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PCC

YOU PUT IT TOGETHER

CONTENTS

Editor Bob Albrecht . . . *this time I mostly watched*

Guest Editors Lillian Mary Quirke, Leonard Meyers
Pam Scarvie

Art & Production Mary Jo Albrecht, Lillian Quirke, Pam Scarvie, Leonard Meyers

Subscription Manager Chief Dragon

Publisher People's Computer Company

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MANFRED MOHR

The fundamental view that machines should not be considered as a challenge to humanity but, like McLuhan predicted, as an extension of ourselves is the basic philosophy when becoming involved with technology.

A technology which 'functions' has to be integrated in our lives like a physical extension - a necessity of our body and our mind. We are living now in an era of enormous technological transitions, where so many misunderstandings in human machine relationships are created by lack of knowledge and the categorical refusal to learn by most individuals. A quasi mystical fear of an incomprehensible technology is still omnipresent.

Breakthroughs in human development are always accompanied by radical changes of attitude towards the so-called human values. It is, for example, from a practical (and philosophical) point of view evident that one should simply be ready to leave the most possible part of a work to a machine when it becomes clear that in this way the desired solution may be better and more reliably achieved. It is also true that human thought can be 'amplified' by machines, raising our consciousness to a higher level of comprehension.

To apply methods of this kind in science is obvious, and generally considered as basic. To use similar methods in aesthetical research is, in my opinion, a possible and nevertheless historical consequence. Aesthetical research runs, for this point at least, parallel to scientific research and together they make our human developments more comprehensible.

In this context I consider the computer as a legitimate amplifier for our intellectual and visual experiences.

Through detailed programming analysis, one is able to visualize logical and abstract models of human thinking, which lead deep into the understanding of creative processing. Creative processes are mental processes having a priori an associative character, where associations are defined as interactions and/or transversal connections (Querverbindungen) of thoughts in a Time-Space neighbourhood realitionship. Unifying those divergent or intersecting data from memory in order to form new meanings is called imagination or the facility of creating free associations. Most adults have been taught to think in a way which does not allow them to play with free associations. This 'cliché' thinking of so many people is radically opposed to imaginative thinking. To create new an perhaps important aesthetical information, it is necessary to operate with free associations. This does not necessarily involve a talent, but a training which has to be practised.

A computer, however, is (at least until today) not able to process in an associative way, even though it is a self-supervising machine. The computer is not conscious of what it is doing and can only execute orders from outside: from us! That means: a computer itself cannot create or invent anything.

We do not have to ask: what can the computer do?, but reverse the question by asking ourselves: what do we want to do? and then consider whether the help of a machine could be useful for our purpose. If the answer is positive, we have to find ways of asking the machine the right questions in order to get reasonable results, amplifying our thoughts and intentions. Proceeding in this way is an important step towards a systematic approach of aesthetical problems. Abraham Moles once said: "La machine ne pense pas, elle nous fait penser."

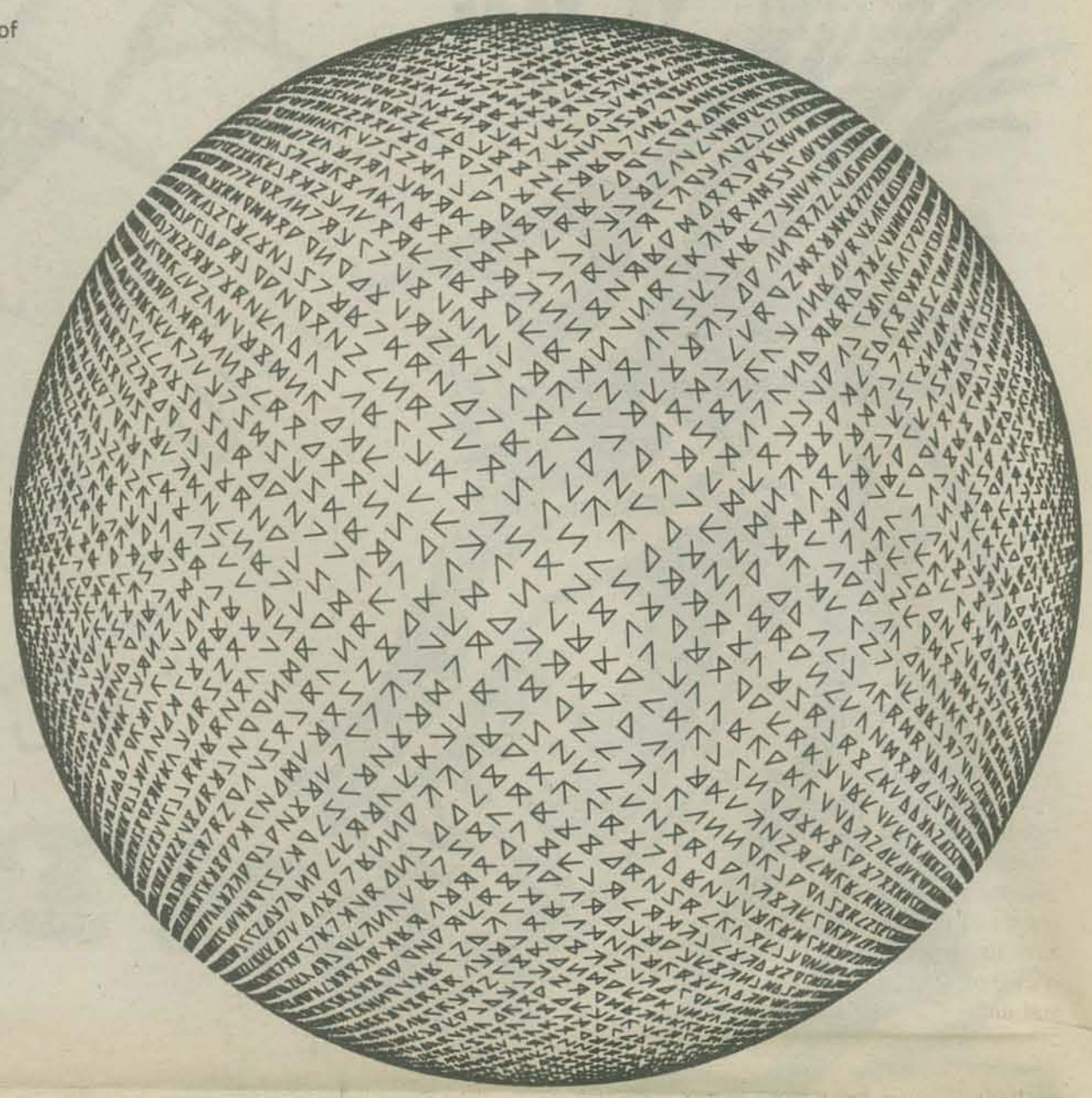
There are several ways of approaching the computer for this purpose:

1 A visual-concrete procedure.

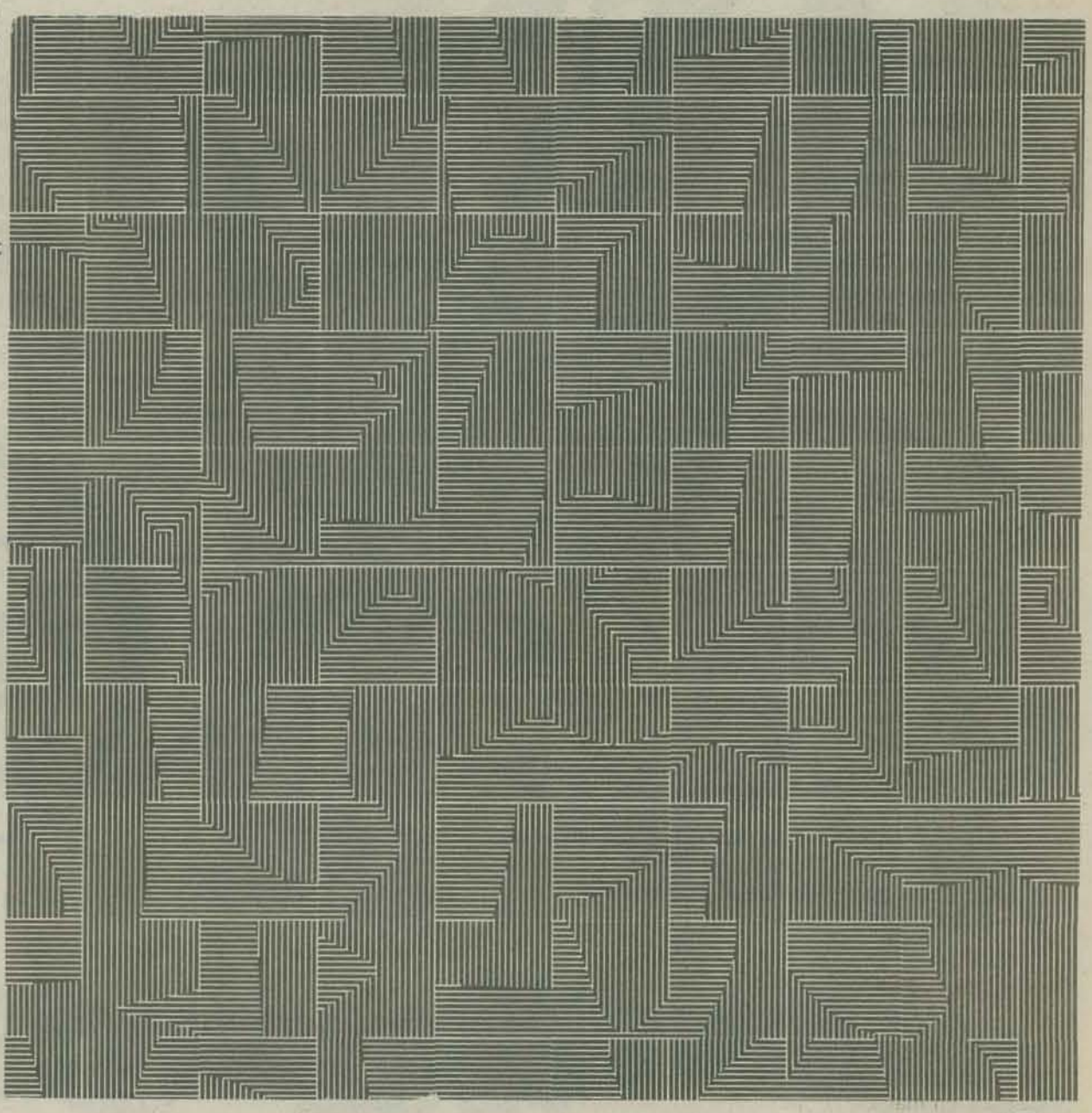
An existing visual image is dissected into its basic elements. Each element can represent an algorithm. One can operate in various ways with these elements. The experience is: visual image → process → visual image.

2 A statistical-flexible procedure.

An existing or invented abstract logic is the basic algorithm and no visual image, or only a vague one, can be predicted. The importance of this approach lies in the applied rules, which are, at least in their conception, a new way of approaching a visual experience. The experience is: abstract logic → visual image.



p 128 Sphereless 50 x 50 cm



p 82 Polystable 50 x 50 cm

Statistical-flexible procedures deviate into two distinct directions:

a) The visualisation of mathematical formulas. Without doubt very interesting results can appear which have never been seen before. For long-term artistic interest however, the resulting aesthetical information of a mathematical formula is in itself limited and therefore a closed system.

b) The research to find or invent individual rules as a means of artistic expression.

The individual impact of human behaviour, filtered and reformed through the inherent peculiarities of a computer, will lead directly to an interesting and overall coherent open system. Of course mathematics are used, but in this case only as a technical help, and not as the sole purpose.

The logical construction of a programming language forces us, on the one hand, to concentrate with an almost maniacal precision of formulation (the instructions), but opens, on the other hand, new dimensions for a wider and statistical thinking.

New operation models appear:

- Precision as part of aesthetical expression.
- High speed of execution and therefore multiplicity and comparativity of the works.
- The fact that hundreds of imposed orders and statistical considerations can be easily carried out by a computer instead of by the human mind, which is incapable of retaining them over a period of time, for example during plotting time (calculation time).
- The continuous feedback during a man-machine dialogue involves a learning process on the side of the human being, resulting in a clearer image of the creator's thinking and intentions.

Properties of this kind form a conceptual basis that shows a rigorous attitude in dealing with aesthetical problems.

The dialogue with the computer implies also that results (graphics, etc.) and their visual expression have to be judged under completely new aspects. It is evident that one should not create single forms and judge them by a traditional and subjective aesthetic, but build sets of form where the basic parameters are relationships between forms with no aesthetical value associated to any particular form *in the set. It is possible within this context to ignore* the former 'good' and 'bad', now allowing aesthetical decisions to be based on statistical and 'wertfreie' procedures, where the totality represents a quality of a quantity.

This procedure may lead to different and perhaps more interesting answers, lying of course outside one's normal behaviour but not outside the imposed logic. The above postulated conception becomes part of a conditioned aesthetical information.

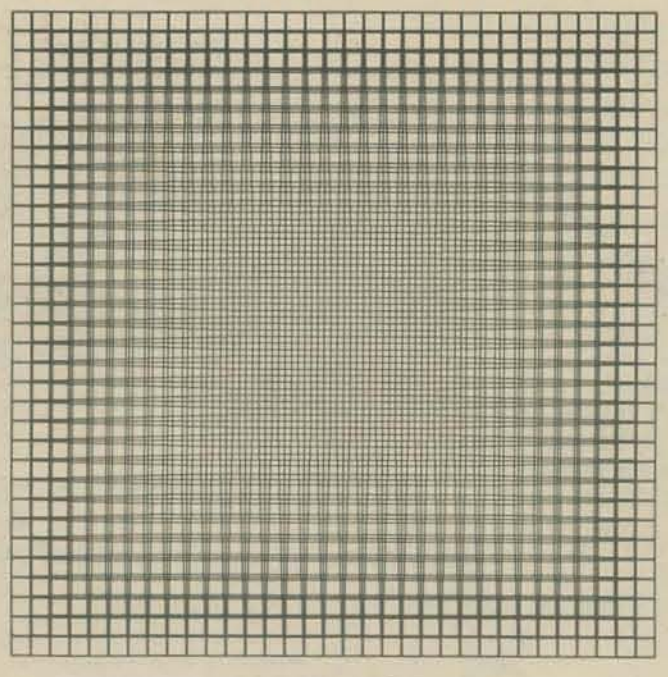
Computer-aided art is too young a phenomenon for one to foresee all its influence on the arts. It is most probable that the importance of an art thus created might lie essentially in its subtle and rational way of proceeding, which means that not only the 'what' but also the 'how' of the change will have fundamental consequences for the future.

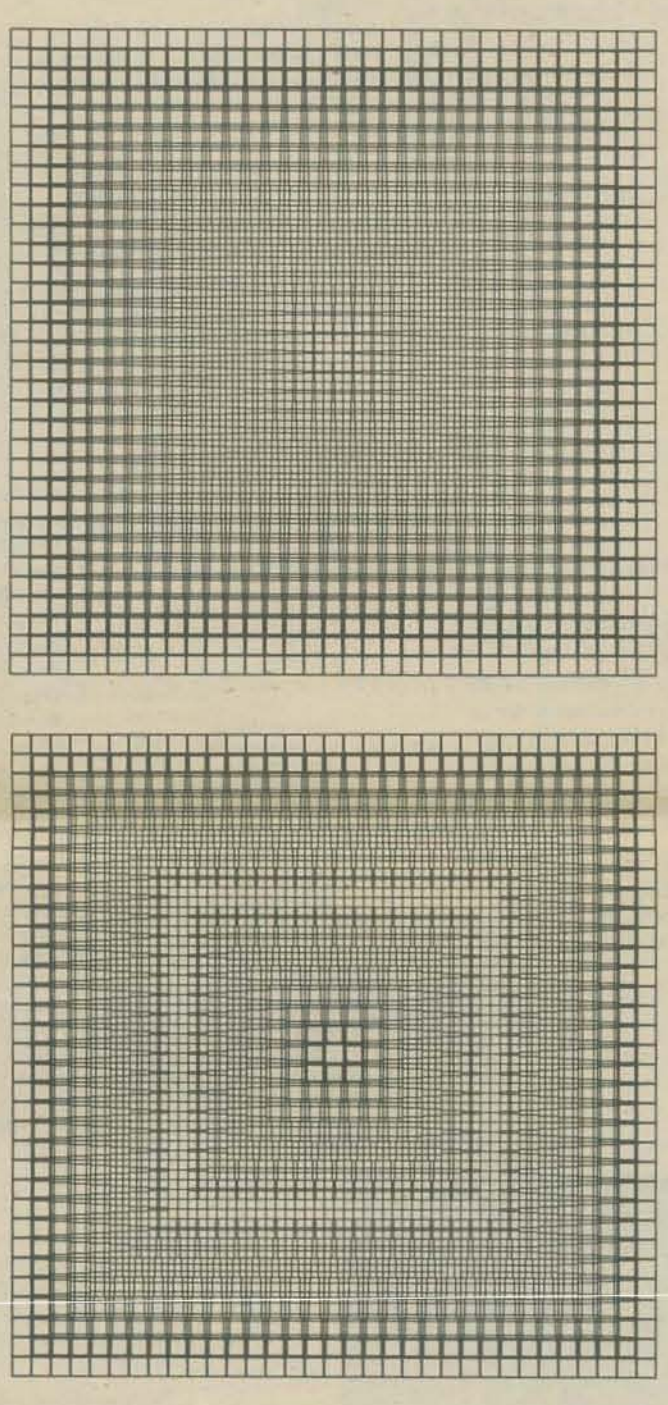
The world will not be changed from the outside but from the inside and aesthetical decisions will be more and more based on knowledge rather than on irrelevance. The shift from uncontrollable metaphysics to a systematic and logical constructivism may well be the sign of tomorrow.

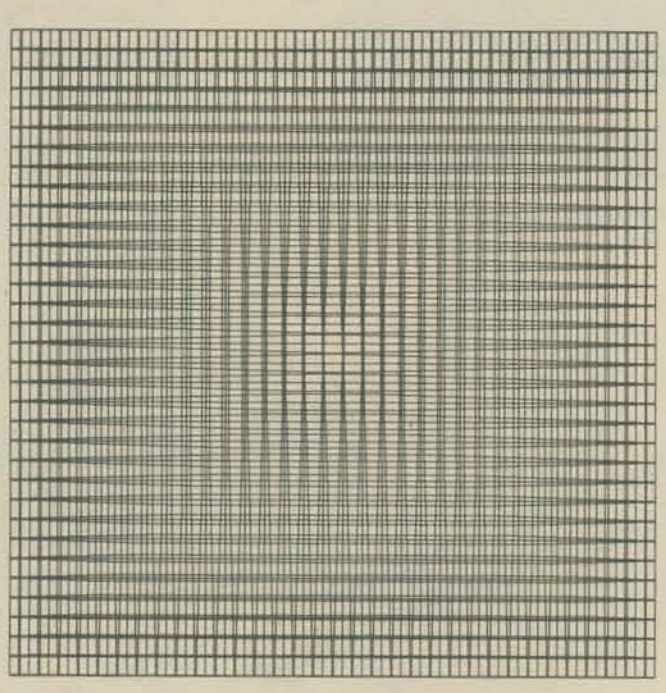
Manfred Mohr

Né le 8 juin 1938 à Pforzheim/Allemagne
Etudes à la Kunst- und Werkschule Pforzheim
Etudes de musique (sax. tenor, hautbois)
Etudes en mathématiques et informatique

Lauréat de la 10ème Biennale, Ljubljana 1973 et World Print Competition 73, San Francisco







p 137 Graph Pattern 55 x 55 cm

Expositions de groupe:

1965
Blanc et Noir, Galerie Paul Faccetti, Paris

1966
Divergenzen, Galerie Margarete Lauter, Mannheim

1967
Concordancia de Arte, Galerie Juana Mordo, Madrid

1968
1ère Biennale de l'Estampe,
Musée d'Art Moderne, Paris
Galerie Martin Krebs, Bern
Kunstverein Pforzheim, Pforzheim
Galerie Daniel Templon, Paris
Galerie Sincron, Brescia

1971
Galerie Weiller, Paris
Arte y Cybernetica, Buenos Aires
Kunstzone, München
Arteonica, São Paulo
2ème Biennale, Nürnberg

1972
Impulsos, Instituto Aleman, Madrid, Barcelona, Bilbao
Kunstverein Pforzheim, Pforzheim
L'Art et les Technologies Industrielles, Vitry-sur-Seine
Computerkunst und Musikalische Texturen,
Staatsgalerie Stuttgart
International Computer Art Exhibition, Montréal
Wege zur Computerkunst,
3ème Kunstmarkt, Göttingen
Cracap, Art et Technologie, Le Creusot
Galerie Weiller, Paris
Musik/Film/Dia/Licht Festival,
Olympische Spiele, München

1973
Programm-Zufall-System, Museum Mönchengladbach
10ème Biennale de la Gravure, Ljubljana
Grenzgebiete der Kunst,
Städt. Museum Schwäbisch Gmünd
Tendencije-5, Zagreb
Circuit, Michigan University
Interact, Edinburgh Festival, Edinburgh
World Print Competition 73, San Francisco
Ordinateur et Creation Artistique,
SESA, Espace Cardin, Paris
Contact II, SIGMA, Bordeaux
Computer Art Exhibition, Toronto
Computer Grafik, Kunstverein Laupheim
Cybernetic Artrip, Tokyo

1974
Instituto Alemão, Lisboa
Miedzynarodowe Biennale Grafiki, Kraków
Fourth British Intern. Print Biennale, Bradford

Expositions personelles:

1968
Galerie Daniel Templon, Paris

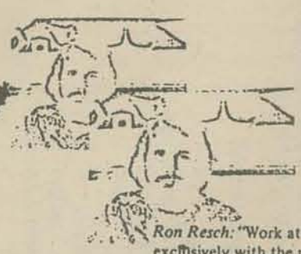
1969
Galerie Anne-Marie Verna, Zürich

1971
ARC, Musée d'Art Moderne, Paris
Sicob, Paris
Galerie Mangelgang, Groningen

1972
Galerie Swart, Amsterdam

1973
Galerie Wahlandt, Schwäbisch Gmünd

1974
Galerie Weiller, Paris
Galerie Gilles Gheerbrant, Montréal



Ron Resch: "Work at Utah has delt exclusively with the problem of representing realistically things in a three dimensional field."

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"POEMFIELD NO 2," Stan VanderBeek, Ken Knowlton, Bell Laboratories:

"life
poemfields
similiar
like
we pick
life
seeming
to
see
separate
things
together
so
you
say
would
seem
life
like"
*****

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separate
things
together
so
you
say
would
seem
life
like"
*****

"MUSICAMERA." The National Research Council of Canada:
(cartoon. . .) ...Business man in office. . . answers phone. . . becomes two heads. . . imagines secretary who becomes Venus. . . her head is now clock face . . . 5 o'clock... becomes large number 5. . . leaves office. . . becomes auto. . . stops at deli. . . swoops in. . . pays for food on buttons / cash register of grocer. . .

"MUSICAMERA." The National Research Council of Canada:
(cartoon. . .) ...Business man in office. . . answers phone. . . becomes two heads. . . imagines secretary who becomes Venus. . . her head is now clock face

Lillian Schwartz: "The video synthesizer is a very complex circuitry. It has consoles, it has as many channels as you want, and it has all sorts of knobs and buttons to push to change the colors. I've used it. I'm feeding with a 16mm chain link footage that was computer generated and using that plus 35 mm slides plus the video synthesizer to create a totally new kind of thing that you can see in real time."

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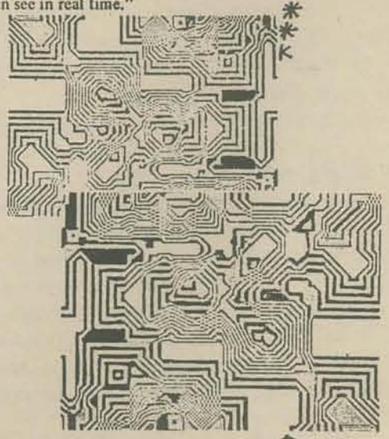

Bill Fetter: "I believe contemporary design can be seen as migrating through three basic phases, integrating three basic phases, each integrating at a higher level and each incorporating the previous phase. From its beginnings in the Bauhaus, design endeavors focused on the artifact, its success dependent on form/ function relationships. Currently many advanced design activities focus on the system, its success dependent on the principles of adaptation. The next focus emerging is the design of our lives, in which success will be measured by quality of life achieved. The question is,'How can computer systems help people make decisions about their lives that are more intelligent or at least more self-organizing instead of being subject to hierarchical systems?' "

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Ken Knowlton: "Sometimes computer pictures are just representations of the original data but in a way that helps you to see things you couldn't see in another way. An example is microwave communication through a rain storm. How spotty is rain? How clumpy? Here is an example of somebody discovering something by animating data."

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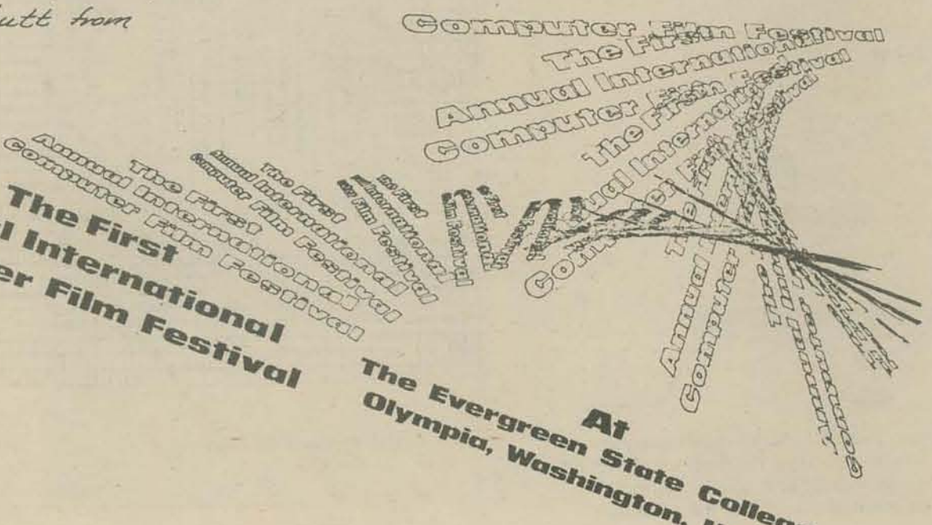
Ron Resch, Bill Pattar, Lillian Schwartz, Rick Speer, Ken Knowlton and Fred Tabbutt from left to right.

Two 80 minute films (one comprised of 11 technical and one comprised of 13 artisitc films) were chosen to travel to museums throughout the country. These packages can be order either together or separately from Rick Speer, Computer Services, Evergreen State College, Olympia, Washington 98501. Contact him regarding price (minimal) and times. Some films included in the artistic package are:

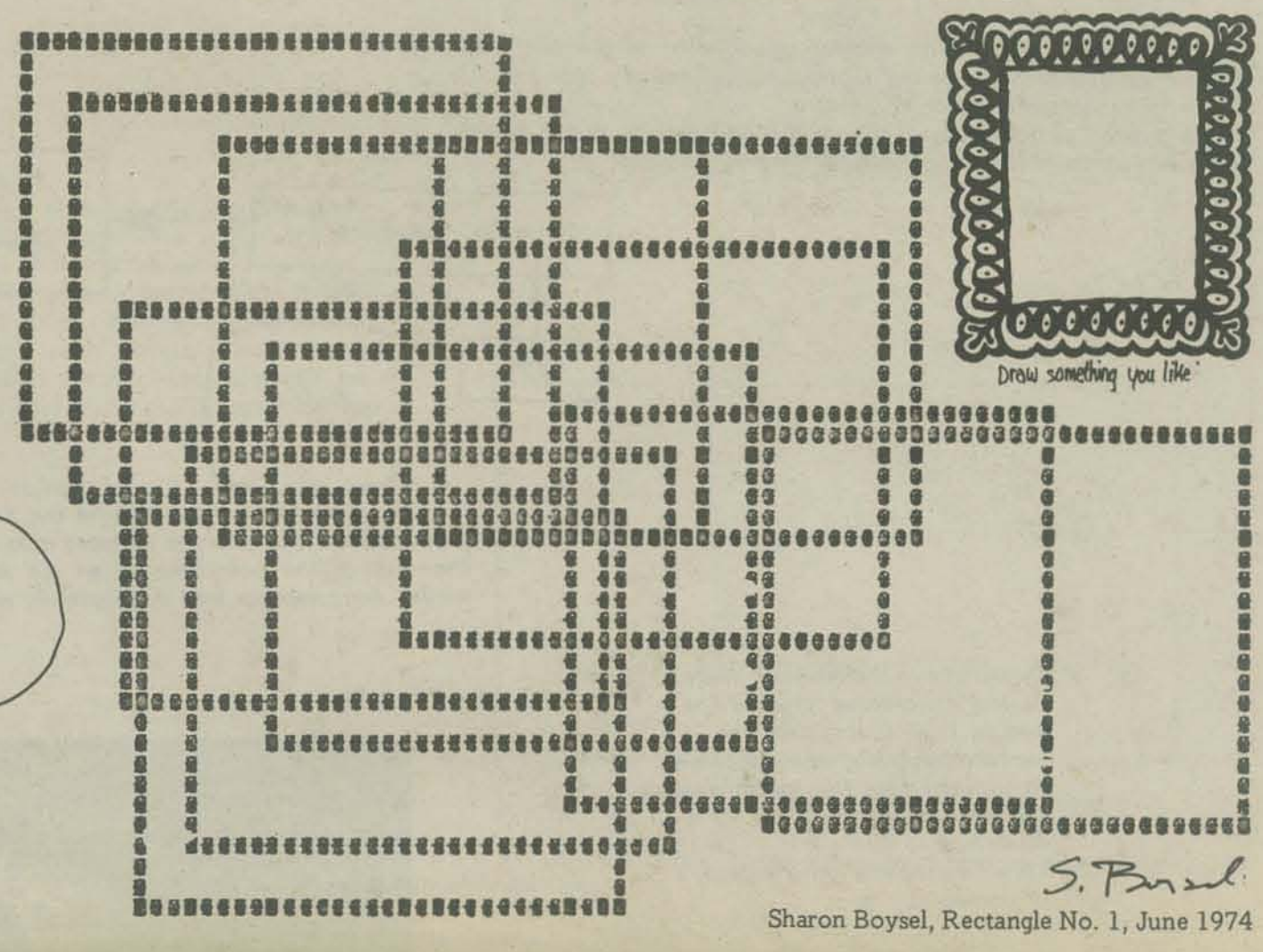
Permutations and Matrix III by John Whitney
Metadata by Peter Foldes
Olympiad Metamorphoses by Lillian Schwartz & Ken Knowlton
Phosphenes by Frankie Foster & Rick Speer



GMJART4 GRAPHICS

GMJART4 is a FORTRAN IV version of a computer language, ART I, devised by Professor Williams at the University of New Mexico. Katharine Nash, Professor of Art at the University of Minnesota uses this program to teach design students to make simple graphics.

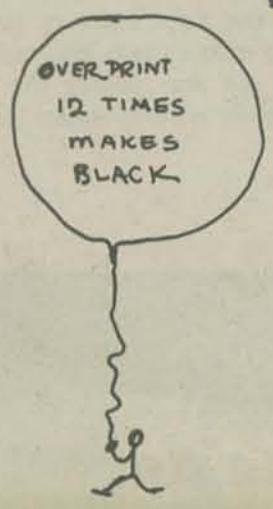
DeAnza College, Cupertino, Calif., obtained the Nash-Williams version. Greg Mushial, a data process major, rewrote the program in FORTRAN IV in a Special Projects in Art Class, Spring of 1974, under the direction of Lillian Quirke, Instructor.



S. Boysel

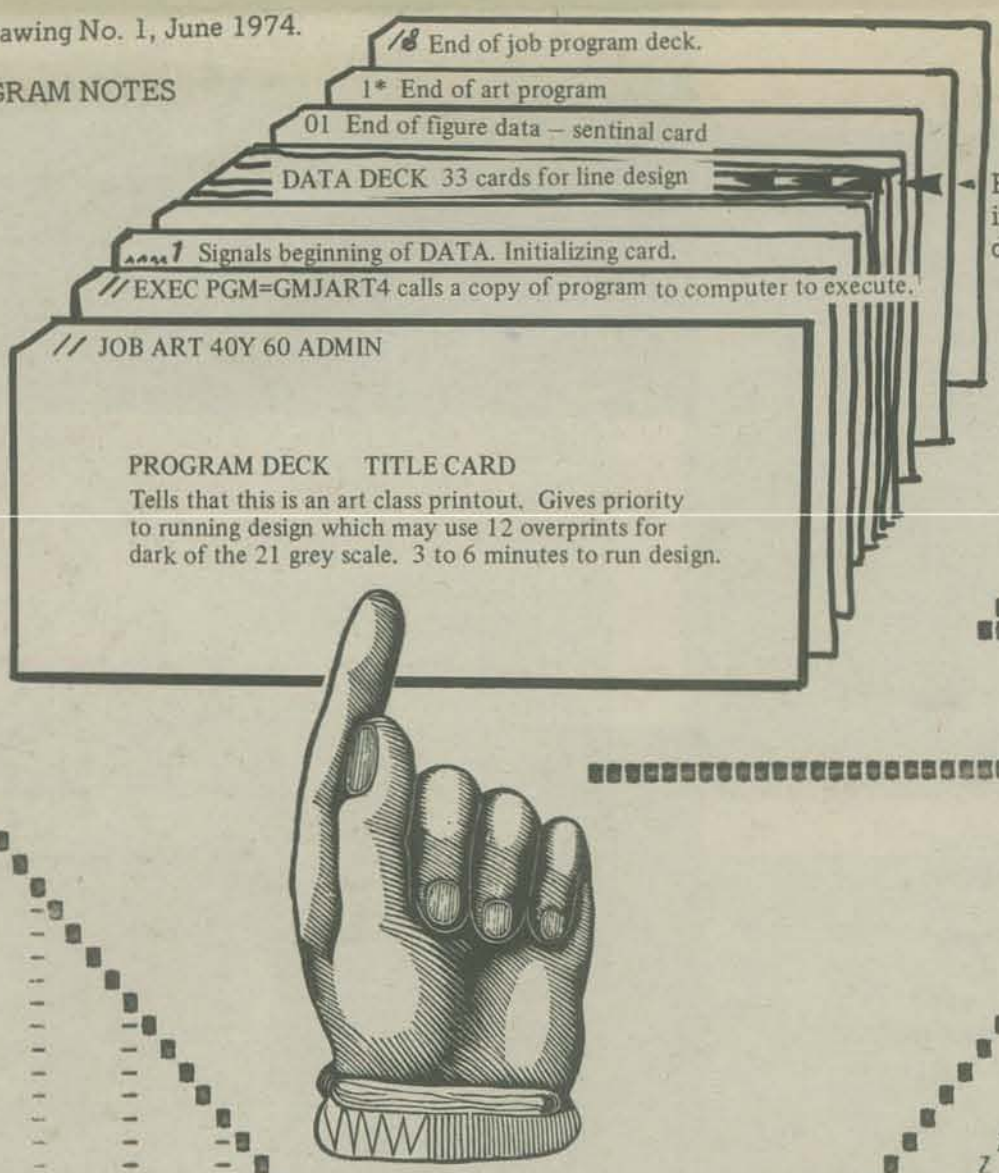
Sharon Boysel, Rectangle No. 1, June 1974

The FORTRAN listing and Deck are available at copy cost by writing President Robert DeHart, DeAnza Community College, Cupertino, Calif., 95044. This version can be used with an IBM 360 or IBM 370 DOS, FORTRAN IV with object module or with any ANS FORTRAN system.



Ken Hann, LIne Drawing No. 1, June 1974.

GMJART4 PROGRAM NOTES



! DO YOU REMEMBER INCHWORM FROM PAST ISSUES?? IF YOU DO YOU HAVE A GOOD IDEA HOW GMJART4 WORKS.

Each card represents one line to be printed in either a horizontal or vertical or diagonal direction.

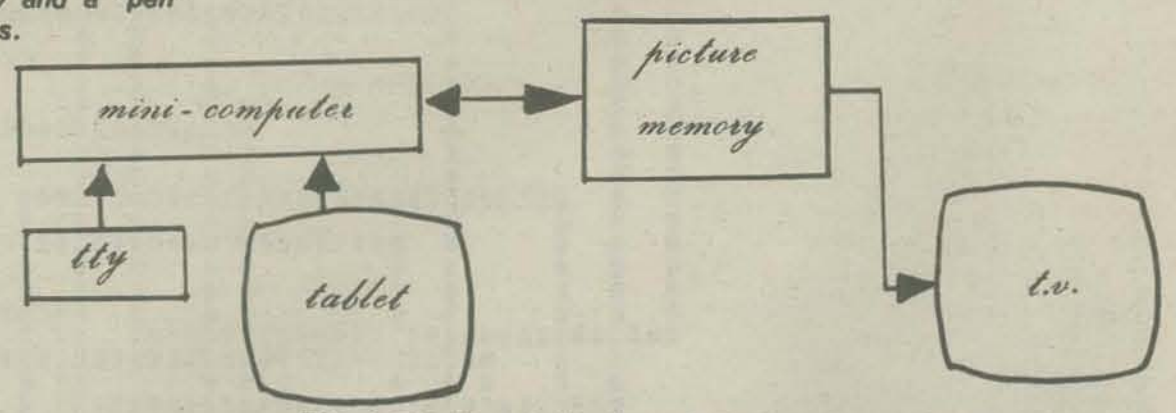
BOB FLEGAL

XEROX PALO ALTO RESEARCH CENTER

3180 Porter Drive Palo Alto,Ca.

I would like to discuss and show a few examples of a type of "computer art" that myself and a few friends have been doing for approximately the last year.

I shall begin with a brief description of our tools. We have a mini-computer,a graphical tablet,a large memory that can store one standard color tv picture (called the "picture memory"),a 25 inch color tv and a "pen" with which to manually construct the image parts.



The basic idea behind our technique is to "paint" a picture into the picture memory and hence on to the tv screen and then using the computer as an aid we modify the picture in various ways. An example will help clarify what I mean.

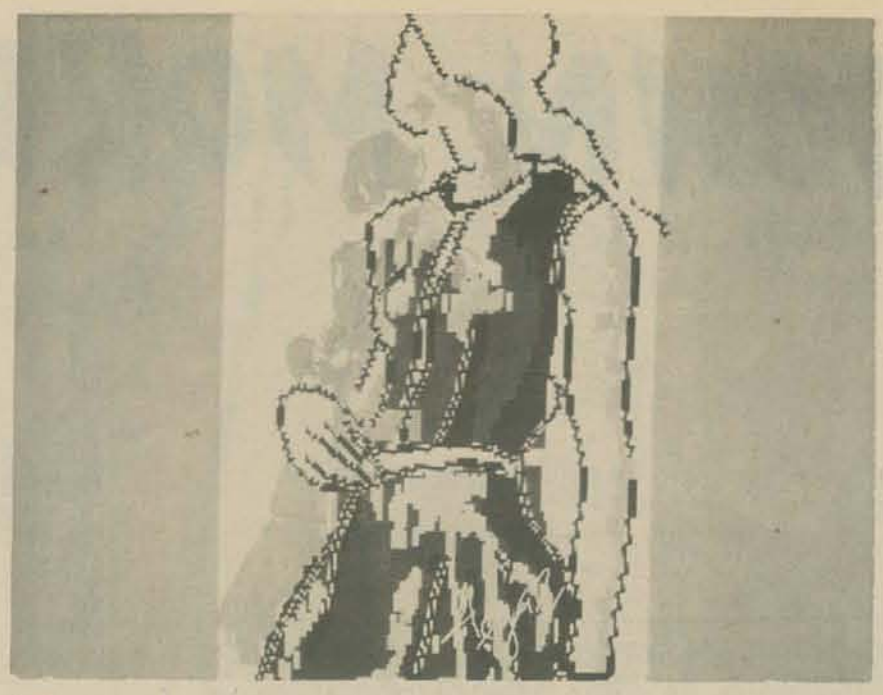
To create a preliminary sketch of the anticipated picture the pen is first touched to the surface of the graphical tablet. At a rapid rate the tablet senses the position of the pen attatched to it. This cooridinate information is immedialtly sent to the mini-computer which displays a dot on the tv screen which follows the motions of the pen as the artist moves it around the tablet with his hand. When the pen is pushed down on the surface of the tablet the mini computer "draws" color information into the picture memory corresponding to the successive positions of the pen in motion, thus leaving a trail of "ink" in the picture memory. Since the contents of the picture memory are displayed on the tv,the sketch appears on the television set.

1

The simple sketch is then colored or shaded using a "paint program. this program displays a palette of colors and some brush shapes on the tv screen. With the aid of the tablet ,the pen may be used as a "brush" by picking up the brush shapes and dipping them into the colors in the palette When the pen is pushed down the brush shape and its current color are "painted" into the picture memory thus causing corresponding colorform to appear on the tv.

2

7



Many manipulations are possible and I will describe more of them later. With this picture

I decided that by stripping out all of the red shades and then blowing them up by a factor of two and then overlaying the blow-up on the original a nice picture would result.

3

When I first started "painting" pictures into the machine I quickly learned that the pictures were suggesting programs rather than the other way around (programs drawing pictures). This is because many of the manipulations and modifications that I wanted to make on a picture I had "painted" were complex or tedious. Hence I wrote many programs to assist with attractive modifications

Any list of interesting modifications to pictures would be staggeringly large and incomplete. a few that I have found useful are:

saving part of a picture for future use.

changing one color for another

making reds redder,greens yellower...etc

scaling and rotating parts of pictures

combining previously "painted" parts of picture with the current one.

move (translate) a piece of a picture to another position on the screen

reflecting a picture through a line.

Pictures 1, 2, 3, 4, and 5 were painted by Bob Flegal

Pictures 6 and 7 were painted by Fritz Fisher

You have probably thought up some of your own picture modification programs by now.

I will conclude by showing a few pieces of art made in the manner just described, that is, By "painting" on the TV screen and using the computer to help make artistically interesting modifications to them.

4

5

6

7

JOHN MORRIS

```
HAIKU: DO YOU WANT PRINTED COPY?
YES
ONE MOMENT WHILE THE TEA BOILS .

AND STILL DISTANT DUSK
DUSK STILL SAMURAI CHERRY
TREES SONG GONE BATTLES

BRIGHT DISTANCE DISTANT
FROGLINGS WEIRD THE FAR WEIRD DISTANT
FAR SCARECROW OLD DISTANT

SAVAGE FROGLINGS OLD
GONE NEVER WEIRD WATERS DAWN
DOWN WATERS FROZEN

BATTLES ECHO AND
DUSK CHERRY MIDNIGHT STILL FROZEN
DISTANCE AND WEIRD FAR

WATERS SONG AND SAMURAI
AND DOWN AND BRIGHT SONG FAR ECHO
TREES FROSTY SCARECROW
```

HOW TO WRITE POEMS WITH A COMPUTER

You don't need rhyme, or meter, or even grammar, to write a poem. What you need is a fresh way of seeing things, and a new way of saying them.

A program which will write poems can be quite simple. Choose some interesting words as your data. (These words came from a book of Japanese haiku.) Let the computer put them together at random. Then choose the combinations that you like, and call them poems.

If you are writing haiku, you will have to tell the computer how many syllables each word has when you type it in as data. Haiku usually have 17 syllables, but there are really no rules. Freshness and beauty don't come by following rules.

HISTORY BOX...

Haiku is the traditional Japanese form of 17 syllables in three lines, arranged 5/7/5, and is essentially open-ended, often distinguished by what it leaves unsaid.

Another verse form is "tanka" which contains 5 lines and 31 syllables.

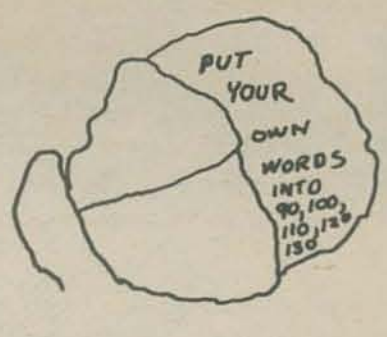
The origins of tanka may be traced back to a time before the Japanese had a written language. Tanka has been an important part of the Japanese culture since 500 B.C.

Though "tanka" has been the most popular verse form in Japan for centuries, it is relatively unknown in America. The shorter "haiku" verse with three lines and 17 syllables, is much better known.

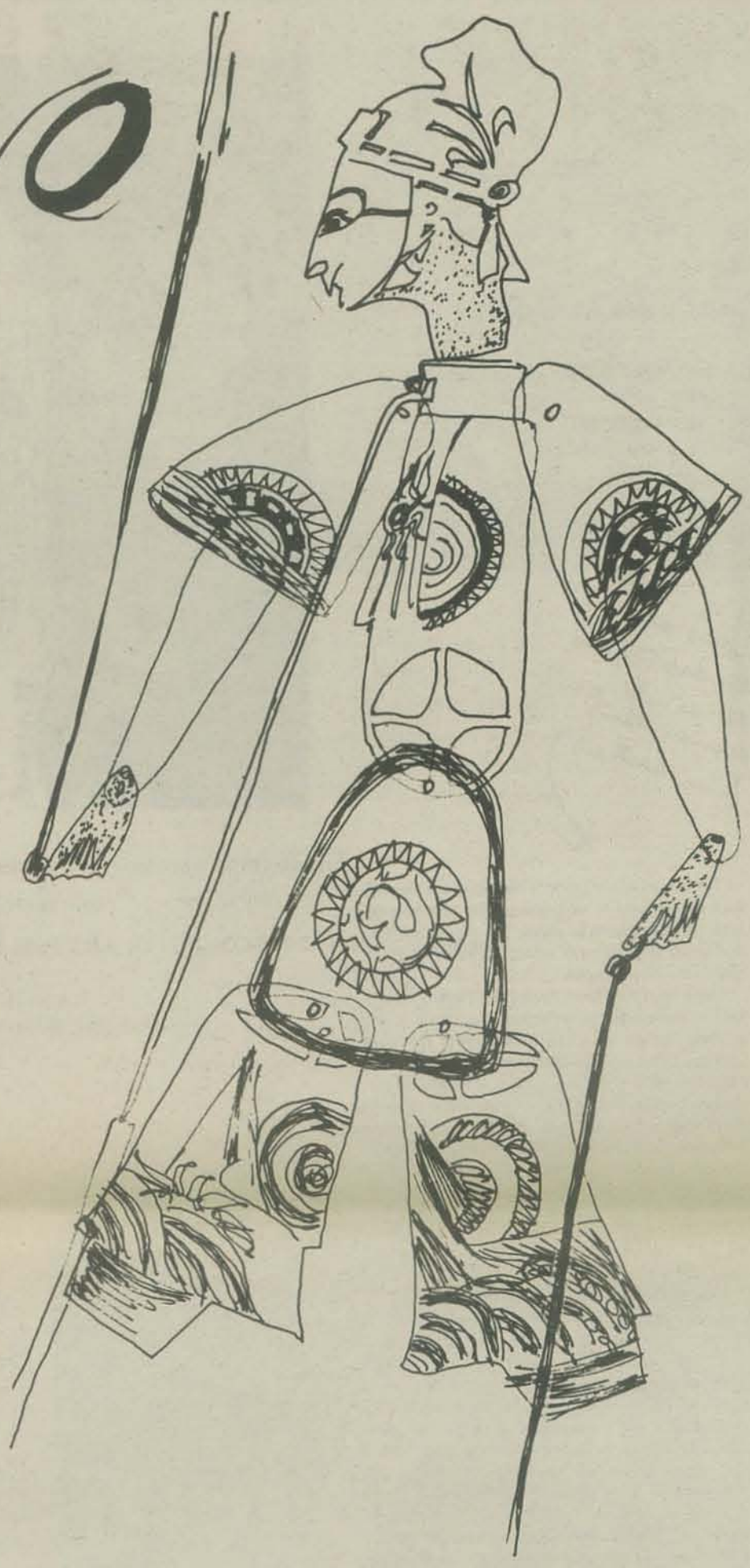
Can you change the HAIKU verse to TANKA?

Listing

```
10 REM -- HAIKU BY JOHN MORRIS
11 REM -- transcribed and slightly changed for datapoint by G.Yob
13 DIM B$[10]
15 "HAIKU: DO YOU WANT PRINTED COPY??"
16 F=0
17 INPUT B$
18 IF B$[1]="Y" THEN F=1
20 DIM W$[35,12],S[35]
30 FOR I=1 TO 35
40 READ W$[I]
50 NEXT I
60 FOR I=1 TO 35
70 READ S[I]
80 NEXT I
90 DATA "SCARECROW","SILENT","DAWN","SAMURAI","FROGLINGS","DOWN"
100 DATA "TREES","HOLLOW","WELL","FAR","DISTANT","FALL","DUSK","AND","FROZEN"
110 DATA "NEVER","BATTLES","BRIGHT","FROSTY","GONE","CHERRY","BRIGHT","STILL"
120 DATA "WEIRD","SAVAGE","MIDNIGHT","WATERS","AND","THE","IN","DISTANCE","OLD"
130 DATA "ECHO","SONG","GLITTERING"
140 DATA 2,2,1,3,2,1,1,2,1,1,2,1,1,1,2,2,2,1,2,1,2,1,1,1,2,2,2,1,1,1,2,1,2,1,3
145 "ONE MOMENT WHILE THE TEA BOILS ..."
150 FOR J=1 TO 35
160 FOR K=10 TO 1 STEP-1
170 IF W$[J,K]=" " THEN NEXT K
180 W$[J,K+1]=3
185 CLICK
190 NEXT J
195 ""
196 ""
200 N=5;Y=Z=0
210 X1=INT(1+35*RND);PRINT W$[X1];" ";
215 IF F=1 THEN PRINT#4;W$[X1];" ";
220 Z=Z+S[X1];IF Z<N THEN 210
230 " "
235 IF F=1 THEN PRINT#4;" "
240 IF N=5 THEN 260
250 N=5;Z=0;GO 210
260 IF Y=1 THEN 280
270 Y=1;N=7;Z=0;GO 210
280 PRINT
290 PRINT
300 IF F=1 THEN PRINT#4;" "
310 IF F=1 THEN PRINT#4;" "
320 INPUT Z
330 GO 200
```



KAWANO

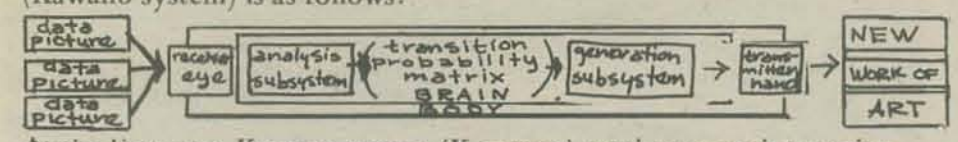


The Idea of My Computer Art

My computer art is not a only fine art. My computer work of art is some results of aesthetical studies in which I wish to throw light on the logic of human art by using the model of information processing of computer. The more we make clear the logic of human art, the better the quality of mechanization of art will become. Then, the mechanization of art will bring the refined mass-production of art and make people's mental life to be rich. I wish to accomplish such a integrated idea of theory and praxis in this research of computer art. Therefore, my work of computer art is the product of cooperation between theory and praxis.

I think that computer art must not be "computer aided art" which is now becoming popular as device which adds the eccentricity to human art. It must be the creative activity of computer which thinks freely like human being. The grief of computer is not at its human-like behavior, but at its not human-like behavior. Therefore, computer art aims at human art and wishes to reach to it as near as possible. That is, computer ought to imitate human art properly. My computer art is only the beginning of scientific studies about art, and so the works have not yet such a artistic value as human art has. But it is caused not by crudity of digital computer, but by unripe reason of aesthetician who thinks about art, I think. In future, the excellent human-like computer art will perhaps be produced under the further progresses of scientific aesthetics.

Now, I call it "art simulation" that computer imitates a human activity and creates the work of art. Computer must recognize the algorithm of art in order to simulate human art. Art-algorithm is the description of solving method about art problem, that is, how to create the so-and-so work of art by computational formula, we need to build the mathematical model of artistic activity to describe art-algorithm as program. I have built this art-model by means of information theory and Markov-process theory. My art-model (Kawano system) is as follows:



At the first step, Kawano system (K-system) receives some interesting works of art as data (data-picture) from his surrounding world through his eyes (receiver). The received data pictures, at the second step, are analyzed by analysis subsystem in the brain of K-system, where the image character can be abstracted after this analysis of data. This process is called the appreciation of work of art in traditional aesthetics.

For K-system, the work of art is to be defined as the picture-matrix in which a few sorts of color picture-element (■ ■ ▨ ▧ □ et al), are arranged in format n x m (length and breadth). The image analyzed in K-system takes the form of transition probability matrix in Markov-process theory, whcih expresses the relative frequency (intensity) of combination among some neighboring picture-elements as Markov-chain in data.

At the thrid step, this analyzed image is to be composed into some new artificial works of art by the generation-subsystem in the same brain of K-system, where the Monte Carlo method in Operations Research has been used. This method is the way to generate the new pictures as the image character of transition probability matrix into n x m format. These conceptions of transition probability matrix and picture random number are nothing but the model-description of creative freedom of artistic activity by means of information theory.
In such as way, the works designed in the brain of K-system are physically performed through hands (transmitter) finally and transmitted towards world again. This process is called the creation of work of art in traditional aesthetics.

The above-mentioned is the model about artistic activity of K-system. If we can describe these process of art-simulation in computer language and give this descriptions to computer as program, the computer will look at various data-pictures to catch their image and be able to create the new pictures which represent that image infinitely. But as the transmitter (output device¾ line-printer

infinitely. But as the transmitter (output device: line-printer) of computer is not so good painter, all output works of art had better to be performed by human hand painting.

Serigraphs are available from Gilles Gheerbrant
2130 Crescent, Montreal 107
phone: 514 843-7535

Hiroshi Kawano
3-16-1-15, Aoto
Katsushika-ku
Tokyo, Japan

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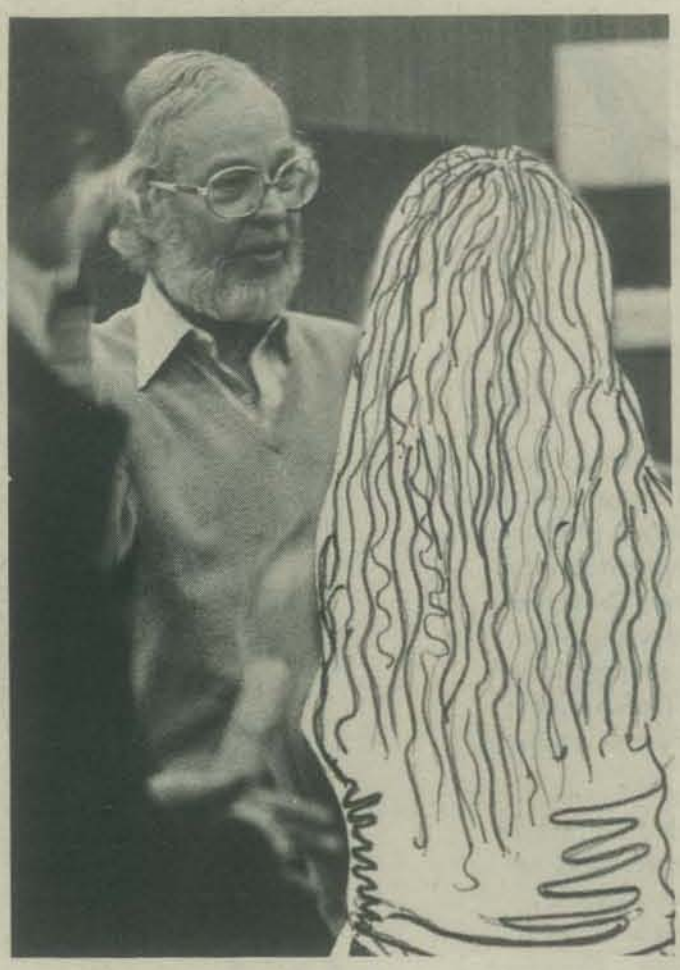

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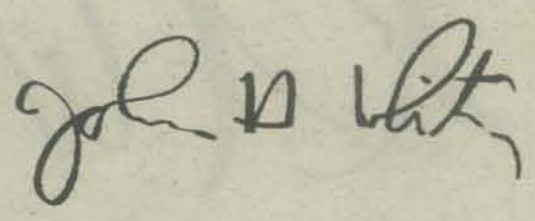


Reprinted from P.C.Q. Vol 2, No 2 November 1973

Photo Credit
DENNIS OPPENHEIMER
EVERGREEN State College
Washington

Here's an excerpt from an article reprint that John sent us

INFORMATION PROCESSING 71 – NORTH-HOLLAND PUBLISHING COMPANY (1972)

Invited Papers *Sciences and Humanities*

A COMPUTER ART FOR THE VIDEO PICTURE WALL

John H. WHITNEY
600 Erskine Drive, Pacific Palisades, California 90272, USA

The marvel of the modern computer need not obscure the probability that even smaller and more versatile graphic systems lie ahead. Nor the probability that future generations of artists will know better how to use these systems.

I have tried thus far to present a different, hopefully an unexpected introduction to my work in order to stress that it is not a film art like any of the forms of film art that are established and well-known today. I could say that what I am doing is more akin to music than to film art, but that too evokes preconceptions that I wish to avoid. All that my work has in common with music is, let us say, this patterning of various periodic phenomena in time.

With the computer as an animation tool, however, its mathematical determinants have led directly into a new world of integer ratios and algebraic functions – harmonic phenomena which express themselves graphically.

First of all, since the computer positions and shapes any graphic object by *x-y* coordinates it becomes the most natural way to position and move objects by way of some dynamic numerical functions of *x* and *y*. Immediately harmonic functions come to mind with regard to moving objects relative to each other. Thinking of graphic form, since it all must be expressed in *x-y* or polar coordinates anyway, impels one toward number functions.

It is ironic, to say the least, that most artist experimenters with computer graphics thus far have sought ways to circumvent the imposing fact that all their graphic conceptions must be translated into number functions. After resisting this rather tedious reality for some time myself, I have come to welcome the mathematical basis of computer graphics because of the structural advantages I have discovered thereby. I have come to accept the numerical problems which are natural procedure with my computerized tool. Now I find that this very acceptance has opened the door to a new world of visual design in motion whose true essence is digital periodicity. But for some details that are not important, this is much the same world that the composer has known for at least a thousand years, composing audio design periodicity.

The first illustration (fig. 1) is a series of frames from the computer generated film, PERMUTATIONS. * These frames were selected from much longer sequences in the film in order to illustrate what might be termed periodic visual harmonics. In each frame, there are two hundred and eighty-one points which move about the motion picture field according to a set of instructions in a graphic program which were input to the computer. The program instructions say, in effect: Starting at the center of the screen, step to the right a computed distance and move in an arc around counter clockwise so many computed angular degrees and place one point. From there, compute a new radius distance outward and a new theta arc around and place another point. Now repeat this procedure again and again to locate a total of 281 points. This takes about a second or two computation time on the computer to produce only one frame of the motion picture. Each frame is slightly different because some of the parameters of the instruction equation are changing with each new computed picture.

Fig. 1.

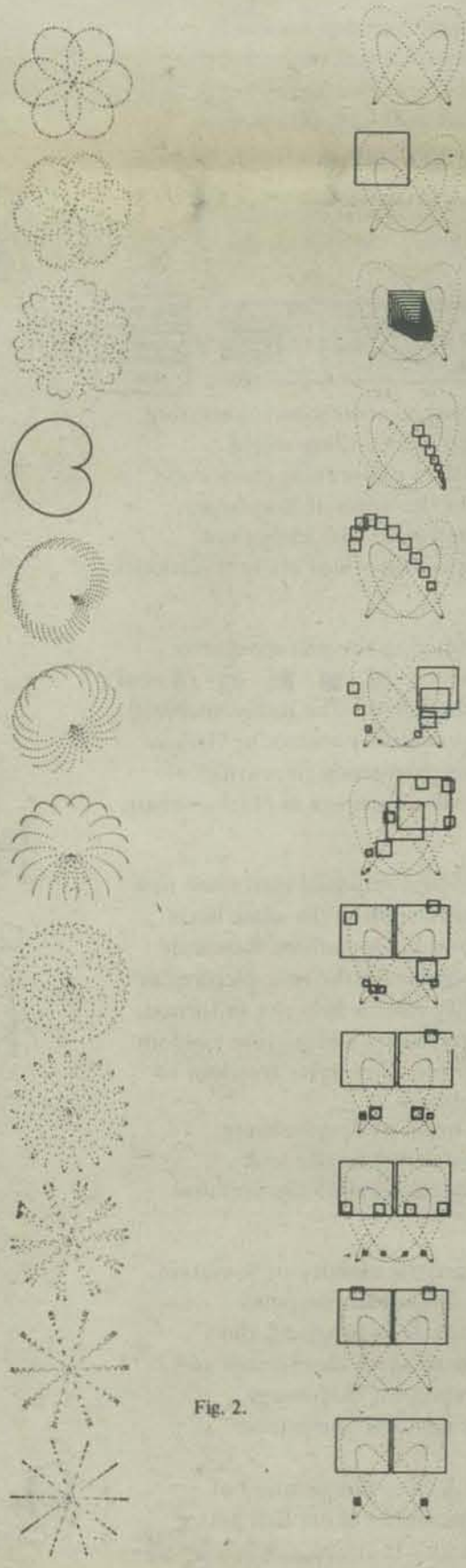


Fig. 2.

If you were to watch the picture on the screen 24 new pictures a second are displayed and you can see changes taking place sometimes very rapidly and sometimes quite slowly. This rate is determined by the size of the incremental steps, or the parametric changes, as they are written into the basic equation. Points seem to be scattered around in a circular area randomly at one moment. But at certain moments they all seem to fall in line to make up some simple rose curve, symmetrical figure; sometimes it is a three lobed figure, or ten or four or two lobed figure.

These action sequences proceeding from order to disorder and back to ordered patterning, suggest a parallel to harmonic phenomena of the musical scale. In an aesthetic sense, they have the same effect; the tensional effects of consonance and dissonance. The scattered points fall into some ordered symmetrical figure when all the numerical values of the equation reach some integer or whole number set of ratios. The effect is to subtly generate and resolve tension which is similar to the primary emotional power of music composition. Incidently, the link between mathematics and music having been remarked, it is particularly the whole number hamonic ratios which support such suppositions.

It is unfortunate that the static illustrations to this text do not begin to show what is already a rather subtle and fleeting experience in the motion picture film. Musical illustrations to any text on that subject usually presume that the reader may perform the illustration if need be. That is, of course, impossible here. Yet this is the best and simplest illustration I have so far. This may suggest how a motion graphic parallel to the harmonic phenomena of music is beginning to take shape. It is a clue as to how visual form may be shaped into periodic elements for the construction in time and space of moving visual elements of nascent time-oriented abstract art.

As a second illustration of periodic visual harmonic structure, a few frames have been selected (in the same manner as fig. 1) from the film MATRIX.*

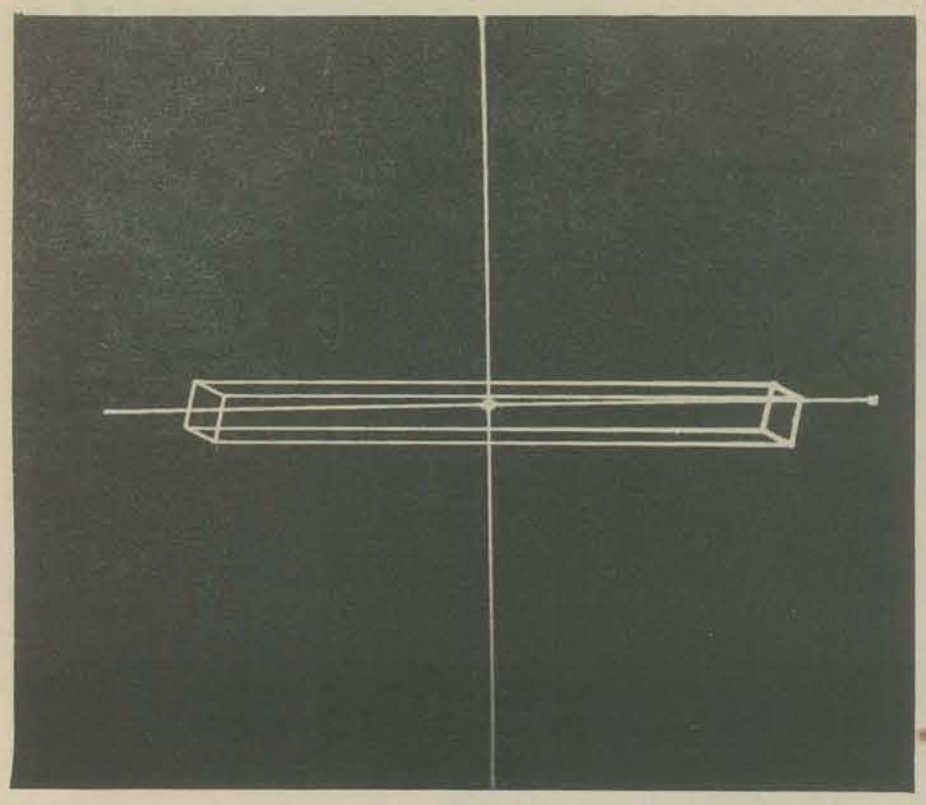
Instead of the simple circular pathway of PERMUTATIONS, now, in MATRIX, the pathway is a more complex orbit which folds around and back on itself and extends in three dimensional *x*, *y*, *z*, space. (See first frame of fig. 2.) All action moves along this path and the visual harmonic principle has become more sophisticated. Lines and cubes move around this orbit path in the film, but in this example, I will show what happens to the cluster of squares. Each square moves independently of its neighbor. The lead square has the fastest rate. Each following square is moving slightly slower. So the squares spread out along their orbit. The lead square "laps" the slowest moving square, like cars on a race track. However, chance is not the controlling factor. The factor of whole number ratios is at work here as in the previous illustration. Harmonic phenomena dictates that sooner or later this apparent randomness will be punctuated by an orderly arrangement of these squares just as the random array of points in PERMUTATIONS fall into rose curve patterns. (See last three frames of fig. 2.)

So MATRIX too is another exercise in visual harmonic composition. It too, I think, is rather clumsy; as you would expect from beginning exercises of a youthful composer's first note book. I am not that young, but I hope you can share with me what promise I see in all this.

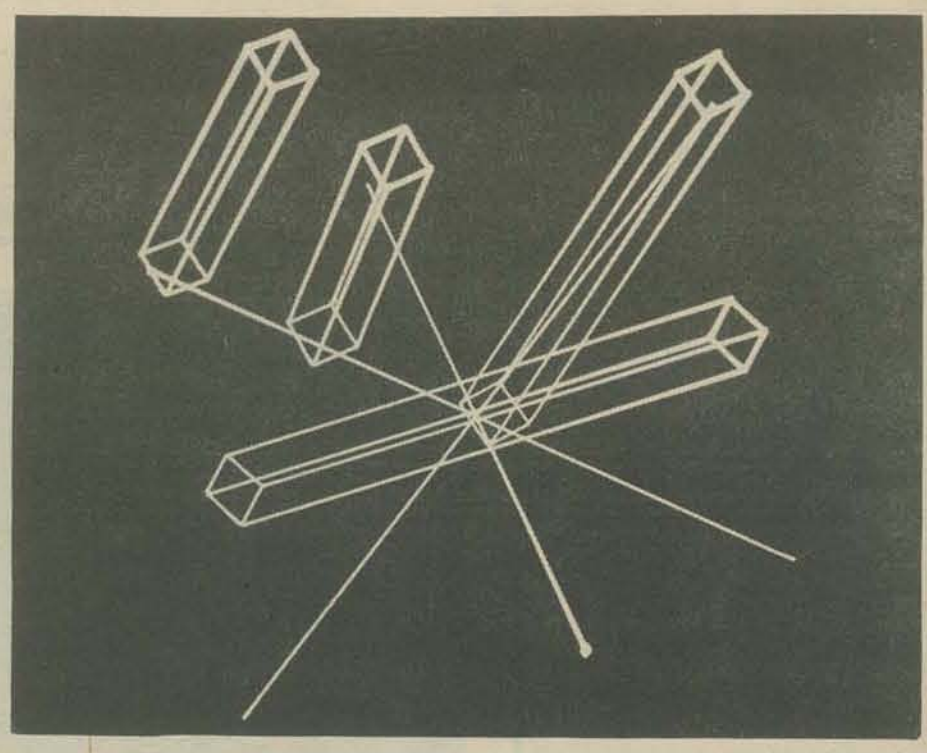
* PERMUTATIONS 7 min. This film is available from the Museum of Modern Art, New York or Pyramid Films, Box 1048, Santa Monica, California 90406. Rent $10

* MATRIX 6 min. This film is available from the Museum of Modern Art, New York or Pyramid Films, Box 1048, Santa Monica, California 90406. Rent $10

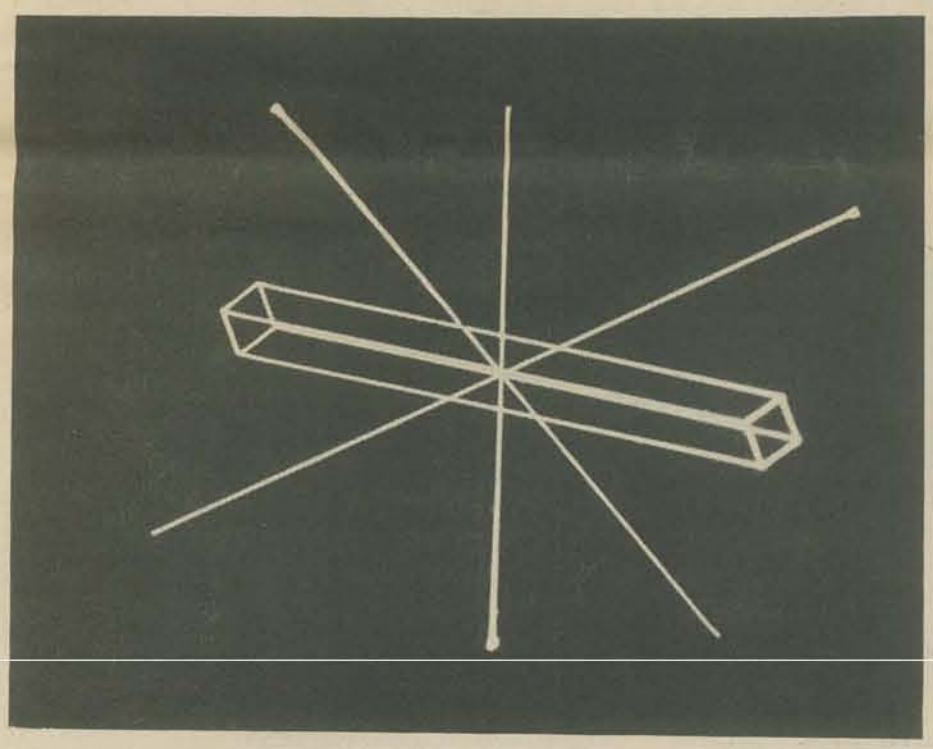
Vicky Meyer



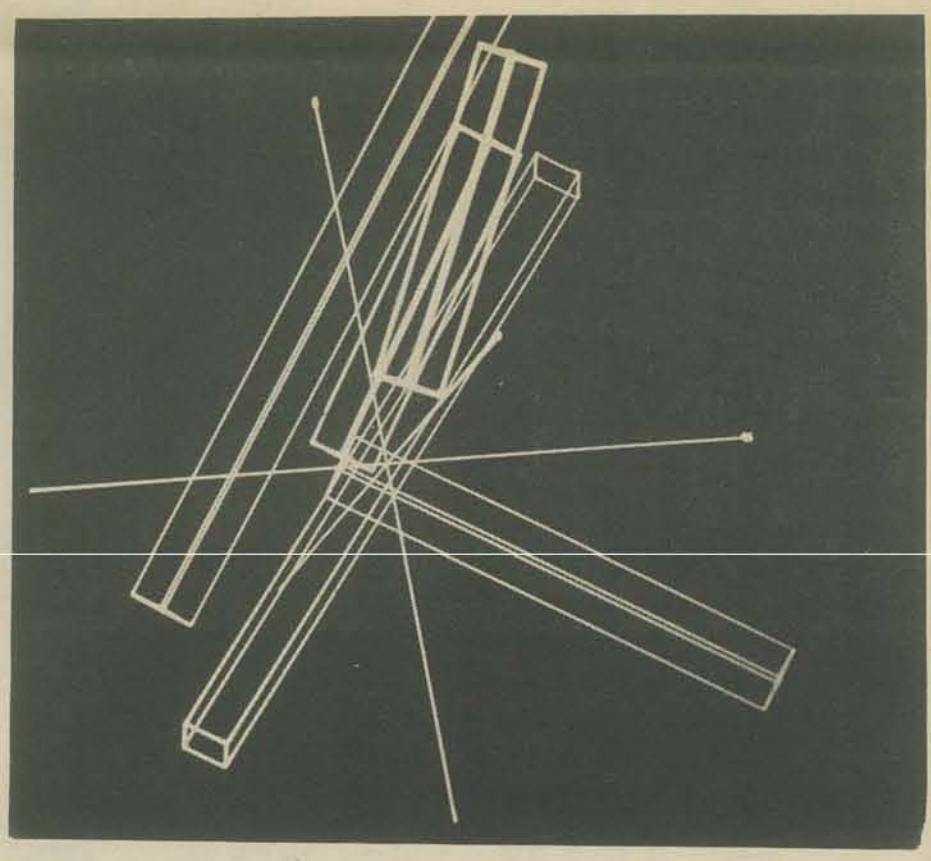
My idea wants to be thus: to direct the movements and timing in clear relationships one to the other.
I describe both shape and movement, and watch the results immediately on a CRT. The computer TV displays lines of cold glowing phosphers. The modules can be turned and moved like sculpture in real space. I can even get inside the modules if I wished.

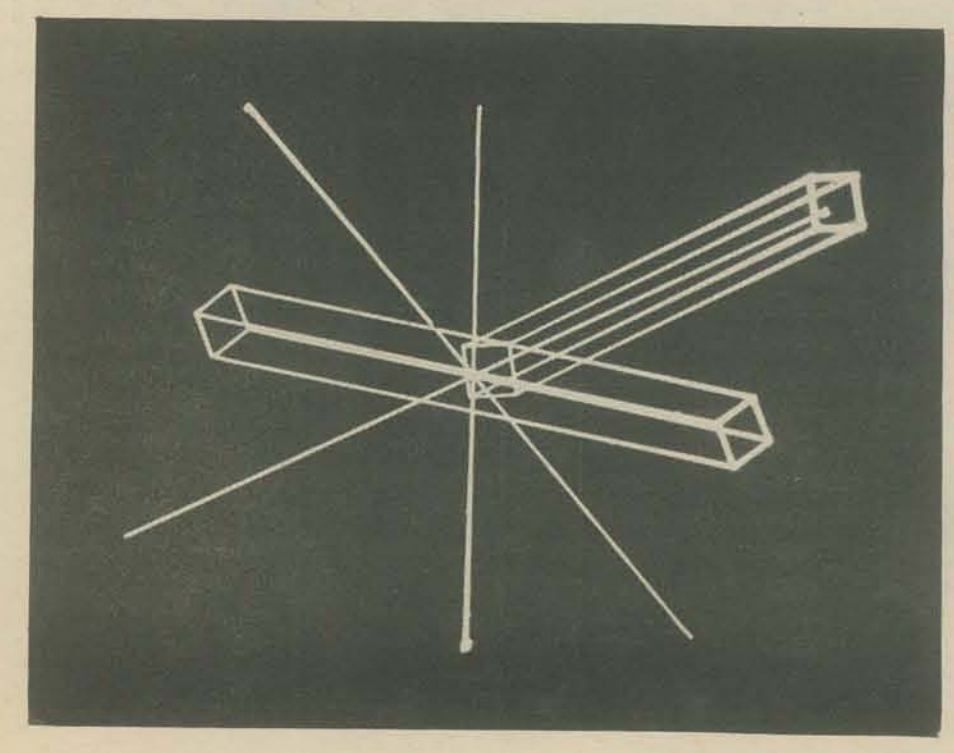


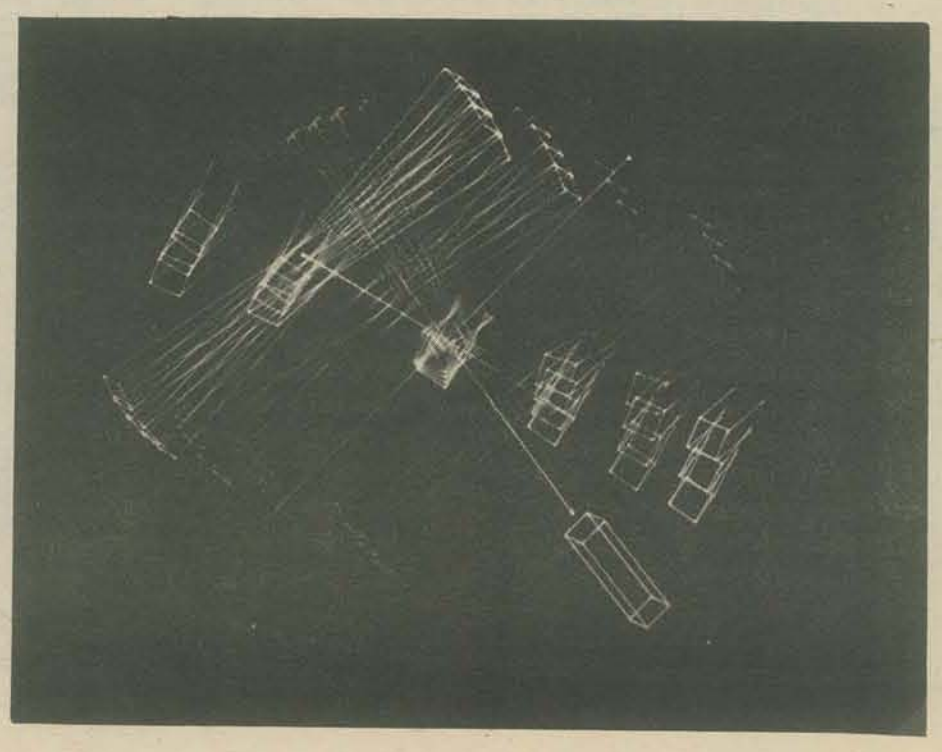
The basic module of the program is a rectangular column of adjustable length. Turning any direction, combining independant length these images orbit in space. The interacting movements reach exciting momentums. But the pace is too slow for me still and often random. The value of these movements is not the logical simplicity of elliptical orbits or more complex x, y, z orbits versus visual complexity of speed and subliminal motion. *"My art is not successful, even if judged well by the viewer, unless the intended emotion is imparted."* Sound is generated from the program.

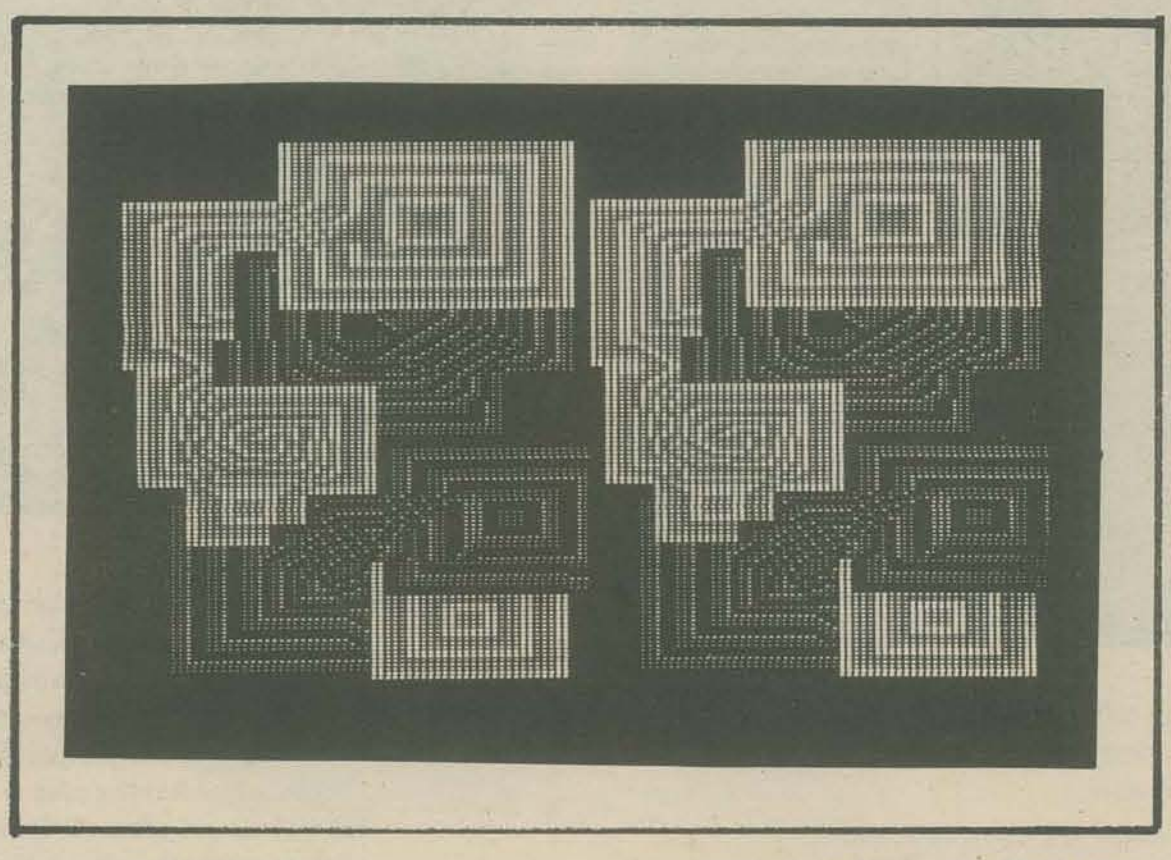


Run on Adage Graphics Terminal, AGT/30 in the Industrial Engineering Department, Stanford University. Programmed in AFORT (FORTRAN II) or GRAPHX. Images composed of as many as 5,000 line segments.









Terence Campbell, 1973
"CYBER I/N/2"

Sources of Computer produced Still Pictures

Harold Cohen, Visual Arts Dept., University of California, Alcala Park, San Diego, California 92110
Dept. of Computer Science, University of California, Chico, Ca., 95926
Dept. of Computer Science, University of Utah, Salt Lake City, Utah 84112
Dept. of Computer Science, University of Maryland, College Park, MD. 21201
Gilles Gheerbrant Editions, 2130 Crescent, Montreal 107
Ruth Leavitt, 5315 Dupont Ave., Minneapolis, MN. 55419

Sources of Computer-produced Art Films

Charles Csuri, Director, Computer Graphics Research Center, 1314 Kinnear Rd., Columbus, Ohio 43210

Computer Image Corporation, Denver Colorado, 80901

Ken Knowlton, Bell Telephone Labs, Murray Hill, N.J. 07974

Museum of Modern Art, 53rd St., New York, N.Y. 10019

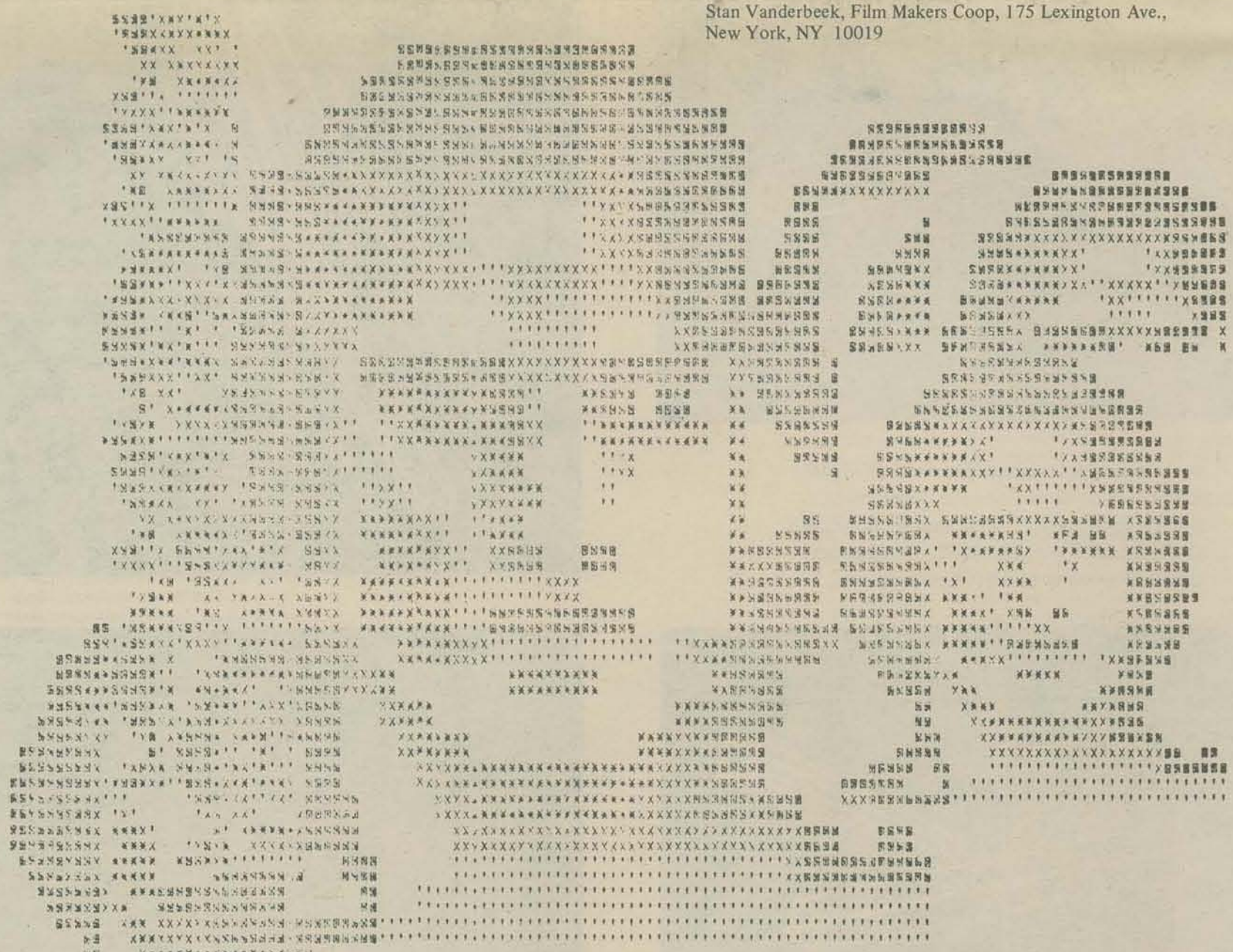
Pacific Film Archives, Museum of Art, UC Berkeley, Ca. 94720

Pyramid Films, Box 1048, Santa Monica, Ca. 90406

Ron Resch, Computer Dept., University of Utah, Salt Lake City Utah, 84112

Lillian Schwartz, Lilyan Production, Inc., 524 Ridge Rd. Watchung, N.J. 07060

Stan Vanderbeek, Film Makers Coop, 175 Lexington Ave., New York, NY 10019



David Link, May 4, 1973
Computer Printout of Ditized photograph
of Garly Ketchum "EXPLOR" Language

Lillian Schwartz

Computer-Produced Films

By Ken Knowlton

A movie is a sequence of pictures (plus sound); each picture consists of thousands of spots of light or color arranged in an appropriate way so as to form a recognizable pattern; these spots may be produced originally on, and photographed from, a cathode ray tube, somewhat resembling a TV tube, which is controlled in turn, by a computer that sends signals specifying exactly where on the screen, and just how bright, each spot should be.

This may or may not be a good way to make a movie: it depends on how clever the programmer is

Ken Knowlton is an innovator in the area of computer graphics and explorer of the art-technology interface; has collaborated with artist-filmmakers Stan Venderbeek and Lillian Schwartz. He is the author of several programing languages, among them: L⁶—a low level list processing language. BELFLIX—a general language for computer prodution of still pictures and movies. TARPS—a two-dimensional alphanumeric raster picture system for artistic stills and movies. EXPLOR—a generator of images from Explicit Patterns, Local Operations and Randomness.

features which can be given precise (though not necessarily the customary) meanings.

...e future of computer animation ...ntific and educational ...ly ...o ...ter ...s ...se ...cal ...not easily ...cting the ...s clear in "computer ...art" thus far, is that new graphics are resulting which never would have been done by hand.

The most interesting thing that I have gotten into recently at Bell Laboratories is a system for making movies which has a rather quick real-time playback of approximate images (i.e. coarse resolution). This makes the whole experience a much more interactive sort of thing, not as immediate and direct as working with the video synthesizer, but far better than having to wait two days for your first glimpse of a piece of black and white film. I hope you will come this way some time so that we can give you a demonstration.

Love,

Ken

photography: Marty Oppenheimer

Computer Research

By Charles Csuri

At Ohio State University an animation/graphics programming language on a mini-computer has been developed which makes the computer system natural to use and one which makes the system more powerful in terms of itself. Specific computer techniques and algorithms are programmatically combined to make complex interactive programs that are general enough to be applicable to any structure. Structures, in turn, can include any drawing or motion sequence the artist creates.

The artist is seated in a computer environment, working with electronic tools to do film animation. The drawings are displayed on the face of the computer's cathode-ray tube—a television-like screen. When the artist instructs the computer to induce movement, follow a prescribed path, or change from one shape to another, the computer responds.

The artist controls the movement of his drawings through a graphics programming language. He specifies these changes with commands and special devices. For example, with a single command he can shade 3-D objects and then adjust gray levels with dials. By simply adjusting the computer's switches and dials, the artist makes the moving drawings speed up or slow down or become larger or smaller. By pointing with a stylus, he positions or erases objects on the screen.

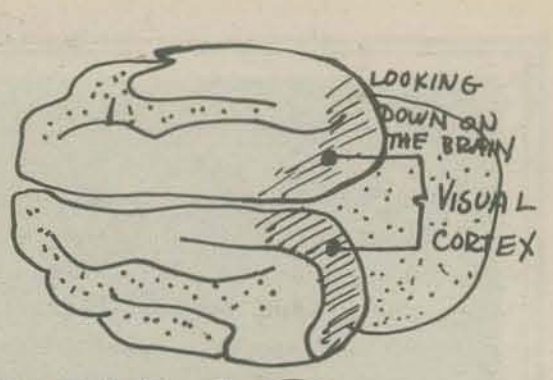
To supplement a visual image with explanatory words or sentences that appear on the screen, he types them in through the keyboard. The computer has stored 4,000 software characters, signs, and symbols as well as a wide variety of type faces. He controls their movement, size, and orientation as if they were pictures.

Using a special sonic pen, the artist can draw in two and three dimensions with the results displayed on the computer's screen. He might draw a helicopter on the screen, and quickly make it hover or move in any direction, its two blades turning at different speeds. He can construct a sea turtle and have it shaded by the computer while swimming through three-dimensional space in real time with twenty shaded bird's and twenty butterflies flapping their wings, moving about the computer's screen —each one with independent movement and speed. When he is ready, the inherent timing processes of the computer system will help the artist record his efforts on film.

Charles Csuri
Professor of Art and Director
Computer Graphics Research Group
The Ohio State University

Computerized Steinberg: Lacy 3-D

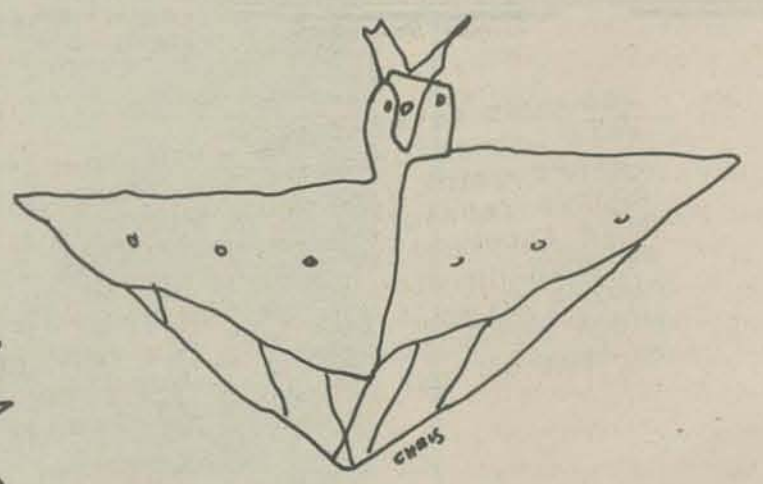
HAROLD COHEN

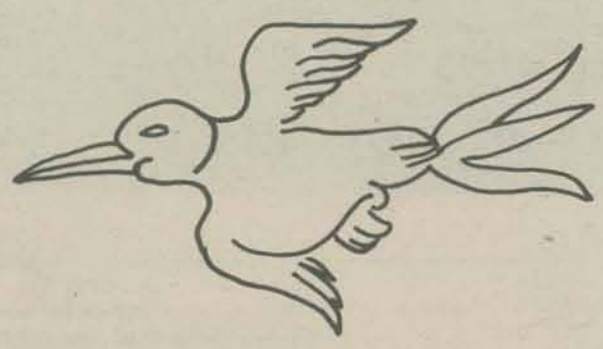


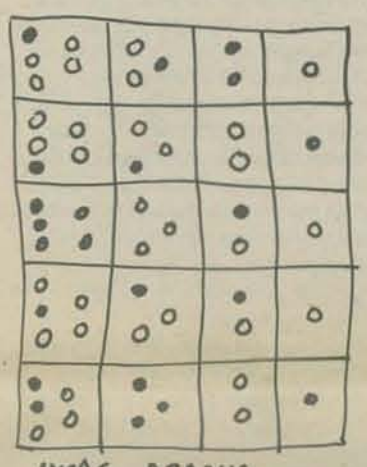
You read a good deal these days about the computer being a powerful *tool*. It is. But there are many different kinds of tools, and to form any clear idea of what the computer may be capable of doing, you need to have some understanding of the nature of tools.

ATOLL for NEW THINKING

We invent tools to give ourselves abilities we wouldn't otherwise have. You can't drive a nail with your fist, so you invent the hammer. You can't fly like a bird, so you invent the airplane. It isn't true that man is the only animal to use tools, by the way: the sea-otter uses a rock 'hammer' and a rock 'anvil' (which it balances on its chest while it swims on its back) for cracking sea shells. Some birds use thorns for 'sewing' leaves together; in fact, many animals are extremely inventive about using the things around them to their advantage, even if they don't manufacture tools the way we do.

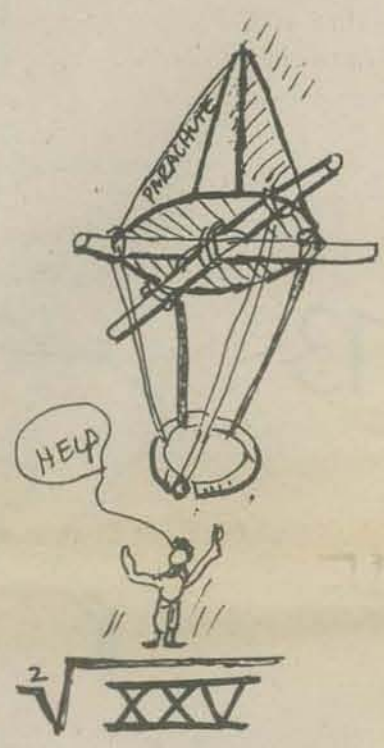


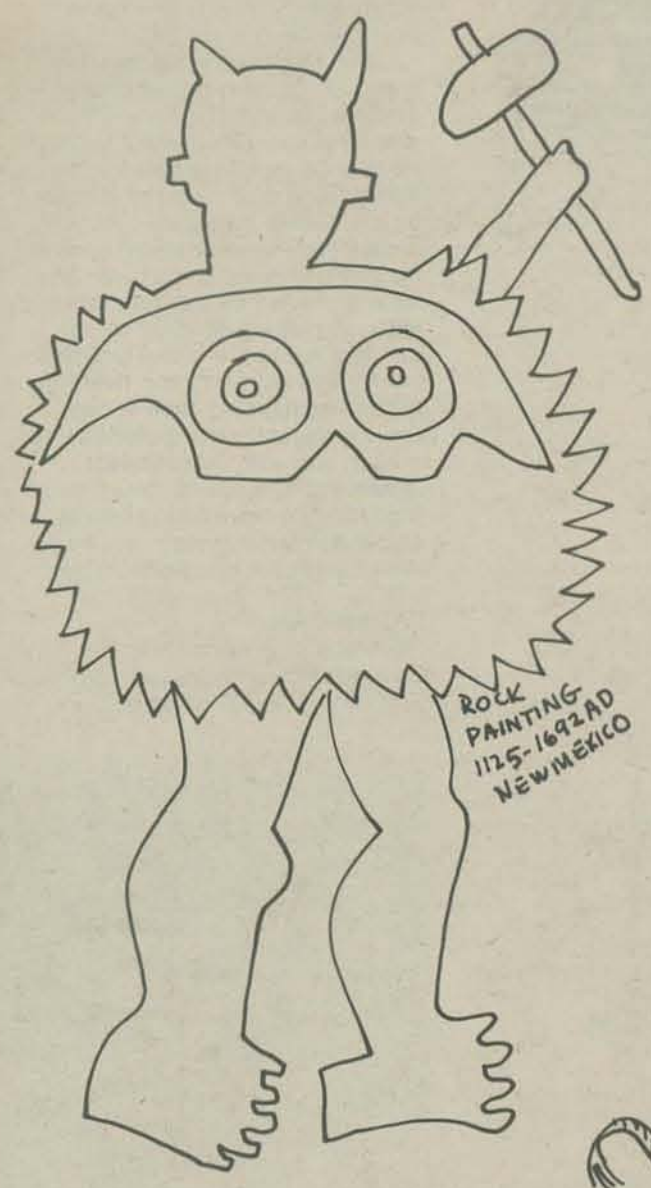


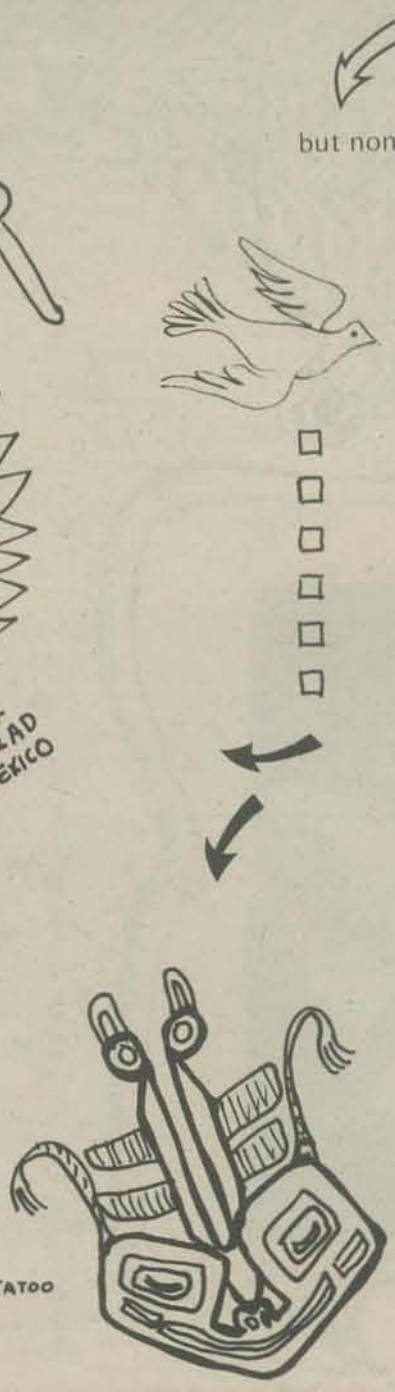


Like their tools, most of ours have to do with our physical limitations, and overcoming them. But man has a relatively high intellectual development compared to the other animals, and he is – I believe – the only one to have done anything about inventing tools in connection with his *mental* limitations.

In this sense, you should obviously think of the abacus as a tool – simple and fairly powerful. But the numbers which it helps you manipulate are themselves a much more powerful tool. (As a matter of fact, the Arabic numbers with which you are familiar are more powerful than Roman numbers: try doing long division or square roots with Roman numerals!) In the same sort of way, the printing press is an enormously powerful tool, and so are radio and television;







HAIDA TATOO

but none of them are as powerful as language itself, which not only serve our minds, but actually helps us to understand how our own minds work.

Whatever other tool-like functions the computer may be given, I believe that it is on this level that its greatest power will be felt. It may prove to be one of the two or three most powerful tools ever invented.

All this may seem very odd stuff for an artist to be writing, especially since most of the 'art' made with the computer up to now has consisted of fairly simple geometrical patterns which would not have required any great mental effort of their human makers in the first place. Personally, I have always found geometrical symmetry to be mildly interesting from a mathematical point of view, but extremely dull to look at. I find pattern-making quite boring, and I don' think art has ever had much to do with that kind of activity. What makes art remarkable, I believe, is the fact that a mark drawn on a piece of paper, or painted on a wall, or scratched on a rock, can take on *meaning* for the people who look at it. It can give the strong sense of being *about* something, even when we couldn't possibly know what it is about – when, for example, it was made thousands of years ago for some completely unknown purpose.

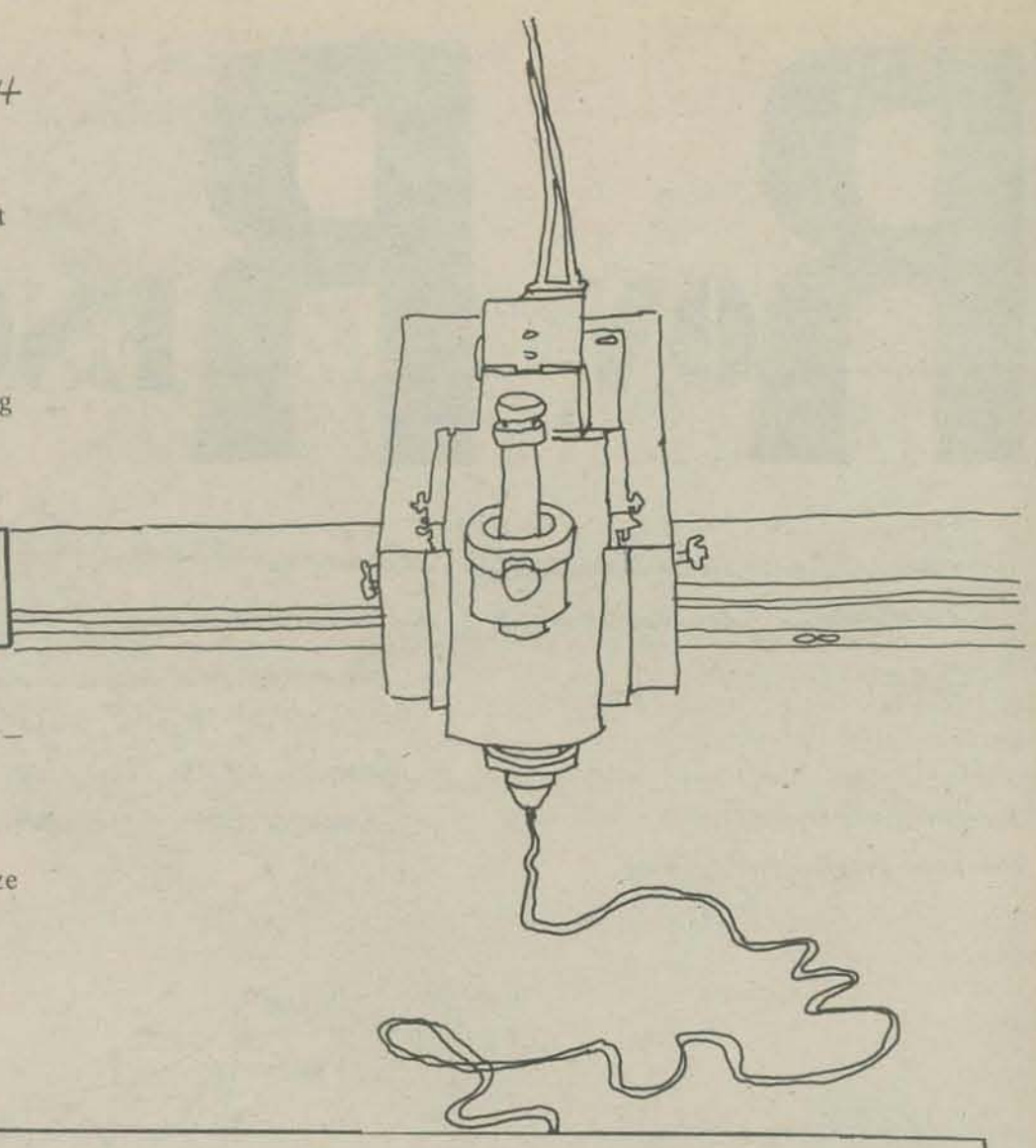
The nature of this 'aboutness' has been the central issue in my work as a painter for as long as I can remember, and if I started using the computer after doing without one for twenty-five years it was because I felt that I needed a new tool to help me sort out some of the difficulties I had found. You see, it has grown to be my conviction that 'aboutness', as well as a lot of other aspects of 'artisitc' performance, actually involves quite normal characteristics of human behavior – that there is nothing *special* about the artist's brain. The question is, what are those normal behavioral characteristics?

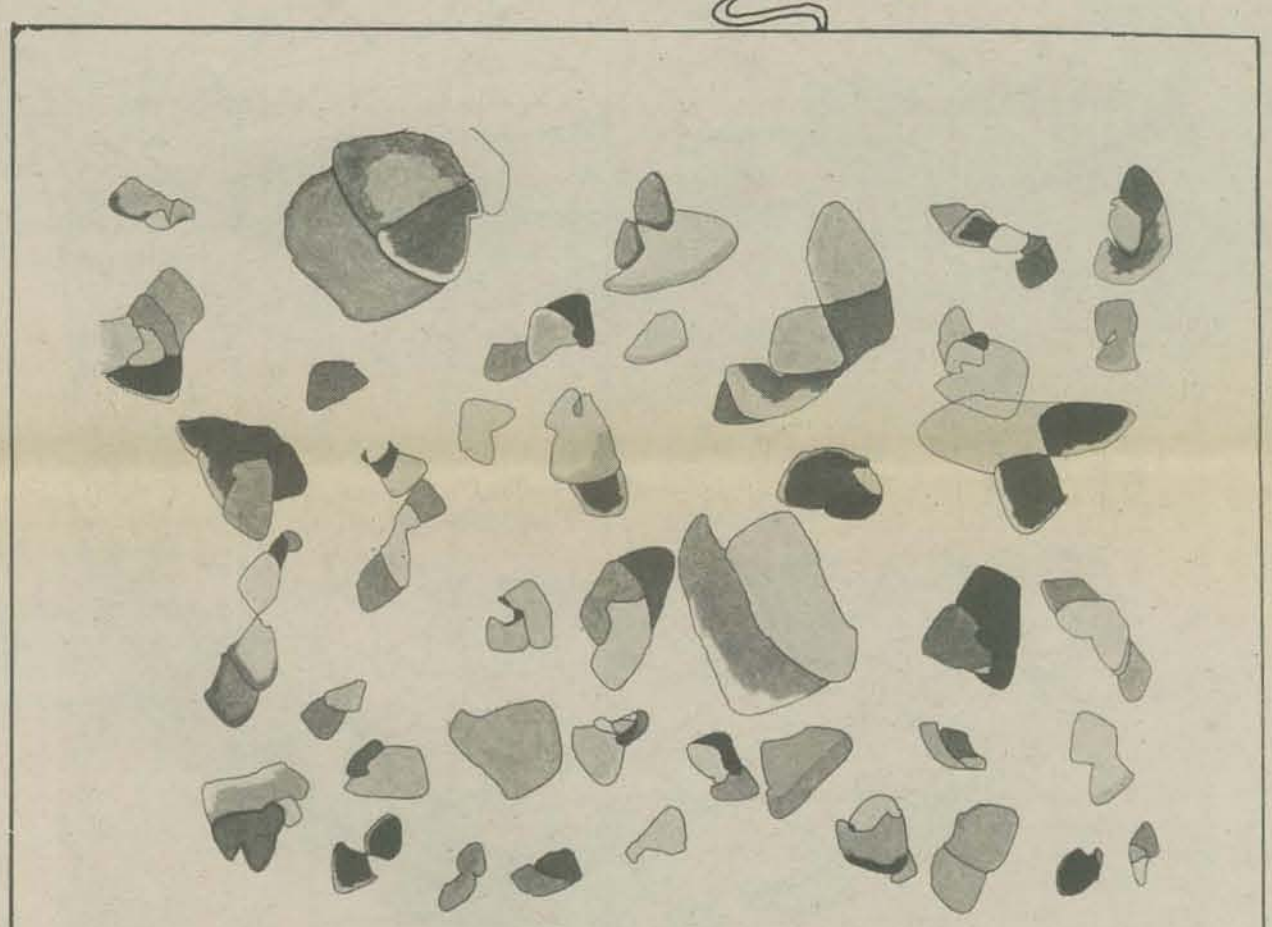
Harold Cohen 1974

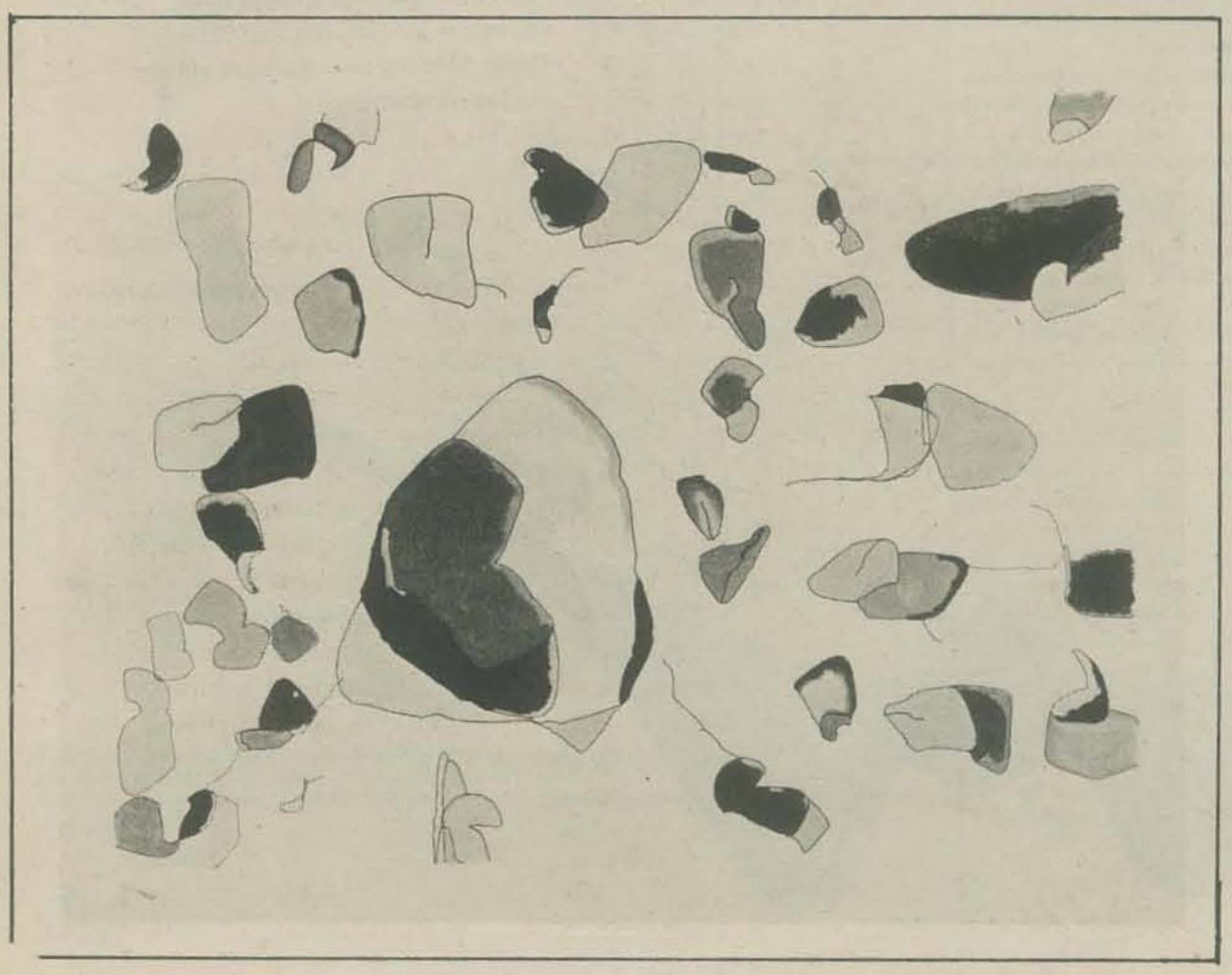
For me, then, writing a computer program to make drawings is not a matter of telling the machine what I want it to draw, just for the delight of seeing it do the drawing. It is a matter of trying to give the machine the sort of abilities which I suspect that human artistis exercise, and having the machine make decisions about what it is doing in the sort of ways I think human artists make decisions. The machine is given no vocabulary of forms from which to select; it starts each new drawing with a blank sheet of paper, and it generates the forms which it draws as it goes along.

If my ideas are correct, then the machine should make drawings which look as though they had been done by hand, IF its behavior actually IS enough like human behavior.

If you would not have guessed, without being told, that the drawings reproduced here were made by machine, then that is probably the case — and I suspect that it is. At least as important, from my own point of view, is the fact that these drawings are at least as interesting and exciting as any I ever made by hand — I can show them in exhibitions which have nothing to do with computing, and I don't have to apologize for them on the grounds that they were made by machine. What this means for the future, it seems to me, is that we might expect to see some quite stunning art made by computer, just as soon as artists realize what *kind* of tool the computer is. We don't have to use it just to crack sea shells!







This is a computer program in EVOC 1.Written in SAIL and run on PDP10 at Stanford University Artificial Intelligence Laboratory, Stanford, California in May, 1974.

You are invited to color the screen printed reproduction in the center fold

DRAWING 1974

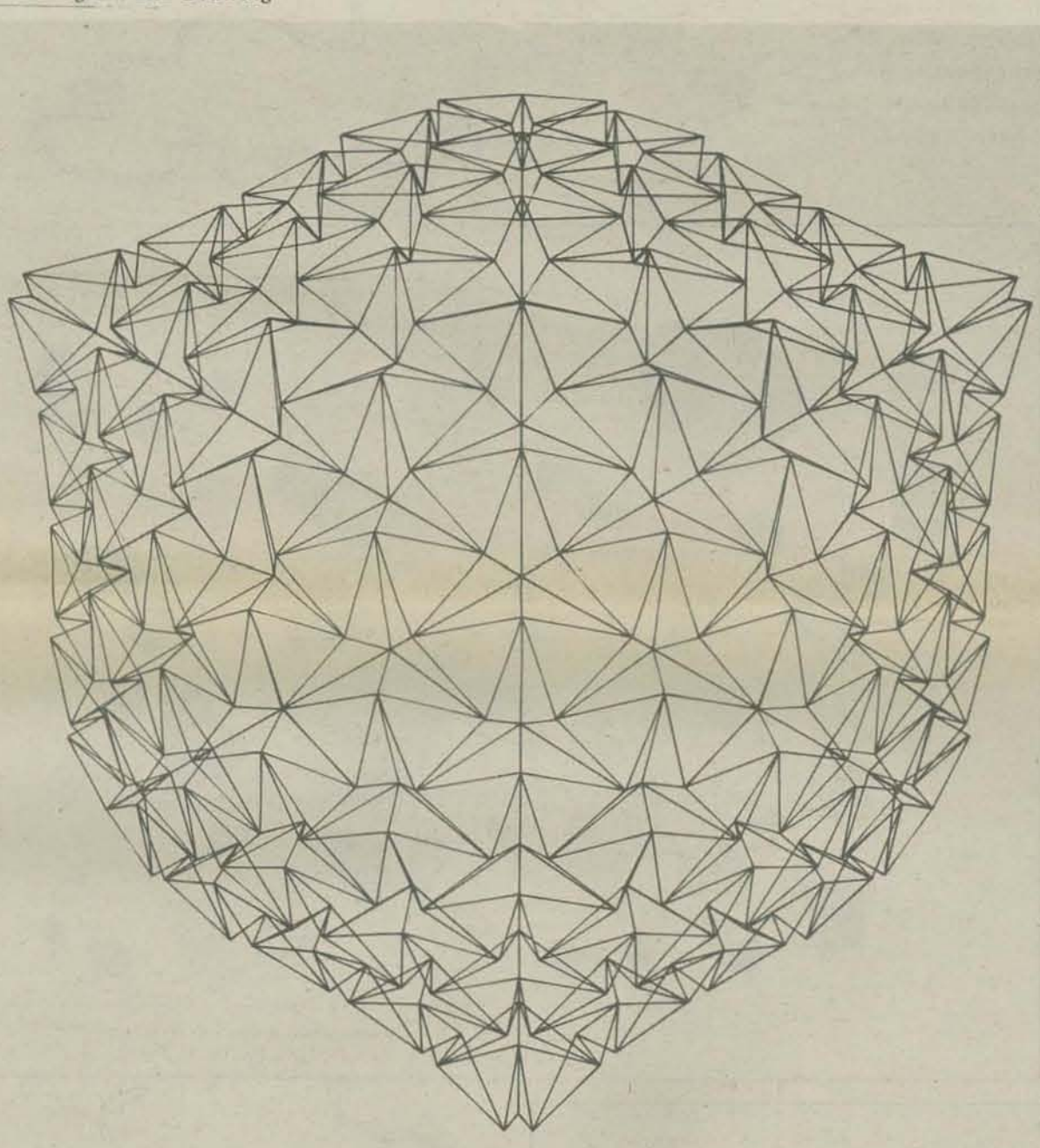
RON RESCH

16

University of Utah
Salt Lake City, Utah

for a detailed description of the "synthetic image" programs (outstanding color reproductions) see:
Proceedings of IEEE
Vol. 62, No. 4, pp. 496-502
April 1974 ... a Special Issue on
Computer Graphics

Flexible Dome Plate System
Computer Program and Drawing

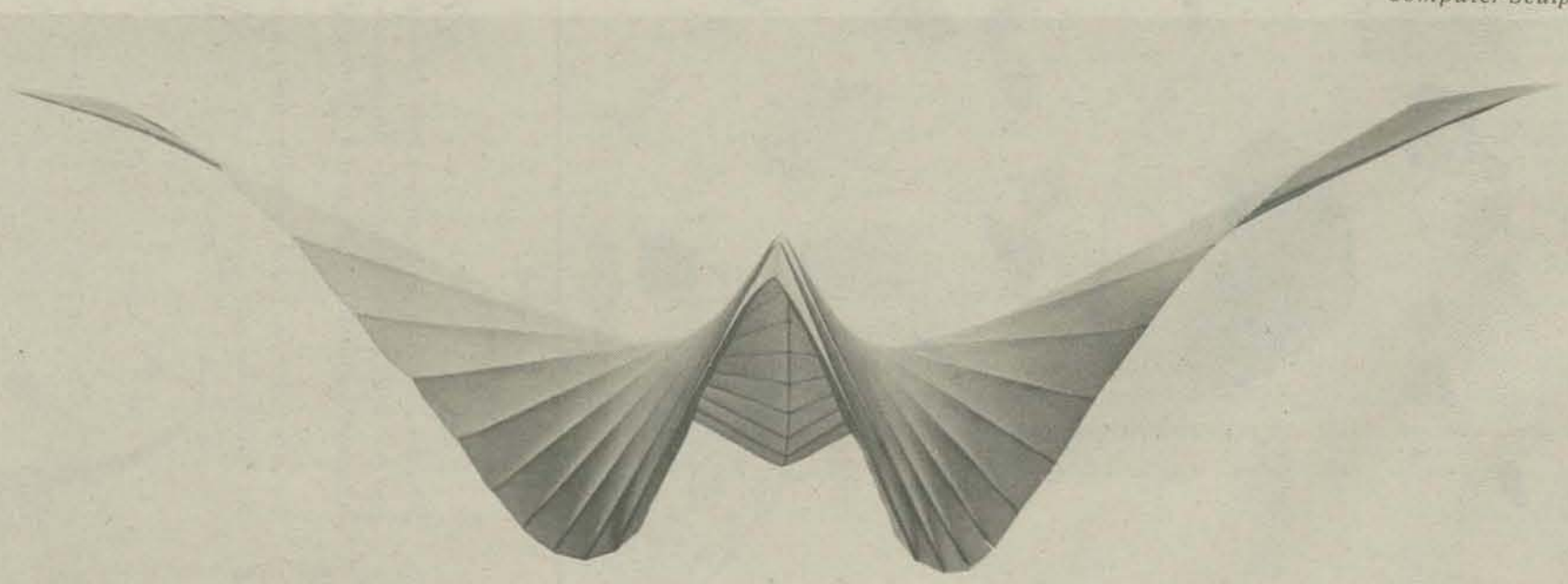


This is taken from a tape of Ron's paper at the Evergreen State Computer Film Festival.

Ron Resch: "Synthetic Image: The image is projected on a square array of dots. Color is achieved by first achieving a grey scale . First we develop an algorithm for visibility and then for shading. The shading rule here is that as the facet moves around to be normal to the line of site combined with the reflection of the light source, it looks as if that model is shaded with shadows but it turns out that it isn't. It is only shaded with that rule. Each point has a red, green. and blue component. The way we produce color is to produce three images and display them sequentially on a cathode ray tube and, as they are being recorded onto full color negative stock, we insert first, a red filter for the red component, then a green filter for the green component and, finally the blue filter for the blue component. It might be 10% red and 30% blue . This is how we have three color separation."

The illustrations which you see here represent work which resulted from the self - imposed constraints of making art by making use of a flat sheet of paper as the only technique and of folding as the only technique.

Folded Paper Bird
Computer Sculpture



Dear Pam,

Thank you for the chance to express some thoughts on computer art and its future. My academic background is in mathematics and my present job is not directly involved with computer graphics. But I have been interested in its esthetic possibilities for three years and presently have access to a DatagraphiX 4460 Computer Output Microfilm (COM) recorder. This is operated offline from tapes generated by an IBM 7094 computer in a strictly batch processing environment.

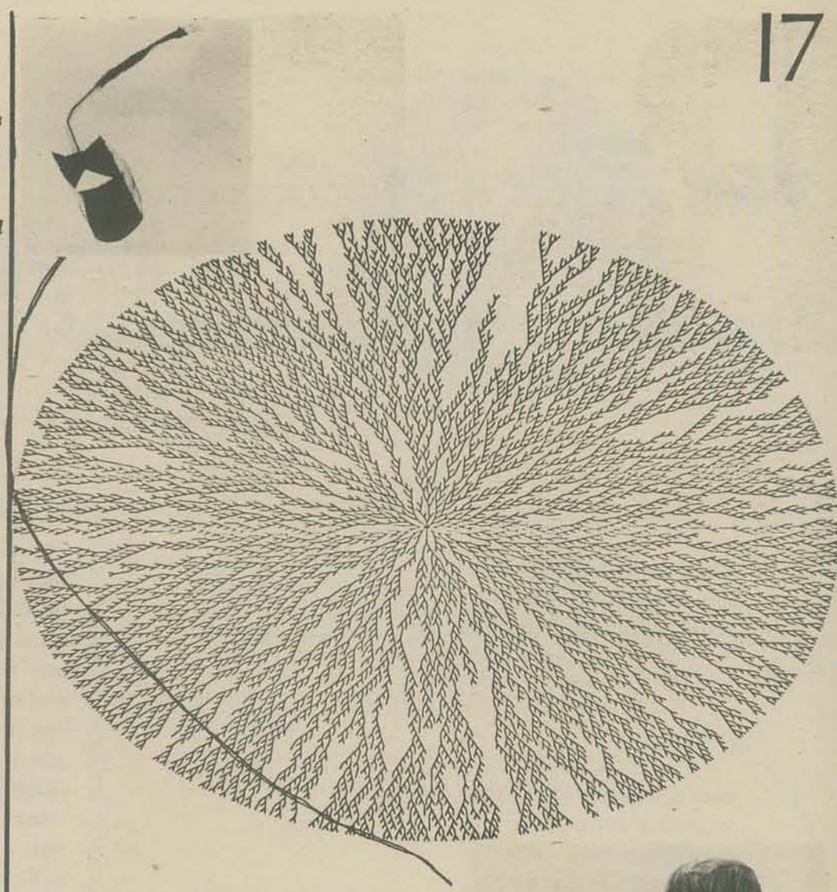
I think that electronic graphics devices offer more esthetic potential than mechanical plotters because of their much greater speed and because of their greater variety of graphical effects subject to program control. For example, the COM recorder I am now using plots a vector on 16 mm film in about 4 milliseconds, and there are four choices of line width and four choices of line intensity. Color is already available at some installations (see Popular Science, February, 1973). High costs and the difficulty in getting large prints are present drawbacks to COM. But the great speed of electronic displays allows the generation of numerous modiciations of a design or the direct production of animated films.

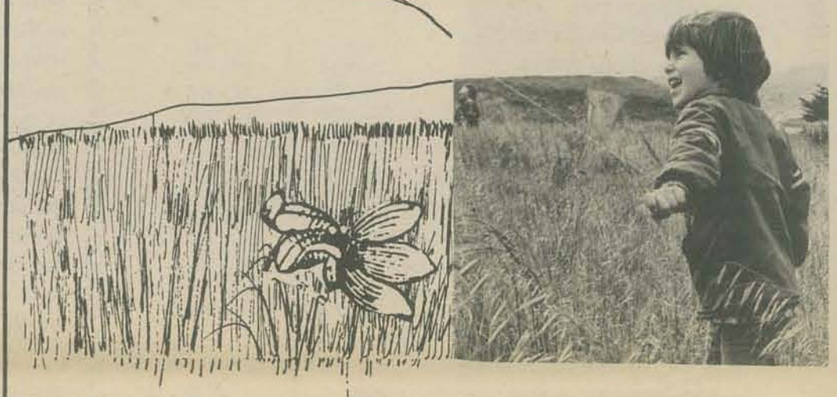
For example, when I first program a design I make certain features variables which are to be read in from data cards. These features may include line width, a starting seed for a sequence of random numbers, placement and relative size of components, a view point for perspective representations, the number of points on a star, and so on. In one computer run each such set of design parameters is acted upon by the program which advances the film and makes separate plots. Thus simply adding data cards produces entire new variations. Of course in the debug stages an interactive terminal display of these variations would be a great help. This parametrization of designs and the resulting ease of total modification is a distinctive aspect of computer art and permits the "mass production" of different prints. A computer artist could market his work as an edition of unique prints.

I do not think computer graphics can enter into and compete with most painting traditions, with the possible exception of certain hard edge or linear styles. But it should be increasingly applied in areas of commercial art such as advertising, fabric design, educational illustration, and architecture. Uniform coloring of an area with plotters is technically difficult and I feel computer art would be more impressive if there was more manual and photographic modification of the output. Collaboration of commercial artists and programmers should be productive.

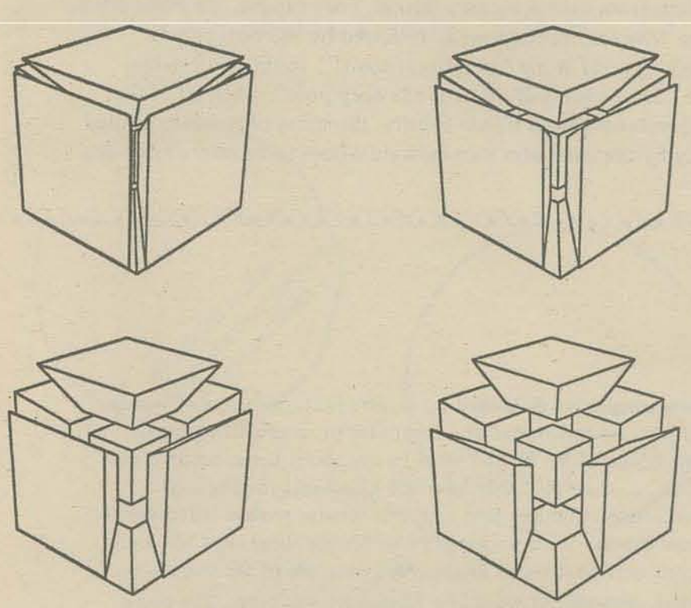
I do think that computer graphics makes possible whole new modes of esthetic expression that will produce dazzling visual experiences in the coming decades. Computer animated geometrical designs are a well known example. The color film Permutations by John Whitney and Jack Citron is an impressive sequence of transforming mandalas. Newer technology makes such work easier and I am sure there are more recent examples I haven't seen. For cost reasons I haven't made a film using COM but the basic programming is simple in principle – in a large loop an image is incrementally transformed, plotted, and the film is advanced one frame.

I expect to see more interpretive color displays of sound (music) on home television screens. Perhaps all present attempts use analog methods; but digital processing in the conversion of sound to an image might be tried. Digressing here, my guess is that a clever real time visual display of vocal sounds would give a deaf child the understanding of speech and the feedback to learn to speak. This might be the fastest way for anyone to learn to speak, and if the display included the letters spoken (a difficult programming feat given our present language and spelling) one might learn to read at the same time, at a very early age. In any case this present ability of the mind to express itself instantly in pictures suggests possibilities of some higher order visual communication system evolving. Such a language of light could use the full capability of the retina (e.g., parallel processing) rather than using it as a model of the ear as a printed phonetic alphabet does. I don't have the technical background to work in this area now; but it's fun to speculate about and if I ever return to school I may get into it.





REPRINT FROM
P.C.C. Vol. 2 No. 2
Nov. 1973



Hypercube Dilation. A demonstration of animation possibilities in 4 frames. Seven cells of a 4-dimensional "hypercube" are progressively contracted about their centers and projected into three dimensional space. An easy program if general geometrical subroutines are available.

Another new artistic medium made possible by the accuracy of computer graphics is stereoscopic art. Stereo pairs of drawings are easy to produce – one just plots two projections from displaced eye positions. Although the first stereoscopic images seen were manual drawings by Wheatstone, the drafting difficulties prevented any important artistic applications and the whole idea became associated with photographic ultrarealism. A stereoscope should be looked upon as simply a device to present separate images to the eyes, and these images do not have to be restricted to separate views of a single spatial configuration. The most promising idea here is to use "binocular rivalry" effects. This is the presentation of unmatched and conflicting colors and contours to corresponding parts of the left and right retinas. Reactions are very individualistic and color rivalries can cause the appearance of lustre, alternations of colors, or even the additive light mixture of the two – an effect much sought by the impressionist painter. Dynamically changing perceptions produced by binocular rivalry are the experience of processes in the visual cortex at the back of the brain, processes that search for a unified interpretation of the stimuli. Work in "binocular art" is going to be esthetically difficult (e.g., avoiding visual discomfort) and quality presentation requires a 35 mm stereo slide viewer. Still this is something I would particularly enjoy experimenting with in the future. Some simple stereo films have already been made using COM. But imagine the possibilities of a full color stereoscopic film with music and rivalry effects in the images. This could be a fantastic neurological excursion.

Most of my effort in computer graphics has been in the development of general programs to assist in the production of line drawings – not in the actual production of such drawings. The result is a package of FORTRAN subroutines with such capabilties as reflection, rotation, duplication, cross sections, automatic viewpoint selection and scaling, hidden line deletion, and a repertoire of stored polyhedra. All procedures work for two, three, or four dimensional figures and are independent of any particular graphics device except for a single statement. These programs are particularly suited for esthetic and educational uses of plotters and I hope I can find another job this year that involves a continuation of this work or other graphics applications. Also I look forward to more experimentation and production of computer art itself, preferably in collaboration with artists or photographers. Programming as it is, I see computer art as a disciplined undertaking, and requiring the efficient use of expensive machines. Eventually it may be easier and cheaper. But even with the present technology I believe computer art has the capability to generate the most exciting visual experiences of the twentieth century.

Daniel W. Van Arsdale
5361 Perkins Rd., No. 5
Oxnard, California 93030

Jim Runner

Remarks on computer poetry by Jim Runner. The program referred to is a little more sophisticated , and uses a larger vocabulary , than the SNOBOL IV program published in this issue.

Poetry

1
Flapping to spring the winter
a completionlike wind
drifts with candles humming.

2
With new smells of midnight the
laughter in the bread,
sprinkles curious,
but naughty in tear gas
the mysterious nation.

3
Winter,
to unwind,
in terror-stricken blood
bargainlike and thawing a damnation of panic,
raps short and dizzy running
while violets fall within splendid posters.

4
Ivory brooks,
to sniff,
in wild plastic into the
blood along hairs that were
skating favorite,
when ounces are dusty blots
a sound organ,
dines on the claw within
splendid branches.

Computer poetry stands at the line between the traditional, and the formless unknown. The computer poet utilizes the capabilities of the machine as a way of ensnaring scraps of insight from the universe of all that which has never been seen. A printout of computer poems may be compared to a dense woods in which the sharpeyed observer may be able to catch momentary glimpses of escaping creatures dwelling among the words placed there by the machine. A computer, being one of man's tools, does not have a mind of its own, and itself cannot judge good poetry. It can produce its work only within the limits provided by the efforts of the programmer, and it is this artistic "indifference" which is itself the advantage of the machine in producing poetry. Within the range of variation defined by the program (vocabulary length, treatment of grammar, etc.), the form of any poem produced by the machine may be considered to be an accident. A creative work must be one which is new, and one which takes its place as an unpredictible event in the environment. However, in addition to being an experience of the new, a creative work must also be appropriate to actually solving the problem originally tackled, or to in fact providing a real perception or coherent image. Thus, the computer can be quite useful in providing the opportunity for exploring new poetic styles and images, but it is up to the human element to spot them and make a judgement about their worth.

The computer poetry given here uses the entire word listing of a children's dictionary, giving a vocabulary of about 3,000 words. The words have been separated into simple categories of nouns, adjectives, and verbs -- transitive or intransitive. The sentences themselves have been built by adding together different phrase "structures" which are stored in the computer program. There are seventy-five such alternate phrase structures, divided equally among noun, adjective, and verb. The computer randomly selects a noun phrase to be the subject of the sentence, and either an intransitive verb phrase or a transitive verb phrase followed by a noun phrase to form the predicate. About one half of the time the computer will also select one of the adjective phrase structures to be used with a noun phrase. The words requried by the phrase structures are then filled in at random by the computer, using words from the vocabulary listing. For example, the noun phrase structure *"The (adjective)(noun)"* followed by the verb phrase *"(intransitive verb) in the (adjective) (noun)"*, could result in the sentence "The brown leaf floats in the deep pool", when all of the word requests have been filled. Finally, the string of words is divided randomly by the computer into individual lines to be printed out as a poem.

NO PREJUDICE

Leonard Meyers

A short note on using computers to generate "poems." These works are probably called "poems" because the creator has usually tried to incorporate into the computer poetry program some relatively obvious quality of traditional poetry (rhythm, meter, rhyme, number of syllables, number of sentences in a stanza, etc.) Most "poets" like to generate sentences that are syntactically correct, but it is more difficult to generate sentences that are semantically correct, and horrendously difficult to generate a group of sentences that together represent a concept not represented by any of the sentences taken separately.

Some people are distrubed by bizarre juxtapositions of words and phrases and would like computer programs to eliminate their occurrance. What I want to say about these occurrences is this . . . they probably have the effect of bringing into consciousness images that might otherwise remain inaccessable. These deviant juxtapositions of words are somewhat like non-representational visual images. An example of the evocative power of the latter would be Rorschach ink blots. We know from experimental psychology that removing oneself from our familiar, context laden environment is a powerful stimulus to invention and imagination. Elements of randomness may also be seen as a virtue. We have an internal censor who prevents certain interesting collocations; the computer is not subject to any human behavioral prejudices.

snobol 4

Jim Runner's remarks on his SNOBOL IV poetry program printed below:

The vocabulary has been kept to a short 85 words; it may be enlarged or changed by an appropriate adjustment of the number within the parentheses in statement (7), and the numbers in the respective subprograms in statements (53) through (56.) The prewritten phrase frames are the "PX" statements, and more may be added or changed by anyone fooling around with this program. The number in the parentheses in statement (20) refers to the number of frames, so if more are added on it is only necessary to change this figure and to maintain the same " PX " labelling procedure.

```
 1        &DUMP = 2
 2        DEFINE('NOUN()')     ; DEFINE('VERB()')
 4        DEFINE('PPHR()')     ; DEFINE('RAND(Z)')
 6        DEFINE('ADJECTIVE()')
 7        NN = ARRAY(85)
 8        BB = BREAK(' ')      ; NO = 1
10        TOTAL = 50           ; N = 1
12 FILL     NN<N> = TRIM(INPUT)
13          N = LT(N,85) N + 1                    :S(FILL)
14 START    X = ''             ; Y = ''
16          STORAGE = ''       ; LIMIT = 1
18          LINE = ''          ; LIM = 1
20 A1     XP = RAND(10)                           :($('PX' XP))
21 PX1    CHOICE = 'THE ' NOUN() ' '              :(A)
22 PX2    CHOICE = 'THE ' NN<RAND(25)> ' '
   .      VERB() ' ' PPHR() ' '                   :(A)
24 PX3    CHOICE = 'THE ' NN<RAND(25)>
   .      'LIKE ' NOUN() ' '                      :(A)
25 PX4    CHOICE = 'LIKE THE ' NOUN() ' '         :(A)
26 PX5    CHOICE = 'THE ' NN<RAND(25)> "'S "
   .      NOUN() ' '                              :(A)
27 PX6    CHOICE = VERB() ' '                     :(A)
28 PX7    CHOICE = VERB() ' ' PPHR() ' '          :(A)
29 PX8    CHOICE = VERB() ' AND ' VERB() ' '      :(A)
30 PX9    CHOICE = 'BECOMES '                     :(A)
31 PX10   CHOICE = 'IS ' PPHR() ' '               :(A)
32 A      STORAGE = STORAGE CHOICE
33        LIMIT = LT(LIMIT,3) LIMIT + 1           :S(A1)
34        MIN = RAND(3)        ; MAX = MIN + RAND(3) - 1
36        OUTPUT = '' ; OUTPUT = '' ; OUTPUT = ''
39        OUTPUT = '                ' NO
40        OUTPUT = ''
41 A2     STORAGE BB . WORD LEN(1) REM . STORAGE
42        LINE = LINE ' ' WORD
43        IDENT(STORAGE,'')                       :S(A3)
44        LIM = LT(LIM,MAX) LIM + 1               :S(A2)
45 A3     OUTPUT = '                ' LINE
46        LINE = ''
47        LIM = DIFFER(STORAGE,'') ''             :S(A2)
48        NO = LT(NO,TOTAL) NO + 1                :S(START)F(END)
49 NOUN   X = ''             ; Y = ''
51        X = EQ(RAND(3),2) ADJECTIVE() ' '
52        Y = EQ(RAND(7),3) ' ' PPHR() ' '
53        NOUN = X NN<RAND(25)> Y                 :(RETURN)
54 ADJECTIVE ADJECTIVE = NN<25 + RAND(25)>        :(RETURN)
55 VERB   VERB = NN<50 + RAND(25)>                :(RETURN)
56 PPHR   PPHR = NN<75 + RAND(10)> ' THE '
   .      NOUN()                                  :(RETURN)
57 RAND   R = R * 1061 + 3251
58        R RTAB(5) =
59        RAND = ((R * Z) / 100000) + 1           :(RETURN)
60 END
```

Jim Runner

The eighty five element array NN used in the adjoining program stores 25 nouns (elements NN ⟨1⟩ through NN ⟨25⟩), 25 adjectives (elements NN ⟨26⟩ through NN ⟨50⟩), 25 verbs (elements NN ⟨51⟩ through NN ⟨75⟩), and 10 prepositional phrases (elements NN ⟨76⟩ through NN ⟨85⟩). Some of the values are given below.

```
NN ⟨1⟩  = 'FERN'
NN ⟨2⟩  = 'TREE'
NN ⟨3⟩  = 'LAKE'
NN ⟨4⟩  = 'PEBBLE'
   .
   .
   .
NN ⟨26⟩ = 'SOFT'
NN ⟨27⟩ = 'HARSH'
NN ⟨28⟩ = 'UNDISCOVERED'
NN ⟨29⟩ = 'RAMBLING'
NN ⟨30⟩ = 'UNCERTAIN
   .
   .
   .
NN ⟨51⟩ = 'SINGS'
NN ⟨52⟩ = 'POUNDS'
NN ⟨53⟩ = 'REFORMS'
NN ⟨54⟩ = 'UNCOVERS'
NN ⟨55⟩ = 'BOILS'
   .
   .
   .
NN ⟨76⟩ = 'OFF OF'
NN ⟨77⟩ = 'INTO'
NN ⟨78⟩ = 'WITH'
NN ⟨79⟩ = 'DOWN ON'
   .
   .
   .
NN ⟨85⟩ = 'UNDERNEATH'
```

like the puddle the shallow tree the memorylike stump

the sparkling farm becomes like the pebble

boils and smokes the aged puddle like the moon

the fossil's pebble sings and shrinks the domelike theory

the smilelike memory the jokelike rambling screen robs with the moon

the starlight smokes toward the uncertain root disbelieves and dissolves

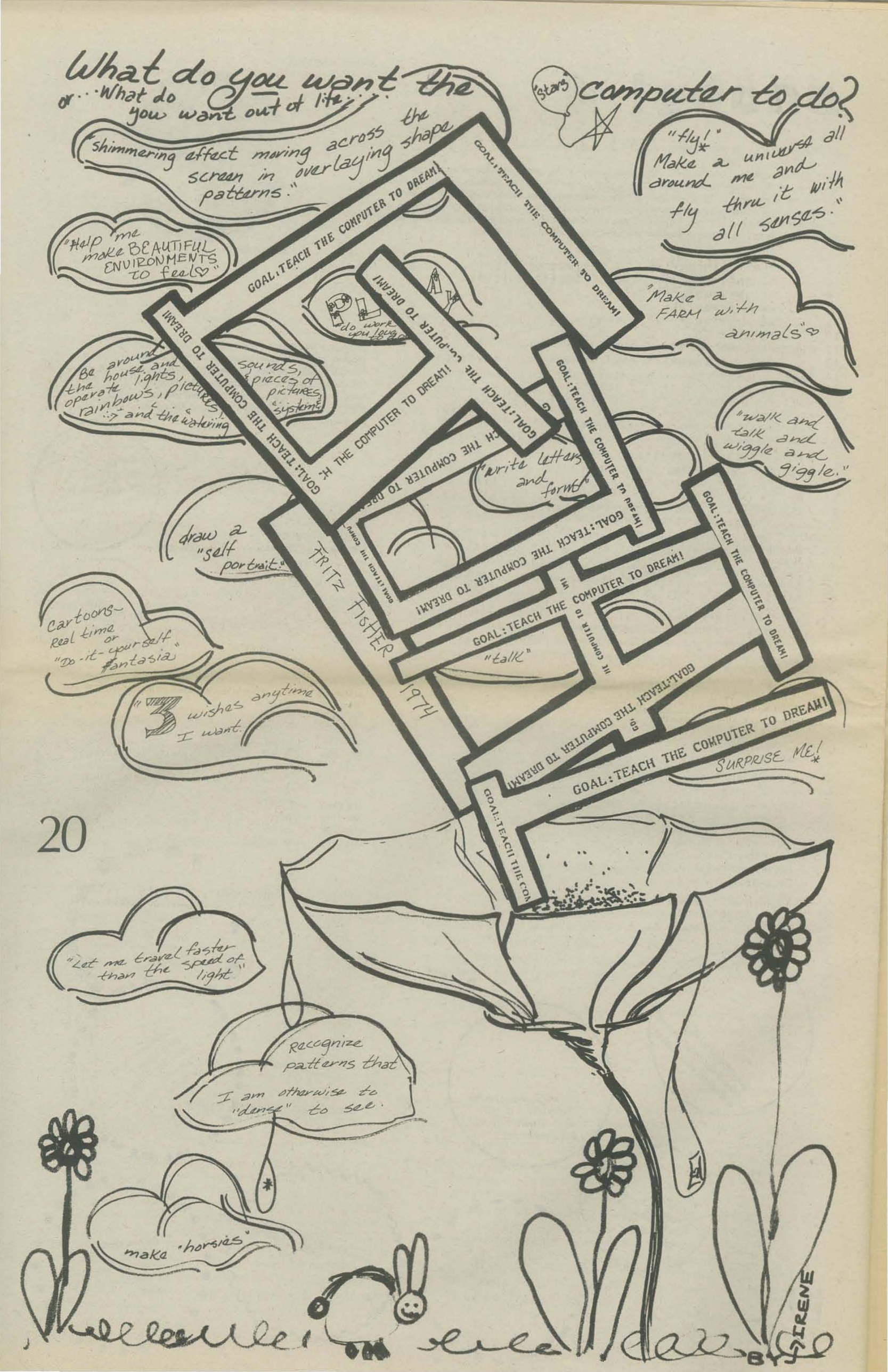
the undiscovered pebble directs and runs uncovers and devours

is along side of the screen the screenlike needle the jokelike hollow quilt

the quilt's machine uncovers like the moon

is underneath the clean tree the seagullike sparkling quarrel like the aged seagull

the machinelike sparkling screen is within the fern is toward the quilt


What do you want the computer to do?
or...What do you want out of life...
"shimmering effect moving across the screen in overlaying shape patterns."
"Help me make BEAUTIFUL ENVIRONMENTS to feel♡"
"fly!* Make a universe all around me and fly thru it with all senses."
"Make a FARM with animals"♡
"walk and talk and wiggle and giggle."
Be around the house and operate lights, pictures, rainbows, and the watering
sounds, pieces of pictures, systems
"write letters and forms"
draw a "self portrait."
Cartoons~ Real time or "Do-it-yourself" fantasia
"3 wishes anytime I want.
"talk"
SURPRISE ME!*
"Let me travel faster than the speed of light"
Recognize patterns that I am otherwise to "dense" to see.
make "horsies"
GOAL: TEACH THE COMPUTER TO DREAM!
FRITZ FISHER 1974
20
BY SIRENE

WHO'S WHO

Burnham, Jack BEYOND MODERN SCULPTURE
New York, Braziller 1968, Chapter on Cybernetics discusses changing form of sculpture.

Benthall, Jonathan, SCIENCE AND TECHNOLOGY IN ART TODAY
Chapter: The Computer - or information processing Technology. pp. 41. The social and economic implications of the computer the contribution of artists Fallacy is regarding the artist as a specialist with predefined professional needs. Seek by Nicholas Negroponte and Senster by Edward Ihnotowicz are steps toward new art forms.

Csuri, Charles (Director) REAL TIME ANIMATION
Annual Report to the National Science Foundation Office of Computing Activities. Grant No. GJ-204. Jan. 1, 1972 to Jan. 1, 1973. Copies may be obtained from Charles Csuri, Director Computer Graphics Research Center, 1314 Kinnear Rd., Columbus, Ohio, 43210.

PAGE
Bulletin of the Computer Arts Society, Alan Sutcliffe, ICL, Brandon House Bracknell, Berkshire, Great Britain, CASUS. Kurt F. Lauckner, Math Dept. Eastern Michigan University Ypsilanti, Mich. 48197. $3.00 fee/year on the outer edge of whats going on – pay $3.00.

REICHARDT, JASIA, THE COMPUTER IN ART
Van Nostrand Reinhold Co., NY., NY 1971. Good Beginning.

CYBERNETICS, ART AND IDEAS
N .Y. Graphic Society, Ltd., Greenwich, Conn, 1971. 18 essays dealing with creative experimentation with the computer. $13.50 Over view, essays and articles cover material which has appeared in German and English language periodicals. Must for interested people.

CYBERNETIC SERENDIPITY: THE COMPUTER AND THE ARTS
Studio International, 115 W. 15th St., N.Y., N.Y., 10011, 1969. Catalog of computer art exhibit. Excellent.

Vanderbeek, Stan. ART IN AMERICA
Jan. Feb. 1970. 86-91. New Talent: The Computer.

Whitney, John, AMERICAN CINEMETRY
Matrix 1 and Matrix 4. Animation Mechanism computer animated film, Pyramid Films, Los Angeles, California. Museum of Modern Art, N.Y., N.Y. Whitney's films over last 30 years visualize the movement of particles and theory of fluid dynamics, like "dust in sunlight" or "fog in a spotlight".

FILM CULTURE
No. 53-55, 58-9 73-30 Spring 72. John Whitney Interview conducted by Richard Brick. Excerpts of talk given at Cal. I of Tech. 3/21/68.

Youngblood, Gene EXPANDED CINEMA
E.P. Dutton & Co., Inc. 201 Park Ave. South, NY., NY 10003, $9.95, P.B. $4.95. Today, our environment is created more by T.V. & Cinema than by nature. Artists in computer film like the John Whitney Family, in experimental T.V. like Stan Vanderbeek and Nam June Paik and in videographic cinema and intermedia theater are creating new languages to express our inarticulate consciousnesses; from these new languages may come a new world. Reports of interviews with these and other filmmakers and artists and descriptions of their work try to define the aesthetic they are thought to be working towards. "Computer Film" p. 207-256.

FILMS by LILLIAN SCHWARTZ and KEN KNOWLTON

1970...pixillation (4 min) 1971...olympiad(3min) U.F.O. (3min) 1972...enigma (4min) googolplex (5½ min) apotheosis (4½) affinities (4½) 1974...metamorphosis (8¼) mirage (5min) Pixillation and U.F.O.'S are distributed by Martin Duffy, AT&T, 195 Broadway,N.Y. others from Lillian Schwartz. 16mm with optical sound.Color except googolplex

SHARON BOYSEL
Art Major Student DeAnza College, Cupertino, Ca. 95014

TERENCE M. CAMPBELL
2582 N. Stowell Avenue, Milwaukee, Wis. 53211
Design Instruction, University of Wisconsin

CHARLES CSURI
Director, Computer Graphics, Research Center, 1314 Kinnear Rd., Columbus, Ohio 43210

HAROLD COHEN
Professor, Visual Arts Department, U.C. San Diego, Visiting Scholar, Computer Science Dept., Stanford University. Centerfold "Drawing 1974" edition 625, printed by Silk Screen Photo Stencil Process. The white paper plotter drawing was contact printed by sun exposure of one minute using Ulano Poly Blue 2 presensitized photo geletin film.

BOB FLEGAL
Xerox Palo Alto Research Center, 3180 Porter Drive., Palo Alto, Ca. 94303

KENNETH HANS
Photography Major, Student DeAnza College, Cupertino, Ca. 95014
P.O. Box 2006, Stanford, Ca. 94305

HIROSHI KAWANO
3-16-1-15, Aoto; Katsushika-ku; Tokyo, Japan

Hiroshi KAWANO, b. 1925 in China. Studied aesthetics at the University of Tokyo. Since 1961 Associate Professor, Tokyo Metropolitan College of Air Technology. Author of "Communication and Art", 1968. Major exhibitions: Gallery of Contemporary Art, Zagreb 1968 and 1969; Gallery Plaza Dr., Tokyo 1970 etc.

KENNETH C. KNOWLTON
Bell Laboratories, 600 Mountain Ave., Murray Hill, New Jersey 07974

Kenneth C. KNOWLTON, b. 1931 in the USA. Ph.D. in communication sciences, Massachusets Institute of Technology. Major group exhibitions: Cybernetic Serendipity, London 1968; The Machine, Museum of Modern Art, New York 1968; Gallery of Contemporary Art, Zagreb 1968 and 1969 etc.

RUTH LEAVITT
Computer Graphic Artist, 5315 Dupont Street, Minneapolis, MN 55419

DAVID LINK
Computing Center, North Carolina State University, Box 5445, Raleigh, North Carolina 27607

LEONARD MEYERS
Guest Editor and Centerfold Circle Graphic. San Francisco State College, San Francisco, Ca., 94132. Centerfold "Poem Circle" edition of 450 was printed by Silk Screen Process. The plotter graphic line was drawn three times over itself using a wide Cal Comp plotter pen to achieve a dense black line. The contact print sun exposure of 90 seconds was made using Ulano Poly Blue 2 presensitized film.

VICKY I. MEYER
Artist, 228 Kipling, Palo Alto, Ca. 94306. Videotaped Computer Animated Sculpture

MANFRED MOHR
Galerie Weiller, Paris or Galerie Gilles Gheerbrant, Montreal

Manfred MOHR, b. 1938 in Germany. Lives in Paris. Studied art, music, mathematics and computer science. One man exhibition at the Musée d'Art Moderne, Paris 1971. Major group exhibitions: Galerie Paul Facchetti, Paris 1965; Biennale Internationale de l'Estampe, Musée d'Art Moderne, Paris 1969; Réalités Nouvelles, Paris 1969; Sérigraphies, Galerie La Hune, Paris 1969; Intermedia, Heidelberg 1969 Computer 70, London 1970; Arte y Cybernetica, Buenos Aires 1971 Arteonica, Sao Paulo 1971; Biennale, Nuremberg 1971; Staatsgalerie, Stuttgart 1972 etc.

JOHN MORRIS
Pattern Analysis and Recognition Corp. 128 E. Domenick St., Rome, New Yor, 13440

GREG MUSHIAL
Data Processing Major, DeAnza College, Cupertino, Ca. 95014. Implement Nash-Williams Design Overprint Programs and EXPLOR on IBM 370

LILLIAN MARY QUIRKE
Art Instructor, Fine Arts Division, DeAnza College, Cupertino, Ca. 95014. Supervised Screen Printing Class and Computer Artists in producing the 1,175 centerfolds. Guest Editor of this issue PCC.

RON RESCH
Department of Computer Sciences, University of Utah, Salt Lake City, Utah 84112

DOUG RICHARDSON
4030 The Scarp Castlecrag N. SW, New South Wales Australia 2068

JIM RUNNER
Department of Design, Southern Illinois University, Carbondale, Ill. 62901

PAM SCARVIE
P.O. Box 310, Menlo Park, Ca. 94025. Artist, Environments and Guest Editor, Art Issue PCC. I'm working on computerized environments. are any of you?

LILLIAN SCHWARTZ
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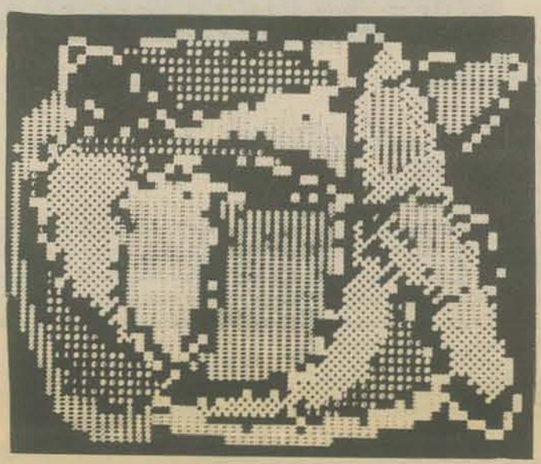
Dragon Moma thanks Eric Stewart for Puppy—

Excerpts a letter from Ruth Leavitt



Graphics program 1973, drawn on cathode ray tube with light pen and Calcomped. *Ruth Leavitt*

Minneapolis 1974

Hi,

Were delighted to hear from you. Every thing is going very well here. Jay is busy right now analyzing literature and poetry with some others using a new system of clustering he's devised. Danny is working hard at school and on his Suzki Violin lessons. I'm painting and preparing a series of lithographs for the Stretch work. The Paris show was very successful for me.

.....

In addition to that, Manfred Mohr, Kenneth Knowlton, Herbert Franke, Colin Emmett and I have been invited to have an exhibition next Fall in England. I really feel blessed so many good things are happening.

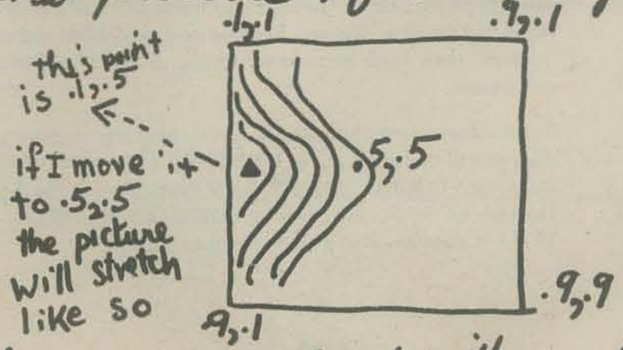
.....

Im excited about the Peoples Computer Company... its terrific. The computer should be for everyone. Im including information about my new work. Hope its what you want..... I thought youd like a quick return on work for the "Dragon".

Warmest regards from all of us

Ruth Jay and Danny

The work I am now engaged in Stretches patterns. Right now I am only streching a herring-bone pattern. Each picture begins exactly the same - a blank square with a herring bone pattern around it. The manner in which the picture is Stretched forms the final outcome of a piece. The Stretch is achieved by picking points along the design and placing them elsewhere in the picture, for example:



The program is written in Fortran IV. I am working off a Porta Com with paper output. The picture is Cal Comped onto Micro film via Electron Beam Gun and I enlarge the work to any size I wish.

The idea is basically this Pretend you have a sheet of rubber tacked down on all sides. Now lay a design on it and begin to poke and push the pattern around. Where you pull the picture it gets lighter and stretched, Where you push it gets darker and scrunched. Two things will vary each picture - the design chosen and the manner in which the picture is stretched.

Herring bone Variations

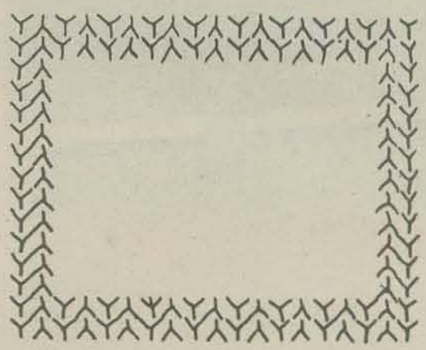


Figure C

Both figures A and B began exactly as figure C. It is only in the manner they were stretched that makes them different.

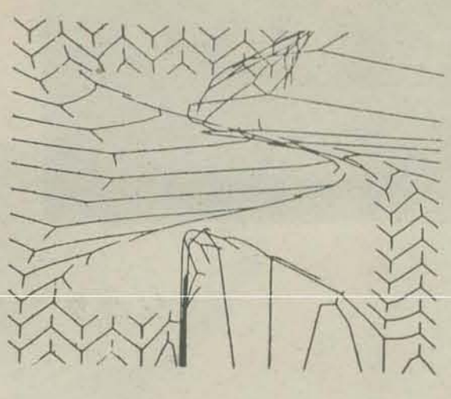


Figure A.

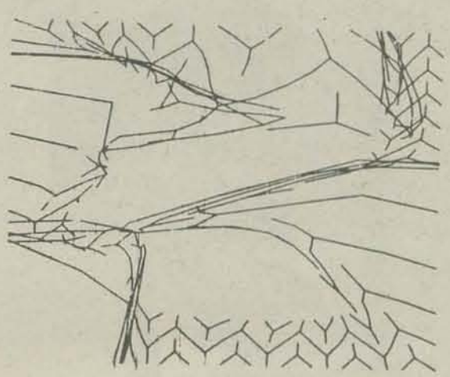
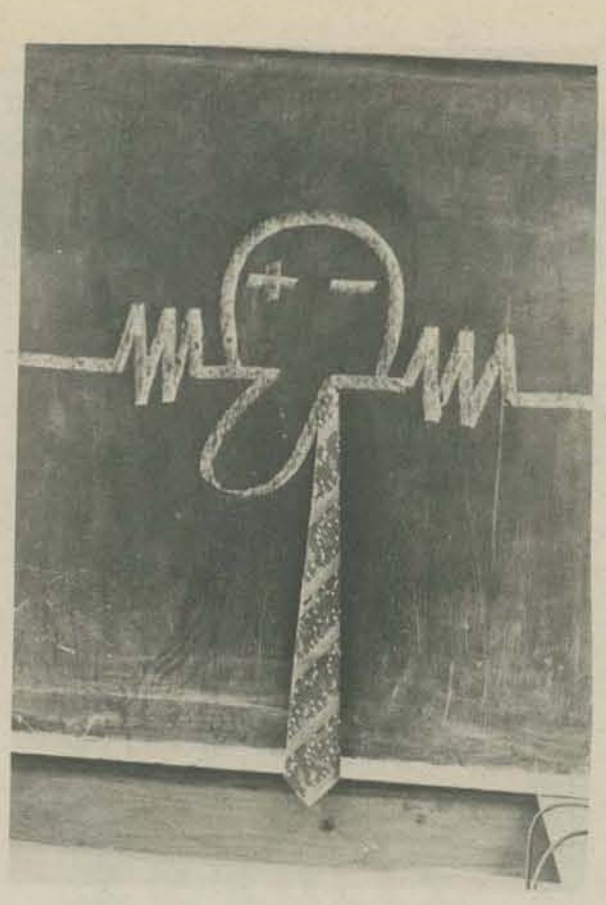


Figure B.

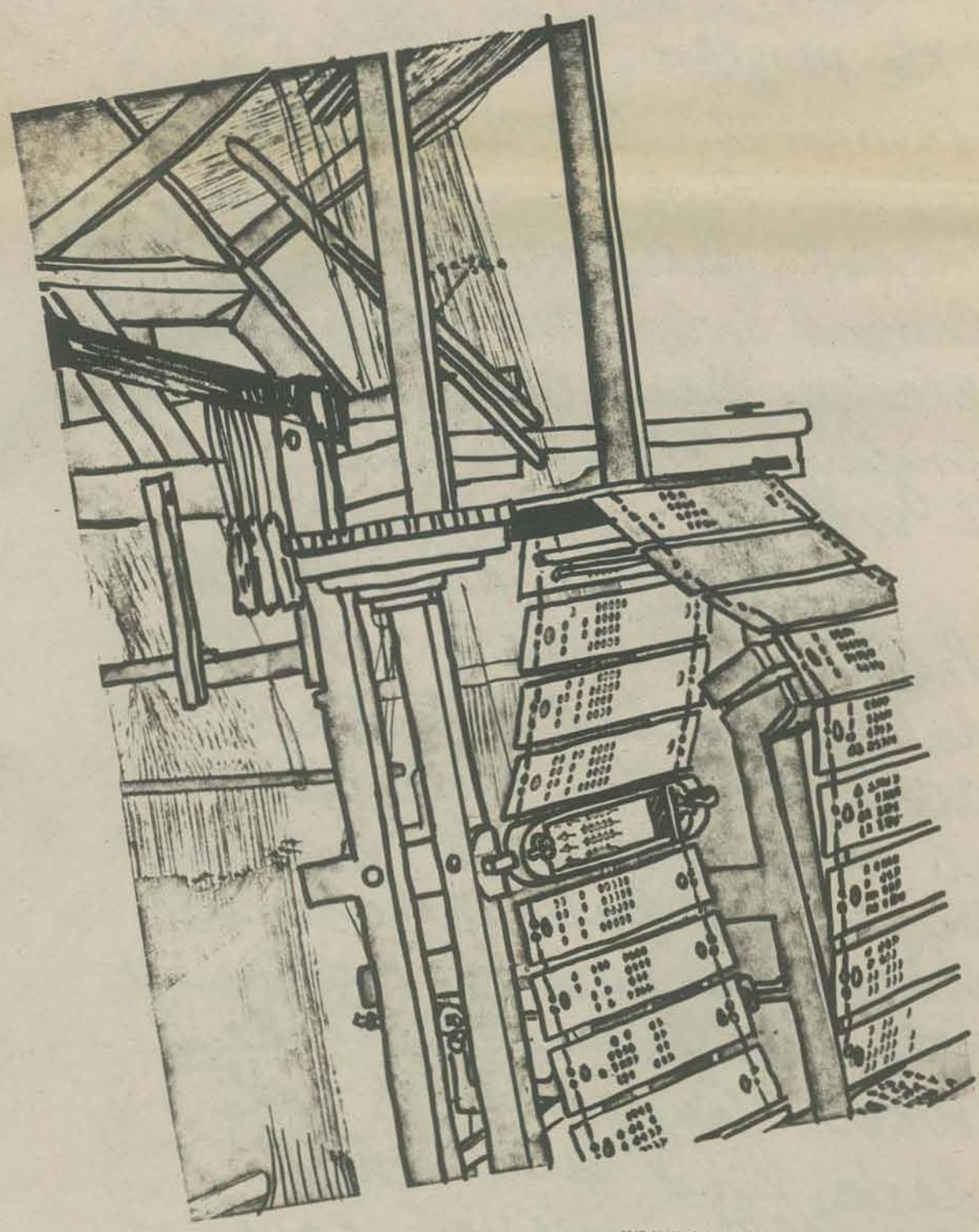


The Computer & the Weaver

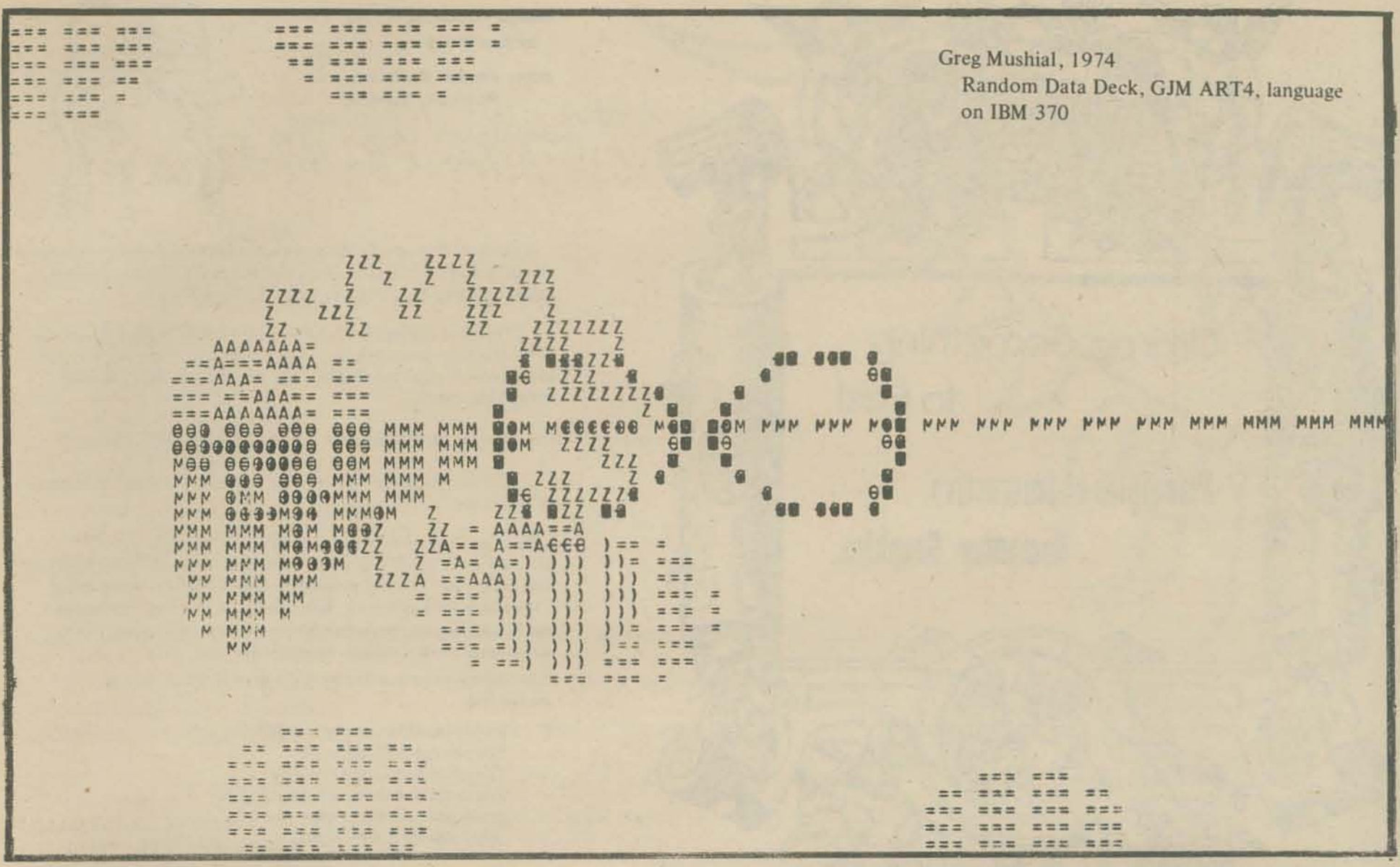
Regrettably, the name and company of the Japanese artist that produces this computer generated weaving, was lost in the shuffle.

A French weaver by the name of Joseph Jacquard invented a very sophisticated type of loom that first arrived in America about 1820 and was operated by hand with the flying shuttle. The Jacquard attachment could be added to looms already in use for Double Weave coverlets, and thus the mechanization of weaving had begun. Jacquard's invention consisted of a series of cards with large and small punched holes that activated the harnesses of the loom (as many as 40 at a time) and made the pattern. Weavers became very proficient and could "punch" their cards so as to satisfy the design whims of their customers.

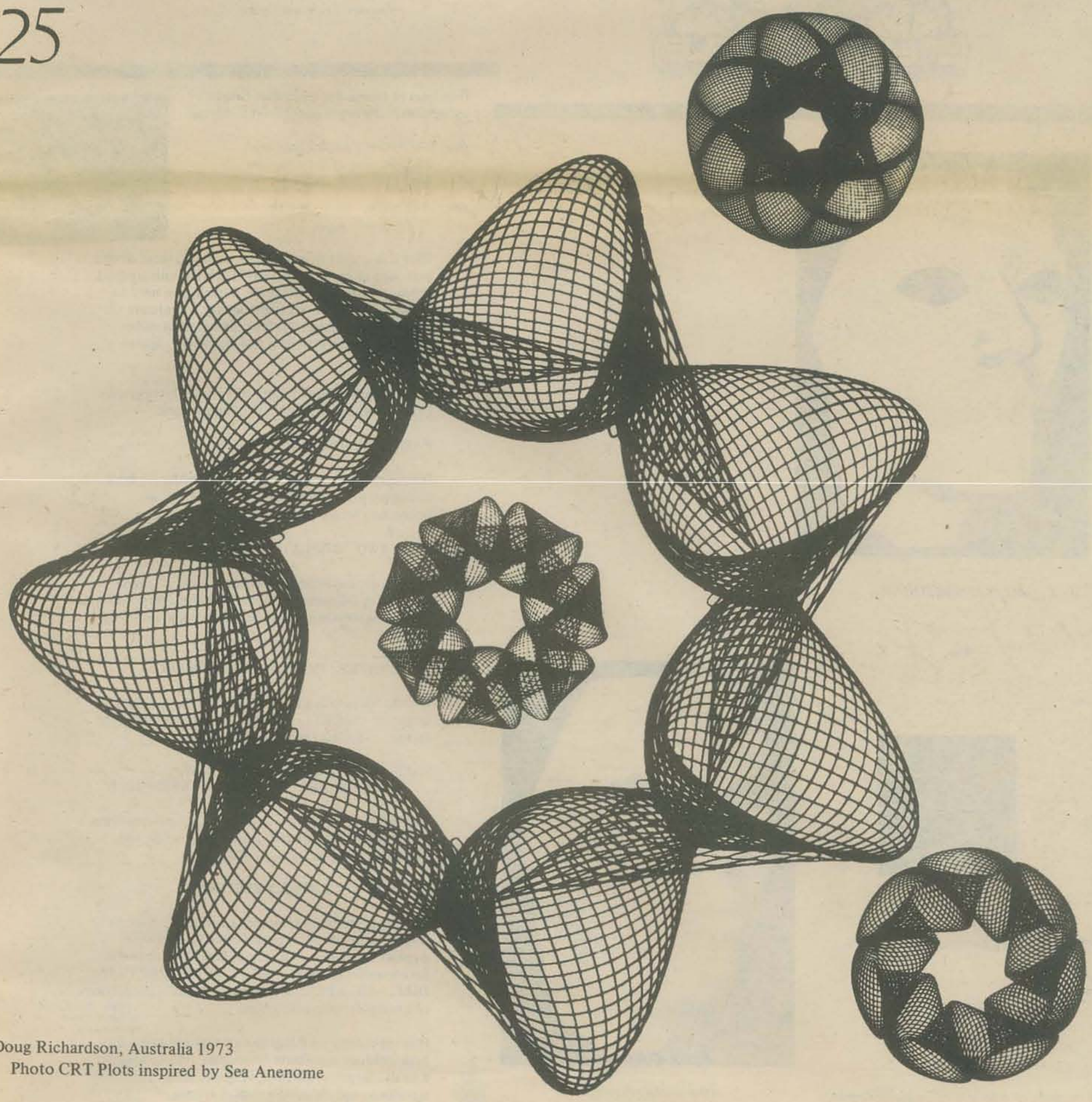
Some information about the use of a computer to generate designs will be found in the HANDWEAVER and CRAFTSMAN magazine. LOURIE, JANICE R., Winter, 1966, "The Textile Designer of the Future" and VELDERMAN, PATRICK, Fall, 1971, "Computer Generated Overshot Pattern."



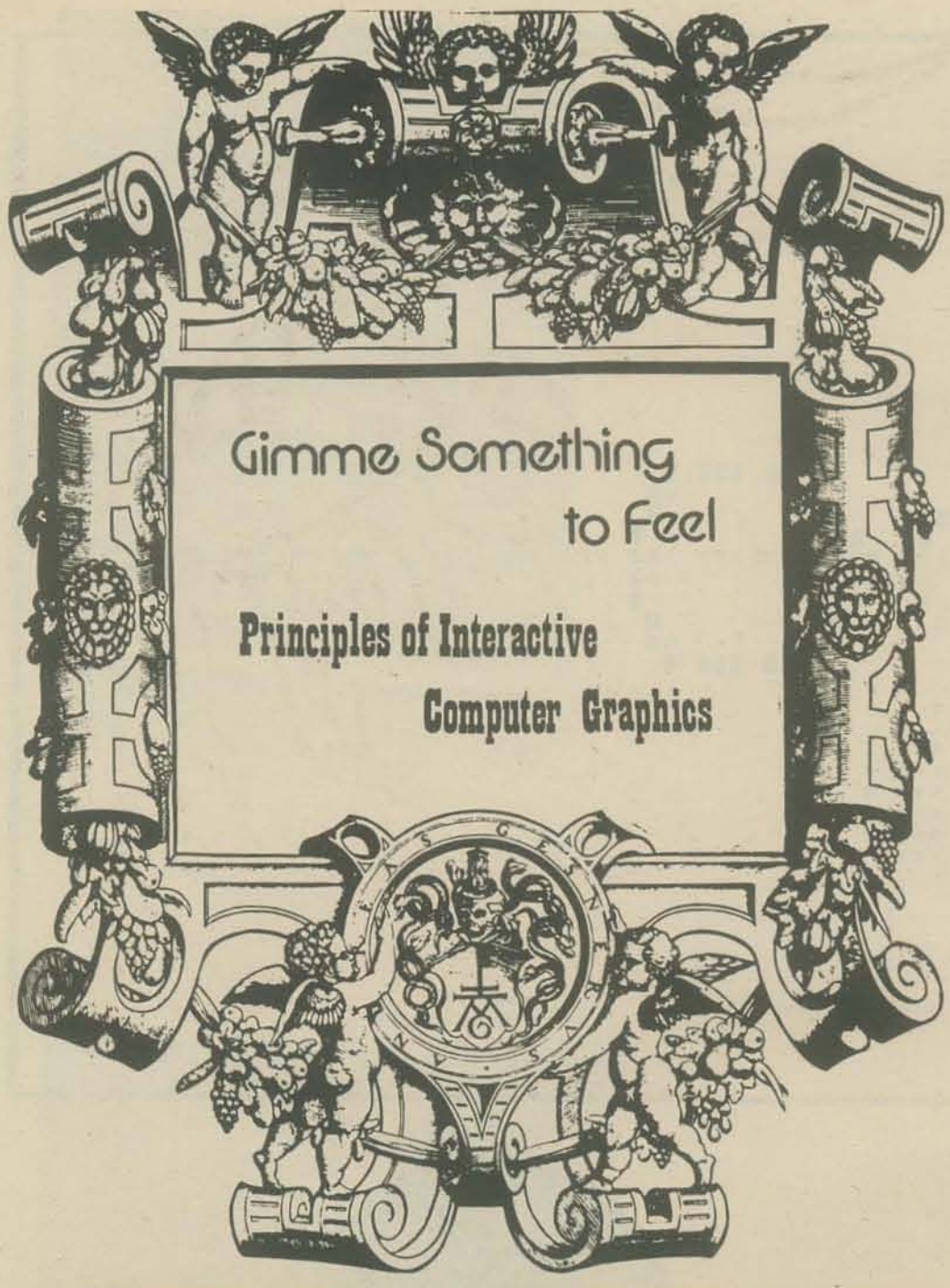
WEAVING BY THE CARD
In 1728 a French engineer invented this automatic loom. An endless chain of punched cards was set to rotate past the needles of the loom. As the cards moved by, only the needles which matched holes were able to penetrate, and their threads determined the pattern.



Greg Mushial, 1974
Random Data Deck, GJM ART4, language
on IBM 370



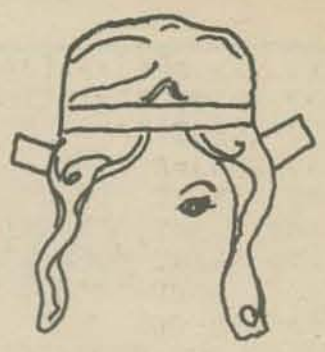
Doug Richardson, Australia 1973
Photo CRT Plots inspired by Sea Anenome



Gimme Something to Feel
by Jane Wood

from: Penguin Books Inc.
Baltimore, Maryland

price: $2.95



A lovely collection of whimsy which is full of deliciously outrageous things to do that make you feel good, is a recent Penguin original called " Gimme Something to Feel " by Jane Wood.

" . . . On a hot day put the book you are reading in the refrigerator. After one hour take it out and read it or just let it rest on your lap so people will think you are reading. Some books hold the cold better than others. . . "

" . . . Pay for the car behind you at the freeway toll booth. . . "

" . . . Cut out the ends of a pair of socks and glue fur in the bottoms of your shoes. . . "

These are exterior constructs to stimulate interior "glow." They are seeds inside you which continue to expand and expand. They help you to change perspective and find new ways of seeing.

It's a how-to-feel- it book. When feeling is freed up then action can be spontaneous so feeling moves action moves feeling moves action until there is ecstatic existence and also peace.

According to Jane, when we wake up and act by choice we can feel.

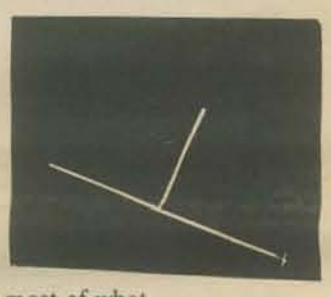
" . . . When you wake up, you can feel.
You can make changing light
You can zoom in and zoom out
You cease to become what HAPPENS
and begin to become what you DO.
What you do is your dance..

When you wake up and feel,
you can dance with grace. . . "

Principles of Interactive Computer Graphics
by William M. Newman and Rovert F. Sproul

from: McGraw-Hill Book Company
1221 Avenue of the Americas
New York, NY 10020

price: $15.95
1973; 607 pages



Here it is . . . the first book that tells you most of what you need to know to get started in computer grpahics. Before you dig into this book, though, you need to know something about trigonometry, coordinate geometry and matrix algebra plus a modest understanding of both high-level and assembly language programming.

The book consists of 5 parts plus a giant bibliography (319 references) and a bunch of appendices.

PART ONE: DISPLAY DEVICES

Hardware for displaying computer graphics . . . how to display points and vectors on a CRT . . . an instruction set for programming simple pictures.

PART TWO: DISPLAY FILES

Ways to generate codes to make pictures . . . match for making 2-dimensional transformations on pictures . . . translation, rotation, shrinking, expanding, distorting images.

PART THREE: INTERACTIVE GRAPHICS

Devices for pointing at, positioning, adding, deleting images on the CRT . . . the light pen, the joystick, the mouse . . . tablets for entering graphical stuff . . . .

PART FOUR: THREE-DIMENSIONAL TRANSFORMATIONS AND PERSPECTIVE

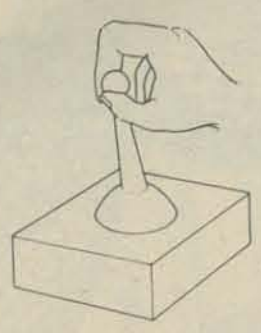
Displaying 3D images on a 2D screen . . . perspective . . . mathematical transformations . . . hidden line and hidden surface problems . . . shading.

PART FIVE: GRAPHICS SYSTEMS

Languages for doing computer graphics . . . features of languages, design of languages, need for high-level graphics languages . . . survey of high-level languages for computer graphics - ALGOL 60, PL1, FORTRAN, DIAL, SAIL, LEAP, EULER and others . . . components of a complete graphics system.

Plus appendices on things like vectors and matrices, homogeneous coordinate techniques, instructions for a small computer, the SAIL language, hidden line algorithms and choosing a display system.

Before reading POICG†



After reading POICG†

†Principles of Interactive Computer Graphics

```
10 DIM $[6];A$[10]
20 PRINT "PRINTING CHARACTER ";
30 INPUT A$
40 $[6]=A$[1]
100 PRINT "SIZE OF SQUARE (1 TO 500) ";INPUT S
110 PRINT "CENTER X&Y (1 500) ";INPUT X1;Y1
120 PRINT "DENSITY (TO 100) ";INPUT D
130 GOSUB 2000
140 GO 20
1000 REM PLOT ROUTINE
1010 $[1]=15
1020 $[2]=X/256;$[3]=X
1030 $[4]=Y/256;$[5]=Y
1040 PRINT#4;$;
1050 RETURN
2000 FOR J=1 TO S*S*D/1E4
2010 X=X1-S/2+S*RND
2020 Y=Y1-S/2+S*RND
2030 IF X<0 OR Y<0 OR X>500 OR Y>500 THEN 2100
2050 GOSUB 1000
2100 NEXT J
2110 RETURN
```

designed by **Gregory Yob**

Run on a DATAPOINT 2200 May 1974

THE SERVO PRINTER MAY BE USED AS AN IMPRESSIONISTIC PAINTBRUSH.

WITH A LITTLE PATIENCE, SCENES SUCH AS THE COVER PICTURE MAY BE CREATED IN AN HOUR OR SO.
HERE'S AN EXPLANATION OF THE PROGRAM AND ITS WORKINGS.

LINE 20 LETS THE ARTIST CHOOSE THE 'PAINT' -- A CHARACTER ON THE PRINT WHEEL.

THE MAIN ELEMENT OF THE COMPOSITION IS THE SQUARE FILLED WITH THE 'PAINT' IN AN IRREGULAR MANNER.

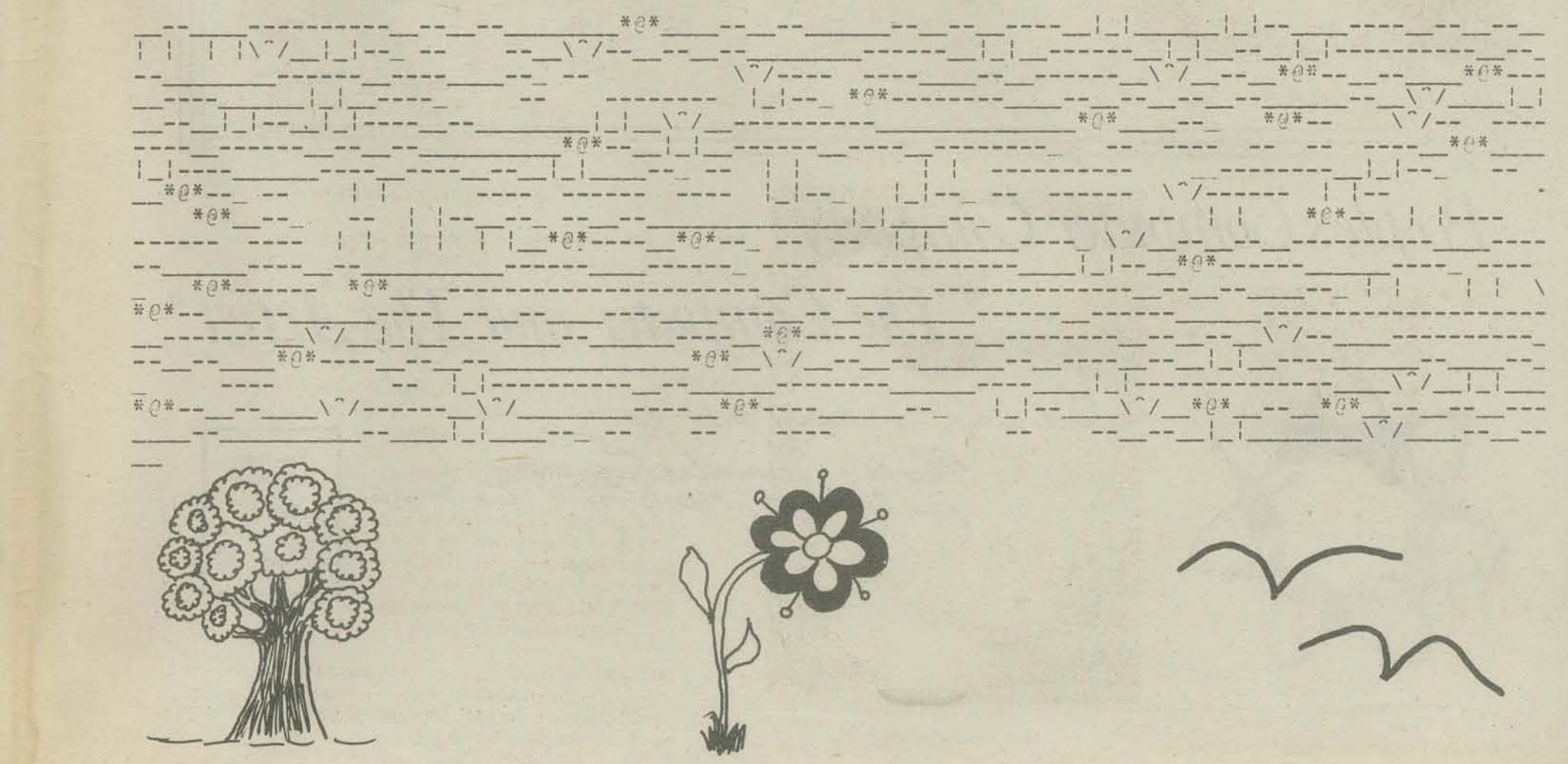
LINE 110 PLACES THE SQUARE IN THE PAINTING.
LINE 100 SELECTS THE SIZE OF THE SQUARE.

LINE 120 ALLOWS ONE TO VARY THE INTENSITY OF THE 'COLOR' OR 'PAINT'

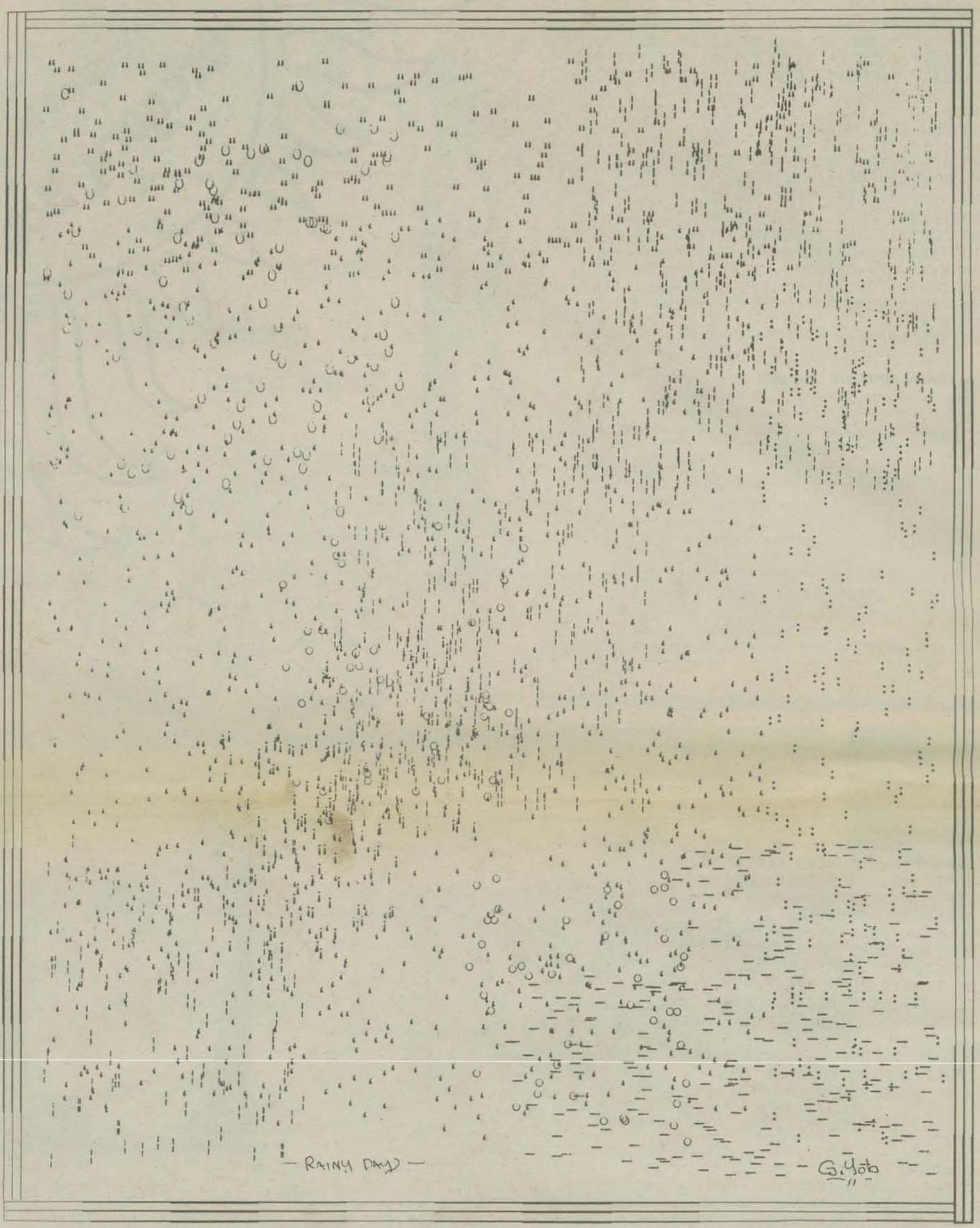
THE REST OF THE PROGRAM THEN PAINTS THE SQUARE ELEMENT AND THEN REQUESTS THE INFORMATION FOR THE NEXT ELEMENT.


```
1#4;"LANDSCAPE WITH OCCASIONAL TREES"
2#4;"OR EARLY SPRING FLOWERS"
3#4;"WITH A FEW BIRDS"
4#4;""
10 Z=RND.5
15 IF Z>.5 THEN PRINT#4;"--";
16 IF Z>.5 THEN GO 10
20 PRINT#4;"__";
25 IF RND>.9 THEN PRINT#4;"|_|";
26 IF RND>.95 THEN PRINT#4;"\^/";
27 IF RND>.95 THEN PRINT#4;"*@*";
30 GO 10
```

```
LANDSCAPE WITH OCCASIONAL TREES
OR EARLY SPRING FLOWERS
WITH A FEW BIRDS
```

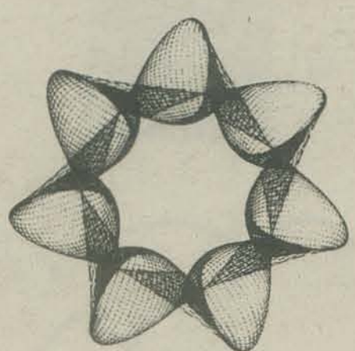


July 1974 Vol. 2 No. 6



People's Computer Company

"The Computer and The Artist"



Send check or money order to:
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