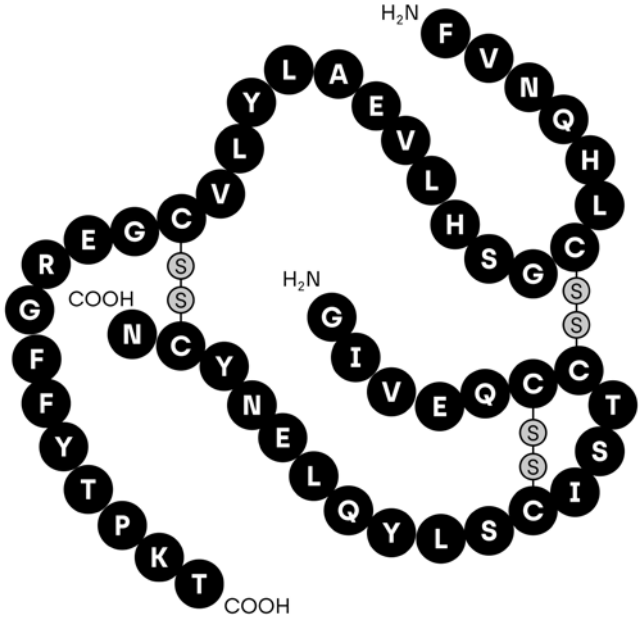
# Orígens




*Computer Graphics and Art*
1976 - 1978

## *Computer Graphics and Art*
## 1976 - 1978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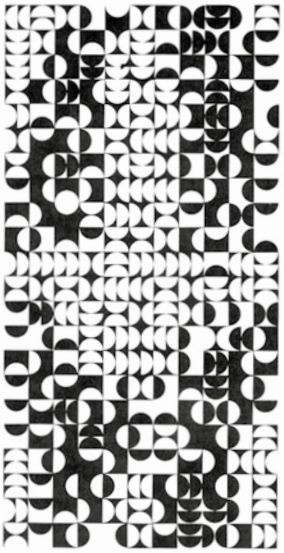
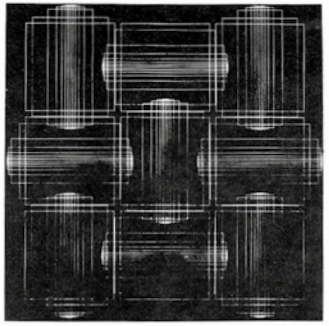


"Structure" by Z. Sykora

ZDENEK SYKORA

"I began, in 1961, to make paintings of a geometrical, abstract kind in which the composition results from the repeated use of one or more basic elements characterised by a unique shape and by specific internal geometrical patterns. I soon realized that I was running into combinatorial complexities that might be easily resolved by means of a computer. Hence my collaboration with Jaroslav Blazek, a mathematician."

"Black-White Structure" by Z. Sykora, from the SDL Collection.



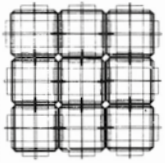
Roger Vilder, "Variation on 9 Squares," from the SDL Collection.

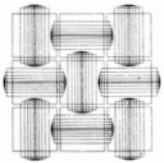
ROGER VILDER

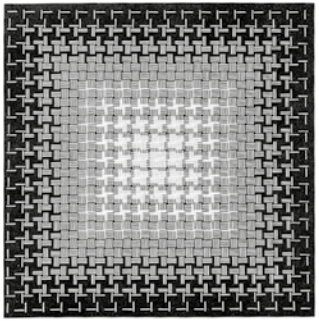
"When I began to work with computers, my first reflex was to recreate on the cathode-ray tube most of the visual phenomena I had created by mechanical means. Soon, I realized the amazing potential of the computer and began to expand my ideas into more graphically oriented work. As a result, I produced some short animated films.

I found myself very much at ease with a computer, mainly because I was already used to working within a well defined system, with the constraints of mechanics. Yet, there is a great difference between computer art and other media. The exchange, while the process of creation is happening, seems more alive because of its instantaneity. It is almost like having a conversation with someone from which something visual results. This very aspect of the computer, along with its extraordinary speed of execution, is what I appreciate most when working through this medium."

(Below, the artist explores variations on a theme of the nine squares. The computer works bear a strong, familial resemblance to the luminal sculptures.)



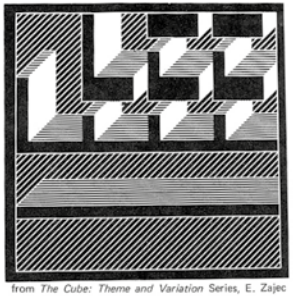




"Segrid" by John Roy, from the SDL Collection.

JOHN ROY

"At the present time there is a tendency to consider the computer generated product as being the only relation between art and the computer. I believe, however, that as our experience with the use of the computer in art develops, we will learn to give at least equal consideration to the programmer's art."

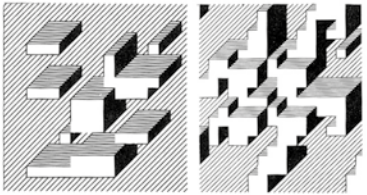


from *The Cube: Theme and Variation* Series, E. Zajec
From SDL and ICCH/2.

EDWARD ZAJEC

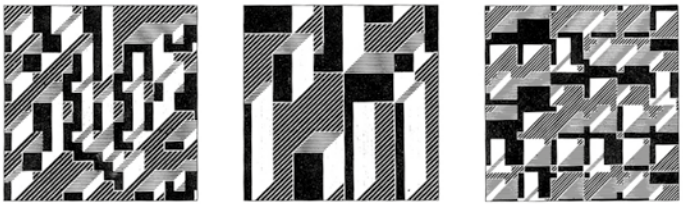
"The impact of the computer as an art medium can be felt already in the gradual shift from an art essentially static, contemplative and introverted, to a dynamic, interactive, extroverted art, from an object oriented art to a process oriented one. Artists no longer concern themselves solely with the sublimation and expression of their internal struggles in the form of finished objects, but are concentrating on developing processes demanding involvement and participation from the spectator.

It is with this view in mind that an appropriate answer can be given to the very relevant and often posed question of what can be done with a computer and could not be done without it. With a computer we can describe and communicate the organization, structure and dynamics of any given message, leaving it open at the same time to different interpretations and modifications, or better: only with a computer can we untie the constructive aspects of an idea from its material features, and observe and articulate them in time through direct interaction. This, for now, is the most important contribution, the meaning which the theory of information and the use of computers have brought to aesthetics."

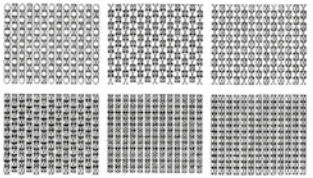


Edward Zajec explores transformations of forms, in a series of related works. The forms yield varied perceptions, as in op art, depending upon the focus of the viewer.

Examples from the ICCH/2 Exhibition.

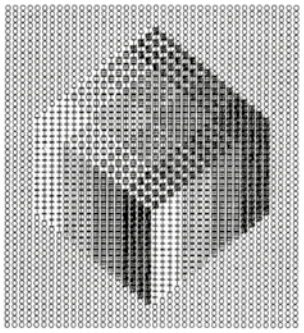






*ABOVE: Line printer output by Klaus Basset, Stuttgart, Germany, with examples of varied patterns that may be achieved.*

*1. Printers - The first method of data retrieval from computers was the printout. By operating a typewriter, the computer can print verbal and mathematical information. Since these machines print typewriter letters and symbols in whatever order is asked of them by the operator, the symbols may be arranged to form a picture, rather than words. Some symbols appear darker than others and are used to print dark areas of the picture. Additional contrast can be produced by having combinations of symbols further darken some area. This method has the advantage of gradations of grey from black to white, but offers little intrinsic beauty unless greatly refined. Printouts are usually black and white pictures on industrial paper. Printout pictures based on scanned photographs can often be obtained in amusement parks, in which case they are more novelties than aesthetic works.*



*ABOVE: "Diagonale, Raumbeschreibende Matrixform" by Klaus Basset. These works have a specific appeal in their "solidity", departing from the linear emphasis so predominant in most computer art.*

*2. Plotters - The development of the plotter enormously enhanced the visual interest of computer graphics. A plotter is a device that, when given instructions by a computer, moves a pen to make a line drawing. While most early computer graphics were black and white, any color ink may be used in the plotter pen, and either in felt-tip or ball-point form. The drawings are, of course, linear -- with little variation in thickness of line. Texture can be produced by combinations of line patterns, as Jean Bevis does in his his "Seated Nude."*

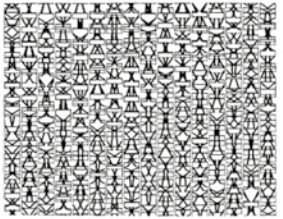
*The plotter has the additional benefit of allowing in some cases, a variety of good quality papers to be used. If the paper moves, it must be of a kind that will go through the machine.*

*Many arresting visual diagrams describe curving lines based on the actions of physical forces; for example, the regular changing motion of a swinging pendulum, or mathematical functions. These patterns of curving lines, often overlapping to form variations of texture and shade, are called Lissajous figures, after the 19th century French scientist who used a mechanical device to describe them. Although among the most elegant early plotted drawings, Lissajous figures seem less prominent among computer-assisted artists than a decade ago.*

*Plotters have produced a wide variety of images from representational to abstract. "Abstraction" is perhaps an appropriate term for many geometric forms taken from nature, but it is not applicable to purely nonrepresentational line patterns.*

*One gift of the computer to the artist is the capability of forming combinations of lines based not on his conscious or unconscious bank of images and associations, but on random numbers as coordinates. These patterns are abstracted from nothing, thus taking art a step closer to "art for art's sake."*

*The range of plotted drawings can be seen by comparing William Kolomyjec's easily recognizable "Flying Elephants" with Mutsuko Sasaki's "Naples in Storm," a combination of representational and nonrepresentational patterns produced on a CalComp plotter, and with Shao and Dunker's purely geometric "Zup Tze 30."*



*ABOVE: Detail of "Meta Language II" by Manfred Mohr, plotter output - an example of mathematics approaches to computer art.*

INSTANTANEOUS MOMENT INSTEAD OF HISTORICAL EXISTENCE

Computer art so far appears to express an instantaneous moment only. But a good picture regularly represents not just one instant of time or one momentary event, but many historical events or happenings. It shows the way an object or a scene has grown or decayed, began, flourished, and collapsed.

The pattern of pine needles under a pine tree can show pine needs that have just fallen, and underneath them the needles that fell a year ago, and underneath them those that fell two years ago, and so on. Their color changes, their texture changes, the amount of decay increases. Further down the pine needles decompose into humus. If there is a wagon track or a horse's hoofprint, its edges will show a historical sequence. A good picture can show or indicate all this, the dimension of time and history.

The same is true for rocks in a roaring stream, where there is a hard basalt dike cutting through much softer sedimentary rock layers. Some of the rocks will erode swiftly, some will erode slowly. A good picture can reveal history.

A good artist thoroughly knows the detailed characteristics and historical events that he is reporting on. And he can make these real and vivid to the beholder. And then he can add his expression of mood and feeling and atmosphere, etc., to what he is depicting.

People understand more and enjoy art more when they can look at all the scene shown and find interesting and challenging things to observe. The artist Arthur Rackham made a reputation for himself by drawing trees with knotholes that seemed to look, and little figures of animals, fairies, and elves nearly hidden, in his illustrations for children's books. Another example is the extensive body of lithographs and woodcuts by the famous artist, Maurice Escher, and the viewer never tires of finding new ideas in his works. A great artist is likely to show many relatively hidden yet interesting details in his representation of past events in his pictures.

Below: *Medium-Size Persian Medallions*, by Gregory Mirow, from his book, *A Treasury of Design for Artists and Craftsmen*, published by Dover, New York, 1969. Why not write a computer program to make medallions like these? One quadrant is programmed, and the other three quadrants are mirrored. The design may be digitized initially, or put through a curve-fit routine. Excessive emphasis on angularity in art becomes boring.

Above: *Chinese Bronzes - Bird*, from the Chang and Chou periods, 1st millennium B.C. is an example of curved, decorative forms found throughout man's art. Computer art is excessively angular, due to point to point programming of X/Y coordinates. I would like to see more curved art, as featured on these pages. Below: Bouquet by Gregory Mirow.

Why not a computer program to make a floral cluster like this? The above designs are readily programmed.

STIMULATION OF THE BEHOLDER

I think the basic quality of great pictures, great photographs, and great designs is that one can look at them repeatedly for a long time, and discover more and more and more of interest and delight and "beauty".

Is beauty in the eye of the beholder? Certainly, if chimpanzees were establishing standards of beauty in a chimpanzee culture, the beauty of some chimpanzee faces would be "obvious" to chimpanzees, and similarly beauty in some human faces is "obvious" to human beings. Yet the type of beauty of a human face is clearly dependent upon culture of a particular society of a particular time.

It seems to me, that for a beholder, interest and delight in art depends on recognition of objects and scenes, and richness of detail, all suffused with a way or manner or technique of conveying emotion or feeling or mood. In this way, messages both intellectual and emotional, are conveyed to the beholder, and he is greatly stimulated by "beauty".



# EDITORIAL

## THE STATE OF THE ART OF COMPUTER ART: PHASE TWO

IN THE BEGINNING

In Phase One of computer art, a new art form arose naturally (but inevitably) as scientists used the computer. Phase One began with the exhibition organized by Jasia Reichardt titled "Cybernetic Serendipity". The exhibition featured experiments in art and technology, in which scientists explored varied art forms and the computer. This happy accident was not an accident, for it was preceded by the Bauhaus experiments in mathematics and art, and the artistic world was populated with prophets who sought, via mathematics, to find new art forms. These people found computers, and gave us a new art medium that is now implanted in many art forms.

In Phase One, a great many of the practitioners of computer art were scientists, mathematicians, and individuals with strong programming backgrounds. Even in these early stages of Phase One, some classical works of computer art were created. A great many works of early computer art were merely visualizations from computer science, science, and mathematics. They possessed some charm, with moire, or interference patterns dominant in final works. Many of the artists in Phase One continue their computer art: Charles Csuri, Ken Knowlton, Duane Palyka, Manfred Mohr, Georg Nees, Herbert Franke, John Whitney, Michael Noll, and many others.

Randomization was very popular, along with decrementing, rotating polygon forms and transformations of patterns.

THE TRANSITION

Artists began collaborating with programmers. Braver souls learned programming and worked alone. Eventually a new breed of artist emerged: one with training in the fine arts, with new experiences with computers.

Many of these new artists became so proficient, that they worked entirely alone, and defected from the manual arts, to embrace the interdisciplinary areas of art and technology, with highly varied media experimentations, with highly diversified styles and products.

PHASE TWO

In coordinating the ICCH/2 Exhibition that will be shown at the NCC '76, I could strongly perceive a great difference between this new art and that of Phase One. The viewers agree also: this new art looks more like art. It is a more mature art form. It is more pleasing. It has more color, more form, more emotion, more poetry.

In Phase Two, computer art has been implanted in art. In Phase One, computer art output was from cathode ray tubes, animated systems and static plotters. There was an artistic war between the animated practitioners and those who desired static forms. Slight dogmas arose and fell with time. Didactic persons claimed that certain forms of computer art were more "pure" than other forms. I was criticized back in 1968 and 1969 for using too many art materials, and using computer art as an "art" medium. It was a great satisfaction to see the movement "back to art".

In Phase Two, computer art is taken from output devices, and is an intermediate step before implantment in art media. Photography is often the means by which computer art output is taken into silkscreening, etching, and lithography. Graphics explorations using overlays, Diazochrome acetates, photographic combinations, etc. are but a few new experiments.

But there will be other explorations—they are inevitable. And these new experiments, in Phase Three will be in heuristic programming that is aesthetic in final form. Thus far, the ideas and programs are interesting, but generally the output leaves very much to be desired. Artificial intelligence may give way to aesthetic intelligence and output! And this new art will be one in which we come full circle: mathematics, science, integrated with art.

CAN WE DEFINE ART?

There are measurable elements of art. See the May, 1974 Computers and People, "Computer Art: Towards a Measurable Analysis", by the editor. Art often possesses some of these qualities:

1. A new vision, which may be engendered by new ideas from other worlds other than art.

2. The microcosm and the macrocosm are revealed.

3. New materials and new tools give rise to new art forms.

4. The new medium is sufficiently learned so that the artists freely express themselves in varieties of highly personal products.

5. The "leap of the imagination" is the most important element of art, in which the mind and eye absorb and synthesize tools, materials, ideas, and life experiences.

Then art is born anew. This art moves the viewer and elicits an emotive, visceral, gut-level response, as well as an intellectual reaction. Art is a total experience. And computer art is becoming such a total experience.

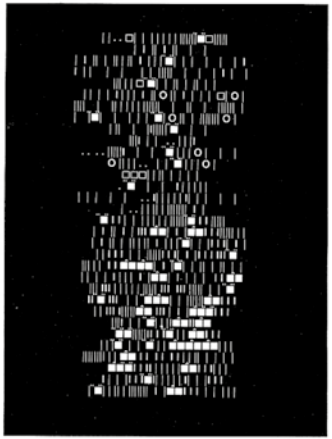
In the very near future, computer art will become a common, accepted art form that many people will enjoy and practice. Computer art applications will be implanted in many useful, everyday functions as well. It is often a game, "esoterica mathematica", as one of my friends put it recently. May it grow in beauty. May it grow freely, without dogmas.

Grace C. Hertlein
Editor

# HIEROGLYPHS

by Aaron Marcus
Bezalel Academy of Arts and Design
1 Bezalel Street
Jerusalem, Israel 02-225111

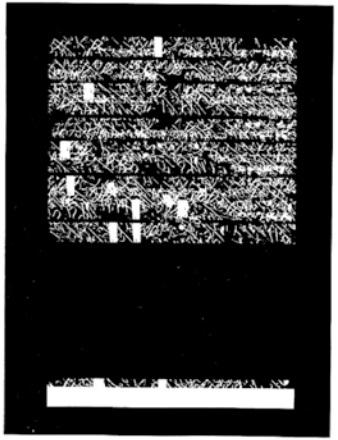
Comments by Aaron Marcus are from varied writings of the artist. Throughout there is an intense interest in the markings or symbolic glyphs of man as graphic patterns.



ABOVE: Untitled photoprint, 15" x 19".

...from COMPUTER-ASSISTED POEM-DRAWINGS: As with most of my computer-assisted art works, they are meant to be seen as white symbols against dark fields. Therefore the positive space as well as the negative space is part of the total meaning. I am interested in this kind of computer-assisted image generation as it relates to the use of light/electromagnetic information display, the primary medium for a computerized, bureaucratized society. I am interested in relating the most advanced technological-symbolical achievements to the most archaic experiences of mankind. Hence, I find it appropriate to ponder Genesis II and II in considering these images; the creation of order out of chaos, the creation of light out of darkness.

BELOW: "Noise Barrier" silkscreen in two colors, 12" x 17-3/4", 1974. This image is a transformation of the original computer-generated form. Copies of the edition are available through the Pratt Graphic Center, 831 Broadway, New York City, N.Y.



...from CYBERNETIC ENVIRONMENTS: As writing was born, man struggled to find ways to compress his spatial, temporal wraparound experience into abstract, easily reproducible marks on specially prepared flat surfaces. From essentially pictographic images bearing an iconic resemblance to things and actions, abstract forms evolved to provide man with more complex conceptions and a more intricately structured cosmos. After two millenia of relatively stable symbols and 500 years of their mechanical reproduction, the forms of writing, the ideas expressible by them are changing rapidly. At this moment, with the aid of electronic media and computer-assisted displays, the semiotic parameters of verbi-vocovisual communications are revitalizing long unused possibilities and discovering new combinations of elements for restating the inner and outer worlds of man's experience.



UNIMAGINABLE IMAGES

by Vera Molnar
54, Rue Nalle
75014 Paris, FRANCE

ABOVE: From the "196 Trapeziums Series" by Vera Molnar, variation 75.137/12.19.38. MEDIUM: Ink on paper.

The task of a painter is to create forms, combinations of forms which correspond to certain combinations according to criteria called "plastic" by estheticians.

Let us stress that nobody knows exactly what this epithet "plastic" means. For my purpose, just as for Matisse and some other classics, plastic means a "feast for the eyes". A feast, which must have sensorial bases -- painting which is not done for the eyes is not a painting.

We maintain, we have to maintain, that all these "feasts" are not as rich as they could be. We maintain, we have to maintain, a relative poverty of the repertory of forms and their combinations if we compare them to the infinite number of possible forms. Imagination is set in motion only by elements seen in nature, or as far as a painter is concerned, in museums (as it has been shown by Malraux). The imaginary museum is full of real and not of imaginary works.

The computer is the only instrument up to the present which permits us to go beyond the bounds of learning, cultural heritage, environment -- in short, of the social thing which we must consider to be our second nature.

Because of its huge capacity of combinations, the computer permits systematic investigation of the field of possibles of the visual world permits clearing the brain of the painter of mental "ready-mades" of culture and allows the artist to produce combinations of forms never seen before either in nature or in museums -- images one would never imagine, that is to say, unimaginable images, an art of the SPACE ERA.

ABOVE: "Hypertransformations" by Vera Molnar. System: IBM 360, CRT Screen 2250, Benson Plotter.

BELOW: A second variation from the "196 Trapeziums Series" from the ART OF THE SPACE ERA EXHIBITION. MEDIUM: Ink on paper.

*OSCILLONS: ELECTRONIC ABSTRACTIONS*

*by Ben F. Laposky*
*301 S. 6th Street*
*Cherokee, Iowa 51012*

The best of computer art should be acknowledged as fine art, even though it is technological in origin. Produced by the selection and control of the apparatus used, the visual results must be judged for their aesthetic value by the artist.

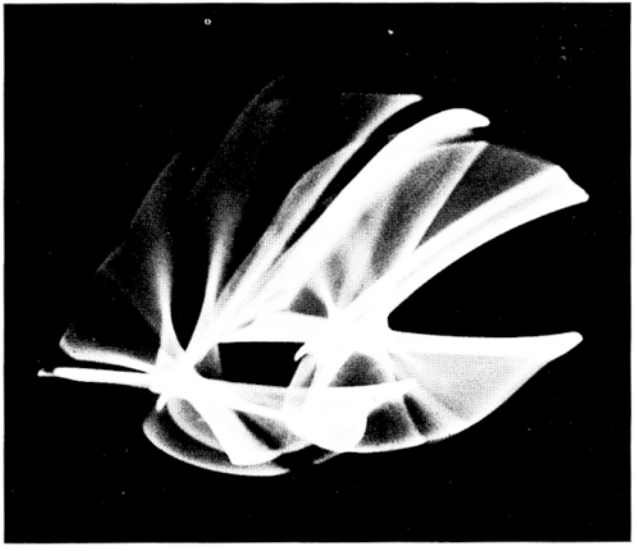
The oscillons or electronic abstractions are considered to be a kind of computer art since they are composed of analogue curves, which are related to the basic functions of the analogue computer. As oscillographic photographs, the electronic abstractions were the first such art to be widely exhibited and published in America and abroad. My work in this area has been exhibited and published beginning in 1952, a forerunner of current computer art.

The electronic abstractions are recorded on photographs, as this is the best way of preserving their intricate lines, planes and often very delicate color shadings. They may also be presented by means of lighted transparencies, motion pictures, direct kinetic displays on television tubes, plottings, drawings or paintings.

Special kinds of oscilloscope circuits, as well as a large number of many types of other output instruments, such as oscillators, amplifiers, modulators, and so on, are required in order to produce the wide range of forms shown in the oscillon technique.

Art forms for the space era, the oscillons represent in their glowing kinetic images the unseen forces of electrostatic and magnetic fields, as well as the vibrant motions of atoms and electrons.

*BELOW: "Oscillon 1049" by Ben F. Laposky. MEDIUM: Photography. The work shown in the ART OF THE SPACE ERA EXHIBITION is in color, illustrated here in black and white, and also displayed horizontally.*

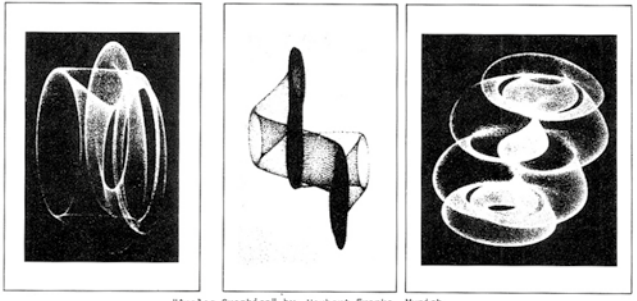






Because of the number of artists represented in the ICCH/2 (International Conference of the Computer and the Humanities), the reader is referred to the August Annual Art Issue of Computers and People for many other illustrations from this exhibition.

The works on pages 26 and 27 illustrate very clearly the highly personal, highly varied approaches and final presentations of international computer artists. The works by Franke and Kallin and Johannesson are silkscreening, while the Marquette final works are canvases.

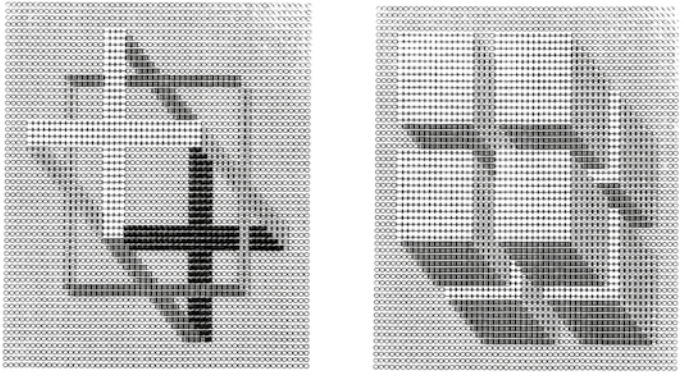


"Analog Graphics" by Herbert Franke, Munich

Above, Herbert Franke explores the "opposite" of highly detailed, linear computer graphics by using a grained screen in developing the final images used in his silkscreened editions. The works recall the earlier constructions of Naum Gabo, and the Constructivist Manifesto.

In the seven graphics of the "Kubus-Serie", from the ICCH/2 Exhibition, Klaus Basset presents a series of permutations based on the cube. The works of Basset also recall the early Bauhaus constructions -- yet are reminiscent of the transformations in the recent Scientific American.

Below: "Kubus-Serie" by Klaus Basset, Stuttgart



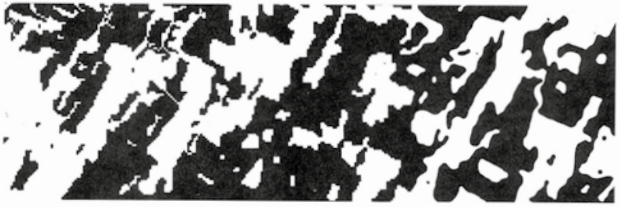
HIROSHI KAWANO

"My computer art is not only fine art, but is also the result of aesthetical studies, through which I wish to throw light on the logic of human art by using the information processing model of the computer.

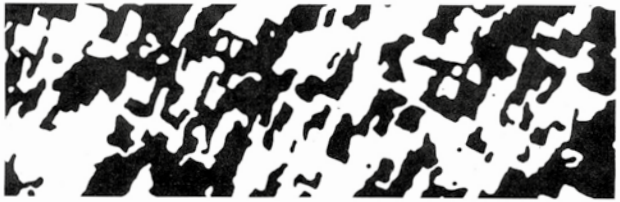
I think that computer art should not be mere computer-aided art, which is now becoming popular as a device which adds eccentricity to human art. It must be the creative activity of the computer which thinks freely, like a human being. The problem of the computer is not its human-like behavior, but its non-human behaviour. My computer art is only the beginning of scientific studies about art, and so the works have not yet such an artistic value as human art has. But I think that this is caused not by the crudity of the digital computer, but by the unripe reasoning of the aesthetician thinking about art. In the future, excellent human-like computer art will perhaps be produced as scientific aesthetics make further progress.

Now, I call a computer's imitating human activity and creating a work of art art simulation. The computer must recognize the algorithm of art in order to simulate human art. The art algorithm describes a method to solve art problems; that is, how to create such and such a work of art through a computable formula. We need to build a mathematical model of artistic activity in order to describe the art algorithm as a program. I have built this art model by means of the theory of information and the MARKOV-process theory.

"Simulated Color Mosaic" by Hiroshi Kawano, from the SDL Group.
If we can describe this process of art simulation in computer language and give that description to the computer as a program, the computer will look at the various data-pictures, capture their image, and subsequently create an infinite variety of new pictures from the images it has grasped." (From the SDL Portfolio Notes.)



Black and white illustrations of computer printouts by Hiroshi Kawano — in the ICCH/2 EXHIBITION. The upper strip reveals the grid-like output, while the lower portion is altered through a transformation technique.



**Information Processing 77**

Proceedings of the IFIP Congress "77, Toronto, Canada, August 8-12, 1977.

edited by **Bruce Gilchrist,** Columbia University, New York

With its focus on the congress theme of *"The Maturing Profession-Perspectives and Prospects"*, this volume of proceedings will cater for the individual interests of specialists in a very broad range of fields associated with computing. In addition, it provides a comprehensive survey of the most topical developments in information processing, a survey invaluable for those who need to keep up to date with the subject's many facets. The 1977 Congress, like its predecessors, brought together a group of the world's foremost computer science authorities, and a special effort was made by these experts to ensure the practical relevance of the conference program to business users of computers.

**Cited from DATAMATION, September 1977:**

*Communicate all implications -*
... five panel sessions around the social impact of computers and information processing...
... Another welcome addition was the plethora of sessions devoted to business applications and administration. The IFIP program committee carefully targeted these discussions at dp managers, bringing together big names in international computing to talk on such topics as data base management, distributed processing, microprocessors, telecommunications, and programming.

*Out of an ivory tower*
... This represented a marked departure from IFIP's normal emphasis on the theoretical foundations of dp...
... "This congress has finally come out an ivory tower", quipped Paul Dixon, director of information systems for Massey-Ferguson in Toronto.
... Dixon who was responsible for putting many of these business-oriented sessions together, is chairman of IAG, IFIP's business arm. He claims conference organizers got "good feedback" on these "more practical" sessions ...

**INFORMATION PROCESSING 77** contains in 1024 pages **a "state of the art of to-day's computing knowledge".** Regular sales price:
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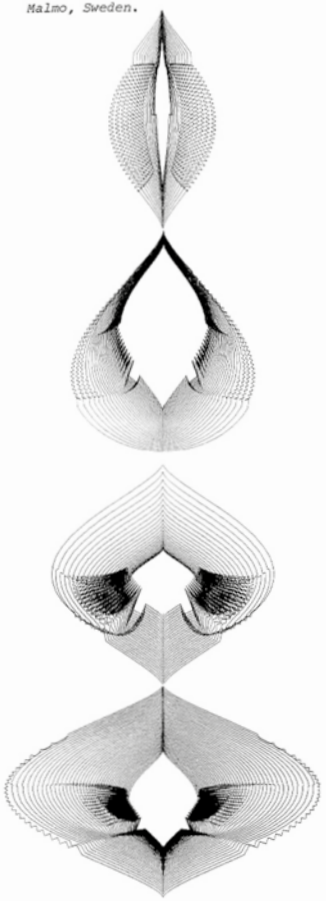
*BELOW: Untitled Transformation by Sture Johannesson and Sten Kallin, Malmo, Sweden.*



and three push downs; *Current End*, with location pointer, *Curen*, *Current Pick*, with location pointer *Curpi*, and *Next Weave*, with pointer, *Nxtwe*. Next weave is used in setting up the linked list during the decoding phase. Current end and Current pick are used to store the value of the current location under consideration.

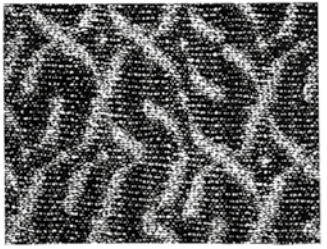
Decode - The interpreter part of the program has two functions; to set up the linked list, current weave, and to partially fill the list of associated parameters. All weave descriptor strings are first read into a buffer, *IN*, and a number of separate strings can be entered at one time. The strings are separated by a semi-colon, which not only delimits the separate strings but also terminates the decoding process for each string. The explicit actions of decode are shown in the accompanying flow chart.

Perform - This is a two pass program. On the first pass the preambles of the weave algorithms which generate the weave dimensions are performed and the dimensions are placed in the appropriate locations in the operational parameter list and the address in current weave is changed to point to the function portion of the algorithm. The second pass is a pair of nested loops; the outer loop counting the number of the row under consideration and the inner loop counting the column. Each pass through the inner loop places either an X or a _ in the output buffer, *Out*, according to whether the value of the weave function is 1 or 0 and each pass through the outer loop prints the contents of the buffer as one line of the weave.

Weave Algorithms - The weave algorithms consist of two parts, one which generates the weave dimensions and an operational part which implements the function form of the weave. The general structures of these algorithms for the basic weaves, the single operators the parameter operators and the double operators is shown in flow chart form.

Flow Charts - In the flow charts the following notation is used extensively.

#A - use the address of A as a value.
A - use A as an address.
@A - use the contents of A as an address.
(A) - the contents of A.
@A" → B - transfer the contents of the location that is pointed to by A into the address B then increment the contents of A.
@"A → B - decrement the contents of A then transfer the contents of the location pointed to by A into B.



Push A - place (A)+2 into A.
Pop A - place (A)-2 into A.
A|B - concatinate the contents of A and B.
If WE is the name of a weave operator then WE will also stand for the symbolic address of the corresponding functional algorithm and WEP will stand for the symbolic address of the corresponding dimension algorithm.
ε - element of.
SO - the set of single operators.
DO - the set of double operators.
PO - the set of parameter operators.
WE - the set of basic weaves.

The following subroutines are used in the perform portion of the program :

FIX1 - sets the current weave pointer to point to the next location in the linked list, then uses the address pointed to to relocate the pointer.

FIX2 - returns the current weave pointer to its location prior to relocation by FIX1.

NORM - pushes the current end and current pick push downs, performs the calculations
(column number) mod (number of columns in weave)
(row number) mod (number of rows in weave)
then stores the results in the new locations in the respective push downs.

REPLACE - pops the current end and current pick push downs.

DO - causes a jump-to-subroutine to the address that is pointed to in the current weave list.

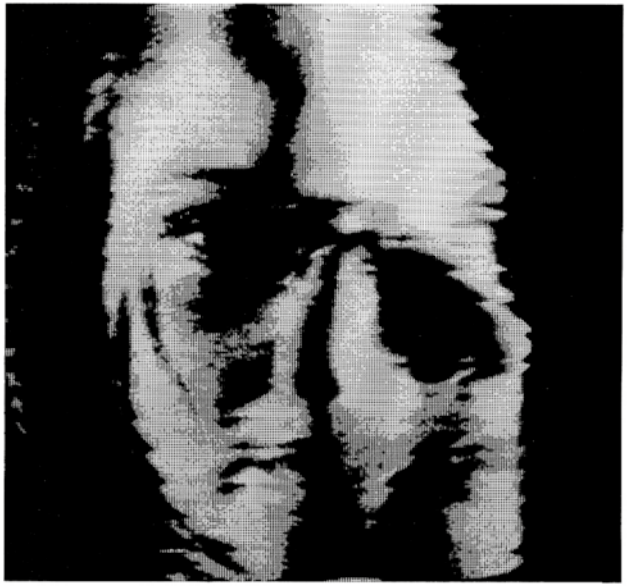
SET - associates the pointer, Oparm, with the current weave pointer, Curwe.

ADDITIONAL FEATURES

Weave Renaming

Justification - In the case of more complex weave structures the weave descriptor strings can become quite cumbersome. To enable the designer to write such strings with more facility and with less chance of error a facility is privided in the program to allow the designation of an entire, or partial, weave descriptor string by a two character name chosen by the user. This is done by preceeding the two characters by either the symbol / or the symbol ', writing the descriptor string as usual and following it by





*ABOVE: "Lillian II" by Lillian Schwartz and C. B. Rubenstein. MEDIUM: Photography.*

*THE TECHNOLOGY OF EACH ERA*

*by Lillian Schwartz*
*524 Ridge Road*
*Watchung, New Jersey 07060*

The awesomeness of such a tool as the computer places the artist in quite a humble position. There is a necessary kind of readjustment for the artist, for here is a medium that may take some of the burdens from the artist. To find a real justification for the use of the computer by a painter would be to shift the emphasis by stimulating a new angle of approach; to maybe relieve the formal elements of some of the conscious emphases which are necessary and place more stress on content.

It is no easy task for the artist to live with too much freedom in her medium. Great care must be given to the selectivity of these elements.

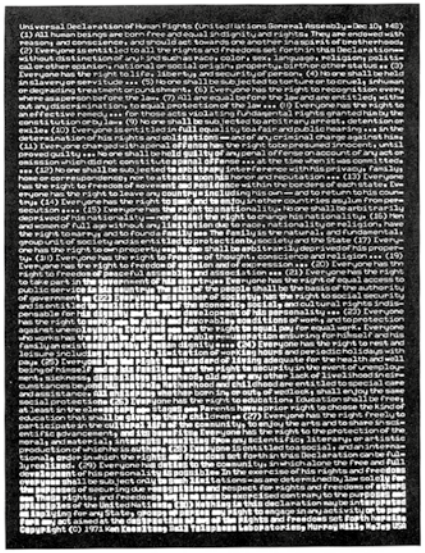
Artists must express their own creative character in the technology of their era in order to find their own historical and individual level.

I'm using the technology of today because it says what's going on in society today. Ignoring the computer would be ignoring a large part of our world today.

It seems clear that the results of this new medium may well fall into direct ascendency of the hieratic forms of Seurat and the mosaics of Byzantium. The artists in India also worked from set Sudras. Even among the more recent artists, Delacroix, Cezanne, and Matisse, the same desire for system and regularity for an ordered universe seem to dominate.

The computer has also assisted me in the visualization of sculpture in 3 dimensions. Programs can be used to rotate sculptures, to view them stereoscopically, to place in a given site -- all before any execution has taken place.

For the artist newly exposed to using the computer, it is not unlike Stephen Leacock's hero, who jumped to his horse and dashed madly off in all directions!




"Universal Declaration of Human Rights" by Kenneth Knowlton

## KENNETH KNOWLTON

"It is quite clear that computers will be used more and more extensively in the production of new designs and other static and dynamic visual images; our visual experience will thus be enriched.

It is too early to call the results art, and this will be the case for a long time to come because the complexity of the process intrudes — although it fascinates the viewer, it also separates him from the artist.

To say that the medium is the message is to say, unfortunately, that there is no message in the ordinary sense."

(Comments by the artist are from the SDL Portfolio.)

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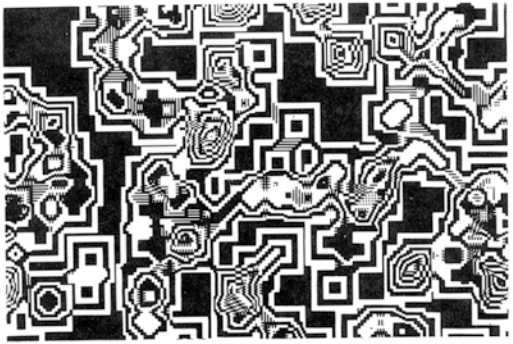
Editorial Comments: Kenneth Knowlton is one of the most important, universally respected computer artists. His capacities as a scientist are equally balanced by his sensitivities and his imagination, as displayed in his innumerable art works. The graphic at left conveys more than just interesting technique— it is social commentary, something lacking in most computer art, which all too often, is mere decoration, and frequently, manipulation of materials and design in repetitious, and non-inventive ways.

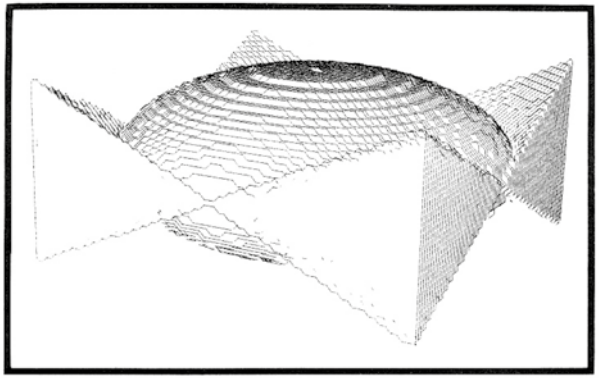
Ken Knowlton is perhaps one of that growing number, of "New Renaissance" people, who live equally at home in the world of art and science.

At right, Detail of "Tapestry I", by Ken Knowlton and Lillian Schwartz, from the cover, Computers & People, 8th Annual Computer Art Exhibition.

Works by Ken Knowlton and Lillian Schwartz are included in the ICCH/2 Exhibition.

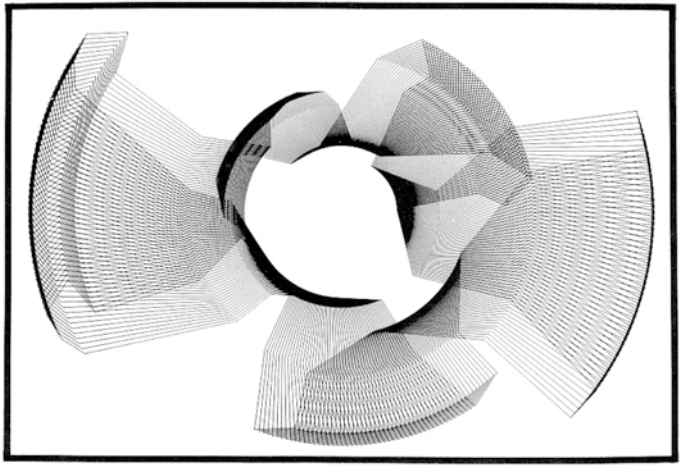






*ABOVE: Ellipsoid" by Tony Martin, American Buildings Company, Eufaula, Alabama. Like many computer professionals, Tony Martin executes detailed, delicate, mathematically based computer art as an avocation. (See the August, 1976 issue of Computers and People for more of his work, and also graphics by his friend and colleague, Kerry Jones, who works for the same firm.)*

*BELOW: "Gyrating Form" by James R. Warner, Colorado University Computing Center, Colorado University, Boulder, Colorado.*



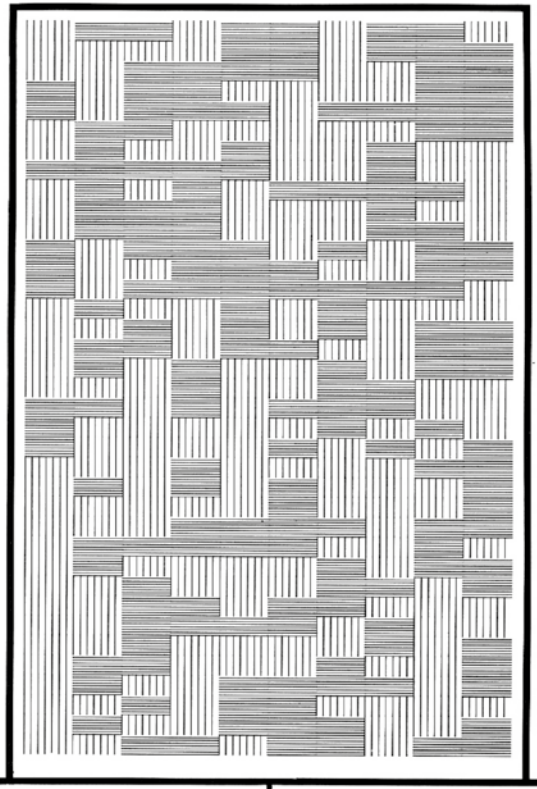


Figure 4 (OPPOSITE PAGE AT LEFT)

This picture was generated by the student of R. Stoiber. The middle point M(M1,M2) of each square was ascertained by chance.

M1 = SNERAD (A1,B1)
M2 = SNERAD (A2,B2)

SNERAD gives a probability value between A1, B1 and A2, B2 respectively, which pertain to M1, M2 respectively.

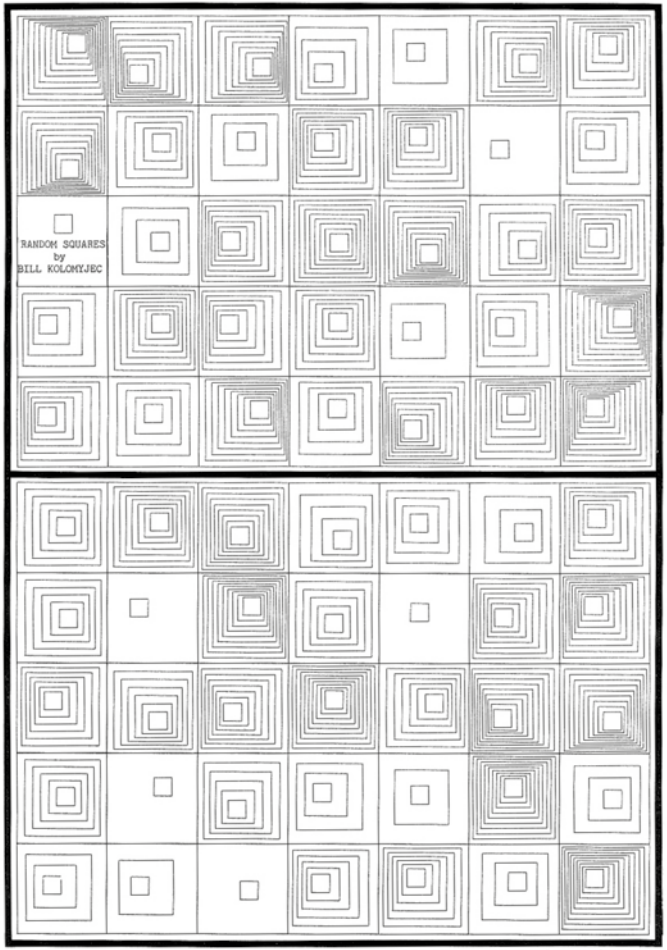
Figure 1 (ABOVE)

The program consists of three call orders:

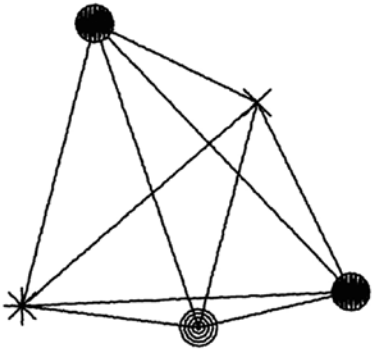
1. Size of the sheet of paper.
2. A scale distortion of 1:2 in one direction.
3. The routine SNEKAD with eight parameters.

The routine SNEKAD proves here two elements: 1. ▯ 2. ▯▯▯. These squares occur in a random order. The scale distortion of 1:2 stretches the elements in on one direction to produce graying effects.





MAGBa



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