similar to the hair, the eyebrows, the eyelashes, and (if any) the beard. Finally, to add to the problem, there are the lips and the teeth (if they show), and that marvelous study in light and shadow, the ear.

With all this complexity of substance, line, contour, color and texture, the face is a marvelous subject for study of the modulation of light. This accounts in part for the great variety of portraits possible with only one face as the subject. In practice it is frequently difficult or even impossible to have at the photographer's command a face for study purposes, so at the School of Design the student manufactures light modulators out of paper or other materials which can be bent or molded or cut to produce the various shapes, textures, etc., in the photographing of which he must become proficient.

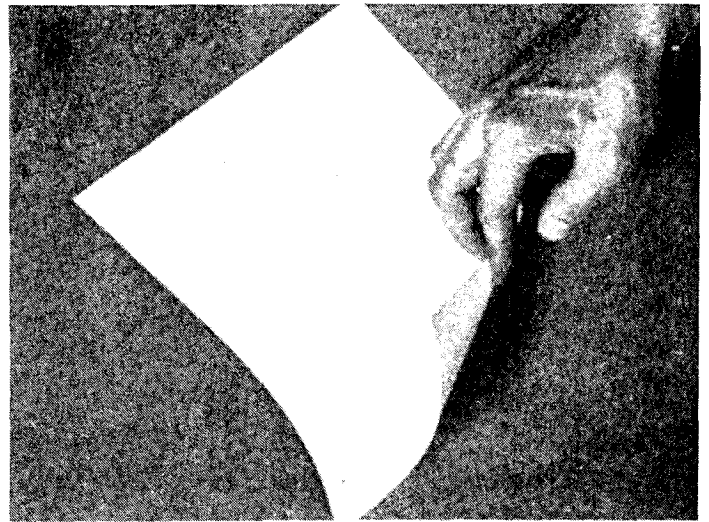
Few detailed directions are necessary for the actual making of the light modulators. Each is the product of the individual's own ingenuity, dexterity and interests. Having seen in the accompanying

From *Minicam*, 3, No. 7 (March, 1940).

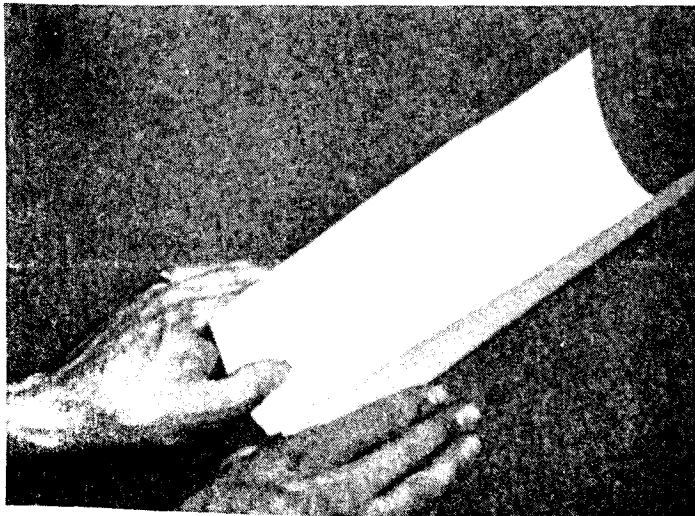
MAKE A LIGHT MODULATOR



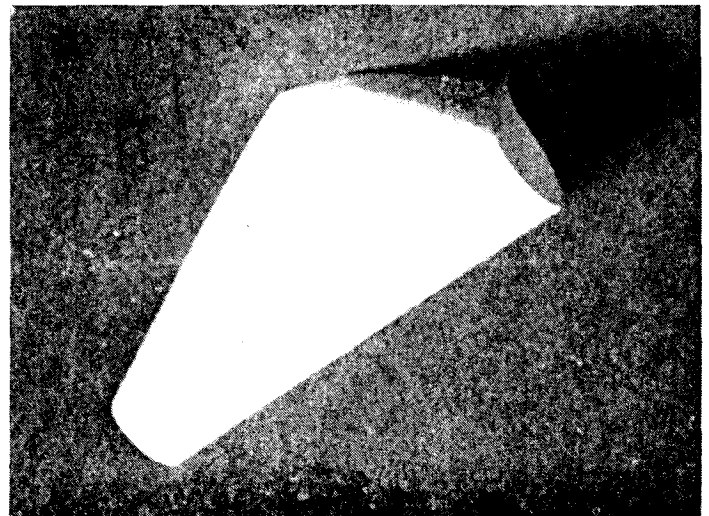
1. Place a sheet of white paper on a dark background.



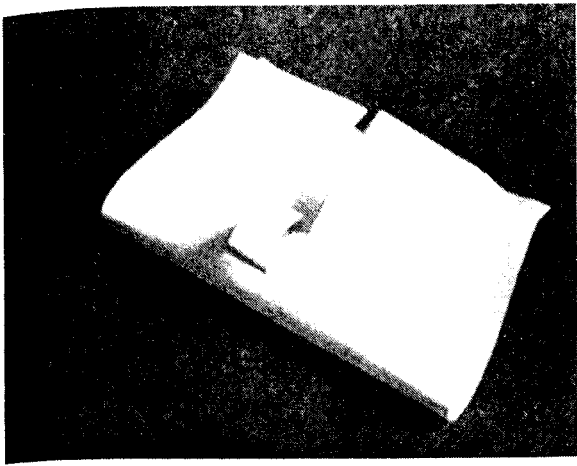
2. Bend one corner and notice the shadow cast and the gradual darkening as the paper curves away from the light source.



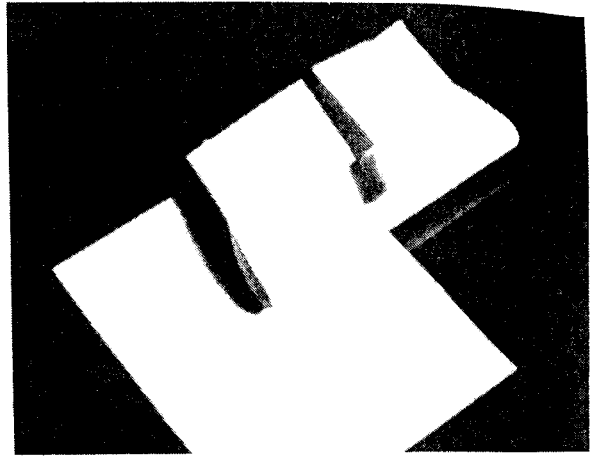
3. Observe the effects of bending up two sides.



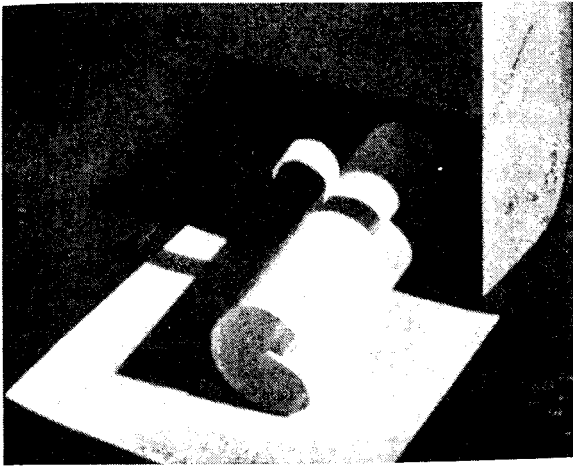
4. Fasten the four corners together to see the effect of curvature on light.



5. Cut or tear a hole in the paper and note the effects of this upon the lighting and the number of tones obtained.

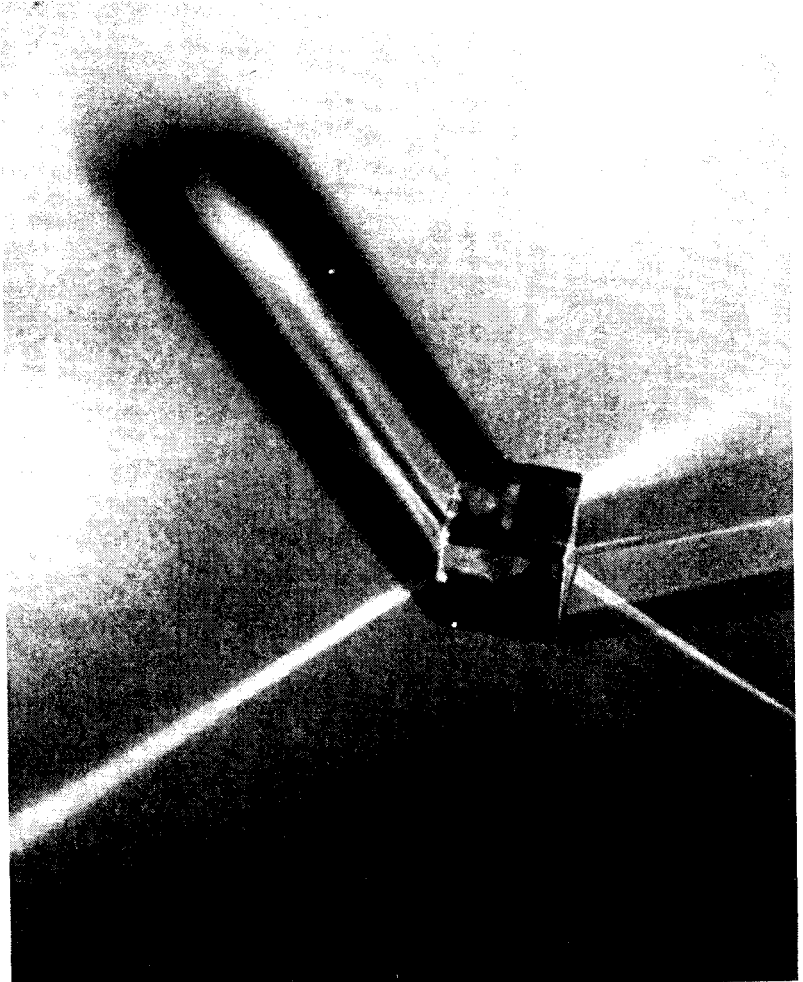


6. Watch the effect of adding a second sheet of paper.



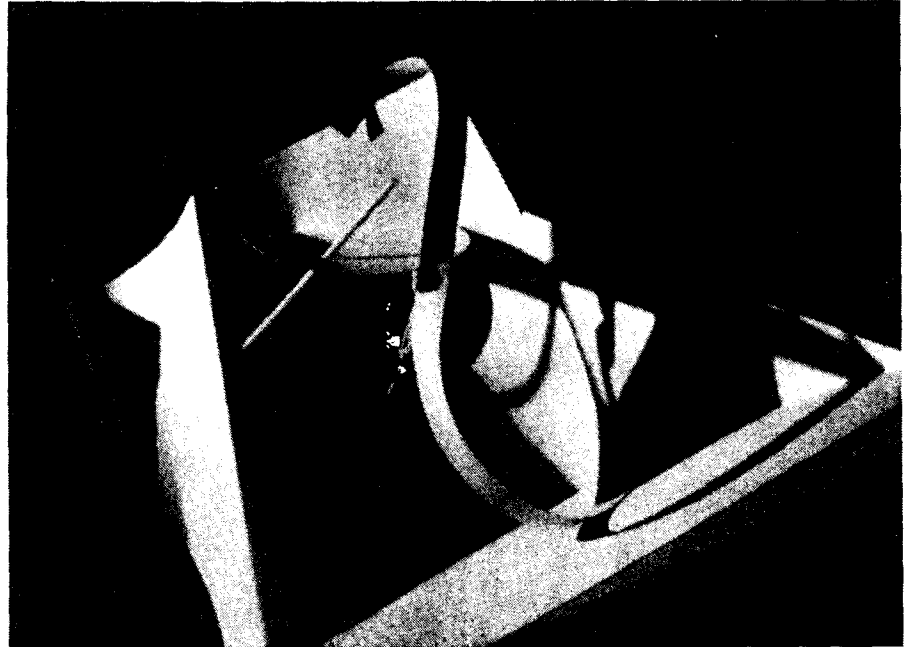
7. Add an opaque object or let the light fall across a straight edge before it hits the modulator. Observe how noticeable the curves become, due to the modeling furnished by the tone gradations.

8. Photograph opaque, translucent, and transparent objects with shiny and dull surfaces. Experiment with the light source itself, increasing or diminishing it, focusing it on the object or diffusing it. By William Keck and Robert Tague.





9. Light modulator by L. Cuneo. The light modulators shown here were devised and photographed by students at the School of Design.



10. Paper light modulators as a product of the imagination are as simple or as intricate as the photographer wishes. By L. Nederkorn.



11. Paper modulator contrasted with a flat panel of grained wood. By Clarence Bielman.

illustrations what some typical light modulators have been, you can imagine what any other modulator might be. If you lay a piece of plain white paper on the top of a table, Figure 1, you will see that even in that form it is one type of light modulator—the simplest possible of all types, for it reflects the light evenly over its entire surface.

Then, if you lift one corner, or one edge, Figure 2, or both edges, Figure 3, or all four corners, you will see for yourself how its light-modulating values change with each slight alteration of position. If you fasten all four corners together as in Figure 4, you can see the reflective effects of various types of curvature on the light, and the space relationships which have been created. If now you cut or tear a small hole near one corner, as in Figure 5, you can observe the changes in light and shadow which have been wrought by this simple act.

Try various bends, cuts and folds of the paper. The variety of modulators possible is endless. Then try adding another factor—perhaps another type of material, more shiny, more nearly opaque, or perhaps more nearly transparent, metal and glass are examples—and observe what this does to the arrangement of light values. Add an opaque object with a straight edge to the assembly or let the light fall across a straight edge before it hits the modulator, and observe how much more noticeable the curves are when contrasted with it. See, too, how much more readily depth and illusions of space are created.

Light the modulator from various angles, and with different combinations of light. Observe what changes are made in each part and in the whole effect.

Photograph the modulator, striving to reveal it to its best advantage—that is, so your photograph will most quickly identify the true shape and nature of your modulator in the mind of another person.

Observe closely. Impress upon your memory the manner in which each feature modulates the light. With some thought and practice you will be able to apply this information to similar surfaces and contours when they appear in the subjects you wish to photograph.

There is an important application of the light modulator in the field of creative photography. As you observe its effects upon *light*, note *your emotional reactions* to each combination of shape, contour, texture, color and lighting. Note how the light was integrated with the other factors to produce that reaction and you have a basis for deliberately producing a similar instinctive response from other persons. Photography, which is painting with light, can achieve this

as surely as can painting with oil and pigment, or the shaping of words into sentences. That is the new frontier of photography.

After learning how to photograph a series of light modulators made in this manner, graduate to the photographing of a more difficult object, perhaps a face, which will include all the properties and problems of your whole series of light modulators. Having studied each problem separately, you will know what each type of modulation will mean in the finished photograph. You will need less time to achieve good results.

Obviously this principle can be applied to pictures other than portraits. In making an industrial photograph for advertising purposes, for example, it may be necessary to stop the machinery while the picture is being made. There will be no time for experiments while the machinery is stopped, for each minute costs the manufacturer money. You must know beforehand which view will make a dramatic picture and how to translate the available light into a dramatic picture. There will be many shapes and types of surfaces, and definite space relationships—depth, height, comparative dimensions, interpenetrating objects, surfaces that meet and cut one another, transparencies, mirrorings, etc. If you are familiar with the uses and effects of each individually and in relation to one another in a picture, you will be able to move surely, swiftly and efficiently about your work. Such complete familiarity with these elements can be acquired by study of light modulators of your own manufacture.

The camera and finishing equipment, together, constitute merely the “typewriter” of picture-making mechanically. The quality and power of the finished product depends mainly on the operator, not the mechanism itself. Instead of words, he works with light values—highlights and shadows—and if he modulates and uses them properly he can produce the desired optical impressions of space relationships.

The New Bauhaus and Space Relationships *L. Moholy-Nagy*

The key to workshop training, which is the real Bauhaus idea, is the very deep, spiritual connection it has with craftsmanship. In the old Bauhaus it was the idea of the founder, Professor Walter Gropius, to have, in spite of a technically and socially advanced

From American Architect and Architecture, CLI (December, 1937).

world, the same excellence of production that was significant of craftsmanship in the Middle Ages. This implied a training closely related to architecture, an architecture which integrated all designers' shopwork. Separate laboratories were devoted to the study of wood, metal, glass, clay, stone, textile, plastics, etc., affording the student a possible means of livelihood and certain security. This community of teachers and students was able, day after day and year after year, to produce useful inventions as a result of their studies. This was not due to their knowledge alone, but to their imagination and ability to see the goal of their own lives. The source of their ingenuity was their vision of life and their freedom to utilize the means and knowledge of the time in a new and unrestricted manner.

Raoul Francé's bio-technique, which we shall teach in the New Bauhaus, is an attempt at a new science which shows how natural forms and designs can be translated without great difficulty into human production. This means that nature's ingenious forms can be reduced to technical ones. Every bush, every tree, can instruct us and show us inventions, apparatus, technical appliances without number. I visited the east coast this summer and I was most amazed to see a little animal until then unknown to me—the horse-shoe crab. This very thin prehistoric animal shell is constructed in such a wonderful and economical way that we could immediately adapt it to a fine bakelite or other molded plastic form. It is said that Edison, who was one of the greatest of your countrymen, had never invented anything without getting an order for it. His conscious approach to inventions is a great example for our students because whatever was done in human history as an outstanding achievement can be repeated or can be developed to a standard ability. This approach of function and industry is today no longer a revolutionary principle but an absolute standard for every designer. For this reason alone we could not build in the New Bauhaus a creative community again, but could produce only a rigid teaching system.

A fresh outlook can come only through satisfactory designs for our biological needs. Our aims today go far ahead of those of yesterday, of the labor-saving devices built into our architecture. When we design we must relate them on a much greater scale with our psychological, psycho-physical needs beyond those of our physical comfort. This, I confess, cannot be done easily because we do not know enough about ourselves. We must work hard for such a knowledge since our biologists and physiologists, etc. have not supplied as yet sufficient data to enable us to understand the human

being and his most important needs. When a clear statement, clear function and clear means are given, the design will not be difficult to execute. A factory, hospital, school or office building is rather definable and we have in each up to now really the most satisfactory designs. The difficulty today lies in the architectural design for dwelling purposes. We are told that we can kill a human being with housing just as surely as with an axe, but we do not yet know how to make him happy. The problem is clearly stated. To help bring about a right solution is the goal which the New Bauhaus has set for itself. But all have to cooperate, the scientists, the technicians and the artists, in order to find which course our designs should take; how they should be controlled, simplified, or enriched in accordance with the needs of the individual today and for future generations.

We must be far-sighted enough to visualize the effect of our actions on mankind and to have sufficient intuition to relate our suggestions to his work and also to his recreation. We must know, among other things, his reaction to material, to color, to form and to space.

We attempt to teach today the understanding and use of spatial relationships much as we are teaching in the grade schools the ABC's which can be put together in words, the words into sentences, and the sentences into expression.

In our definition of space considerable uncertainty prevails at present. This uncertainty is evident in the words we employ, and it is precisely these words which increase the confusion. What we know of space in general is of little help in assisting us to grasp it as an actual entity. The different kinds of space are rather surprising, and you will be amused when you hear the manifold terms which we daily use without exact knowledge of what they convey. We speak today of:

mathematical	crystalline	projective	finite
physical	cubic	metric	infinite
geometric	hyperbolic	isotropic	limitless
Euclidian	parabolic	topographic	universal
non-Euclidian	elliptical	homogeneous	etheric
architectural	bodily	absolute	inner
dance	surface	relative	outer
pictorial	lineal	fictive	movement
scenic	one-dimensional	abstract	hollow
cinema	two-dimensional	actual	vacuum
spheric	three-dimensional	imaginary	formal, etc.

Space

Notwithstanding this bewildering array, we must recognize all the time that space is a reality in our sensory experience; a human experience like others, a means to expression like others; like other realities, other materials. Space is a reality that can be grasped according to its own laws. As a matter of fact, man has constantly tried to use this reality (this material) in the service of his urge for expression, no less than the other realities which he has encountered.

A definition of space which, even if it is not exhaustive, may at least be taken as a point of departure for further consideration, is found in physics—"Space is the relation between the positions of bodies."

An explanation for that may be this: Two bodies exist, say the earth and the moon. The relationship between their positions means space. We can now change earth and moon into other bodies, e.g., to two chairs or two houses or two walls. We can change it into telegraph posts, into wires, into two fingers of our two hands. We must test this simply by sensory experience through our eyes in order to be able to understand it correctly. This experience of the visible relationships of position may be checked by movement—alteration of position—and by touch, and it may be verified by other senses.

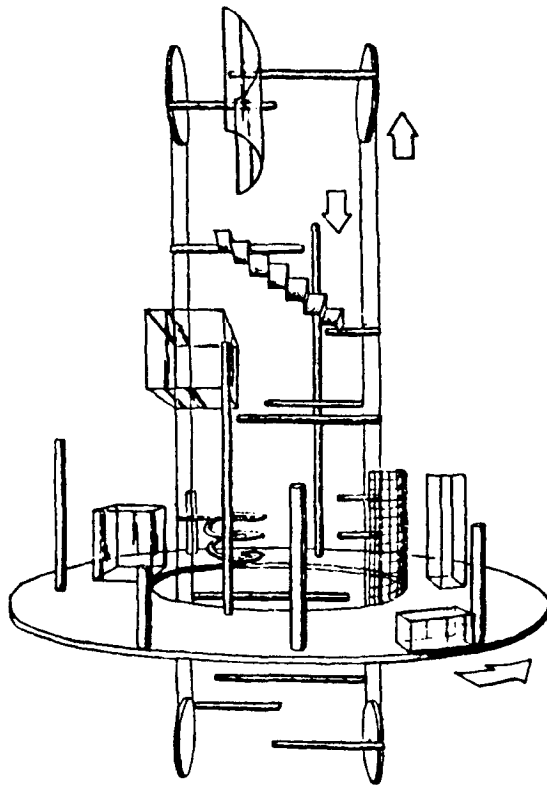
We know, for example, through experiments, that it is possible to distinguish forms and space through hearing, too. We know of substitutes for the eyes of the blind which mean that the photo cell is used to translate the visual existence into an acoustical one. We know the localization and function of the organ for balance called the labyrinth through experiments with the swirling porpoise. We know through our own experiences that when we ascend or descend a spiral staircase or land in an oblique airplane, our own balance sense, the labyrinth, records clearly the relationship between our consecutive positions.

According to this, man perceives space

1. Through his sense of sight in such things as wide perspectives, surfaces meeting and cutting one another, corners, moving objects with intervals between them.
2. Through his sense of hearing, by acoustic phenomena.
3. Through means of locomotion, horizontal, vertical, diagonal, jumps, etc.
4. Through his sense of equilibrium; by circles, curves, windings (spiral stairways).

All this sounds very complicated, but once we begin practical work with small models the goal becomes more clear. We must certainly know that a real space experience is a summary of experiences from many categories. If we analyze this we observe that every sense is able to record space relationships, but the highest form of space comprehension means the synthesis of all sensory experiences. Thus our students work first with the simplest perception formulas and slowly reach the peak.

In the near future I hope to construct a spatial kaleidoscope which should be an example for small constructions by the students themselves. I will assemble on a horizontal disc some perpendicular sticks which will revolve. Over the middle of the disc I will place a small elevator containing slats and rods, horizontal and oblique, and spiral forms, and transparent bodies, and then I will move it, too, in a vertical direction.



As the disc and the elevator move simultaneously we will have every kind of intersection and every kind of relationship between the "positions of bodies." The movement may be stopped at any time so that an interesting space relationship can thus be easily

fixed, and by drawing or other means of representation may be recorded.

To this type of spatial exercise we add the study of perspective and stereoscopic drawing which helps to obtain a spatial vision. I find very often that the grasping of space seems to be, for most people, a very difficult task. They find it difficult to think in terms of space relationships on different intersecting and penetrating levels and heights. Even excellent architects, knowing every part of their subject, everything about technique and function, sometimes have difficulty in visualizing a rich space formula. This is actually the reason why contemporary architecture appears sometimes rather simple in comparison with the Gothic or Baroque.

According to my belief, space experience is not a privilege of the architectural genius. It is a biological function, and we must try to approach it in a conscious way. The biological bases of space experience are everyone's endowment, just like the experience of colors or of tones. By practice and suitable exercises this capacity can be developed. To be sure, there will be many degrees of difference in the maximum capacity, exactly as is the case in other fields of experience, but basically space experience is accessible to everyone, even in its rich, complicated form.

I am convinced that sooner or later we shall have a genuine space system, a dictionary for space relationships, as we have today our color system or as we have our sound system for musical composition. This has another significance, too; it is not enough that the architects will be clear about spatial relationship and spatial composition but, if their work is to be appreciated, the layman, the client, must know about space, too. Of course, in the planning of a modern building the most varied problems come up; social, economic, technical, hygienic. It is probable that upon their correct solution the fate of our generation and the next, in an essential aspect, depends. But in addition to the fulfillment of these elementary requirements, man should have opportunity in his dwelling to experience the fact of space. This means that a dwelling should be decided upon not only on the basis of price and the time it takes to build, not only upon the usual considerations of its suitability for use, its material, construction and economy, but the experience of space also belongs in the list, as essential to the people who are to live in the house. This requirement is not to be taken as a vague phrase of a mystical approach to the subject; it will not be long before it is generally recognized as a necessary element in the architectonic conception, and one capable of being exactly circumscribed. That is, architecture will be understood, not as a complex of inner spaces, not merely as a shelter from cold and from danger, not as a

fixed enclosure, as an unalterable arrangement of room, but as a governable creation for mastery of life, as an organic component of living.

The future conception of architecture must consider and realize the whole. Individuals, who are a part of a biological whole, should find in the home not only relaxation and recuperation, but also a heightening and harmonious development of their powers. The standard for architects will then no longer be the specific needs in the housing of the individual, or of a profession, or of a certain economic class, but it will revolve around the general basis, that of the biologically evolved manner of living which man requires.

Architecture will be brought to its fullest realization only when the deepest knowledge of human life in the biological whole is available. One of its most important components is the ordering of man in space, making space comprehensible.

The root of architecture lies in the mastery of the problem of space; the practical development lies in the problem of construction.