

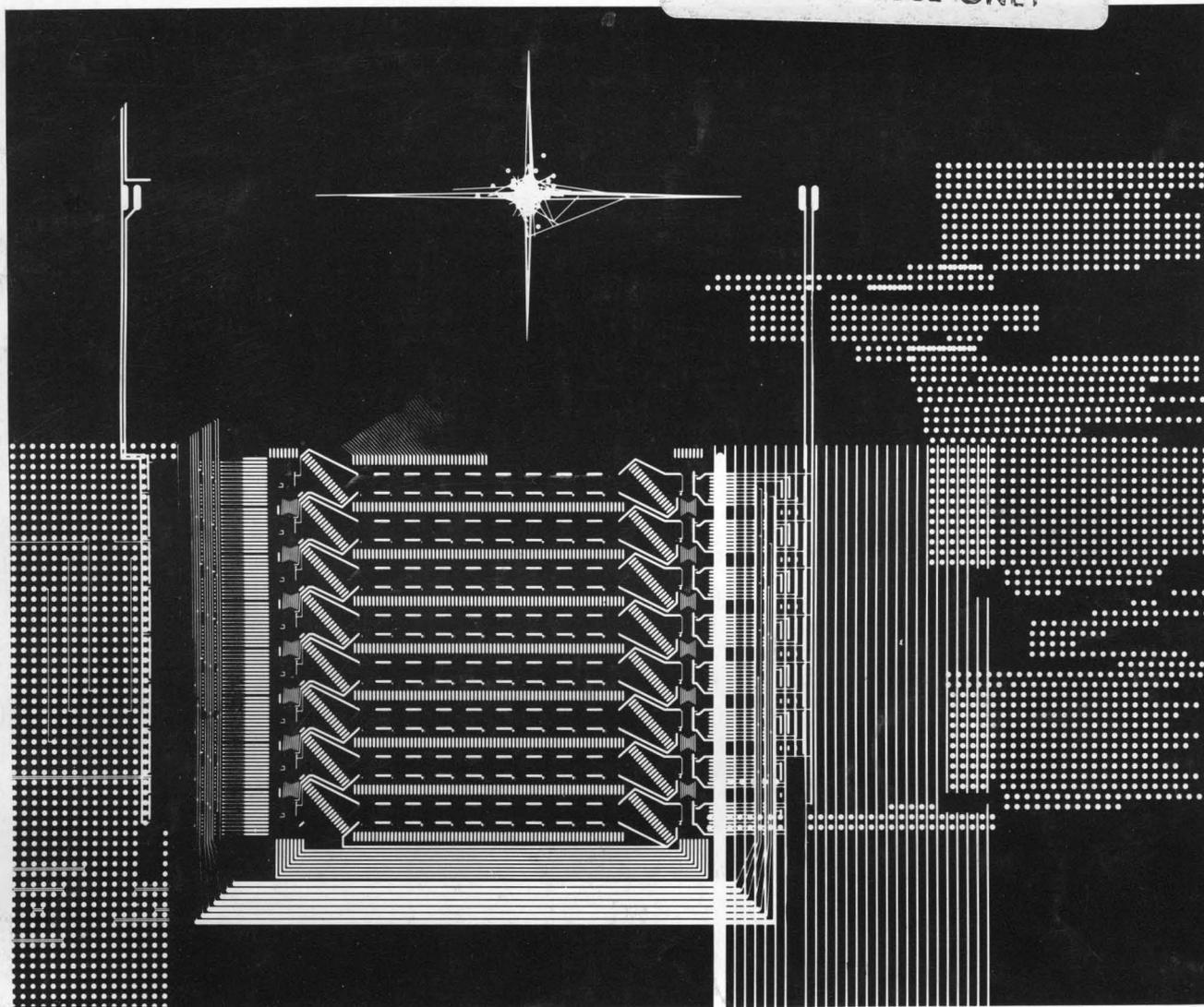
computers and people

formerly *Computers and Automation*

August, 1975

Vol. 24, No. 8

LIBRARY USE ONLY



"NIGHT SCENE"

by Lillian Schwartz

13th Annual Computer Art Exposition

The World of Translation

"All the Language of Thought Calculable like Mathematics"

Daily Surveillance Sheet, 1987, from a National Data Bank

An Almost-True Theorem Involving Tetrahedral Numbers

— Grace C. Hertlein, Art Editor

— Serge Raffet

— Lawrence M. Clark

— Dennie Van Tassel

— Herbert E. Salzer and Jeffrey Mogul

7601 211251

023

Announcing plans for a new quarterly magazine:

COMPUTER GRAPHICS AND ART

To all persons interested in:

Applied Arts and Graphics
Architectural Graphics
Cartography Systems
Computer Aided Design
Computer Assisted Instruction
in Computer Graphics

Computer Graphics in Physics,
Chemistry, Mathematics, and
Other Sciences
Computer Graphics in Literature,
Semantics, Fine Arts, Applied
Arts, and Other Fields

Computer Graphics in Business,
Industry, and Other Branches
of Knowledge
Interactive Graphics Languages
Courses in Computer Graphics
....

Dear Colleague,

At the present time we are exploring the possibility of publishing a new magazine on interdisciplinary computer graphics and computer art aimed at the college level. We need your feedback concerning the graphic interests that you have and that you know of. We want this magazine to be useful to you and your colleagues.

Accordingly, this is your invitation to submit material and to begin subscribing (or indicate your intention of subscribing) to

COMPUTER GRAPHICS AND ART

a new quarterly to be published starting probably in January 1976, and for which I have been asked to be the editor.

At the present time an advisory board of distinguished people and a group of contributing editors well known in graphic fields are being assembled. Your suggestions and nominations will be welcome.

You and your colleagues are cordially invited to submit papers, articles, computer graphics, photographs, reviews, computer art, ideas, etc. — no holds barred — for us to consider for publication. In addition, your suggestions about authors whom you would like to have papers from will be most welcome. One of our goals is to publish materials on computer graphics early; and then authors can more quickly establish their professional claims for origination of good ideas and programs. Every author receives permission to reprint his or her material unlimitedly, although the magazine is copyrighted by the publisher.

We look on subscribers as colleagues in a mutual effort, and not as listeners in a lecture room.

Your help and cooperation in this mutual undertaking is warmly invited and will be most appreciated. May we hear from you?

Cordially,

Grace C. Hertlein
Editor, "Computer Graphics and Art"
Associate Professor
Department of Computer Science
California State University, Chico
Chico, Calif. 95926

Here is your chance for feedback to us:

---(may be copied on any piece of paper)---
TO: COMPUTER GRAPHICS AND ART
Berkeley Enterprises, Inc., Chico Branch
555 Vallombrosa, # 35
Chico, Calif. 95926

- () 1. Yes, please enter my annual subscription to the quarterly COMPUTER GRAPHICS AND ART:
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and notify me when plans are firm.
- () 3. I hope to submit for consideration for publication, material on the following topics:

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- () 4. I would be particularly interested in coverage of the following subjects:

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- () 5. I am interested in reading materials by the following authors:

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- () 6. Please send me further information on bonuses for subscribing:
() Computer Art Reprints
() FORTRAN IV programs for computer art
() Computer Graphics Bibliography
- () 7. I suggest you send information to my friends and associates whose names and addresses follow:

*A

8. Any Remarks or Comments? _____

*A

Name _____ Title _____

Organization _____

Address _____

*A - attach paper if needed

IMPORTANT NOTICE

TO: All foreign subscribers to "Computers and People"
(formerly "Computers and Automation") who are
outside the United States, Canada, and Mexico

FROM: Berkeley Enterprises Inc., publisher

As a result of circumstances outside of our control, we have adopted the following procedure, effective June 1, 1975:

1. If you had a subscription to our magazine in force on August 1974, we are sending you free the July and August issues of 1975.
2. We ask you to write us immediately and tell us (if possible before August 20, 1975):
 - (1) up to what date your latest subscription to our magazine is or was in force;
 - (2) when your subscription was paid for;
 - (3) how much you paid; and
 - (4) in what way you paid.
3. If you have failed to receive any issues to which you are entitled, please write us at once and ask for those issues. We shall try to arrange that those issues are sent to you promptly.
4. Effective June 1, 1975, the price for subscriptions to "Computers and People" outside of the United States and Canada is as follows:

<u>Period</u>	<u>Without Directory Issue</u>	<u>With Directory Issue</u>
One Year	\$17.50	\$32.50
Two Years	34.00	64.00

5. All subscriptions should be ordered directly (or through your subscription agency) from:

Berkeley Enterprises Inc.
815 Washington St.
Newtonville, Mass. 02160, U.S.A.

6. All subscription correspondence should be directed to us.

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NOTE: The above rates do not include our publication "The Computer Directory and Buyers' Guide". If you elect to receive "The Computer Directory and Buyers' Guide," please add \$12.00 per year to your subscription rate in U.S. and Canada, and \$15.00 elsewhere.

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Computer Art and Computer Graphics

- 8 **Thirteenth Annual Computer Art Exposition, 1975** [A]
edited by Associate Professor Grace C. Hertlein, Art Editor of *Computers and People*, Dept. of Computer Science, Calif. State Univ.—Chico, Chico, Calif.
More than 70 examples of computer art with many new and effective variations in technique.
- 28 **Roster of Computer Artists in the Thirteenth Annual Computer Art Exposition** [R]
41 computer artists from Austria, Brazil, France, Germany, Israel, Italy, Japan, Spain, Sweden, United States of America, and Yugoslavia
- 6 **A Defense of Computer Art and Graphics** [E]
by Associate Professor Grace C. Hertlein, Art Editor of *Computers and People*, Dept. of Computer Science, Calif. State Univ.—Chico, Chico, Calif.
The pros and cons of recognizing and teaching computer art and computer graphics.
- 2 **Computer Graphics and Art — Announcement of a new planned magazine** [F]

Computers and Language

- 28 **The World of Translation** [A]
by Mr. Serge Raffet, President, Translation Company of America, Inc., New York
The art and the technique of translation from one natural language to another, in an increasingly complex and international world — with occasional minor assistance from computers.
- 30 **"All the Language of Thought Calculable like Mathematics"** [A]
by Lawrence M. Clark, Framingham Centre, Mass.
What is "calculable"? What is the "language of thought"? Is "all the language of thought calculable like mathematics" a feasible goal?

Computers and Society

- 31 **Daily Surveillance Sheet, 1987, from a Nationwide Data Bank** [A]
by Dennie Van Tassel, San Jose State College, San Jose, Calif.
Some food for thought for anyone concerned with the establishment of a national data bank.
- 27 **Improvement of the Operations of the Association for Computing Machinery and Some Other Topics — II** [F]
by Gerard Salton, Dept. of Computer Science, Cornell Univ., Ithaca, N.Y.

The magazine of the design, applications, and implications of information processing systems – and the pursuit of truth in input, output, and processing, for the benefit of people.

- 7 Recommendations on Social and Political Issues [F]
by Edward D. Napier, Falls Church, Va., and the Editor
- 7 The June Issue of *Computers and People* – Comments [F]
by R. D. Jamtgaard, SCIP Academic Computing Services, Stanford Univ., Stanford, Calif., and the Editor

Computers, Puzzles, and Mathematics

- 35 Games and Puzzles for Nimble Minds – and Computers [C]
by Neil Macdonald, Assistant Editor
NAYMANDIJ – A systematic pattern among randomness?
NUMBLES – Deciphering unknown digits from arithmetical relations
MAXIMDIJ – Guessing a maxim expressed in digits
- 33 An “Almost-True” Theorem Involving Tetrahedral Numbers [A]
by Herbert E. Salzer, National Bureau of Standards, New York, and Jeffrey Mogul, Newton, Mass.
When a non-trivial statement in mathematics is true for the first 2500 consecutive cases, with exactly one exception at case 618, the statement becomes intriguing.

Notice

- 3 Important Notice to Foreign Subscribers [F]

Monthly magazine, first issue May 1975:

PEOPLE AND THE PURSUIT OF TRUTH

Some of the articles in the May, June, July, and August 1975 issues already published:

- The Assassination of President Kennedy: The Involvement of the Central Intelligence Agency in the Plans and the Coverup** / Richard E. Sprague
- The “Oswald Window” (with two photographs)** / Neil Macdonald
- Substantial Evidence of Conspiracy Ignored by the Warren Commission** / Mark Allen and others
- Chile and Central Intelligence Agency Intervention, 1964–1973** / Hortensia de Allende
- The Coverup of the Coverups: The Protectors of the Assassins** / Richard E. Sprague
- Zapruder Film Frame 413: Does It Show a Rifleman on the Grassy Knoll? No** / R. B. Cutler

For more information, see back cover.

Front Cover Picture

Night Scene by Lillian Schwartz.

For other entries in our 13th Annual Computer Art Exposition, see pages 8–27.

*Message from
Neil Macdonald:*

WOULD YOU LIKE
A COLLECTION
OF THE PUZZLES
PUBLISHED IN
*COMPUTERS AND
PEOPLE?*

IF SO, WRITE US AND
TELL US WHAT
YOU WOULD LIKE.
MAYBE WE CAN WORK
SOMETHING OUT.

Key

- [A] – Article
[C] – Monthly Column
[E] – Editorial
[F] – Forum
[N] – Newsletter
[R] – Reference

NOTICE

*D ON YOUR ADDRESS IMPRINT MEANS THAT YOUR SUBSCRIPTION INCLUDES THE COMPUTER DIRECTORY. *N MEANS THAT YOUR PRESENT SUBSCRIPTION DOES NOT INCLUDE THE COMPUTER DIRECTORY.

A Defense of Computer Art and Graphics

A provocative question arose some days ago, over dinner table conversation. A philosophy student from the University of California at Berkeley said to me, "I would like to read something of yours that defends computer art and graphics."

My first reaction was one of amusement, because I am convinced computer art and graphics have many valuable contributions to make to life (and to computer science). However, the more I thought about it and discussed it, the more it seemed to me that computer art and graphics does need a defense.

Many people believe that computer graphics and art do not have immediate practical benefits. They are convinced that computers are meant primarily for the manipulation and processing of numbers and data. They have not awakened to the fact that computers are practical also for processing words, drawings, images, and symbols. At times a computer is defined as "an information processing machine". But words, images, and symbols are information also. Processing of numbers, "bit chasing", hardware, software, etc., are recognized as practical, present needs of computer science. But practitioners in this large and continually developing field need to be involved also in the "tomorrow" of computer science, which includes more and implied computer images and graphics in literally every field of endeavor.

Let's list some of the pros and cons of recognizing and teaching computer graphics and computer art:

Pros: For Computer Graphics and Art

- Utilitarian graphics design in industrial and military uses is being vastly altered by computer technology.
- Practical graphics applications in medicine, geography, and architecture are becoming so common that the student who has not been exposed to computer graphics is not well-prepared.
- Applied arts and graphics communication (mass communication, film, television, package design, textile design, advertising) is rapidly changing to include new images achieved by computer graphics.
- Computer graphics in every area of graduate study is valuable, and ranges from graphing to simulation and visualization of statistical data in many forms.
- Graphics instruction for general education can be an enjoyable and easy introduction to computers and graphics, including art.
- Computer is a good introduction to alternative problem solving, brain-storming, and exercises in inventivity — all needed by computer scientists.
- Computer graphics can serve as beginning or remedial instruction in FORTRAN (and other computer languages) for computer scientists.
- Exposure to the humanities is achieved by computer graphics and art, and is much needed by computer scientists.

- Graphics hardware and software systems are part of graphics, and many different kinds of systems apply.
- For humanists who tend to negate computers, computer art is an excellent introduction to computer science and technology.
- Personal expression using computer art as a medium for many kinds of people is now possible; this eliminates long periods of training and affords pleasure and self-expression to many people.

Cons: Against Computer Graphics and Art

- Classes using computer graphics systems are expensive, as compared with other classes, even computer classes.
- The time requirements are costly and long for computer graphics classes, compared to other classes.
- Students need to learn many subjects, and there are not currently as many jobs in computer graphics as in other fields such as programming, systems, etc.
- High professional competency, resulting in a job in computer graphics, is not easy to attain; it requires advanced mathematical and computer science capacities, and as such is not suitable for the mediocre programmer.
- Too many people take one course in computer art and then expect to be experts in computer science and in graphics.
- Computer graphics in education (computer-assisted, managed instruction and video-assisted instruction) has a significant potential area that lied outside of computer art. In other words, more people can benefit from graphics in education than from art for art's sake.
- "Computer art could make a significant contribution if it were not so concerned with empty decoration," according to Jorge Glusberg of Buenos Aires. Computer art could have social significance but does not.
- The major problems of the world are not going to be solved by computer art or graphics; although computer graphics are moderately important in some areas, they are not as important as other subjects.

Conclusion

Computer graphics and art, in my view, has a valuable contribution to make to society, computers, and education. Too often, only token support is given to computer graphics and art (along with token support of computers and the quality of life). Too often the support is advertising slogans and nothing more. But computer graphics and art (as well as computers) will become valuable to man and the earth if we use them to the advantage of man and the earth. If we use them for money, efficiency, prestige — without giving heed to people and the genuine quality of life — then we shall have lost a magnificent potential that computer graphics and art and other applications of

(please turn to page 34)

MULTI-ACCESS FORUM

RECOMMENDATIONS ON SOCIAL AND POLITICAL ISSUES

1. From: Edward D. Napier
2403 Claremont Dr.
Falls Church, Va. 22403

I subscribe to "Computers and People" with some reservations about "editorializing" on some of the more "political and social" issues. And while I ordinarily respect your sense, I am well aware of your "sentiments" and often disagree with you as I do in your July editorial.

When I can afford to, I prefer to form my own judgments based on arguments presented — not who presented them. For this reason I do not care one whit what recommendations the ACM or its council might make on a deeply political or social issue. Their competence to make an assertion in a technological area does not naturally extend to areas outside this special competence. As interesting and provocative as such discussions of political and social issues might be, it would be difficult and if not impossible for ACM to stop short of recommendations. As an unnecessary distraction from its central purpose, recommendations could split ACM into many nontechnical camps.

It is probable that some good and worthwhile ideas originate and are suffered as a minority opinion. With some indulgence and tender loving care these may grow into the majority opinion. But I hesitate to see such ideas subjected to a majority vote in any organization that is not required to judge these issues. Your frequent use of the attributes of "good, responsible, and humane" to support your own assertions are self-serving and not always justified. In particular, you seem unable to sail by the sirens of "peace and love" without succumbing to their call and losing your perspective. But your bias is known and taken into account.

Which all goes to say, I believe the ACM made a correct decision in ducking political and social issues.

2. From the Editor:

Thank you for your interesting and important letter which we hope to publish in "Computers and People" very promptly.

In a small democracy such as existed in Athens in antiquity at one time, it might be possible for all citizens to be well informed on all issues, and the recommendations of experts even in areas outside of their field of expertness might be unnecessary

even if interesting.

But in a large democracy, or a large society which may approach a democracy without being one, it is not possible for most citizens to know enough about all of a thousand and one issues to be well informed. In such a situation, the recommendations of professionals in fields outside of their expertness should be interesting, and may be valuable and necessary.

The response to a scientist who is a great chemist and who makes recommendations in the field of war using nuclear weapons cannot be "Your field is chemistry: stay out of other fields." Dr. Linus Pauling won two Nobel prizes—one in the field of chemistry, and the other in the field of peace.

A great many computer professionals have to study systems in order to adapt computers to be used in such systems. Systems often include political and social factors and issues. The design of a good system may require study of political and social issues. For the Association for Computing Machinery to continue to avoid recommendations in such areas is in my view unfortunate, unwise, and unhelpful — even if the minority recommendation is more valuable than the majority one.

THE JUNE ISSUE OF "COMPUTERS AND PEOPLE" — COMMENTS

1. From: Ron D. Jamtgaard, Associate Director
SCIP Academic Computing Services
Stanford University
Stanford, Calif. 94305

Thank you for the June issue of "Computers and People". I appreciate the new format very much and laud your efforts as editor. I read the issue from cover to cover. Each article was of significant interest to me.

Please keep up the good work and the great publication.

2. From the Editor:

We thank you for your commendations.

We wish we could hear often from all our readers about what they like and what they do not like in the magazine that we publish.

It is never easy and often almost impossible for an editor to make all the decisions needed to keep all the classes of his readers interested, informed, satisfied, and entertained. Feedback is very desirable.

(please turn to page 27)

THIRTEENTH ANNUAL COMPUTER ART EXPOSITION

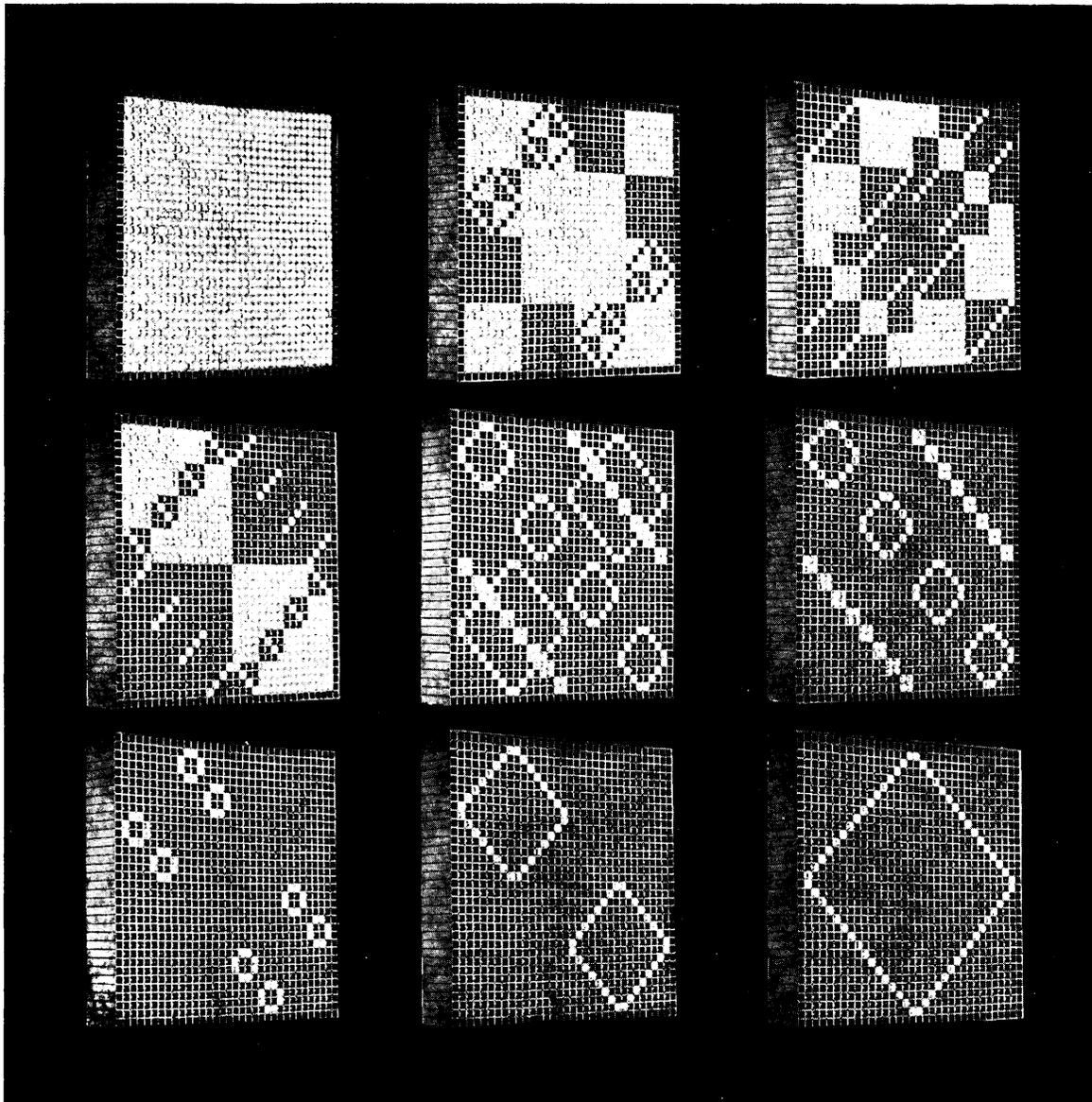
1975

This is the 13th Annual Art Issue for "Computers and People" (formerly "Computers and Automation"). This is also our largest and most varied issue, featuring the work of 41 artists from 11 countries.

Many of the artists (and illustrations) are from the exhibition of the International Conference of Computers and the Humanities, and are reprinted here with special thanks to Professors Rudolph Hirschmann of the German Department and Robert J. Dilligan, Department of English, University of Southern California, Los Angeles. Many of the photographs were taken by Dr. Joseph Raben, Editor of "Computers and the Humanities", and developed by C&P's Art Editor, Grace Hertlein.

The selection, design, and layout of the Art Issue Section is by Professor Hertlein. Questions, further information on artists may be obtained from the Art Editor.

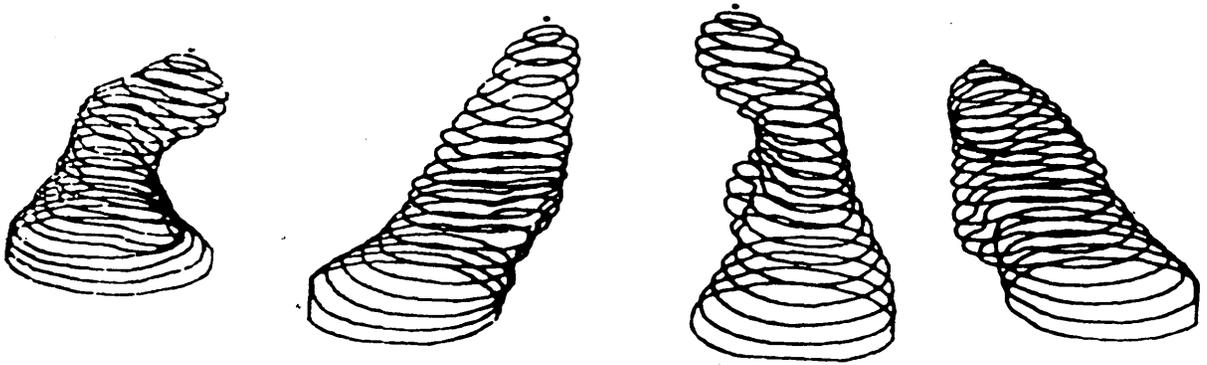
We hope you enjoy the wide variety of works in this issue, by some of the most well-known computer artists in the world, and featuring some very new works not shown in this country before. Student entries are marked with an asterisk to give special attention to them, in the hope of eliciting more student works in the future. One of the student artists is 14 years old – Kelly Lam, of Annandale, Virginia!



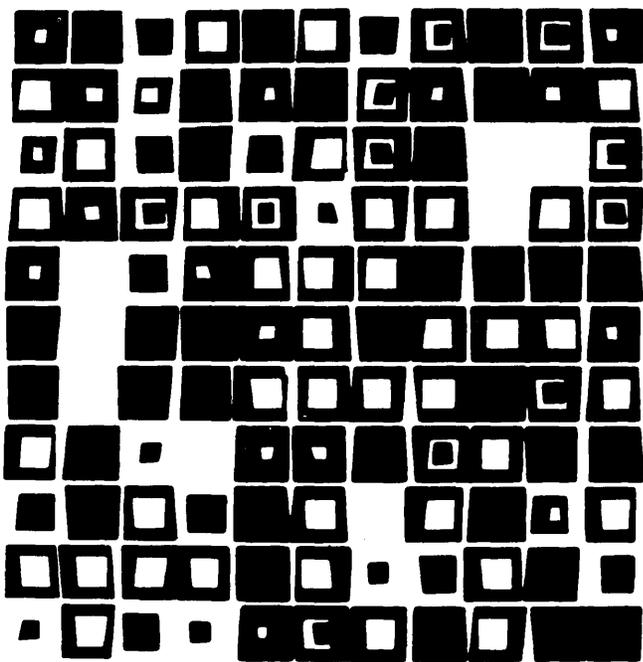
Design for Exterior Mural, Vladimir Bonacic



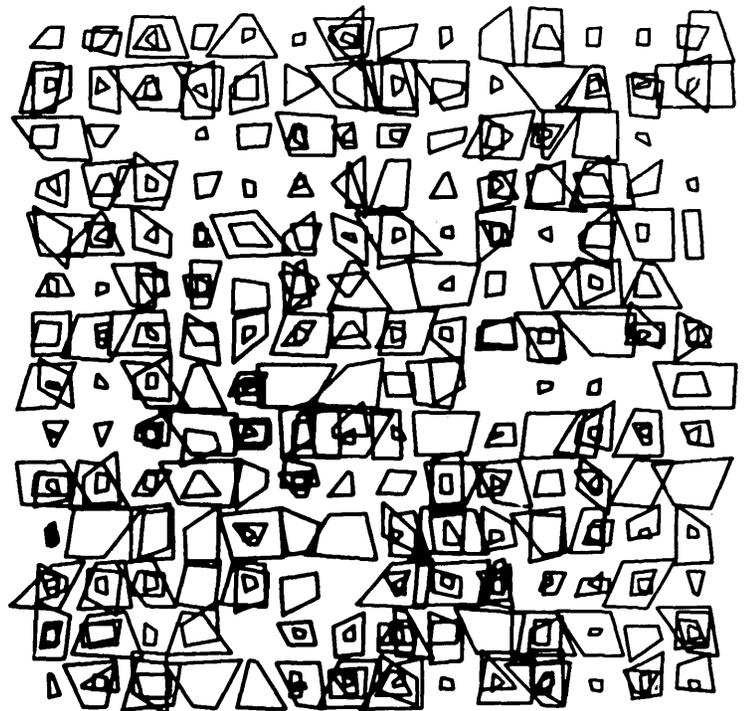
Computer Dance, Analivia Cordeiro



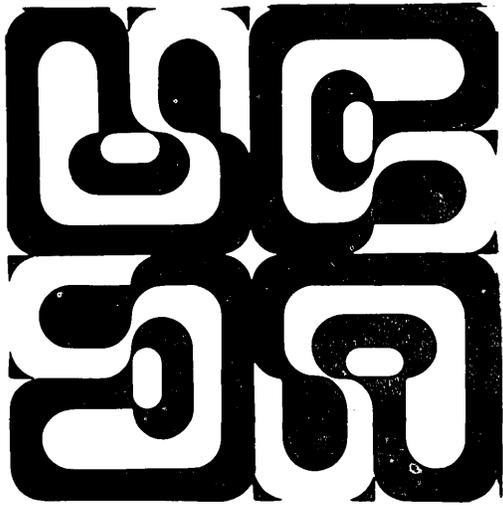
Designs for Sculpture, J. Alexanco



Computer Icone, V. Molnar



Carres, V. Molnar



Ogara, Canvas by Barbadillo



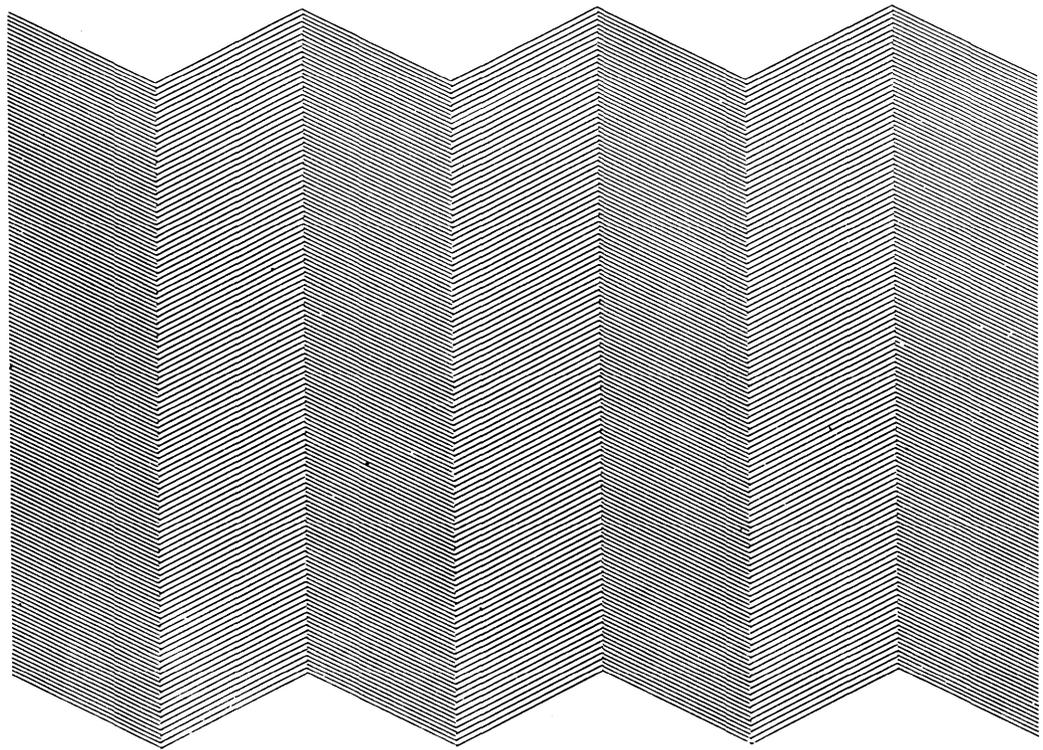
Detail, Waldemar Cordeiro



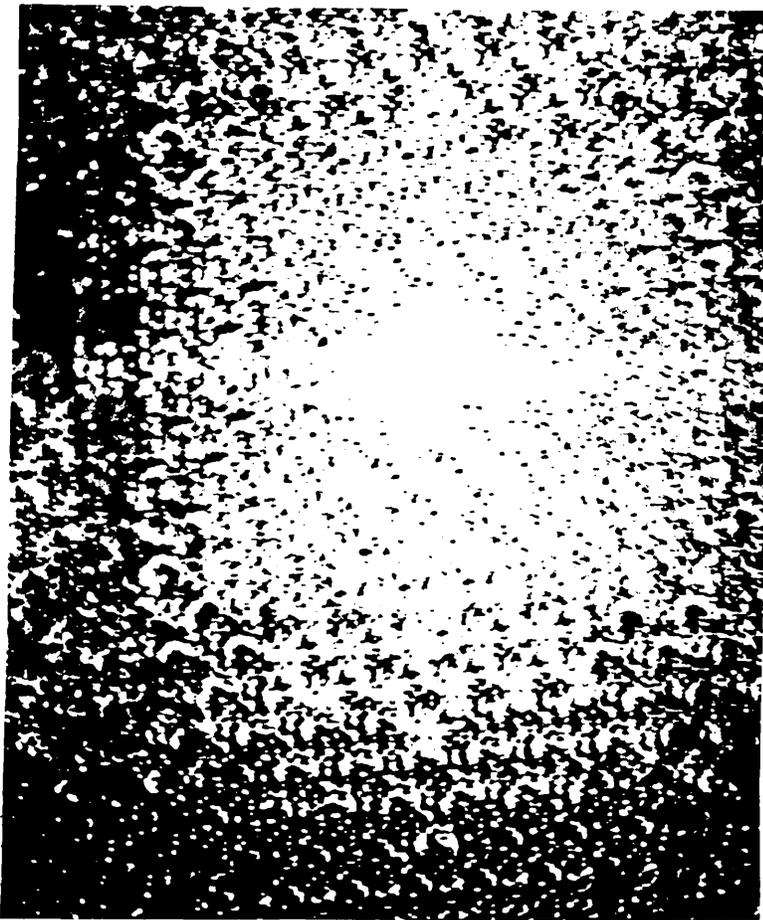
Untitled work, Waldemar Cordeiro



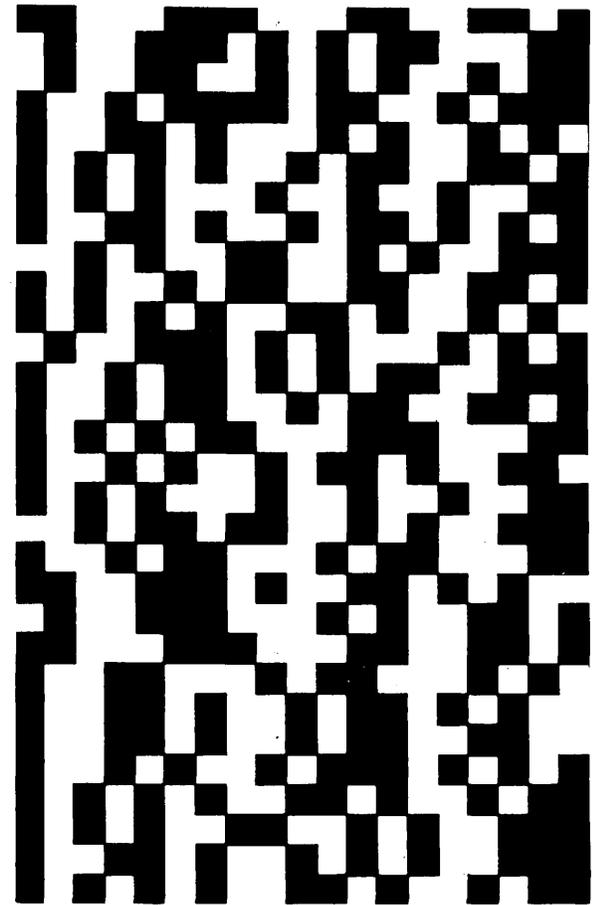
Bois, Johannesson & Kallin



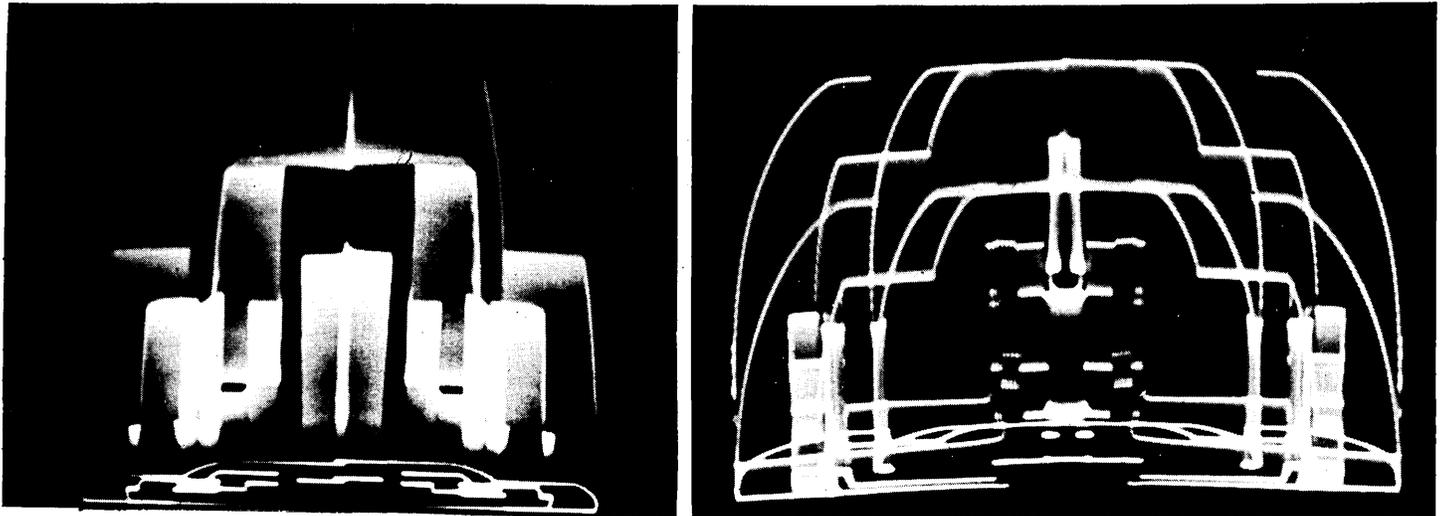
Untitled work, David Garrison



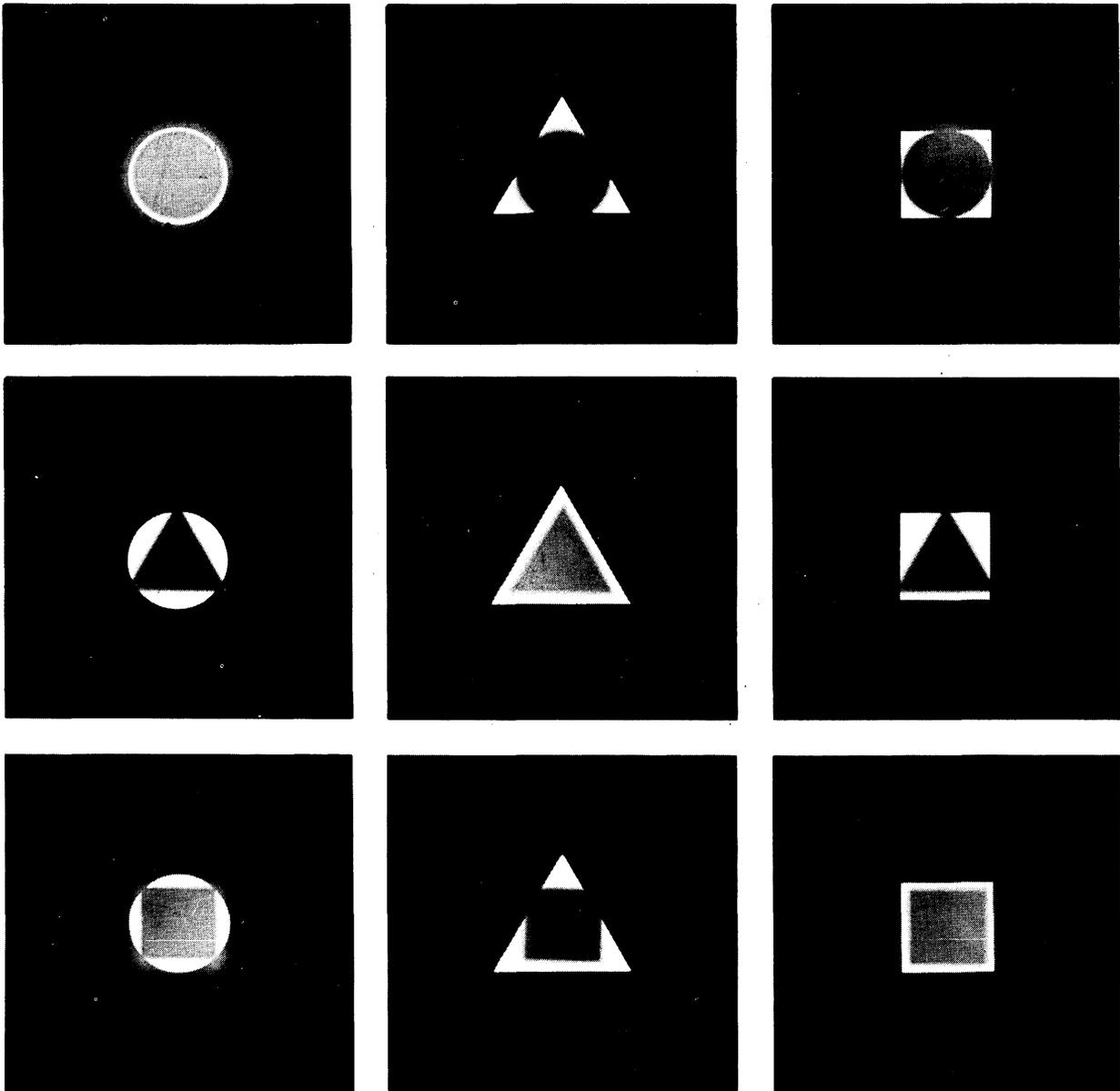
Untitled work, Herve Huitric & Monique Nahas



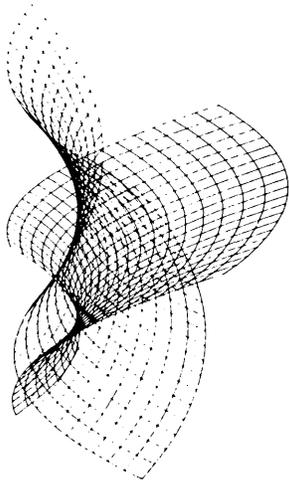
Detail, *Tapestry*, Marquette



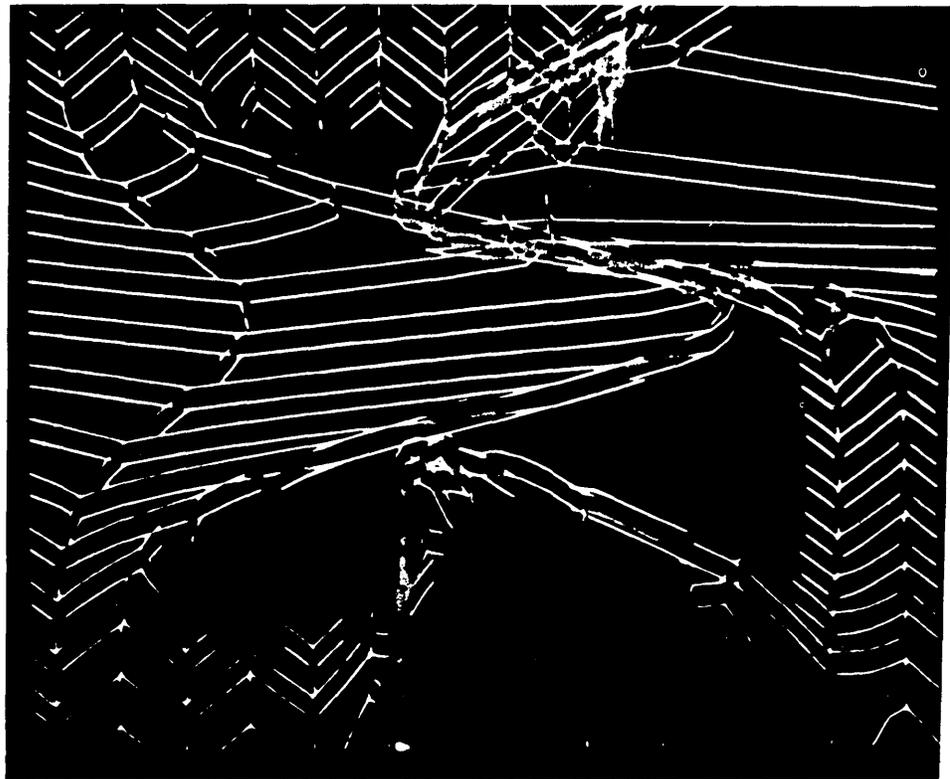
Analog Graphics, Otto Beckmann



Generative Photography, K. Holzhauser



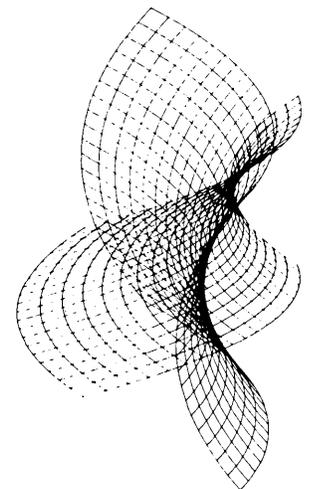
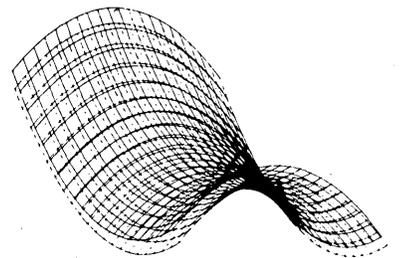
Detail, M. Stephens



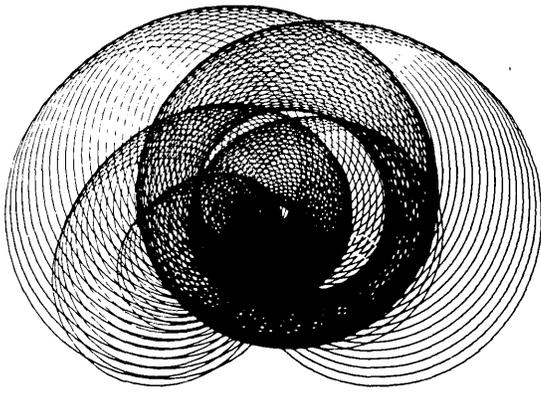
Herringbone Series, R. Leavitt



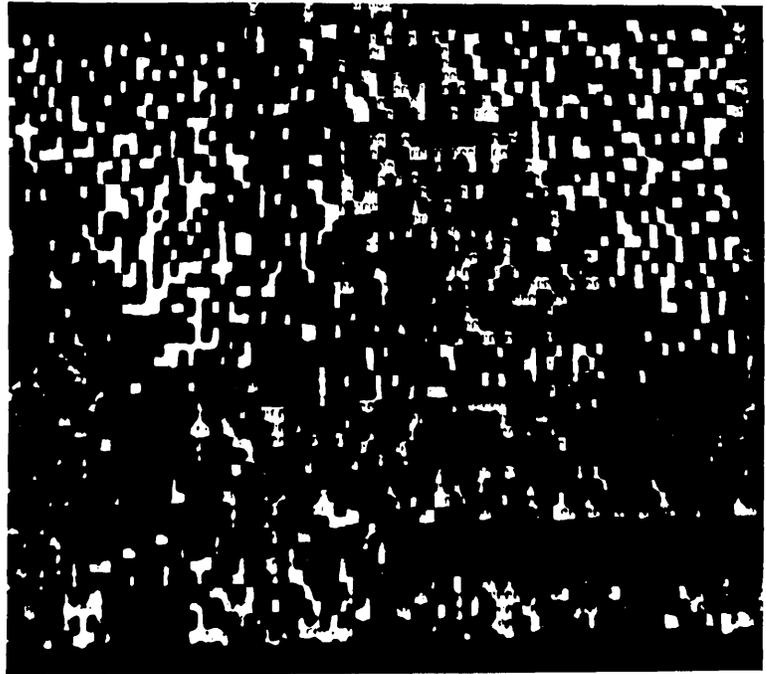
Simulated Colour Mosaic, H. Kawano



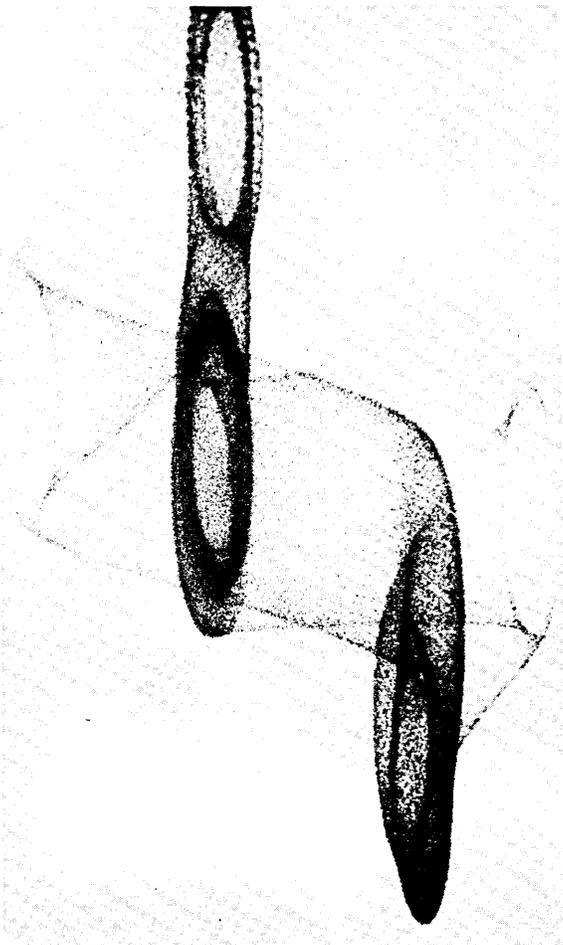
Detail, M. Stephens



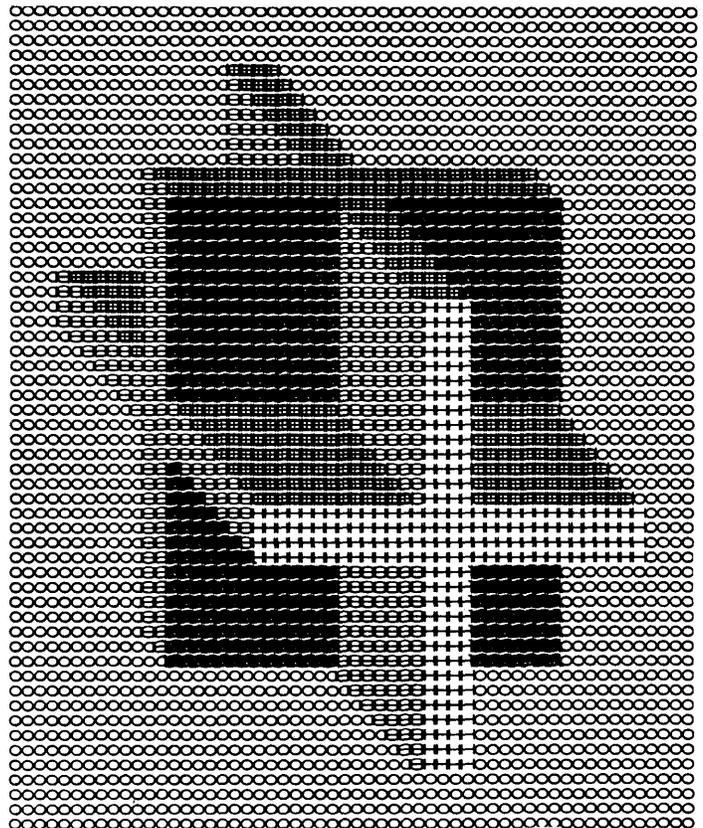
Detail, S. Zeigler



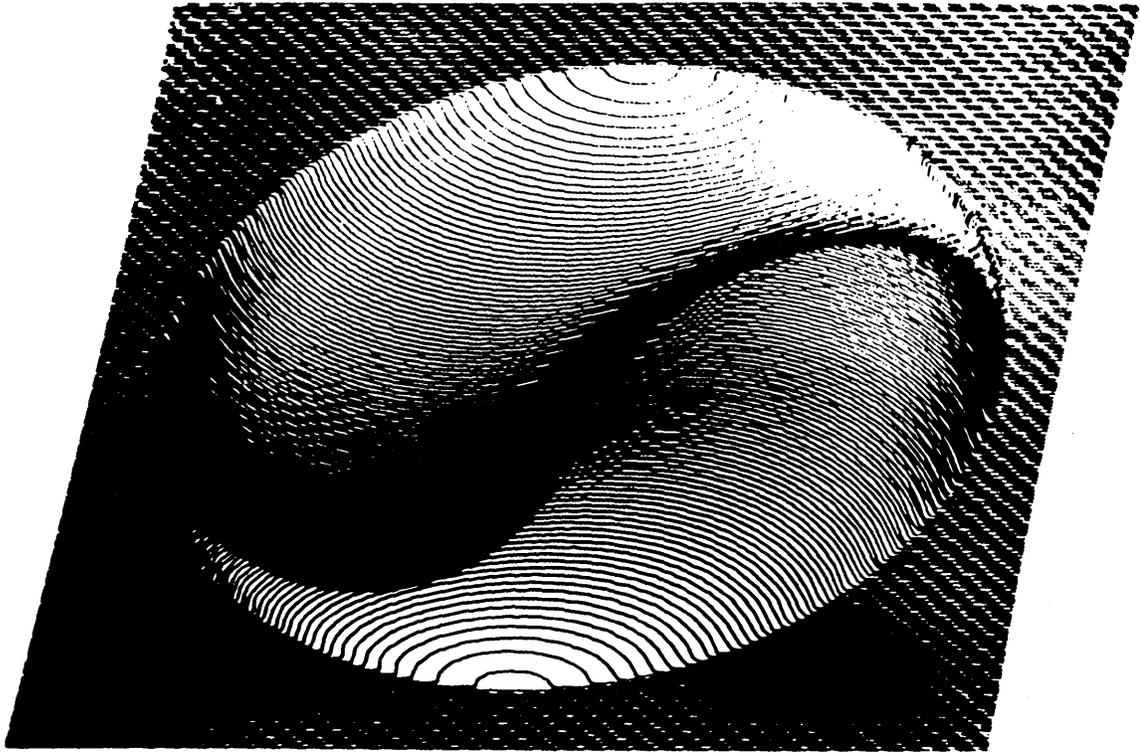
Detail, *Sur I*, J. C. Halgand



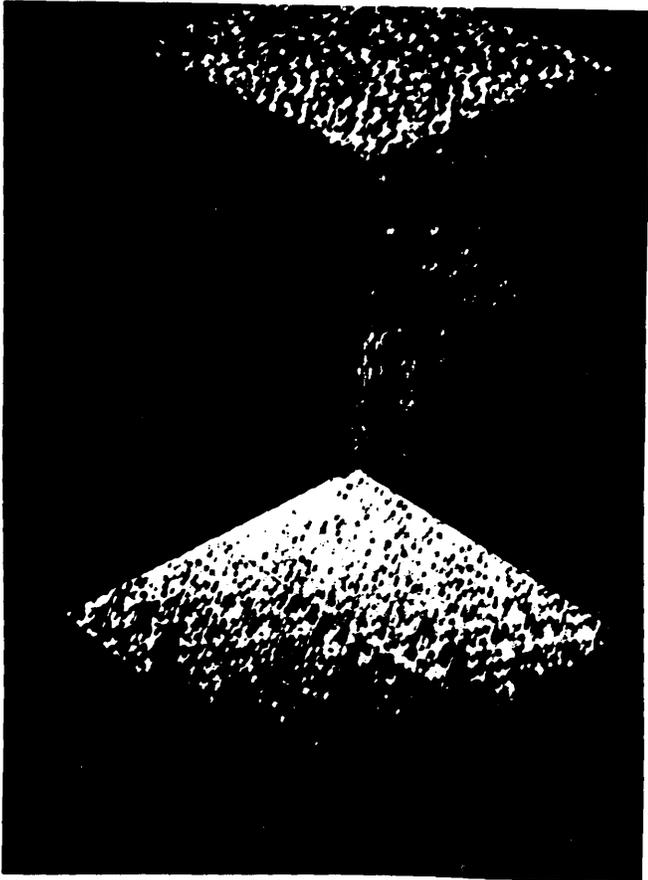
Analografiken, Herbert Franke



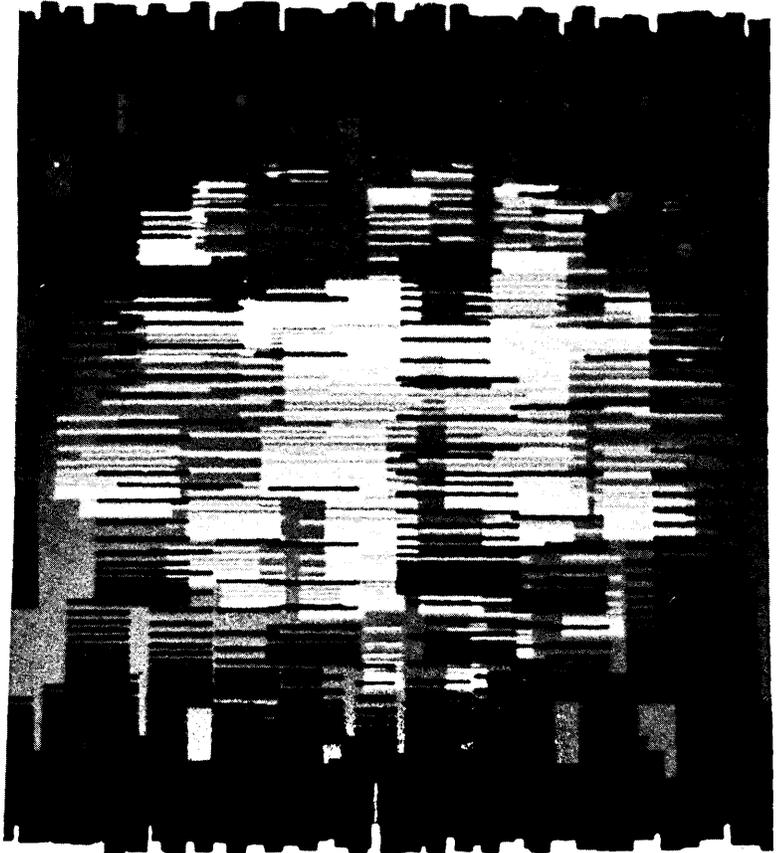
Kubus-Serie, Klaus Bassett



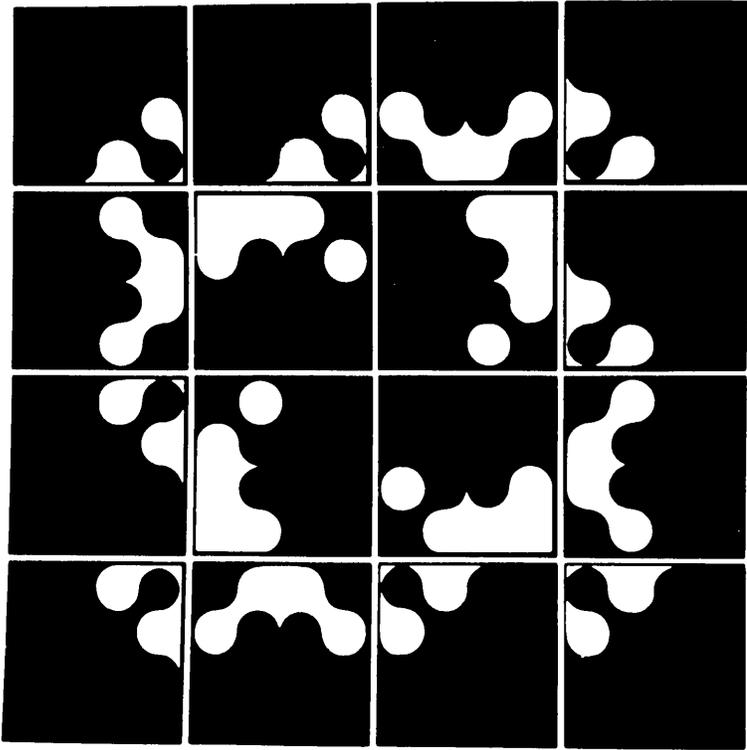
Untitled work, Sture Johannesson & Sten Kallin



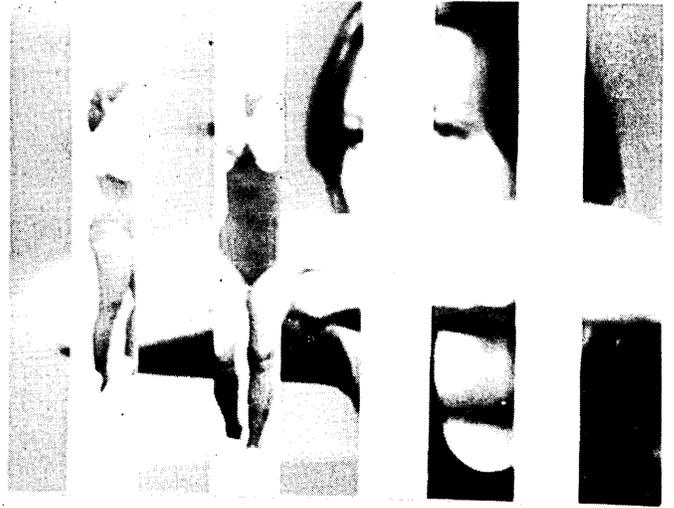
Untitled work, Herve Huitric & Monique Nahas



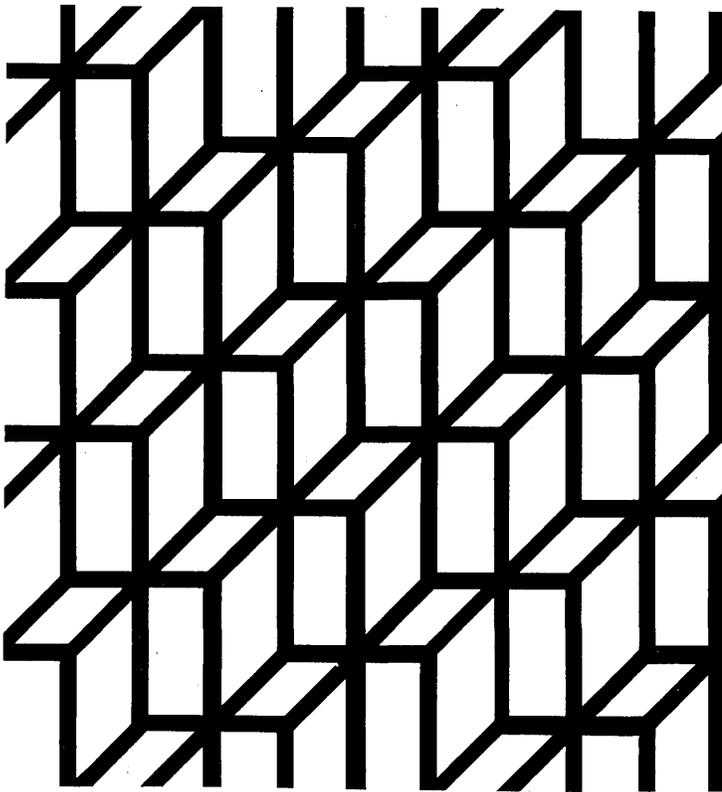
Untitled Serigraph, T. Mikulic



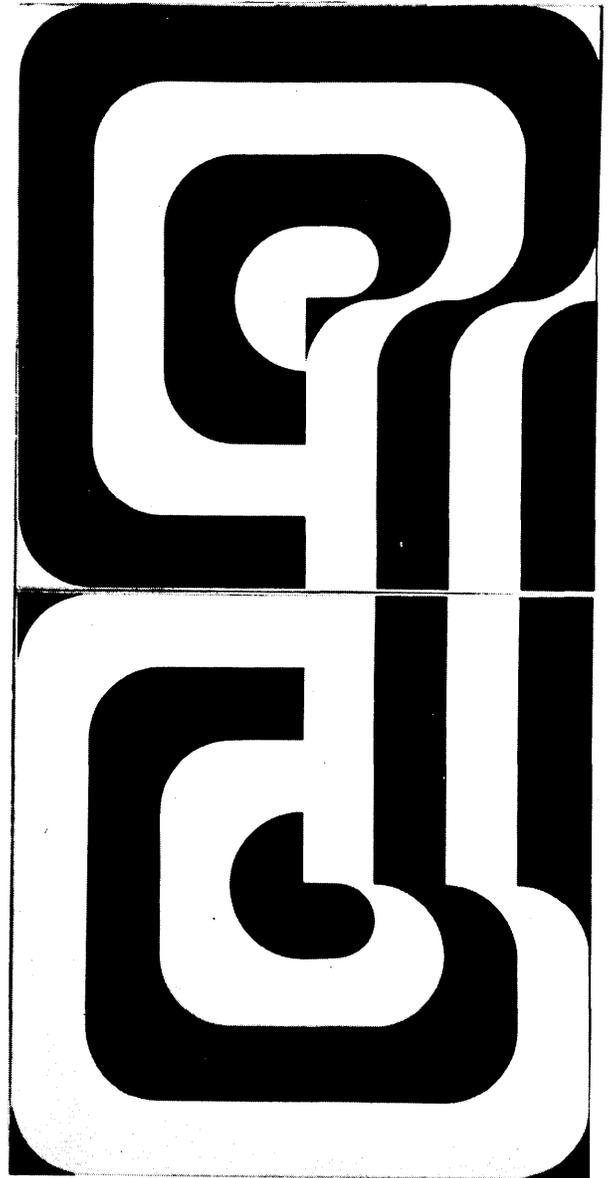
Serigraphy, Gerardo Delgado



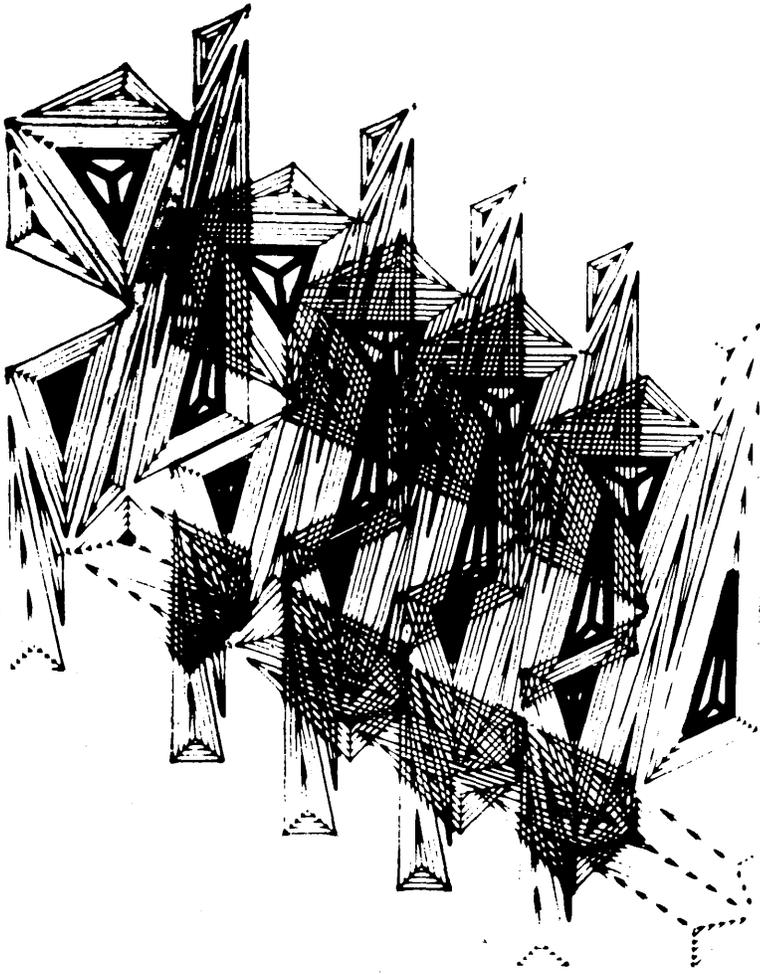
Computer Dance, A. Cordeiro



Detail of Large Work, Soledad Sevilla



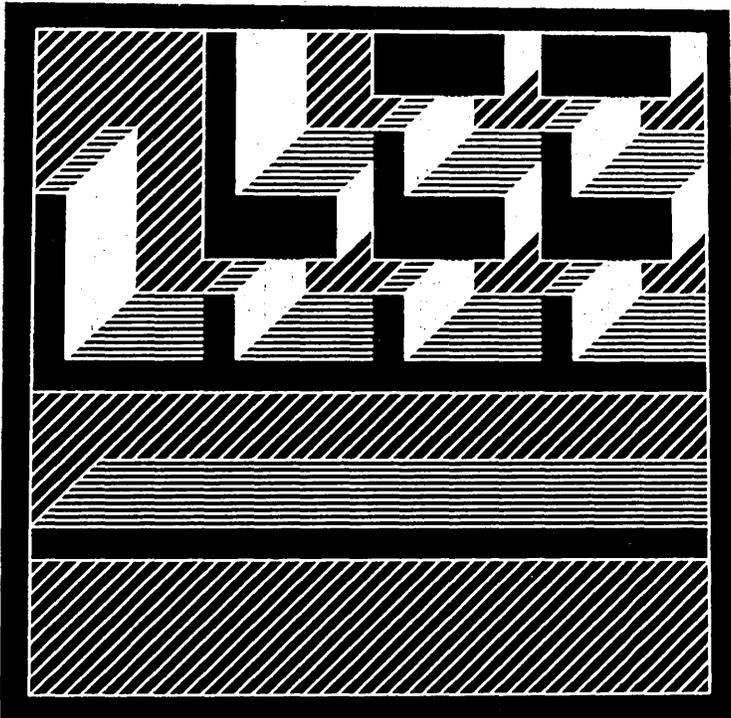
Lenea, M. Barbadillo



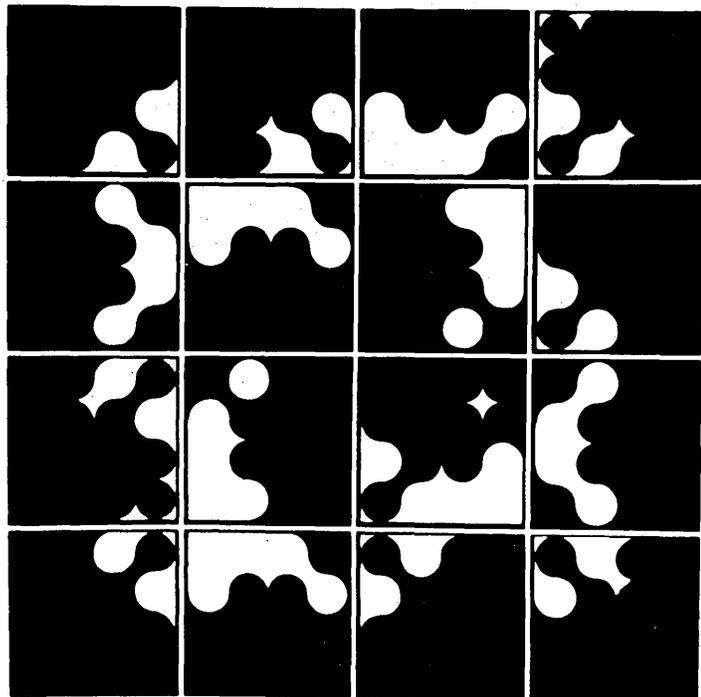
Nude Descending a Staircase, L. Schwartz



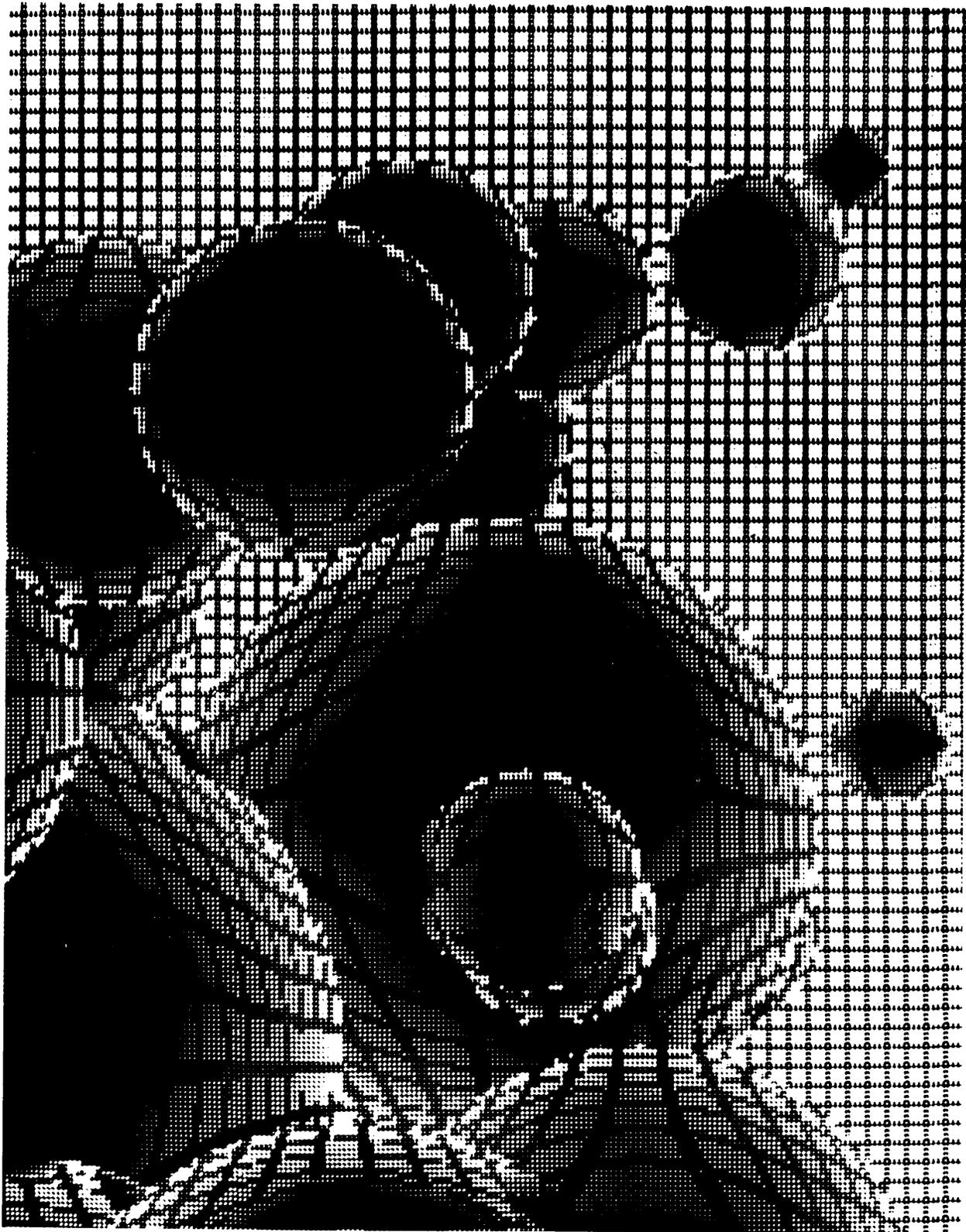
Design for Textile, G. Hertlein



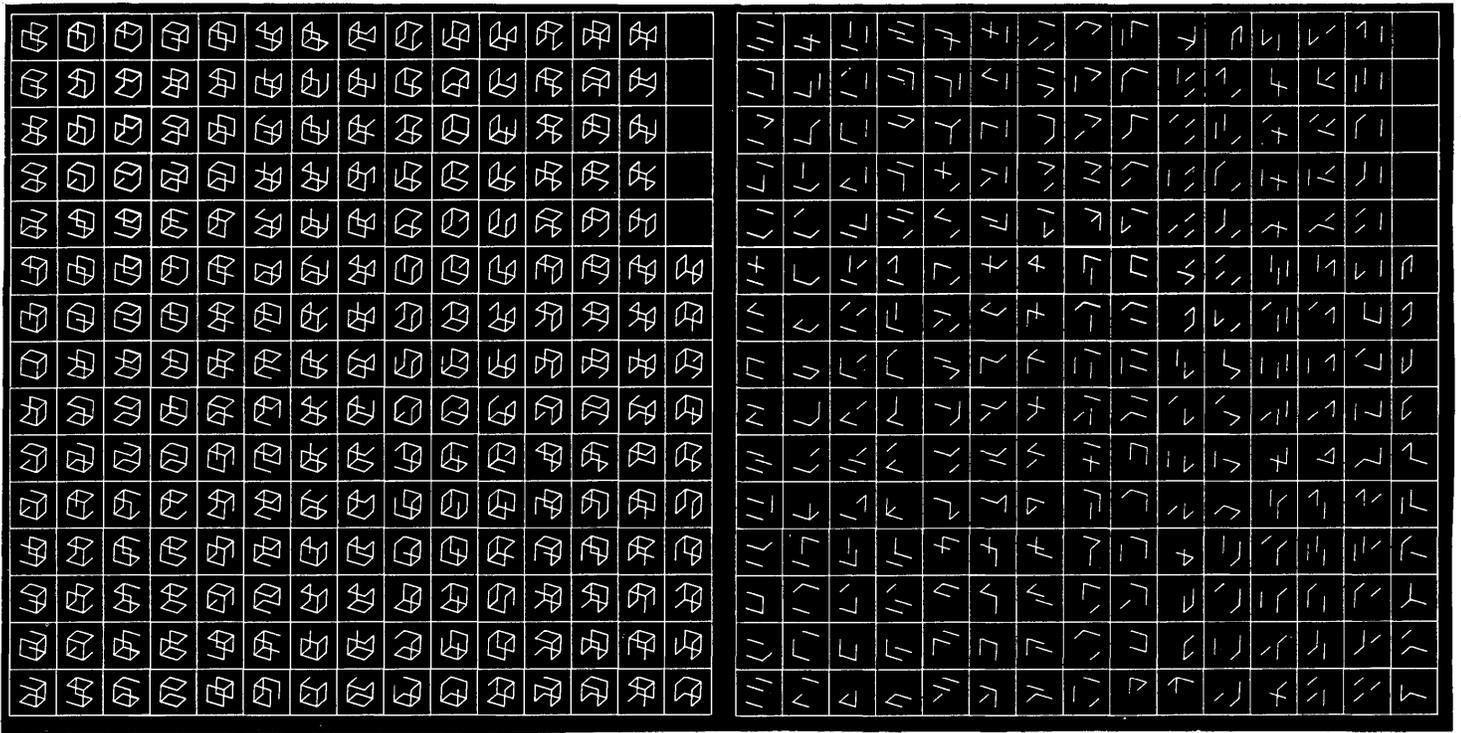
from The Cube: Theme and Variation Series, E. Zajec



Serigraph, G. Delgado



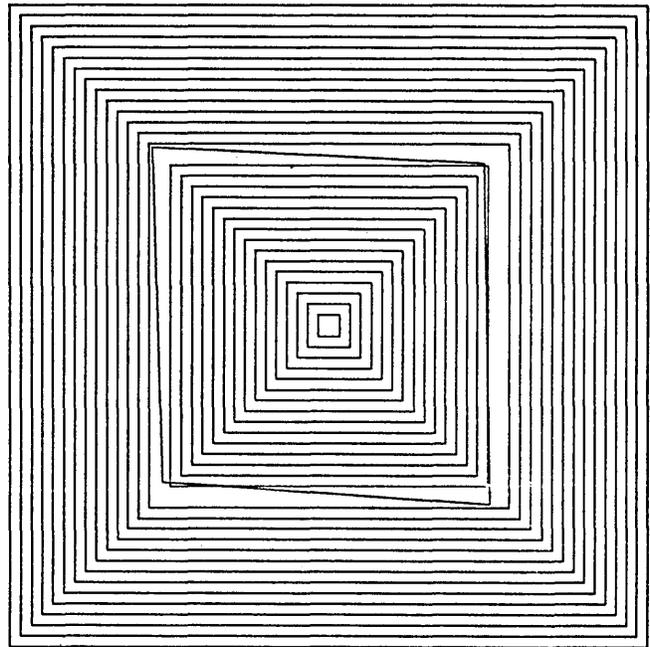
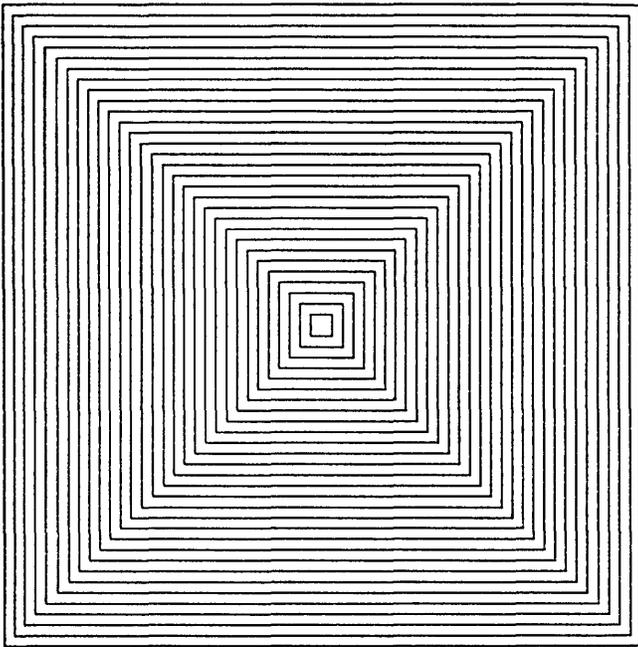
Graphic, Duane M. Palyka



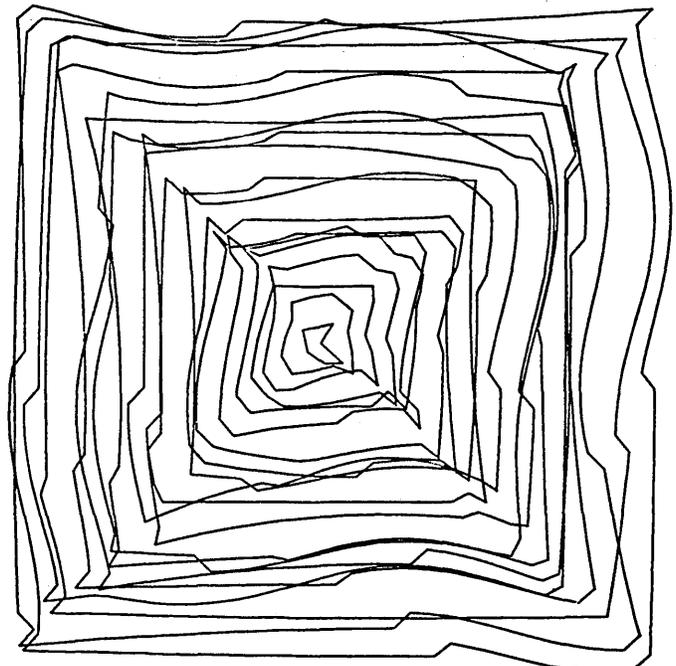
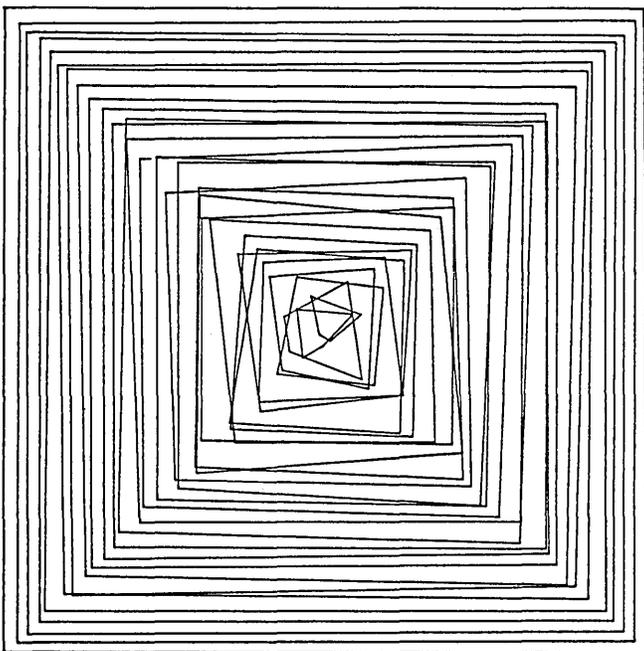
*Generative Drawings from the Cubic Limit Series, Manfred Mohr
(This Series was shown in Paris, May-June 1975.)*

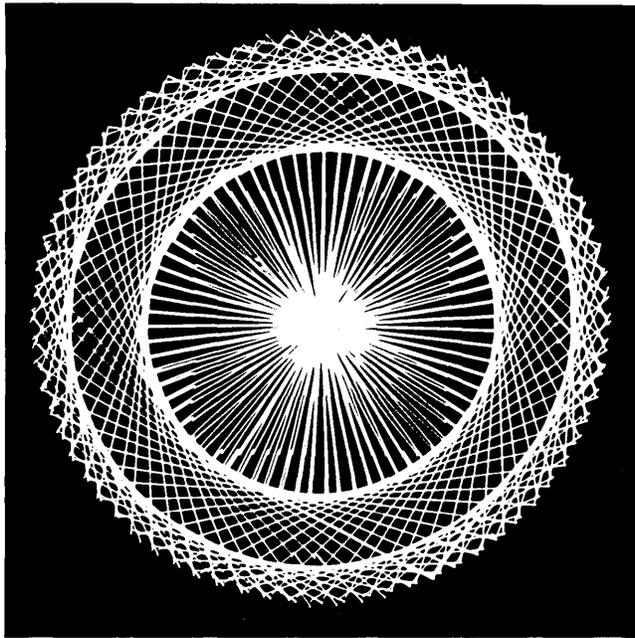


Two Studies by Vilko Ziljak

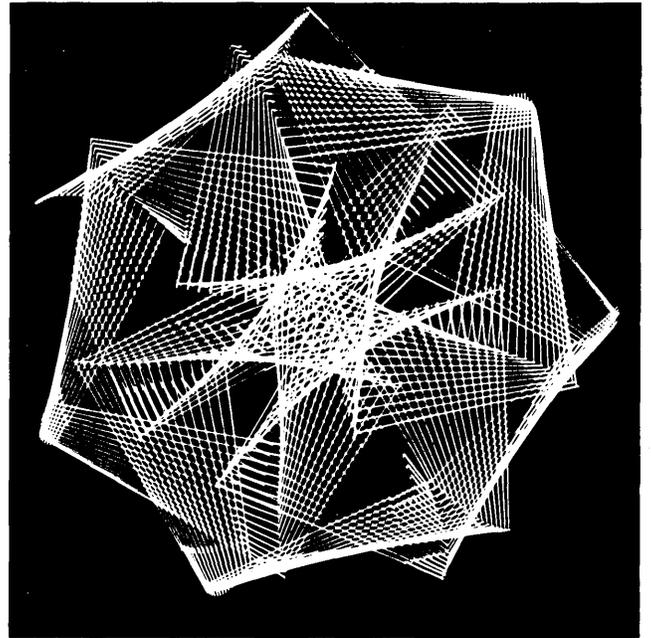


The illustrations are from a book entitled *Computer-Picture-Book* by Vera Molnar, published in 1974. The technique described can be used with many forms and is a deformation method. The works from the book are made by the "conversational method" (CRT screen 2250 + IBM 370 computer) with a program in FORTRAN she calls "RESEAU-TO". This program permits the production of drawings starting from an initial square array of N (30 in this case) concentric squares. The available variables are: the number of concentric squares, the displacement of individual squares, the deformation of squares by changing angles and length of sides, the elimination of lines or entire figures, and the replacement of straight lines by segments of circles, parabolas, hyperbolas and sine curves. Thus, from the initial set an enormous variety of different images can be obtained.





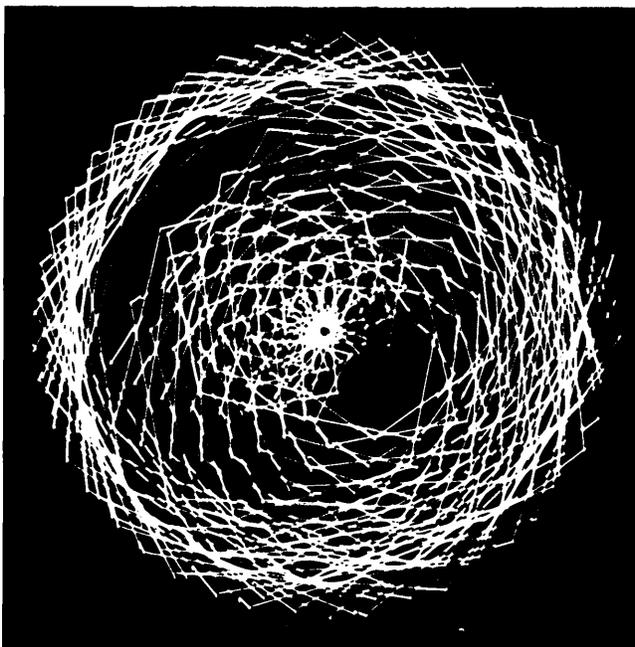
Manifestation 1



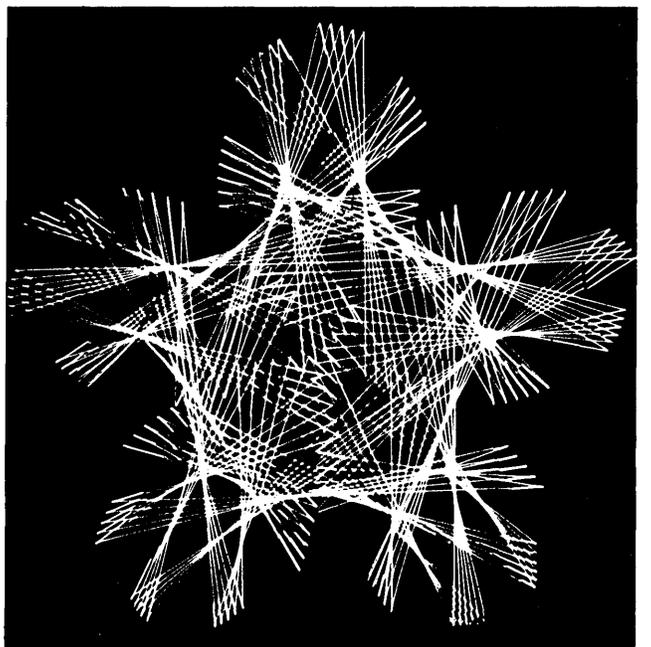
Manifestation 2

Varying Manifestations by Sozo Hashimoto of Tokyo. Computer used: FACOM 230-35 with a F6233A Graphic Display System. Programming is in FORTRAN IV. Here are the artist's comments:

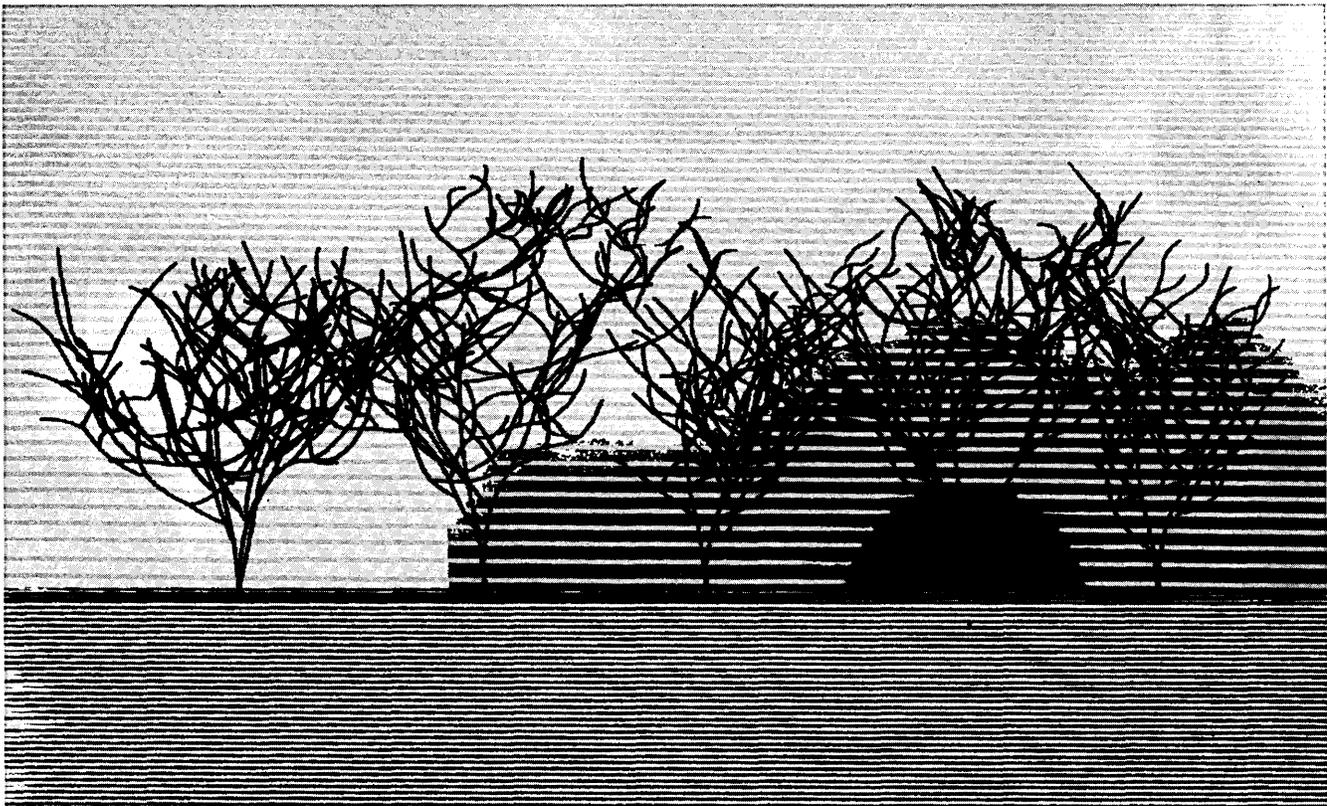
"Life is symbolized by many forms all over the world. But phases of life change with the lapse of time and life maintains a dynamic balance. So I expressed forms to symbolize life by the use of a graphic display system and a computer. These works are named 'Varying Manifestation' Series."



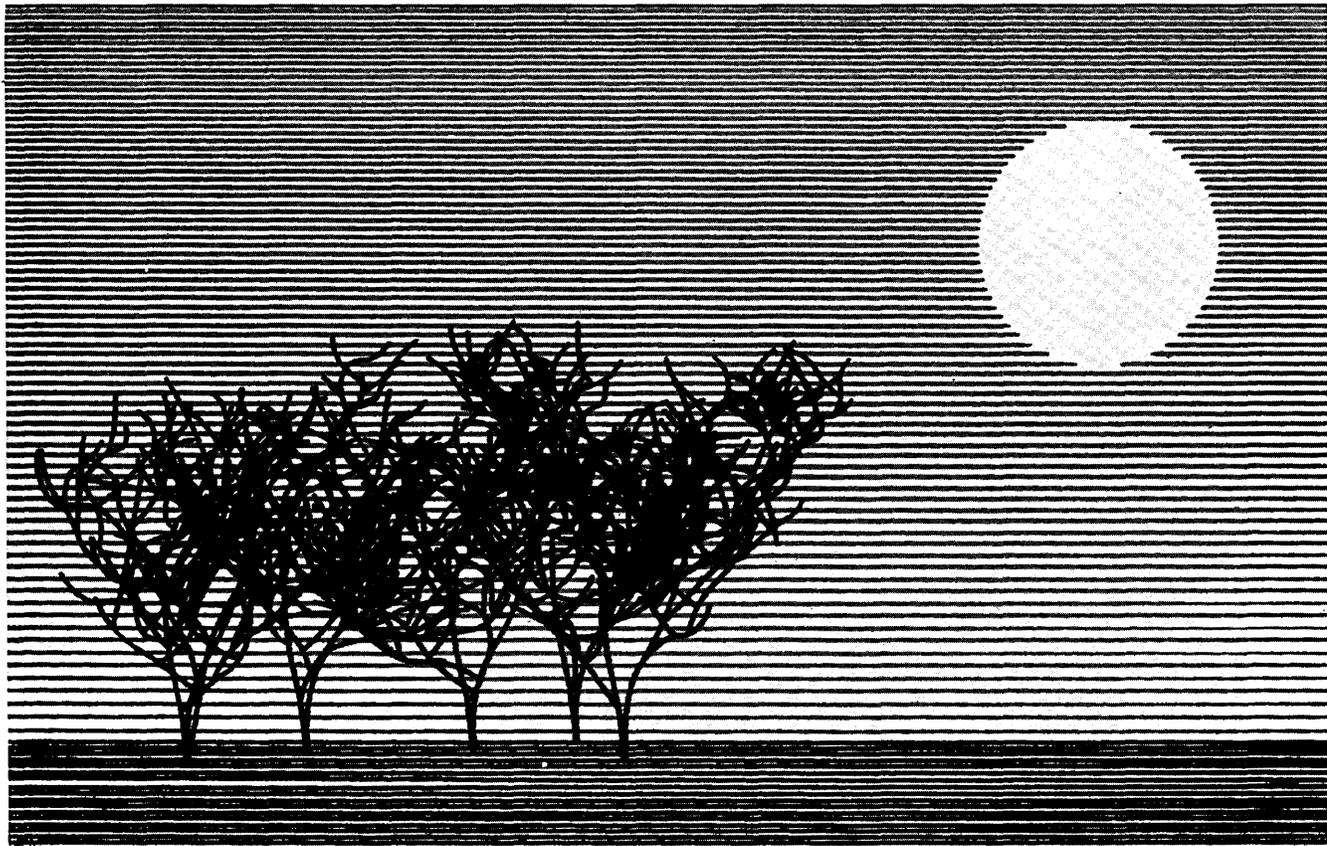
Manifestation 3



Manifestation 4



Dawn of Creative Computing by Katy Owens, who is working on a Masters Degree in Computer Science at Ball State University in Muncie, Indiana. Below, *Moon Rise* by Katy Owens. Both works are available as serigraphs (silkscreen prints) from COMPUTRA, Inc., U.S.A., Upland, Indiana. (*Dawn of Creative Computing* and *Moon Rise* — ©1975 Katy Owens)

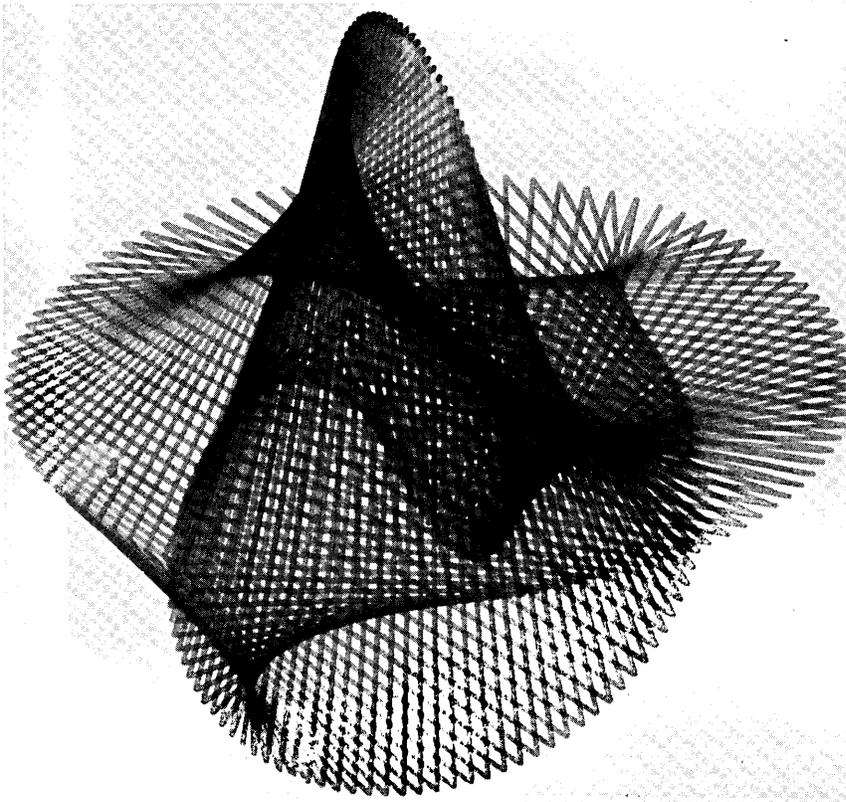
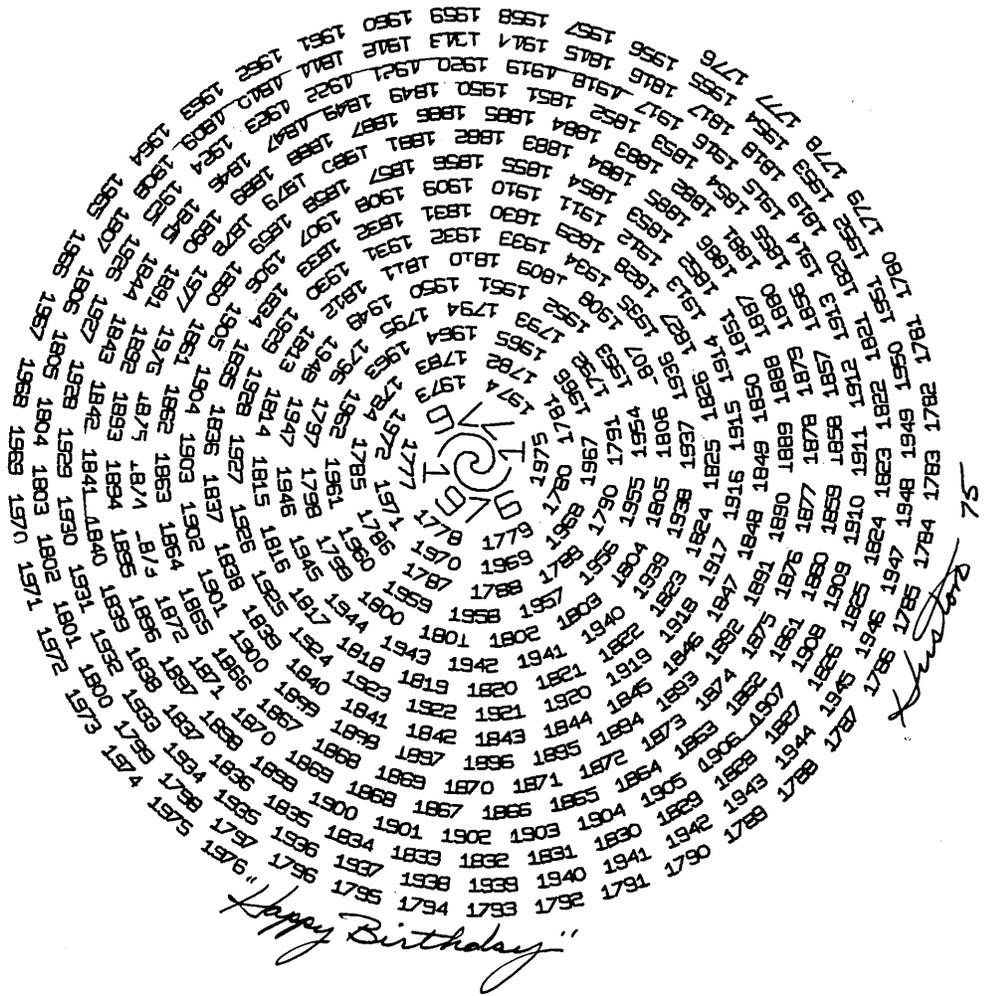


Happy Birthday

by Tom Huston of COMPUTRA,
Upland, Indiana

©1973 COMPUTRA

COMPUTRA, or Computer Art
for People, Upland, Indiana,
46989, has moderate-priced
computer art in a wide range
of styles and colors. Readers
may send for brochures and
prices.

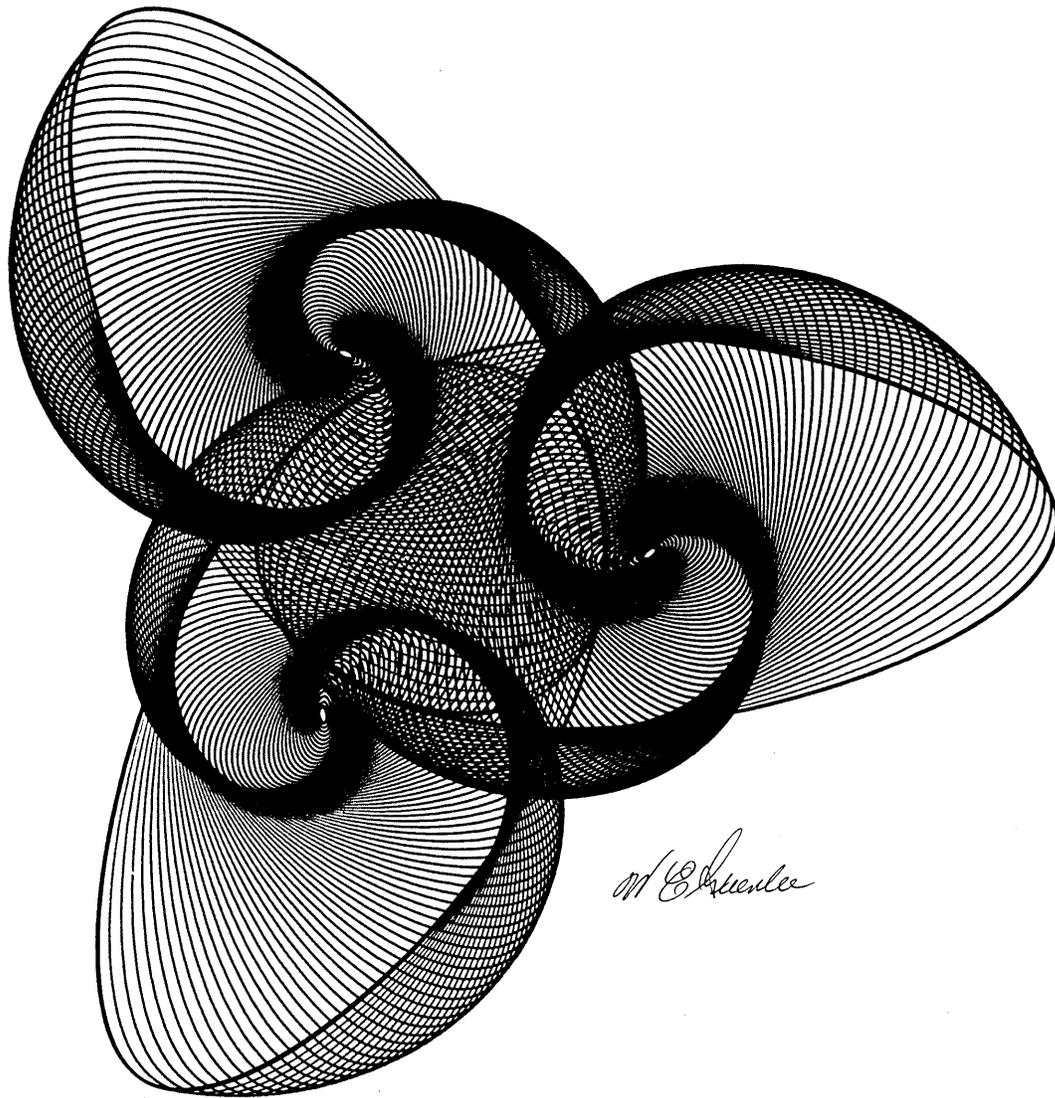


Space Circles

by Charles Bromley
Taylor University

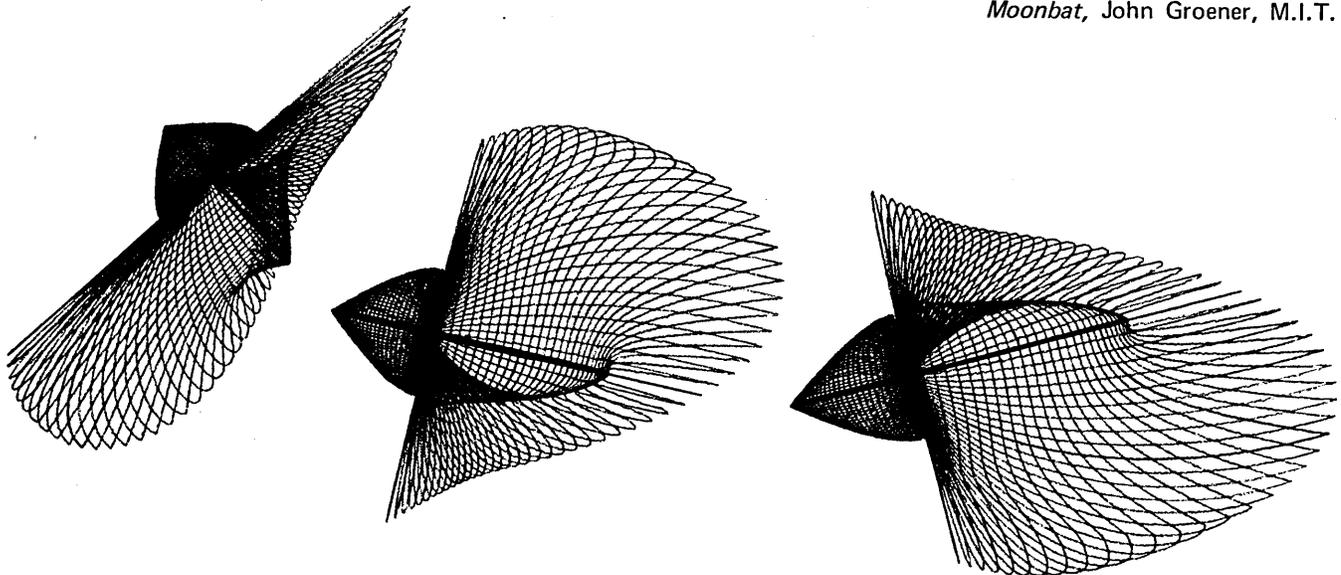
©1973 COMPUTRA

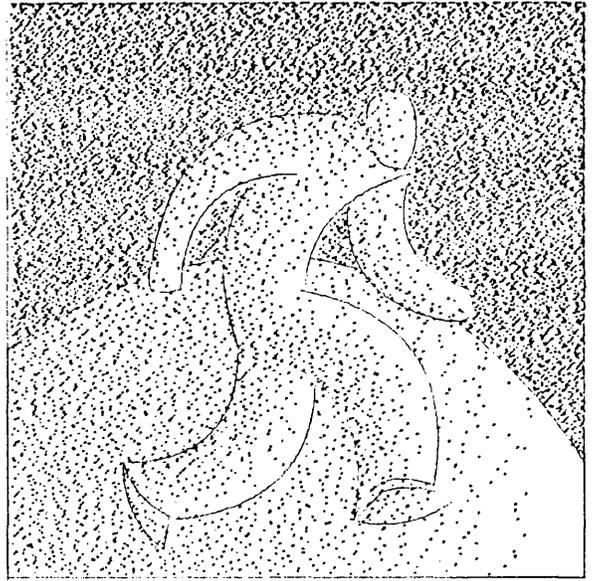
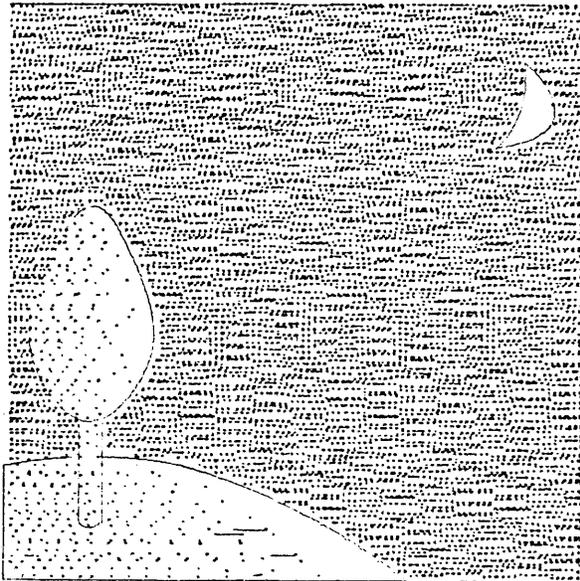
(Work available from COMPUTRA)



Untitled Work, R. E. Greenlee (drawn with homemade computer and plotter)
Available from *COMPUTRA*, Upland, Indiana

Moonbat, John Groener, M.I.T.



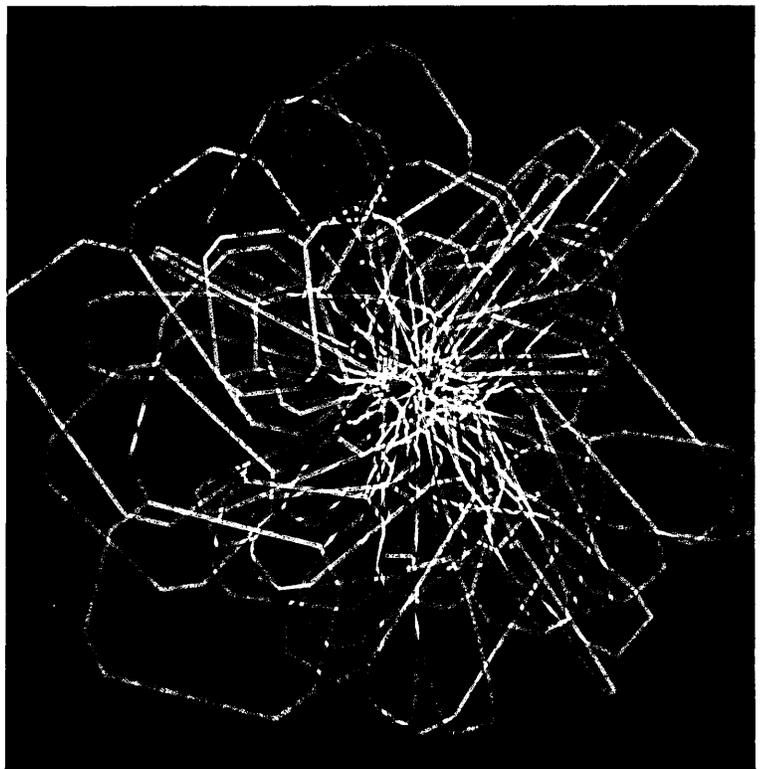
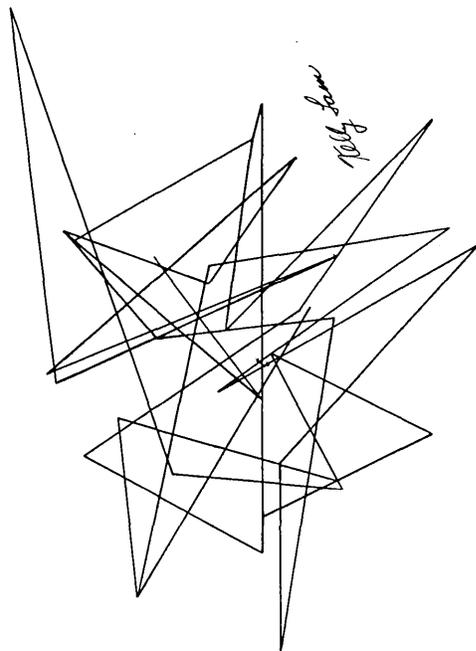


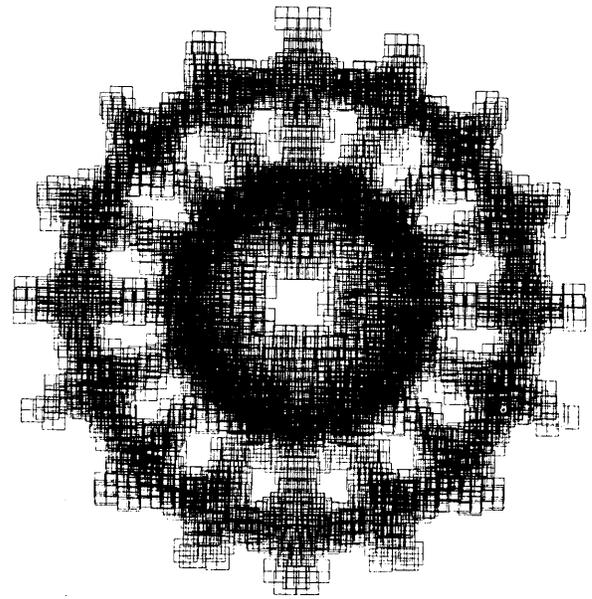
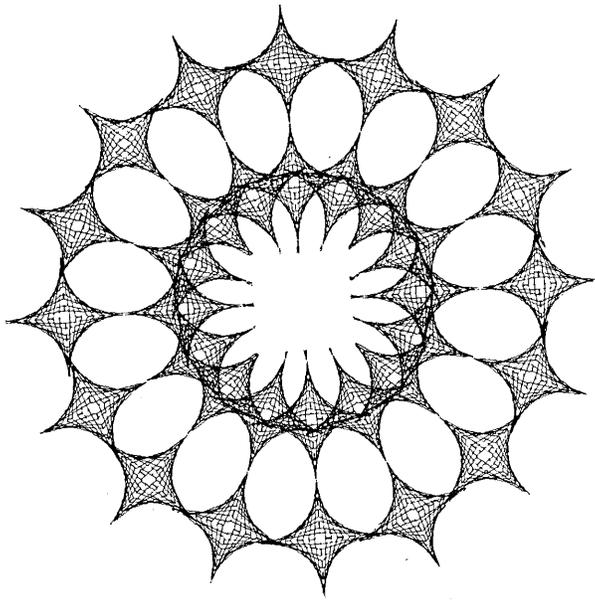
Above: Nocturne and Man Running by Michael Davis, a student at San Francisco State University. Programmed on a CDC computer in Michael's own language, ARTRAN.

Below left: Untitled work by our youngest contributor, Kelly Lam, age 14, of Annandale, Virginia. Here are Kelly's comments on his work: "This design was created by plotting points on graph paper which were random numbers generated by a Hewlett-Packard HP-65 pocket calculator, which is actually a mini programmable computer. Each point was connected with its preceding one, forming a pattern. An ink tracing was later made."

Below right: Octal Crystal by Jere Truex, student at Taylor University. Available from COMPUTRA, Upland, Indiana

©1973 COMPUTRA



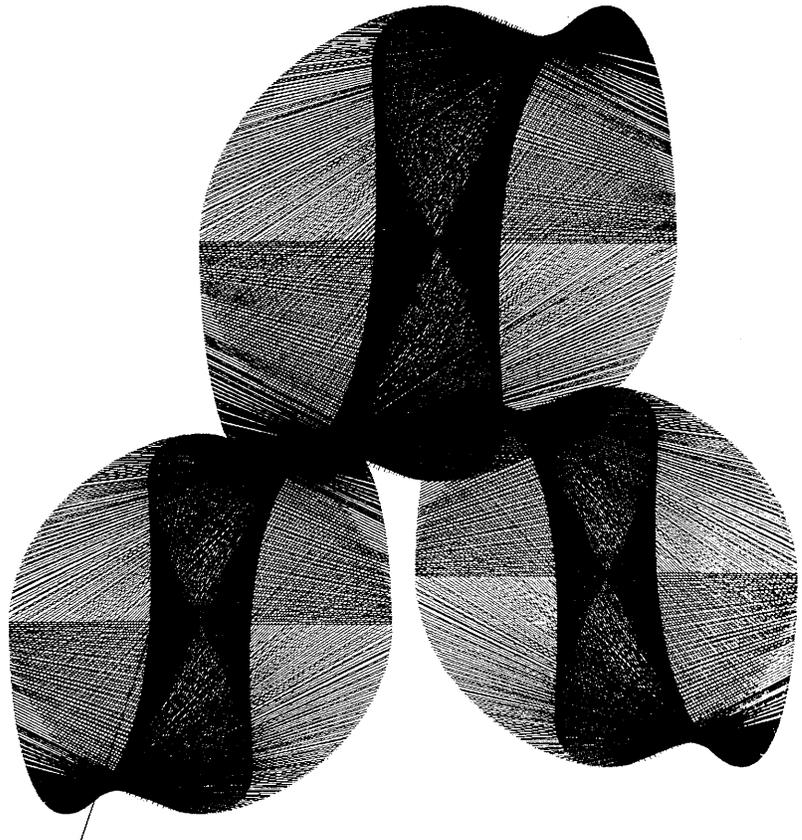


Above: Patrick Porter, graduate student from Blacksburg, Virginia, uses a transformation technique he calls a "modulation" or alteration of an original figure in a series of generative (succeeding, related) works.

His comments: "Modulation is accomplished by considering each line of the drawing as a number of segments (specified by parameter). Each segment of the line is drawn in some manner other than as a straight line connection between the end-points. Rotations and reflections of 'primitive' designs result in generative new works."

Right:

Three on a String by Barbara Dwyer



Computer Artists

The response to the Thirteenth Annual Computer Art Exposition of *Computers and People* was excellent. We received entries from all over the world. We are grateful to all contributing artists. Following is an alphabetical listing of all persons whose artwork appears in this issue. We plan to publish additional entries in future issues of *Computers and People*.

1. ALEXANCO, Jose-Luis, Madrid, Spain
page 9
2. BARBADILLO, Manuel, Malaga, Spain
pages 10, 16
3. BASSETT, Klaus, Stuttgart, Germany
page 14
4. BECKMANN, Otto, Wien, Austria
page 12
5. BONACIC, Vladimir, Jerusalem, Israel
page 8
6. BRONLEY, Charles, COMPUTRA, Upland, Ind.
page 23
7. CORDEIRO, Analivia, Sao Paulo, Brazil
pages 9, 16
8. CORDEIRO, Waldemar, Sao Paulo, Brazil
page 10
9. DAVIS, Michael, San Francisco, Calif.
page 25
10. DELGADO Gerardo, Sevilla, Spain
pages 16, 17
11. DWYER, Barbara
page 26
12. FRANKE, Herbert, Munich, Germany
page 14
13. GARRISON, David, Buffalo, N.Y.
page 11
14. GREENLEE, W. E., COMPUTRA, Upland, Ind.
page 24
15. GROENER, John, M.I.T., Cambridge, Mass.
page 24
16. HALGAND, Jean-Claude, Paris, France
page 14
17. HASHIMOTO, Sozo, Tokyo, Japan
page 21
18. HERTLEIN, Grace C., Chico, Calif.
page 17
19. HOLZHAUSER, Karl, Bielefeld, Germany
page 12
20. HUITRIC, Herve, Paris, France
pages 11, 15
21. HUSTON, Tom, COMPUTRA, Upland, Ind.
page 23
22. JOHANNESSON, Sture, Malmo, Sweden
pages 10, 15
23. KALLIN, Sten, Malmo, Sweden
pages 10, 15
24. KAWANO, Hiroshi, Tokyo, Japan
page 13
25. LAM, Kelly, Annandale, Va. *
page 25
26. LEAVITT, Ruth, Minneapolis, Minn.
page 13
27. MARQUETTE, Claude, Paris, France
page 11
28. MIKULIC, Tomislav, Zagreb, Yugoslavia
page 15
29. MOHR, Manfred, Paris, France
page 19
30. MOLNAR, Vera, Paris, France
pages 9, 20
31. NAHAS, Monique, Paris, France
pages 11, 15
32. OWENS, Katy, Muncie, Ind. *
page 22
33. PALYKA, Duane, Salt Lake City, Utah
page 18
34. PORTER, Patrick, Blacksburg, Va. *
page 26
35. SCHWARTZ, Lillian, Bell Labs, Murray Hill, N.J.
pages 1, 17
36. SEVILLA, Soledad, Madrid, Spain
page 16
37. STEPHENS, Michael, Kansas City, Mo.
page 13
38. TRUEX, Jere, COMPUTRA, Upland, Ind. *
page 25
39. ZAJEC, Edward, Trieste, Italy
page 17
40. ZEIGLER, Stephen, Kansas City, Mo.
page 14
41. ZILJAK, Vilko, Zagreb, Yugoslavia
page 19

[* = student]

Forum — Continued from page 7

IMPROVEMENT OF THE OPERATIONS OF THE ASSOCIATION FOR COMPUTING MACHINERY AND SOME OTHER TOPICS — II

Gerard Salton
Dept. of Computer Science
Cornell University
Ithaca, N.Y. 14853

(Based on a report as Regional Representative to
ACM Members in the Northeast Region, June 1975.)

Anaheim Meeting

The ACM Council met for some fourteen hours in Anaheim, California between May 20 and 23 on the occasion of the National Computer Conference. I sometimes wish that our Council meetings were not tied to the major conferences — after all, we don't need an auditorium that seats 5,000 to accommodate the 25

Council members. However, some people enjoy going to conferences and others are delighted to spend some time near Disneyland. Personally, I can do without the tacky atmosphere that pervades much of Orange County, and I have never thought that the fake decorations in plasterboard or the piped-in music at the Disneyland Hotel were stimulating or capable of relieving the monotony of the surroundings.

\$950,000 Surplus

The ACM news emanating from Anaheim were, I am glad to say, mostly good. The Association seems to be exceptionally well managed at the moment; a great many hard-working people appear to be getting things done; and, most importantly, the finances are in good order. As of March 31 of this year the accumulated surplus exceeded \$950,000, and whereas the actual expenses for the current fiscal year were just about equal to budget, the income exceeded the originally

(please turn to page 34)

THE WORLD OF TRANSLATION

Mr. Serge Raffet, President
Traductor
2 rue René-Bazin
Paris 16, France; and
Translation Company of America, Inc.
500 Fifth Avenue
New York, N.Y. 10036

"Language does in part govern the nature and form of thought, and is closely bound up with the culture of a national or social group."

The World of Translation

"Peter is looking at Paul with his glasses." Although this sentence appears to be clear, it may have been badly translated — or lead to a wrong translation — since there is no way of telling whether it is Peter or Paul who is wearing glasses or whether either of them wears glasses at all. In this particular case, the ambiguity is perhaps unimportant. However, should it be a question of business with a foreign client, it is vital to be able to understand correspondence perfectly in order to avoid potentially tragic consequences. Translation is a difficult art and a vital part of the modern economy — a tool which is becoming increasingly necessary.

Yet some Americans seem to be unaware that people speak other languages beyond our borders. Not only do they often write to foreign clients in English without knowing whether or not they will be understood, they even write to foreign governments as well. For example, take the case of the machine tools manufacturer in Cleveland who recently wrote in English to the Director of the General Services Administration of France asking to be included on the list of companies which the French Government consults for supplies in his line. The poor French official who showed me the letter the other day in Paris was quite bewildered, for despite his fondness for the United States he doesn't speak a word of English. Fortunately, this attitude is not found everywhere. But it is a serious problem which may result in business being lost to a competitor who has had the foresight to write to a potential client in his own language. All of this again reinforces the vital role which translation has to play in the development of the modern world, rivalling finance and transportation in its importance and impact. Translation is, however, infinitely more discreet.

Two factors seem to enhance this importance. First of all, technology is becoming completely international. Although the English and Americans together once held the lead in world technology, at present half of the technical articles on many diverse subjects are published in ten or fifteen foreign languages. The Soviet Union alone publishes nearly 2,500 journals, reviews, and other publications devoted to chemistry — and numerous other examples could be cited.

Reprinted with permission from *The World of Translation*, published by Translation Company of America, Inc., 500 Fifth Ave., New York, N.Y.

A second factor is the astonishing development of the activities of international companies. Efficiency requires that the company maintain consistent methods and procedures in all its offices which, although being operated in a host of different languages, remain under the central control of the home office. And translation assumes a different kind of importance when political factors come into play. We all remember the violent disorders which caused bloodshed in Belgium several years ago and which were linguistic in origin (Belgium has two official languages: French and Flemish).

The problems of bilingualism have assumed national proportions in Canada. Under a recent law, all legal texts or official documents must be published simultaneously in the two official languages of the country: English and French. Whereas in the past it was possible to publish a text in the original language (usually English) and have the translation in the second official language published later (involving a delay of three to five months on an average), now an official text must remain secret and pending and cannot be published until the perfect translation is achieved.

And yet the Canadian Government alone employs more than 750 full-time translators as well as 200 free-lance. This service, the Translation Bureau of the Secretary of State, spent nearly \$15 million in 1972 to translate 135 million words mostly from English into French. Despite this effort, however, Canadians complain that all too often translators lack the necessary skill to preserve "subtle shades of meaning" in their translations. And while the development of exchange programs and travel will undoubtedly increase the volume of translation required, there is no guarantee that a corresponding increase in the number of good translators will result. Indeed, a text that is badly translated may often be even more harmful than one that is not translated at all, for the former is likely to be very misleading and misrepresentative.

A Delicate Art

Although translation employs many thousands of people who almost all remain completely anonymous, and although it involves expenditures running into the millions, translation remains an art. It is an infinitely delicate and thankless business. Thankless because a good translation must reflect the author's personality, not the translator's.

And sometimes the latter finds it difficult to efface himself completely and assume the personality of the former. Translation is a particularly delicate matter in the sense that the ideal, the perfect translation, does not exist. For language does in part govern the nature and form of thought and is closely bound up with the culture of a national or social group. To go from one language into another is to go from one mode of thought into another, and that is a much more profound problem than merely looking up equivalent words in the dictionary.

But do only "good" translations exist in fact? We are not convinced of it. First of all, texts to be translated should be clear and unambiguous — a situation which is rarely the case. The author who knows what he's talking about (in theory) is not always aware that he writes ambiguously. This is so because he is so absorbed in his subject matter that he does not always see other possible interpretations of his text. To give a simple example: "Peter looks at Paul with his glasses." This sentence appears to be quite clear. However, there is nothing to show whether it is Peter or Paul who is wearing glasses. And furthermore, if it is Paul, nothing proves that he does not have his glasses in his hand or his pocket. Even texts for translation which are not so ambiguous as this example usually reveal a lack of precision when analyzed carefully. Sometimes an author's turgid style is aimed at concealing his ignorance of detail or the fact that he has little to say.

In contrast, patents are in a class of their own. In this area, the more vague the text, the better, in order to prevent someone from reconstructing an invention merely from the patent. Yet, at the same time, as large an area as possible must be described so that later patents are threatened.

Frequently, however, a translated text has to be freely adapted in order to be meaningful. For example, an English bulletin for commercial salesmen recently compared a new sales technique to a baseball game. A literal translation into French using a baseball game as an example would obviously have had little meaning for Frenchmen. Thus, some other comparison — soccer or tennis — had to be chosen.

As a consequence, we reach a paradoxical situation which may be summed up as follows: Translation, considered to be a craft of the highest order, is indispensable to the economy while at the same time misunderstood and unappreciated by technicians in general. Translation is indispensable to virtually all technical or commercial exchanges between countries speaking different languages since the percentage of Americans who read even French, German, or Spanish is very small and the percentage of foreigners who read English is no greater. Moreover, the employees of a firm have commitments other than translating documents.

Translation is misunderstood in that people mistakenly believe that since translation is not an original creation it is a strictly mechanical activity, requiring little more time than typing. If produced in this spirit, translations are slapdash, not re-read, lack style, and even contain spelling mistakes and mistranslations. Remember that it is on the basis of translations that foreigners will judge the quality and worth of your products and services.

Translation is unappreciated in that industrialists, although prepared to spend lavishly on equipment and advertising, wrongly practice the strictest

economy when it comes to translating their publications and catalogues, sometimes entrusting the job to a secretary or student who generally has neither the linguistic nor the technical knowledge required.

Translating is one of the most complex and subtle of skills, which ideally should combine the following qualities:

A translation must be absolutely faithful to the original text. The latter must, therefore, be clear and explicit and well understood by the translator. Thus, the translator must have an excellent knowledge both of the original language and of the technical field concerned.

A translation must be clearly written in a style which is pleasant to read. The translator must write only in his mother tongue and must know how to write well.

Experience has shown that these two qualities, good technical knowledge and good style, are rarely found in the same person. A series of operations must then follow — checking, revising, preparing the final copy and typing — all of which is time-consuming and costly.

Some industrial or commercial companies and government agencies have established permanent translation services in order to train their translators to specialize in their own field. On the whole, some results have been good, particularly with respect to the systematic use of a special vocabulary. But there are serious disadvantages — namely, prohibitive cost, delays, and inaccuracies. The latter occur when the specialist-translator is called upon to handle a text on a subject outside normal company matters.

But sometimes the problems are even more complex. For instance, when it comes to translating long lists, whether arranged alphabetically or not, the translation requires a great many translators specialized in different fields who will each translate those descriptions used in their particular sphere.

In order to do this kind of job within a reasonable period of time and without making mistakes, modern methods of handling information are required: transcription of the original descriptions and their translations on punch cards or tapes, processing by computer, alphabetical arrangement in a particular language, and rapid and easily-handled revisions.

In certain cases, internal translation services are amazingly large (like the service of the Federal Government of Canada). However private companies do not usually have a sufficient volume of work on a regular basis to require the full-time services of a team of specialized translators. So they must call upon specialized services for help: the translation companies. And except for a tiny minority, these "services" are in fact an individual translator or couple, very often translating at home into only one or two languages and whose range of specialization is very narrow. Most translators whose "companies" offer a much wider range of language and technical fields subcontract to others the jobs they are unable to handle themselves.

Translating Everything

Ideally, a translation company should provide the same kind of service as industry: that is,

product quality, respect for deadlines and consistent prices. To meet these standards, a translation company must have at its disposal several hundred specialized translators and a sufficiently large clientele to keep such a staff reasonably busy. In short, the ideal translation company must offer its clients a complete line of services: translation of any document into any language, the organization of conventions and conferences with interpreters, the dubbing of films, tape recording, typesetting and printing, summarizing technical articles, providing guides for visitors, and in general, any activity involving a foreign language.

There are very few such companies. Even here in America where there are many large companies, translation is dispersed among thousands of tiny offices most of which work more or less on an individual basis. This explains the success of Translation Company of America, Inc. which is perhaps the only independent specialized translation company offering such a complete line of services and having its own offices abroad.

Translation Services

At the top of the scale there are two distinct categories of translation services:

Offices specializing in one or several specific languages and a particular technical field: these are built around one man who does the translations himself or who personally supervises them.

Offices offering a more complete line of services: translation, interpretation, and related services in more languages and more technical fields.

In order to guarantee the processing of all orders, such offices must have a considerable number of assistants at their disposal: at least one in each particular field and two in each language (because a translator should translate only into his native language). Translation Company of America, Inc. has about one thousand associates in New York, as many in Paris, and more in Montreal and other cities.

Indeed, a document should be translated by a specialist qualified in the field concerned (law, medicine, etc.) and then re-read by a proofreader who checks to see that there are no omissions, errors, or lapses of style. Deadlines set by clients, however, often preclude this ideal method. Some years ago it was even hoped that the difficulties of translation might be solved by computer. This led, especially in the United States, to extensive and extremely costly research programs, prolonged over a period of several years because it was found that the difficulties involved are tremendous. And vocabulary is the least of the difficulties. Although one word in German may have two or even ten completely different meanings in English, all meanings must be stored in a memory bank and readily available to the translator. Although still very costly, automatic dictionaries are coming into use. These dictionaries are superior to conventional dictionaries in that they save time and may be more easily kept up to date.

Grammar presents a much more complicated problem. Although it may appear simple on the surface, the syntax of natural languages is remarkably complex

and the profound nature of linguistic structures is far from fully understood. We can store vocabulary in the computer but we cannot teach it the grammar and nuances of a language.

Some texts may be read by computer, but at best the machine can produce only the most literal translation. In order to be intelligible to the ordinary reader, a text which has been translated by machine has to be revised by highly trained specialists. In short, although the computer may be a useful accessory for jobs such as checking lists, updating, and sorting, direct automatic translation is hardly imminent.

So, for the time-being, translation must remain in the hands of humans. And whether translation remains the "thankless twin" it now is, depends on those who need its services. Perhaps one day a computer will succeed in solving all our translation woes. But until that day, the thankless twin will continue to work ... perhaps to be praised. □

"All the Language of Thought Calculable like Mathematics"

Lawrence M. Clark
835 Edmands Road
Framingham Centre, Mass. 01701

Next to my article in the June issue of "Computers and People", the editor quoted one of my goals: "to make all the language of thought calculable like mathematics".

I have been challenged to explain what this goal means.

Calculable

A remarkable and interesting property of mathematics is that a mathematical statement can be calculated to have exactly the same meaning as another mathematical statement, and that the truth of a statement can be calculated from the truth of other statements.

This is also true a fair amount of the time in ordinary language. If John Jones is a student of Samuel Smith, then Samuel Smith is a teacher of John Jones. If all had a good time at the picnic, then a good time was had by all at the picnic. And very often even in ordinary language we calculate answers to problems by means of manipulating words and ideas:

I find I have lost my penknife. I can look in the pocket of the pants I wore yesterday. I can look on the floor of the closet where I hang my pants upside down. I can look on the workshop bench where I worked yesterday. And so on. So I go look in each of these plausible places, and in one of them, with joy, I recover my penknife. Here is an example of calculation without using any mathematical language.

Language of Thought

What do I mean by "the language of thought"? This is the language in which people discuss

(please turn to page 32)

DAILY SURVEILLANCE SHEET, 1987, FROM A NATIONWIDE DATA BANK

Dennie Van Tassel
Head Programmer
San Jose State College
125 S. 7th St.
San Jose, Calif. 95114

(Because of its impact and its timeliness, this is reprinted from the October 1969 issue of "Computers and Automation".)

The "Daily Surveillance Sheet" below is offered as some food for thought to anyone concerned with the establishment of the proposed "National Data Bank". Hopefully, it will help illustrate that *everyone* should be concerned.

NATIONAL DATA BANK
DAILY SURVEILLANCE SHEET
CONFIDENTIAL
JULY 11, 1987

SUBJECT. DENNIE VAN TASSEL
SAN JOSE STATE COLLEGE
MALE
AGE 38
MARRIED
PROGRAMMER

PURCHASES.

WALL STREET JOURNAL	.10
BREAKFAST	1.65
GASOLINE	3.00
PHONE (328-1826)	.10
PHONE (308-7928)	.10
PHONE (421-1931)	.10
BANK (CASH WITHDRAWL)	(120.00)
LUNCH	2.00
COCKTAIL	1.00
LINGERIE	21.85
PHONE (369-2436)	.35
BOURBON	8.27
NEWSPAPER	8.10

** COMPUTER ANALYSIS **

OWNS STOCK (90 PER CENT PROBABILITY)

HEAVY STARCH BREAKFAST. PROBABLY OVERWEIGHT.

BOUGHT 3.00 DOLLARS GASOLINE. OWNS VW. SO FAR THIS WEEK HE HAS BOUGHT 12.00 DOLLARS WORTH OF GAS. OBVIOUSLY DOING SOMETHING ELSE BESIDES JUST DRIVING THE 9 MILES TO WORK.

BOUGHT GASOLINE AT 7.57. SAFE TO ASSUME HE WAS LATE TO WORK.

PHONE NO. 328-1826 BELONGS TO SHADY LANE - SHADY WAS ARRESTED FOR BOOKMAKING IN 1972.

PHONE NO. 308-7928. EXPENSIVE MEN'S BARBER - SPECIALIZES IN BALD MEN OR HAIR STYLING.

PHONE NO. 421-1931. RESERVATIONS FOR LAS VEGAS (WITHOUT WIFE). THIRD TRIP THIS YEAR TO LAS VEGAS (WITHOUT WIFE). WILL SCAN FILE TO SEE IF ANYONE ELSE HAS GONE TO LAS VEGAS AT THE SAME TIME AND COMPARE TO HIS PHONE CALL NUMBERS.

WITHDREW 120.00 DOLLARS CASH. VERY UNUSUAL SINCE ALL LEGAL PURCHASES CAN BE MADE USING THE NATIONAL SOCIAL SECURITY CREDIT CARD. CASH USUALLY ONLY USED FOR ILLEGAL PURCHASES. IT WAS PREVIOUSLY RECOMMENDED THAT ALL CASH BE OUTLAWED AS SOON AS IT BECOMES POLITICALLY POSSIBLE.

DRINKS DURING HIS LUNCH.

BOUGHT VERY EXPENSIVE LINGERIE. NOT HIS WIFE,S SIZE.

PHONE NO. 369-2436. MISS SWEET LOCKS.

PURCHASED EXPENSIVE BOTTLE OF BOURBON. HE HAS PURCHASED 5 BOTTLES OF BOURBON IN THE LAST 30 DAYS. EITHER HEAVY DRINKER OR MUCH ENTERTAINING.

*** OVERALL ANALYSIS ***

LEFT WORK AT 4.00, SINCE HE PURCHASED THE BOURBON 1 MILE FROM HIS JOB AT 4.10. (OPPOSITE DIRECTION FROM HIS HOUSE.)

BOUGHT NEWSPAPER AT 6.30 NEAR HIS HOUSE. UNACCOUNTABLE 2 1/2 HOURS. MADE 3 PURCHASES TODAY FROM YOUNG BLONDES. (STATISTICAL 1 CHANCE IN 78.) THEREFORE PROBABLY HAS WEAKNESS FOR YOUNG BLONDES. □

Clark - Continued from page 30

seriously, using the intellectual content of words. What is this phrase opposed to? "The language of emotion", "the language of poetry", and so on.

Macbeth in Shakespeare's play says:

Tomorrow and tomorrow and tomorrow
Creeps in this petty pace from day to day
To the last syllable of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. Out, out, brief candle!

This is some of the most enchanting poetry in English. It uses allegory and simile and metaphor. But all of it has to be translated before it becomes the language of thought.

My goal does not include making the language of poetry calculable like mathematics — and I might even add "Heaven forbid!"

But it seems to me that to make the language of thought calculable like mathematics would be a great advantage. For then one could really calculate the meaning of what some piece of writing said. And compare it objectively with the meaning of another piece of writing, showing how and in what ways the two pieces of writing had different meanings if any.

Feasibility

Now it is fine to want to do something like this. But is it feasible? Is it sensible? Have we reached a state of art and of skill so that we can rationally plan to do this?

The unaided powers of the human mind are probably insufficient. At least, these powers are certainly insufficient in the case of very large numbers of human beings. In the ears of your mind you can hear people saying "That is over my head." — "It is Greek to me." — "I wish I could understand what that is all about."

Most people do not have bear-trap logical and mathematical minds, and do not have an adequate grasp of the English language with its vocabulary of over 500,000 words. It is difficult to be almost certain

of the meaning of several pages of successive statements in any field outside of one's own specialties.

But with computers and computer programs, this goal becomes feasible: it becomes sensible to plan on attaining this goal. A computer adds a large and unforgetting memory to the resources of the human mind. A computer enables doing a million simple reasoning operations in the time needed for a human being to do one simple reasoning operation. Furthermore, more than 95% of the words in running text consist of a very small vocabulary of "cement-words" like "the, and, of, is, it, to". Finally, the need to stick to one subject, one context, leads to a small vocabulary of special terms. Thus, we produce a set of limited problems instead of a single vast, unmanageable, unlimited problem.

This separation between cement-words and special terms shows clearly, for example, in the first three sentences of a scientific report published in the magazine "Science":

"Resistant sporangia formed by sporophytic thalli grown on slants of yeast-starch agar become capable of germination three to six weeks after formation. At this time each sporangium contains about a dozen expanded diploid nuclei in an advanced prophase stage. These sporangia are fully mature and, if air-dried, they will remain viable and their nuclei will remain in prophase without further detectable change for periods up to at least ten years."

And so, it seems to me, the goal, "to make all the language of thought calculable like mathematics", has been clearly defined. In addition, it seems to me that it is reasonable to expect that it is feasible with computer powers, logical analysis, and resourceful imagination. □

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An "Almost-True" Theorem Involving Tetrahedral Numbers

By Herbert E. Salzer and Jeffrey Mogul

Editorial Note: When a non-trivial statement in mathematics is true for over 2500 consecutive cases 1 to 2500 with just exactly one exception at case 618, the statement becomes quite interesting, an "almost-true" theorem. This is the case in the situation described below.

To orient a nonmathematician, we give some examples: The first six tetrahedral numbers are 1, 4, 10, 20, 35, 56. The first seven numbers ending in 6 are 6, 16, 26, 36, 46, 56, 66. Each of these may be expressed as the sum of not more than four tetrahedral numbers as follows:

Case	Expression
1	$6 = 4 + 1 + 1$
2	$16 = 10 + 4 + 1 + 1$
3	$26 = 20 + 4 + 1 + 1$
4	$36 = 35 + 1$
5	$46 = 35 + 10 + 1$
6	$56 = 56$
7	$66 = 56 + 10$

1. From: Herbert E. Salzer
National Bureau of Standards
Computation Laboratory
150 Nassau St.
New York, N.Y.

(Statement received October 14, 1948)

The statement that integers of the form $10n + 6$, n greater than or equal to 0, are the sum of four non-negative tetrahedral numbers, i.e., $m(m+1)(m+2)/6$, m greater than or equal to 0, holds for $n = 0, 1, 2, \dots$ up to $n = 617$, fails for $n = 618$, and has been verified for $n = 619$ up to 2000. Thus this property of the number 6186, of being the sole exception to that statement among all numbers ending in 6 which are less than or equal to 20006, affords an example of an empirical theorem which holds as far as the first 618 cases, before failing in the 619th. (This may encourage those seeking to disprove Fermat's last theorem, since in the latest results to date mentioned by H. S. Vandiver, "Amer. Math. Monthly", Dec. 1946, p. 575, it has been verified for exponents $3 + n$, $n = 0, 1, 2, \dots$ up to 615, which are the first 616 cases.) This investigation of numbers $10n + 6$ was performed by suitable grouping into pairs of addends, each addend being the sum of two tetrahedrals, and by employing special stencil-like devices for the addition of a number to hundreds of other numbers simultaneously. Every case was checked in two or more ways, involving the use of independently-designed stencils.

2. From: Jeffrey Mogul
218 Franklin St.
Newton, Mass. 02158

The computer, because of its great speed and accuracy, is a useful tool for analysis of theorems, which, for some reason, cannot yet be proved either true or false. Although it is possible for a computer to be programmed to produce an original proof of a mathematical theorem, that is very difficult.

On the other hand, if one suspects that a theorem is false, and thus suspects the existence of a counter-example to the theorem, then a computer can be called into service to find the counter-example.

Such is the case with an almost-true theorem first brought to my attention by a copy of a statement by Herbert E. Salzer, made in 1948. The theorem was that every number from 6 to 20006 of the form $10n + 6$, n being an integer greater than or equal to zero, could be expressed as the sum of no more than four tetrahedral numbers, except for $n = 618$. A tetrahedral number is a number of the form $m(m+1)(m+2)/6$, m being an integer greater than or equal to zero.

By use of a computer, the theorem has been shown to hold true for all n 's between 2001 and 2736, and in addition Salzer's results have been verified. The number 6186 cannot be expressed as the sum of less than five tetrahedral numbers.

It is quite easy to have the computer generate a table of tetrahedral numbers and then try to combine them to solve the expression. Although this could be tedious if done by hand, there are only a finite number of combinations, and the computer, by virtue of its speed, can quickly evaluate them all. This could still lead to more than 1.3 million combinations before deciding that none will work, as in the case of 6186. But if one of the tetrahedral numbers is taken to be always greater than or equal to one-fourth of the target number ending in 6, then the number of combinations can be reduced on the average by better than 70%.

I attacked the problem with the help of two different computers. I first programmed a Digital Equipment Corporation PDP-11/40, in BASIC-PLUS, and with a very short program managed to solve several hundred cases in a few hours. Unfortunately the PDP-11, in spite of its great speed, was used in a multi-user time-sharing environment, and therefore was relatively slow.

I then used a DEC PDP-9 computer. This machine, although somewhat slower than the PDP-11 in absolute terms, was much faster at solving the problem at hand, because I could program it in machine language, and because I was the only user. Machine language, although less convenient than a high-level language like BASIC, is far more efficient. The program occupied only about 270 locations, and found solutions very rapidly. Only a few hours were needed to examine all of the cases from 6 up to 27376. I plan to pursue the problem for greater n at a later date.

If any reader pursues this problem further, and finds either another counter-example, or a large range of cases for which there is no counter-example, or some explanation for the behavior of this theorem, I would be pleased to hear. Perhaps it can be shown that the theorem holds true for all cases other than 6186. If so, it would be interesting to determine if either of the numbers 618 or 6186 have any unusual properties. \square

budgeted income figure by about \$280,000. The feeling among the experts is that net income will be about \$400,000 at the end of the current fiscal year, compared to a budgeted surplus of \$100,000, assuming that existing trends are maintained. The projections for the next fiscal year (1977) are equally favorable.

No one is certain why the Association is doing so well; more likely than not, a number of different factors are at work: greater income for many of the Special Interest Groups, some growth in membership, an increase in the number of periodical subscriptions. Be that as it may, the budget which the Council approved for fiscal year 1977 is substantially less tight than the current budget.

Plans for a Nontechnical Computer Journal

As a result of the improved financial position, various plans for expansion and improvements in service are now being actively pursued. The President feels that the most important task is the creation of a revised ACM publication to include technical but not research-oriented materials, which is to be received by all members. Accordingly, a committee of the Publications Board is making detailed plans in this connection. I admit that I can't bring myself to evince much enthusiasm at the creation of yet another relatively nontechnical computer journal. At the same time, I don't see why such a journal should not be instituted assuming that the members consider this useful.

Unfortunately, the planning for this new common publication is not matched by equivalent activities relating to the scholarly publications of the Association. I have discussed this question at length in my letter last February and will therefore not repeat the arguments. Under current conditions, we are considering the various publication plans individually, unrelated to each other. The result is likely to be a real mess. With respect to the proposed new "Transactions on Data Bases", an overwhelming majority of Council was convinced that prior to the start of actual operations the scope and coverage of the proposed journal should be broadened to include additional topics in the general area of information science. This does not guarantee, of course, that the journal will properly fit into an overall scheme encompassing the whole computer field. The wider editorial representation which ensues from the Council action may, however, serve to render the new journal more interesting to a greater variety of readers.

A good deal of time was spent in Anaheim discussing the plans submitted by the ACM committee on ACM government reorganization. These plans included two main parts: an enlargement of the Executive Committee by including the Treasurer and creating a second vice presidential position; and a reduction in the number of regional representatives to a new total of only six, the reduced regional representation to be offset by including as a Council member the chairman of the Chapters Board. The net effect of these alterations would be a reduction in the size of the Council from 25 to 21.

Honoraria

A number of other actions were taken by the Council relating to honoraria for lecturers and persons engaged on ACM business; policies regarding international conferences held in cooperation with or

sponsored by the ACM; and ACM positions on the licensing of data processing professionals. With respect to honoraria, the Council prefers a policy of zero compensation, although modest honoraria not to exceed \$100 per day are approved where necessary.

Freedom to Attend International Conferences

The Council also decided to subscribe to the program of other scientific organizations in seeing to it that ACM-sponsored international conferences be open to all interested scientists and be conducted free from political restraints.

Professionalism vs. Educational, Scientific, and Technical Matters

Concerning finally the various issues and activities that come under the heading of professionalism, the Council reaffirmed its desire to see the ACM retain its posture as an organization primarily concerned with educational, scientific, and technical matters. A study was, however, directed to look into the several issues of professionalism that currently preoccupy many people in the computer field. I shall have occasion to refer to these problems again in a future report.

Proliferation of Committees and Groups

In the past, I have had occasion to voice misgivings about the proliferation of the many boards, committees, and ad-hoc groups which collectively determine the operations of the Association. I was reminded of this question when I read the recent letter by John McCarthy published in the May issue of ACM Communications. In that letter McCarthy ridicules "the growing sense of self-importance of those members of the computer community with a taste for committee meetings". Where, I ask myself, does this leave those people who don't enjoy wasting their time in committee, but nevertheless participate modestly in the various professional functions?

And then I remembered that it was a committee that awarded the Turing prize to Professor McCarthy some years ago — a prize which the recipient incidentally was glad to accept — and that committees and peer review regulate advancement and progress in many academic and professional endeavors.

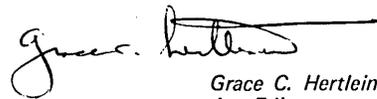
Fools and Mercurial Characters

Committee life is often maddening in its ponderousness, but fools are quickly found out, and mercurial characters who refuse to do their homework and try to bamboozle the audience do not generally go far.

The ACM may, like many other organizations, go overboard on its reliance on busy work of various kinds. The alternative, where some individual would impose his sense of values single-handedly on everyone else would, it seems to me, be much more objectionable. □

Editorial by the Art Editor — Continued from page 6

computers can bring to man, to make life better for more people. In the last analysis, everything depends on what opportunities we seize, both individually and collectively.


Grace C. Hertlein
Art Editor

GAMES AND PUZZLES for Nimble Minds – and Computers

Neil Macdonald
Assistant Editor

It is fun to use one's mind, and it is fun to use the artificial mind of a computer. We publish here a variety of puzzles and problems, related in one way or another to computer game playing and computer puzzle solving, or

to the programming of a computer to understand and use free and unconstrained natural language.

We hope these puzzles will entertain and challenge the readers of *Computers and People*.

NAYMANDIJ

In this kind of puzzle an array of random or pseudorandom digits ("produced by Nature") has been subjected to a "definite systematic operation" ("chosen by Nature") and the problem ("which Man is faced with") is to figure out what was Nature's operation.

A "definite systematic operation" meets the following requirements: the operation must be performed on all the digits of a definite class which can be designated; the result displays some kind of evident, systematic, rational order and completely removes some kind of randomness; the operation must be expressible in not more than four English words. (But Man can use more words to express it and still win.)

NAYMANDIJ 758

2 6 3 8 2 4 1 0 0 4 2 7 1 3 8 6 7 0 3 6
5 8 7 0 1 0 9 7 8 2 2 0 2 5 2 8 4 8 9 3
4 2 2 8 3 0 0 5 7 0 1 8 1 3 5 9 9 8 0 9
1 9 0 2 0 5 6 5 9 4 0 6 3 1 4 3 0 3 8 1
6 0 2 1 0 7 9 0 3 7 7 8 8 7 8 0 4 4 1 6
6 9 2 5 7 2 2 5 7 0 4 4 1 0 1 3 8 4 5 5
6 2 1 6 0 6 2 0 7 9 1 9 1 4 0 3 9 3 6 9
3 1 1 9 6 6 2 3 8 2 8 3 1 1 6 2 5 7 0 2
3 8 3 4 5 1 4 9 0 3 5 8 7 2 6 1 9 6 0 7
9 8 9 4 4 6 6 2 2 3 8 6 0 1 4 8 5 7 0 2

MAXIMDIJ

In this kind of puzzle, a maxim (common saying, proverb, some good advice, etc.) using 14 or fewer different letters is enciphered (using a simple substitution cipher) into the 10 decimal digits or equivalent signs for them. To compress any extra letters into the 10 digits, the encipherer may use puns, minor misspellings, equivalents like CS or KS for X or vice versa, etc. But the spaces between words are kept.

MAXIMDIJ 758



NUMBLES

A "numble" is an arithmetical problem in which: digits have been replaced by capital letters; and there are two messages, one which can be read right away and a second one in the digit cipher. The problem is to solve for the digits. Each capital letter in the arithmetical problem stands for just one digit 0 to 9. A digit may be represented by more than one letter. The second message, which is expressed in numerical digits, is to be translated (using the same key) into letters so that it may be read; but the spelling uses puns, or deliberate (but evident) misspellings, or is otherwise irregular, to discourage cryptanalytic methods of deciphering.

NUMBLE 758

I G N O R A N C E	of the
x	
L A W	
G X K I F U S L X R	
L N I O S O A X S	KIXU =
K R U N G N O X C N	GRSW
= G A L C N L E L L U N I,	
- K A A W O C E E O E L A	
= I S N O E X C U S E	

and 63510 14086 91907 529459 does not shield us from harm

We invite our readers to send us solutions. Usually the (or "a") solution is published in the next issue.

SOLUTIONS

NAYMANDIJ 757: Make diagonal of 4's.

MAXIMDIJ 757: He who gives is king.

NUMBLE 757: Wisdom sails with wind and tide.

Our thanks to the following individuals for sending us their solutions to – **MAXIMDIJ 757** and **NUMBLE 757**: Jean Robbins, Pasadena, Calif. – **NUMBLE 757**: Leigh Brasington, San Francisco, Calif.; T. P. Finn, Indianapolis, Ind.; Manuel Juan, Oakland, Calif.

