

SYMMETRY/ASMMETRY: AN ARTIST'S VIEW

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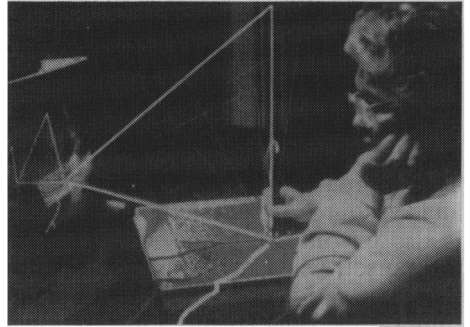
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For weeks I have tried to separate into three parts my responses to the three questions on symmetry/asymmetry (heuristic, interdisciplinary, cultural aspects) only to be frustrated at every attempt. For my life/art/teaching have gone through an evolutionary process and are still so totally intertwined in my mind and senses, that at this time it is impossible to neatly unravel — into separate parts — the three aspects requested.

It has taken me forty years to arrive at my present understanding of life/art/science relationships. I hope that in spite of my non-strict adherence to form, this paper will nevertheless, satisfy the requirements for the essay, for I have tried to show how symmetry/asymmetry have been fundamental structures in my work and struggle as an artist as I ever so slowly moved towards a unity of art and science in my life and work.

QUESTION 1

what is
symmetry?

Symmetry/asymmetry are an underlying structure of my life, art, and teaching and they are a framework for my struggle as an individual in society, in particular this American society. For four decades I have accumulated visual and verbal records showing symmetrical/asymmetrical interaction. These

records show *symmetrical/asymmetrical* structures, which are depictions of the tension of opposites and of balance and imbalance. The tension energizes the whole. *Symmetry/asymmetry* as fundamental structure in my work has remained constant, while the content of that structure has changed. For science and technology have played ever increasing roles in my art and work, an evolutionary, developmental process has occurred. A process of scientific assimilation and technological experience has gradually altered what I perceive as *symmetrical/asymmetrical* structure and content (Figs. 1, 2, and 3).

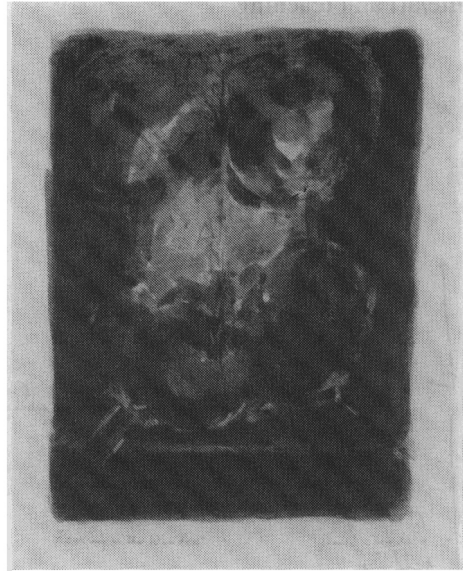
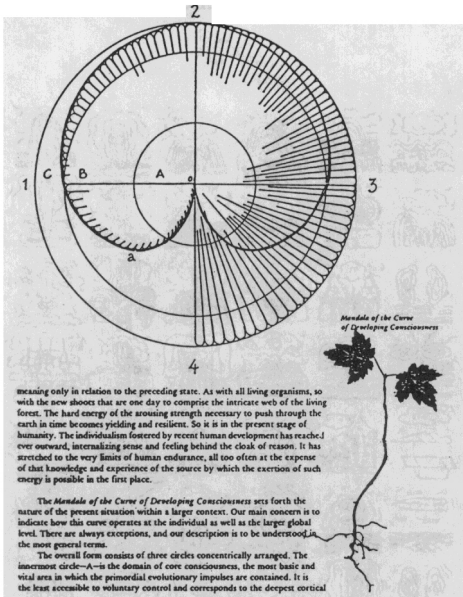


Figure 1: Flowering in the Window, Watercolor 7" × 9" 1963.

Figure 2: Consciousness, Notebook Page 8 1/2" × 11", 1979.

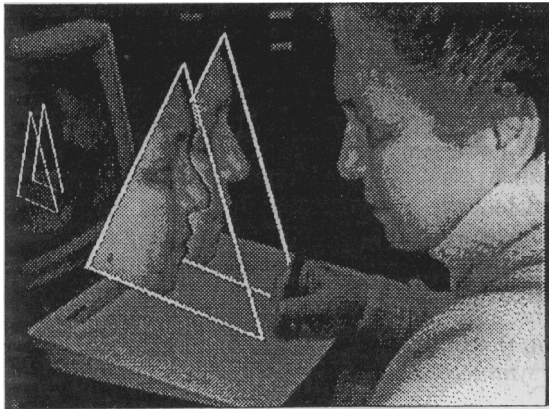


Figure 3: Synchronicity/Simultaneity, Lumena computer graphic 30" × 40", 1987.

Throughout this struggle and search for what art is, my concept of the content of *symmetry/asymmetry* has altered in direct proportion to my acceptance of scientific ideas. In the 1940's I was not consciously aware of the *symmetry* which existed in my work, although I was always searching for that which I considered natural. It was not until the late 1970's, with the help of scientists, that I began to understand that natural mathematical structures relating to growth and motion underlay my art work. Nor was I aware that I was transforming the static geometry of my art history lessons into a dynamic math appropriate to my own time and sensibilities. In fact not until I was asked to submit this article did I really think in precise terms about this fundamental structural element – *symmetry/asymmetry*, – which underlies my life/art and teaching.

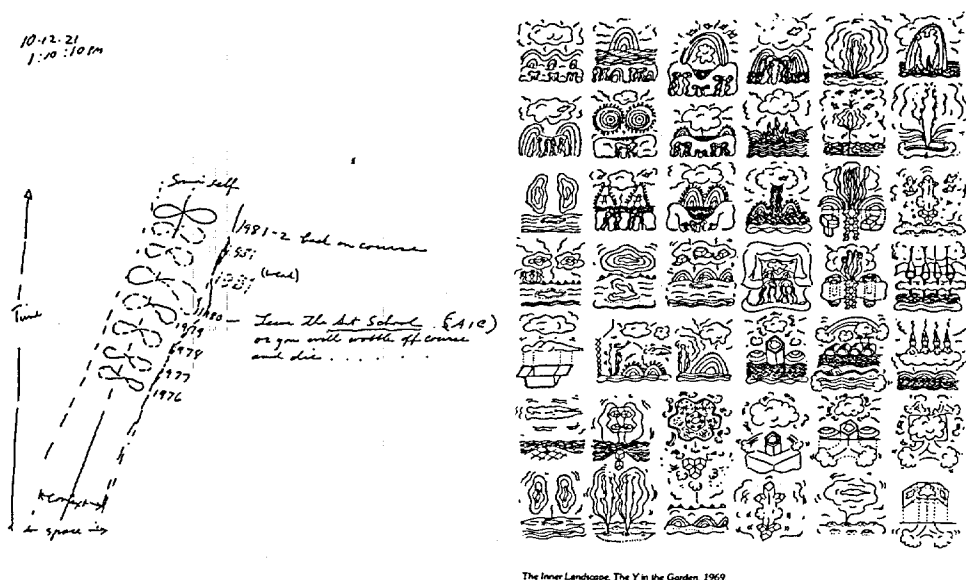


Figure 4: Notebook Page, Notebook Page 8 1/2" X 11", 1980.

Figure 5: Inner Landscape Page, Silkscreen 24" X 30", 1963.

Upon receipt of the *symmetry* invitation however, I raced to search through a vast pile of sketchbooks and art work for what I sensed existed in them. There I found that the conception of *symmetry* existed in work after work, while *asymmetry* appeared sporadically at stress points. A drawing (Fig. 4) in 1979, for example, warns me that I am out of balance at the Art Institute and must leave it to remain an artist. Other 1963 images (Fig. 5) contain two opposing forces – organic/inorganic – in single frames. It seems that time and again, I divided a picture into two parts. I even bought a totally *symmetrical* brick house with a center entrance door and windows on each side because it satisfied some deep inner sense of order. Only now that I am focusing on the subject of *symmetry* do I begin to understand the depth to which my need for *symmetrical* order and balance were programmed into my life and work.

For over a period of forty years I have moved gradually from juxtaposing shapes *symmetrically* to juxtaposing elements in time *symmetrically*. In fact the last body of my work deals with the visualization of time. But all of this developed slowly over a period of decades. In order to explain how this happened, I find, I must pull the threads of this development apart a strand at a time and discuss my life/art work/teaching as a unified whole.



Figure 6: Fire, Lithograph 12" X 14", 1947.

In the process of examining this evolution, I will show the gradual development of my art as I struggled to gain access to contemporary technology and to assimilate scientific ideas.

Forty years ago I had not the slightest notion that by the end of the 1980's I would spend valuable hours in scientific laboratories as artist-in-residence, that I would train a body of students, who would invent and patent tools that I never dreamed of in the 1940's. How could I know that technological tools would be useful in validating my hand drawn dreams? For in the 1940's, in a major college in New York City, a camera was considered a machine and inappropriate for art purposes. Science, in spite of anatomy classes, was never discussed. It belonged to another specialty.

It is not surprising therefore, that my art work of the 1940's and 1950's was for the most part representational. Human figures were my main subject. My art heroes were Rembrandt, Daumier and Goya. My heroines were Käthe Kollwitz and Marie Curie. My 1947 lithograph, Fire (Fig. 6) shows energy, motion and two aspects of *symmetry* – black and white. (In 1960 my Master's thesis was *The Power of Black and White*.) It also depicts myself in *symmetrical* struggle with not only fire, but what I only now understand to be the struggle of a woman artist, with a family, in an intellectually alien environment. My parents had been philosophy majors and social activists. They were not scientists in the strictest sense, but they instilled in

me a deep respect for science, an abiding love for nature and all things natural and appreciation for life-enhancing technology. My early notions of dialectics, of the tension of opposites, and of the contradictions inherent in systems was part of my family education. When I lived in the Far East, this aspect of my home education was reinforced. For it was my home education that set me on a path of long range social and technological change.



Figure 7: Operation Rat Team, Photo, 1955.

Technology, that is new technology, was not permitted in my New York City College in the 1940's. There were no cameras and no printing presses. By the late 1940's I gained access, in the Midwest, to my first "modern" technology, the lithographic press. It was thus when I printed *Fire* (Fig. 6) that I was exposed to "technology" in art. From early childhood I had a camera, but was taught at school that it was not an art tool, while at home *simultaneously/symmetrically* I learned from books that photography and printmaking were powerful democratizing technological processes.

By the 1950's I had become a high school teacher, and had begun to work with a biology faculty member, John Urton, an ex-student of Julliard School of Music and philosophy PhD candidate. We formed a team called *Operation Rat Team* (Fig. 7) for the underprivileged students. While I taught the students medical drawing, as my part of the team, he taught cancer research. My own art work consisted primarily of portraits of the students. In 1957 I went to Taiwan with my husband, who was on a student fellowship to study the Chinese Warlord period. Here I was exposed to Chinese literature and society. The result was a reaffirmation of my earlier education that a dialectic process was involved in life and art. And once again *symmetry* began to assume a major role in my work.

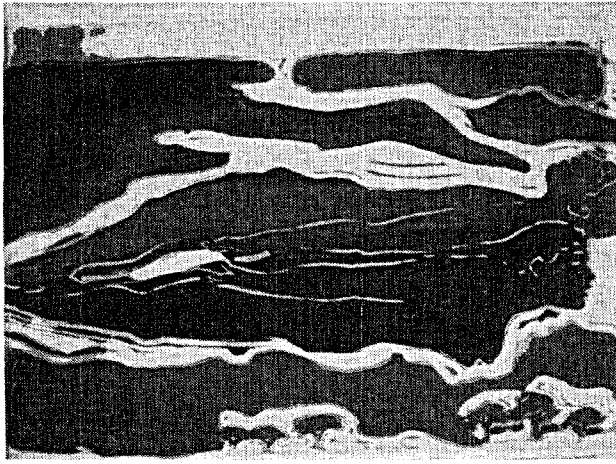


Figure 8: The Floating Life, Japanese Woodcut 16" × 20", 1960.

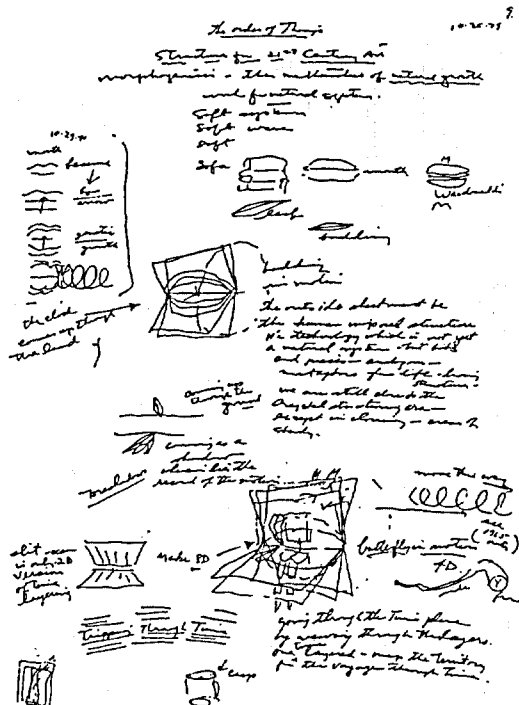
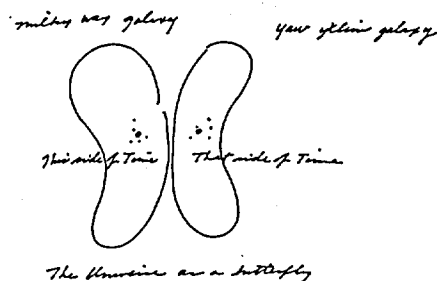
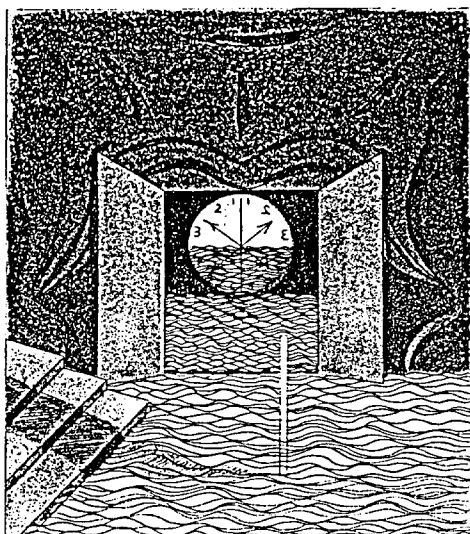


Figure 9: The Order of Things, Notebook Page 8 1/2" × 11", 1979.

In Japan I made a woodcut, *The Floating Life* (Fig. 8), in which a black and brown figure floats on a landscape shaped in human form. This figure was drawn in the form of 'budding' (Fig. 9), as described in Rene Thom's *Structural Stability and Morphogenesis* (1975). I learned of Thom's work and of natural structures

underlying my work from the 1960's on, from the mathematician Don Saari at Northwestern University, where my husband began in 1961 to teach Chinese history. At the same time I began teaching at the Art Institute of Chicago, where I stayed until early retirement in 1980. The dynamic 1960's were the beginning of one of the richest period of my life, art work, and teaching.

Symmetry played a basic role during this period, it was for me, the beginning of an accelerated use of technology, of teaching of fundamentals such as color, and 2-dimensional design, and of coming to grips with East/West cultural differences. I pursued at least two specific symmetrical routes. One was objective art/science investigation done during the daytime. The other was subjective dream retrieval of images, usually after midnight. I studied and drew a great many biological-organic and still-inorganic forms. With yet another philosophy student-turned-physics-lab worker John Bollweg at Northwestern University, I systematically experimented with hand-made (turn of the century) diffraction gratings. Together, John and I, explored the dimensions of light diffraction — I for visual information, John, I believe, for the love of knowledge alone.



The milk way galaxy and the universe embrace
the yow ykewi galaxy.
The Yow Ykewi Galaxy
The Milky Way Galaxy
The Yow Ykewi Galaxy
Taurian milk was called "Time"
Time runs in the opposite direction on Yow Ykewi.
But events on the two galaxies are synchronous!
How? Topological explanation possible?

Figure 10: The Two Sides of Time, Watercolor 7" X 9", 1963.

Figure 11: Notebook Page, Notebook Page 8 1/2" X 11", 1980.

One of our experiments with the gratings involved making a light box, coating it with black ink and drawing into the ink with the back of a brush, to reveal the light below the ink. This taught me how to move from 2-dimensional to 3-dimensional space. A dot in the ink created a spectrum ringed flower, while a line created a radiant cylinder. In the 1960's I was primarily impressed by the aesthetics of these new sights, but nevertheless I refused to build light boxes for walls to satisfy the purely aesthetic demands of the art world. By 1970 the observations I made with

the gratings were translated to new insights when I began working with copiers and transmission machines, which used tapes, discs and cylinders for transmitting information.

On the subjective side, I had endless dreams about time. Some of the pictures were called *The Two Sides of Time* (Fig. 10). They seemed to show the inside and outside of the body as well as the front and the side of time. Time ran forwards and backwards. Most are *symmetrical*. By the 1980's I saw time as two *asymmetrical* kidneys juxtaposed like a butterfly's wings *symmetrically* (Fig. 11). With the passage of time most of my dreams were explainable by my experiences with technology and this transformed the way that I saw art.

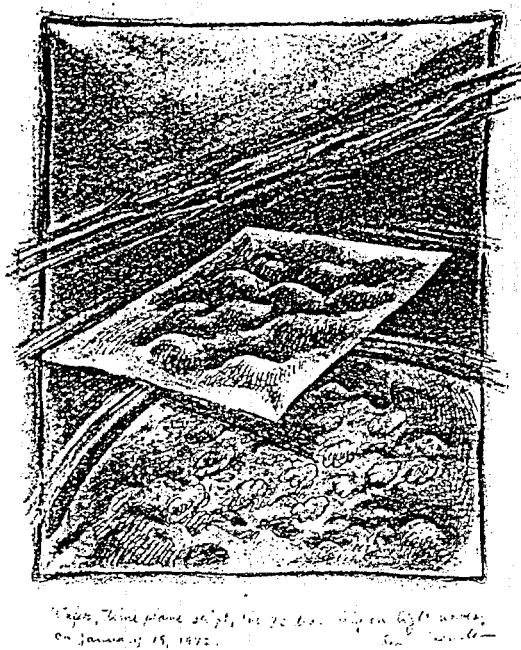


Figure 12: Time Plane Shift, Watercolor 7" X 9", 1972.

The clearest example of this transformation is an experience I had in January, 1972. I had painted a dream (hand-size) of Y's (Fig. 12) travelling at an angle in space over a 'time-plane' covered with dendritic, mountain lumps. This plane, in turn, travelled at an angle over the edge of our planet. I put this image next to a telecopier, where I was transmitting the image of a hand by means of a sound-tape that I had previously made with the telecopier. I used the tape to activate the telecopier and send the image. In the process I received an angled, stretched image (Fig. 13), which at that time was unreadable to me. I looked at my dream image, picked up a pair of scissors and proceeded to cut and reassemble the telecopier image which had travelled around the cylindric drum and become an image of a stretched hand. It looked just like my dream image. The dream image now made sense. Never again would I take a small image and paint a larger version of it. I began to use my

sketches as a different kind of information from that which art schools had taught us.

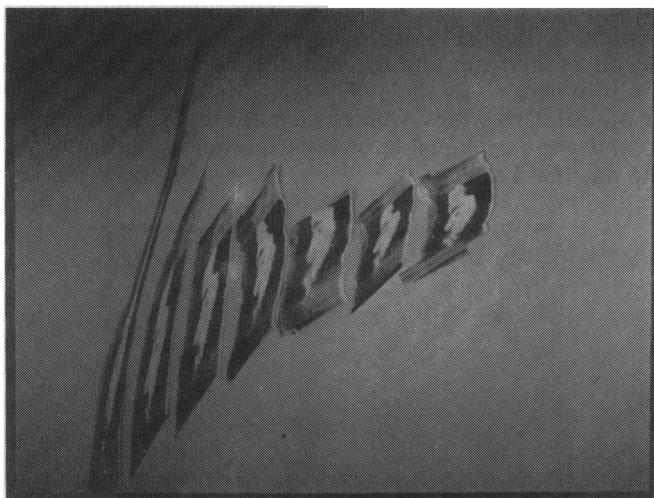


Figure 13: Hear No Evil, Telecopier and Tape Recorder, 1972.

By the end of the 1960's, at the Art Institute, I founded the program Generative Systems for the systematic studio exploration of art/science problems developing as a result of the communication revolution. In the mid-1970's I created two process courses.

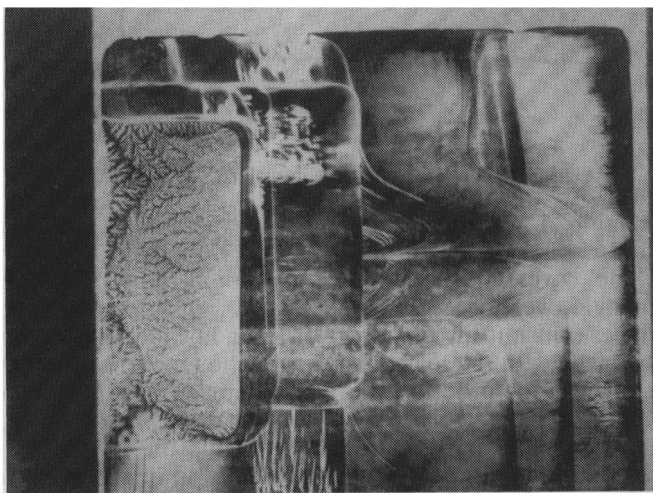


Figure 14: Pressure/Flow, Lithograph, 1950's.

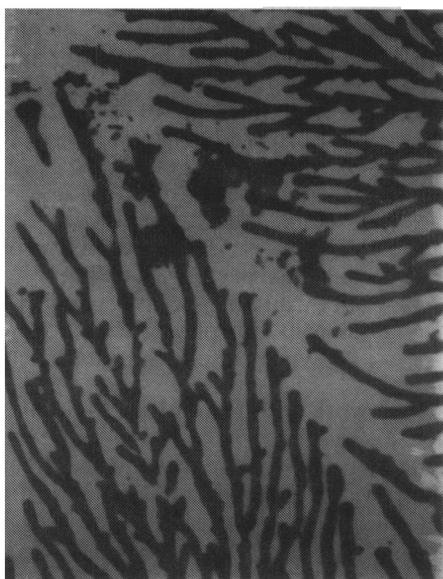
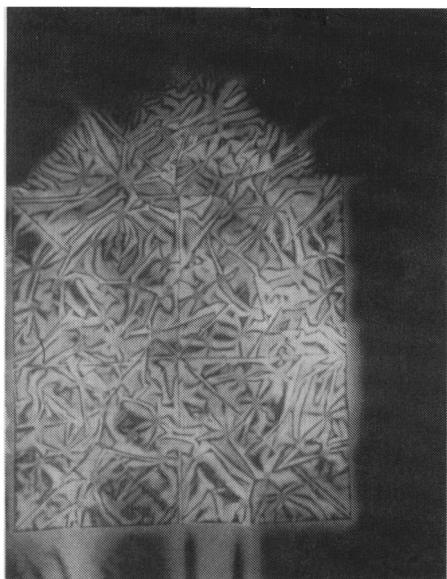


Figure 15: Folded Paper, 3M Thermal papers 8 ½" × 11", 1970.

Figure 16: Positive Electrostatic Charge, Xerox, 1974.

Process I was created to provide an opportunity for artists to explore manually, mechanically, electronically, and photronically energies previously ignored by artists, such as electrostatics, and thermal and magnetic energy. To my amazement two patterns – dendritic and flowing, or pressure and flow – kept reoccurring with thermal imaging and electrostatic imaging (Figs. 15 and 16). In fact, the positive and negative patterns created on the old Haloid Xerox looked exactly like my 1950 lithograph (Fig. 14). I noticed the continual repetition of these two patterns – no matter the energy used – and I thought of Eastern and Western societies and sensed the East as a flowing body, while the West seemed to move from pressure plane to pressure plane.

The second course, *Process II* was designed to permit the artist total freedom in pulling apart machines, putting them back together and imaging with them without making 'Art'. I was amazed at how able the young generation was at assembling and reassembling electronic tools.

The course that most interested me was created in my final years at the Institute. It was called *Homography* (man's meaning) and was intended as a course in which all tools could be used for art exploration. As it turned out it became a course in *The Visualization of Time*. I developed 9 relative ways of visualizing time based on my objective and subjective findings. All 9 ways were described *symmetrically*, i.e. Pressure/Flow was based on my dreams and my observations of the patterns of pressure and flow in my own hand and machine experiments. Stretching/Compressing also came from dreams and from observing in my experiments that I could stretch or compress an image by light or heat or even by sound with a telecopier, merely by holding the recording needle down in time as I transmitted an image.

For each *symmetrical* way of visualizing time, the student was asked to use either manual, mechanical, electronic, or photronic tools. Precise problems were set up, which gradually allowed for greater and greater problem setting by the student.

These are 9 relative ways of visualizing time:

1. Pressure/Flow
2. Scanning/Closure
3. Interference/Filtering
4. Internal/External
5. Opaque/transparent Layering
6. Close packing/Stacking
7. Stretching/Compressing
8. Metamorphosis/Morphogenesis
9. Synchronicity/Simultaneity

As my work with technology took me more and more into the scientific realm, my dreams of archetype still-images altered to images relating to time-travel. I did the objective work in the day and the dream work at night. It was not static Surrealism that I was dealing with, but dynamic dream Structuralism.



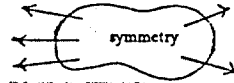
Figure 17: Hattula Moholy-Nagy and Her Father, Lumena Computer Graphic, 1986.

For the first time I began to understand the work of László Moholy-Nagy. In 1971, when the struggle to balance art/teaching home became unbearable, I had a dream of Moholy-Nagy (Fig. 17), about whom I had thought little before. Moholy-Nagy came to me and said, "You are on the right path, follow it!" I now believe that dreams can be validated through science and technology. I believe than the next

stage is not Neo-Surrealism or Neo-Structuralism or Neo-Expressionism, but a synthesis of the positive aspects of each art movement – perhaps Homoism – or what it is to poetically record in any medium.

QUESTION 2

My forty years as artist have been devoted to a search for what art is, which has placed me in a continual and ever-



expanding conjunction with science and scientists. This has created *symmetry* for me, for my students, and for the scientists who worked with us. In 1976 I was artist-in-residence in 3M's Color Research labs in St. Paul, Minnesota. Again in 1976 I was artist-in-residence in 3M's Central Research. In 1980 I was artist-in-residence in Chicago's Xerox Center, Computer Slide Division. Each of these experiences was invaluable in preparing me to lead advanced art programs, and in validating my own decisions about the nature of art. Generative Systems was founded, I believe, because I had outside scientific community support.

As my art and teaching were being transformed, however, my audience in the commercial art market diminished. Hundreds of articles in major newspapers, magazines and books appeared. There was much radio and television coverage of my work, yet there was hardly a mention of my work in art magazines. I had deserted the fold, and was told as much by critics. I knew that my students might suffer a similar fate, but they were determined to pursue their own dreams.

During the 1970's I brought to the Art Institute Generative System's program physicists, chemists, engineers, technicians, business executives, scholars, poets, musicians, and artists of every stripe. We video taped Joseph Needham (1954 to 1988), Douglas H. Dybvig (director 3M Research Labs, London), Robert Gundlach (senior research scientist at Xerox) among others. In 1976, I hired the physicist Rudy Guzik when his company, Apeco, went bankrupt. The graduate students benefited from this enormously.

As for the graduate students, Gundlach's son, Greg, who was introduced to our graduate program by his father, invented and patented Z-Trans, a 3D photo system. John Dunn, a composer, created the first computer graphic system for artists and founded Time Arts (Lumena) in Santa Rosa, California (I am a member of the Board of Directors). Kokilam Subbiah opened the Women's Workshop in Madras, India. Marisa Gonzales, co-founded the Centro Des Belles Artes in Madrid and Generative Systems Spain. Holly Pedlosky, took the Generative Systems program to Venice, Italy.

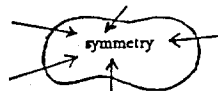
These are just a very few examples of the achievements of some of the Generative Systems graduate students.

By bringing artists and scientists together, by creating an academic environment where asking questions such as why *Symmetry/Asymmetry*? in art as well as in science, by winning prestigious grants, we have validated art/science as necessary components of the creative process. Further, in synthesizing art movements by accepting their most dynamic features, by uniting the dayside/nightside of the creative process, we have been on a path of constant growth and discovery. In all of this we

have tried to keep the Yin/Yang of creative movement, the *symmetry* of East/West, the dichotomy of individual/social, the interaction of art/science alive and well.

QUESTION 3

My cultural background is the basis for my feelings and ideas of *symmetry/asymmetry*. I am a 20th century American, born in 1925, the year of the advent of flight and a time of great social revolutions. My family heritage, though very American, is nevertheless, typical/atypical. It is typical in the sense that each wave of immigrants from the English to the Germans, to the Irish to the Russian Jews intermarried. It is atypical in that my grandparents, who were not highly educated, bred my parents, who were brilliant and educated, and became social activists. They were most influenced, I believe, by seeing the contrasts of poverty of their families and the wealth of a few. As philosophy students they were probably strongly influenced by German professors in Mid-west universities just after World War I.



My parents were my mentors. They considered an artist to be the most fortunate of beings – a privilege – which carried with it social responsibility. They believed that nature and mankind deserved the greatest respect. They believed in the integrity of ideas, systems, society and individuals. They believed that books and learning opened hearts and minds and kept us free. Our house was full of literature of every kind. We were never discouraged for our efforts. We were poor, but not hungry. Life was not easy, but it was rewarding and balanced (*symmetrical*) for me as a budding artist.

To my parents I owe my educational foundation and I try to remember that although it was in the United States that they struggled, it was European culture that enlightened them. America with its cacophony of nationalities and its dynamic environment provided a cauldron for creative experiences. For the past decade, that lively U.S. spirit that infused my earlier work and that of my students, seems to have grown pale. Europe has responded at a much needed moment. Our non-commercial enterprises, such as art/science investigation, limp along without support, while 'art' markets boom.

This struggle for *symmetry* in my life, art, and teaching has not been easy, but because of the struggle I believe I have achieved some of what I had hoped to in my life. I have created a large body of art work with over 50 technologies, I have created a network, Generative Systems (I first founded 1970-82 at the Art Institute at Chicago). I have sent out a body of graduate students, who have achieved everything from the first computer graphic system for artists, to workshops in India, Spain, and throughout the U.S.A.

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