computers and people

including *Computer Graphics and Art*

Nov.—Dec., 1981

Vol. 30, Nos. 11-12

formerly *Computers and Automation*

AUTOMATED COMPUTERIZED WAREHOUSE

Computing and Data Processing Newsletter

WAVES OF TECHNOLOGICAL CHANGE IN COLLEGES AND UNIVERSITIES

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Higher education in the 1980's will be rocked by waves of change. These will be the results of:

- computing
- high speed local digital communication
- satellite communication
- video discs
- graphics
- two way cable systems
- artificial intelligence applications

Most college and university institutions are unprepared for these changes.

EDUCOM is an association of colleges and universities formed to make better use of technology in higher education. The United States is becoming an information-based economy. More students in each year are asking for courses in fields of information processing. The spread of microcomputers is hastening decentralization of computing resources on campuses.

Colleges are suffering from:

- personnel crises
- facilities crises
- inadequate salaries for faculty
- difficulties in recruiting faculty
- difficulties in retaining faculty
- inadequate planning.

Our job is to help.

COMPUTER SYSTEM CONTROLLING GEOTHERMAL WELLS

Carol Smith
TANO Corp.
4301 Poche Court West
New Orleans, LA 70129

A minicomputer system has been developed for controlling and monitoring geothermal wells in California. It is located at the Geysers geothermal field north of San Francisco, and will allow the Union Oil Co. to better control its steam wells.

Holes drilled into the ground here tap naturally heated steam below the surface. The steam is then sold to Pacific Gas and Electric. When the power company curtailed the use of geothermal steam, Union had previously sent employees into the field to manually curtail the pressurized steam wells.

The computer system provides better control of the wells, reduces pollution, saves human labor, and collects and stores data. Fuller automation is in prospect. The computer system was designed, developed, and installed by TANO Corp. under a $495,000 contract with Union Oil.

RUNNING THE WORLD'S LARGEST CENTER FOR THE DISTRIBUTION OF GARMENTS

Jim Hart
Levi Strauss
Waco, TX 76706
(817) 666-5384

The largest and most highly automated center for garment distribution is here, and must be operated by computers. It is a new facility, covering one million square feet, has five miles of conveyor lines, and room for enough garments hung on hangers next to each other to stretch 270 miles.

The center contains a big computer which collects data and manages movement of all incoming and outgoing garments, and prepares daily product schedules. At the end of each business day, the system automatically provides management information to Waco, Amarillo, and San Francisco. Additional computers control mechanized equipment, motors, scanners and conveyor lines. One computer determines by weight alone whether a particular carton has the correct contents; there is no need to open the box and look in. Tags affixed to cartons are read several times by laser scanners as the cartons travel along conveyor lines. Preventive maintenance is also scheduled by computer.

The center covers 15 acres, has 25 miles of rail for garment hanging, and can hold 43 million items of clothing.

(please turn to page 25)

Announcement

Microfilming

UNIVERSITY MICROFILMS INC.
Division of Xerox Corporation
300 North Zeeb Road
Ann Arbor, Michigan 48106

has concluded a contract with Berkeley Enterprises, Inc., publishers of

COMPUTERS AND PEOPLE (formerly
COMPUTERS AND AUTOMATION)

whereby all our issues up to and including Vol. 18, 1969, will be microfilmed and will be available from them. Our stock of back copies for these years is being sent to recyclement of paper, and the scrap heap.

Such is the tide of change as we approach our 31st volume, 1982.

Announcement

COMPUTER GRAPHICS AND ART Magazine

with this issue is being combined with

COMPUTERS AND PEOPLE Magazine

- Articles that would have been submitted to "Computer Graphics and Art" may be submitted to "Computers and People", attention of Prof. Grace C. Hertlein, Art Editor of "Computers and People."

- Subscriptions to "Computer Graphics and Art" will be continued as subscriptions to "Computers and People".

- We plan that at least 4 articles about computer graphics and art will be published each year in "Computers and People."

- If any questions, please inquire of:
  Berkeley Enterprises Inc.
  815 Washington St.
  Newtonville, Mass. 02160
  (617) 332 5453

Announcement

We publish the following periodical publications:

- COMPUTERS AND PEOPLE (which you are looking at now)

- THE COMPUTER DIRECTORY AND BUYERS' GUIDE (which is late but SHOULD come off press before year-end; in the meantime the prior issue will be supplied)

- THE NOTEBOOK ON COMMON SENSE (100 "Notes" have been issued - free sample on request)

- THE FORK RIVER ANTHOLOGY: POETRY AND SENSE Vol. 1, No. 1, Sept. 1981, has been published; $10 quarterly; but first issue available for $1 until Dec. 25.

---- (may be copied on any piece of paper) ---
To: Berkeley Enterprises Inc.
815 Washington St., Newtonville, MA 02160

Please send me a sample of:
( ) Notebook on Common Sense, free
( ) Fork River Anthol.: $1.00 enclosed
My name and address are attached.

Announcement

The Fork River Anthology: POETRY AND SENSE
- Quarterly - - $10 a year -
Vol. 1, no. 1 (Serial 1) is Sept. 1981
Editors: Edmund C. Berkeley, Charles Durang

- "We try to give expression to many ideas in the complex world of today and tomorrow, yet not lose sight of great poetry and much sense in the world of the past ..."

- We invite good unpublished short poems (by human or computer). A prize of $25 will be awarded each issue. For Serial no. 3 (March '82), closing date for submissions: Jan. 26.

- First issue $1.00 (sample) until Dec. 25.

- SUBSCRIPTION RETURNABLE IN 10 DAYS FOR FULL REFUND IF NOT SATISFACTORY --
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NOTE: The above rates do not include our publication, "The Computer Directory and Buyers' Guide." To receive this, please add $18.00 per year to your subscription rate in the U.S., and $22.00 elsewhere.

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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.

QUIZ FOR READERS OF "COMPUTERS AND PEOPLE"

Which is the most important of the following aphorisms?

1. Be not the first by whom the new is tried,
   Nor yet the last to lay the old aside.
2. Always check your results a second time.
3. Trifles make perfection, but perfection is no trifle.

Front Cover Picture

The front cover shows an automated computerized warehouse at Waco, Texas, recently completed by Levi Strauss for control over stock of women's wear. See the story on page 2.

Key

[A]	–	Article
[C]	–	Monthly Column
[E]	–	Editorial
[EN]	–	Editorial Note
[F]	–	Forum
[FC]	–	Front Cover
[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.

Notice to Our *D Subscribers

The 1979-80 *Computer Directory and Buyers' Guide* is expected to be printed by late 1981. In the meantime, the 1978-79 *Directory*, with information to April 1980, may be consulted. Copies are available.

Editorial

The Static Book and the Dynamic Book

Edmund C. Berkeley, Editor

In a fascinating book "The Microcomputer Millennium" (published by Washington Square Press, a division of Gulf and Western Corp., 1981, 308 pages), Christopher Evans, the author, makes some interesting forecasts about the future of the printed word and books. In fact, Chapter 8 is called the "The Death of the Printed Word". There he expresses in essence the following observations and propositions:

1. The cost of housing written records is becoming so great that in many areas such as hospitals, the cost of operating the records system is greater than the cost of the clerks and managers using the records.

2. As microprocessor technology grows, print and paper technology will appear to be as primitive as the hand copying of manuscripts in the Middle Ages.

3. Existing microprocessor techniques can compress written information by a factor of 10,000, and eventually much more.

4. As semiconductor chip technology continues to evolve, a copy of a book, then a copy of an encyclopedia, then a copy of a big library, will be stored on a chip costing less than 20 cents as compared with a single paperback book costing $2.00.

5. Displays and terminals reading chips will evolve (and you will need only one) so that you can load them with a single chip and read any book.

6. "Smart" encyclopedias and databases will evolve that will do their own research, and will respond actively to your questions, such as "what ..." and "where ..." and "when ..." and "how ..." and "why ..." and "who ..." -- so that the six honest serving men of Kipling will be "alive" inside of a chip.

It is an exciting prospect. But will the book, the printed word, actually die?

It seems to me certainly true that many of the uses of books of a directory nature will be taken over by the chip. Enormous masses of data and statistics - such as hospital records, laws, legal cases, records of chemical reactions, genealogical records, and the like - will be taken over by the chip.

But such books as "Treasure Island" by Robert Louis Stevenson, the King James' Bible, "Hamlet" by Shakespeare, "The Summing Up" by Somerset Maugham, and many more - will not be superseded by the chip, and will not be stored solely in the chip. For example, I like to mark a book in the margin so as to show what I think is particularly to the point. I find it hard to imagine how I would appropriately mark a book I am studying, if it were inside a chip, and my only marks would have to be electronic. And if the power went off, the way my flashlight sometimes behaves, I would be stymied.

Even a superlative degree of research power, of clever answers to anticipated questions, might not change my need for easy direct access to the printed masterpieces of the world: in literature, art, science, education, mathematics, etc. What I would need is reading them and thinking about them.

Writing and symbolizing is an ancient practice of mankind. Cairns of rocks and blazes on trees are still used to mark trails in wild places. Chalk and slate are still used for lecturing, after more than 3000 years of writing instrument development. Crayons and scrap paper are still used to train children to express ideas and creativity.

The evolution of the devices of man in the field of dealing with knowledge and communication rarely if ever completely displaces a species of device that occupies a niche. No, I am convinced that the printed word and the printed book will not die. Ω

Generating Mathematical Patterns in Computer Art – Part 1

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Japan

"Mathematical patterns are manifestations of beauty which is mathematical."

We call the patterns which are mathematical in structure "mathematical patterns". Many examples of such patterns are shown in this article.

Mathematical patterns are manifestations of beauty which is mathematical. This was recognized by mathematicians of ancient Greece. The recent development of electronic computers and various plotting machines makes it quite easy to draw such patterns. So computer artists who use these tools have a great advantage over non-computer artists in generating these patterns.

The method we explain in this article for generating mathematical patterns is general and simple. We have implemented this method in our system ART-3 and tested it for four years.

Assumptions

We assume the artist knows certain algebraic and trigonometric functions, and how to represent them in a coordinate space. Our canvas begins with an orthogonal coordinate system O-xy (O for origin, x and y for the x axis and the y axis). We then bring in a vertical coordinate z, and consider a mathematical function z = f(x,y) in a three-dimensional coordinate space.

The function z is composed of a sum of terms where each term may or may not involve: constants; multiples of angles; the distance from the origin (the square root of the sum of the squares of x and y); sines; cosines; arctangents; etc.

The canvas covers an area LX (length of x) by LY (length of Y), where these are positive integers that count the sides of lattice squares. At each lattice point, we have a set of pattern elemnts, such as:

+ (plus sign)
* (an asterisk)
. (dot)

The ART 3 system is equipped with two brushes which draw a pattern element if and only if z = f(x,y) is positive.

We can generate wavy patterns with periodic functions like sine and cosine. We can modify patterns with movements (translations) that change x or y into another x or y.

We can generate spiral patterns with the functions of arctan of y divided by x; contour patterns with changes of constants; flower patterns with the exponential; and quite complicated patterns using modulus functions.

The particular formulas for the patterns shown in the accompanying figures can be obtained by request to the authors.

Figure 1 shows a three dimensional coordinate system, and the behavior of a function z = f(x,y), made up of terms varying with distance from the center of the "undulating hills" and the angle of rotation around that center.

The remaining figures show further developments and expansions of the principles of mathematical pattern making here outlined.

Reference

/1/ M. K. Sasaki, and T. Sasaki, "Computer Art System ART-3" in "Computer Graphics and Art", August, 1978, pp 4-11.

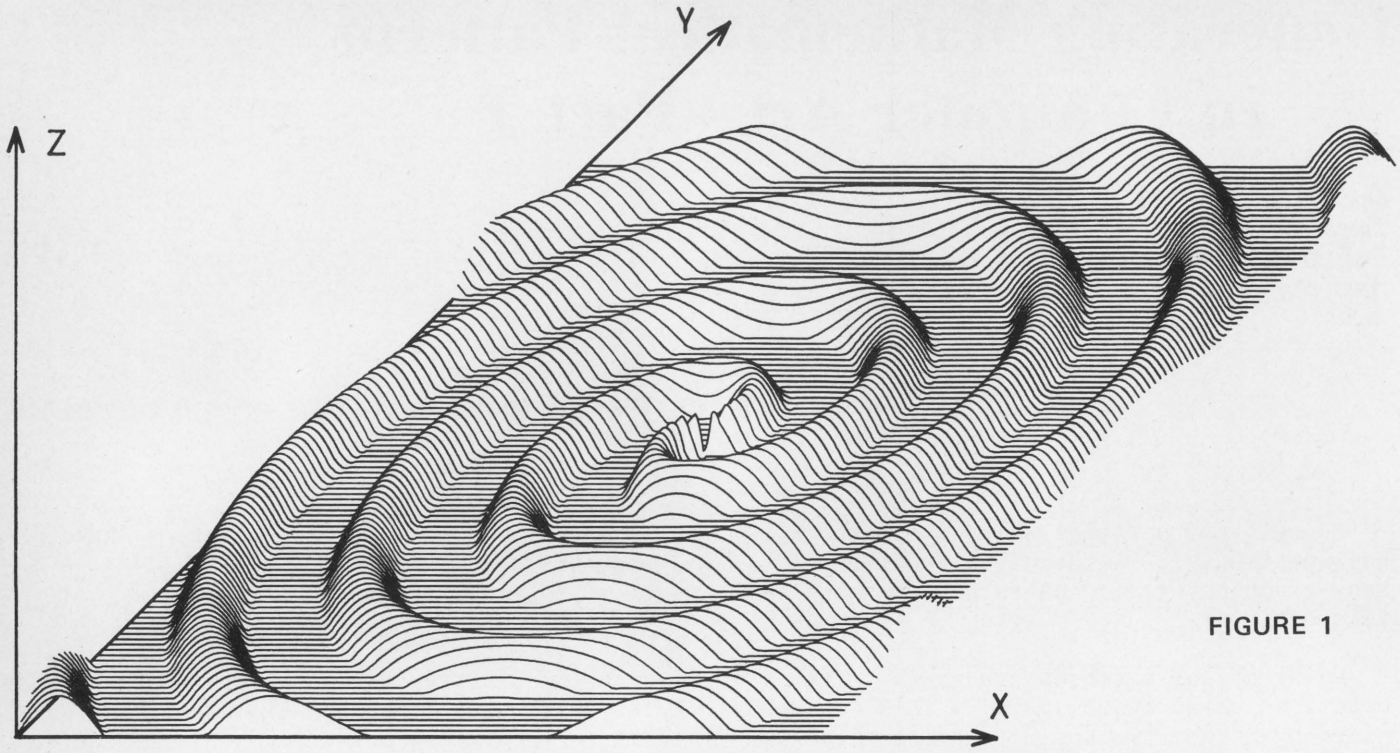
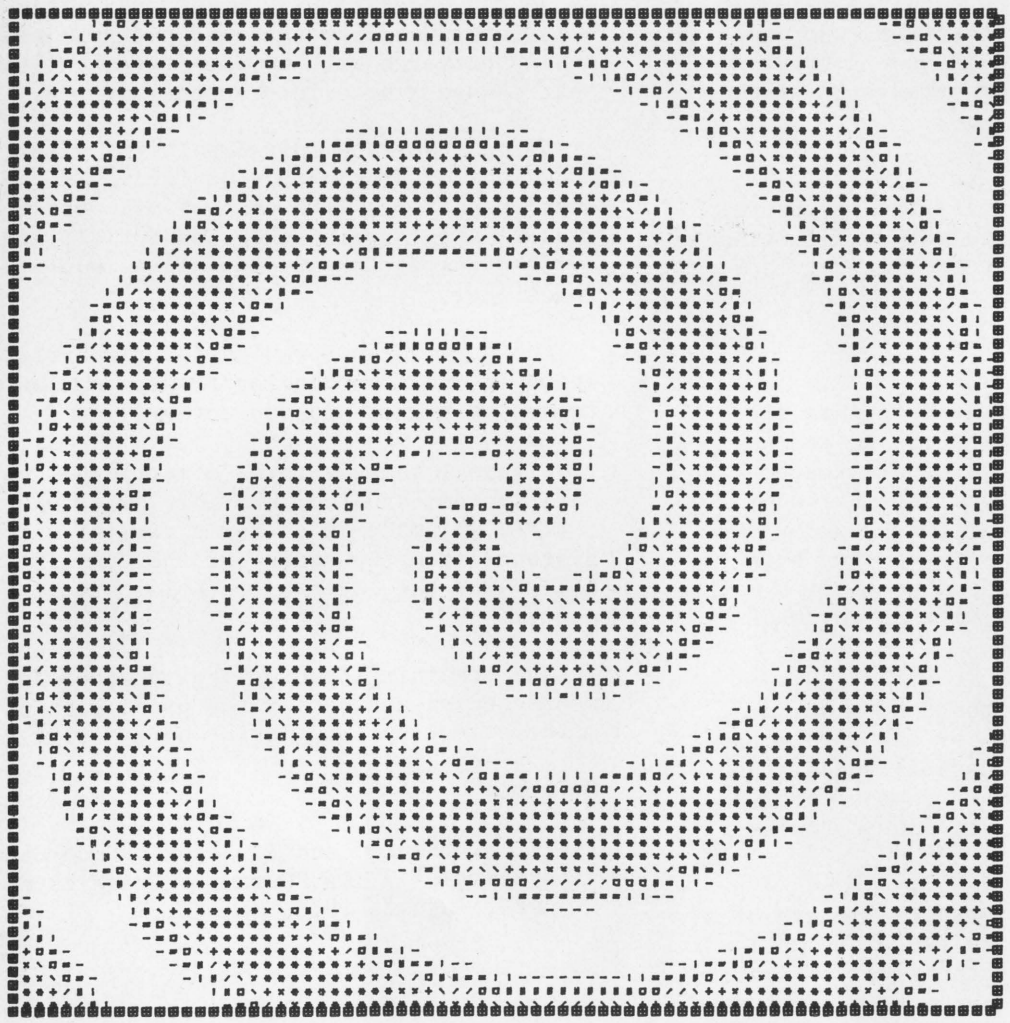


FIGURE 1



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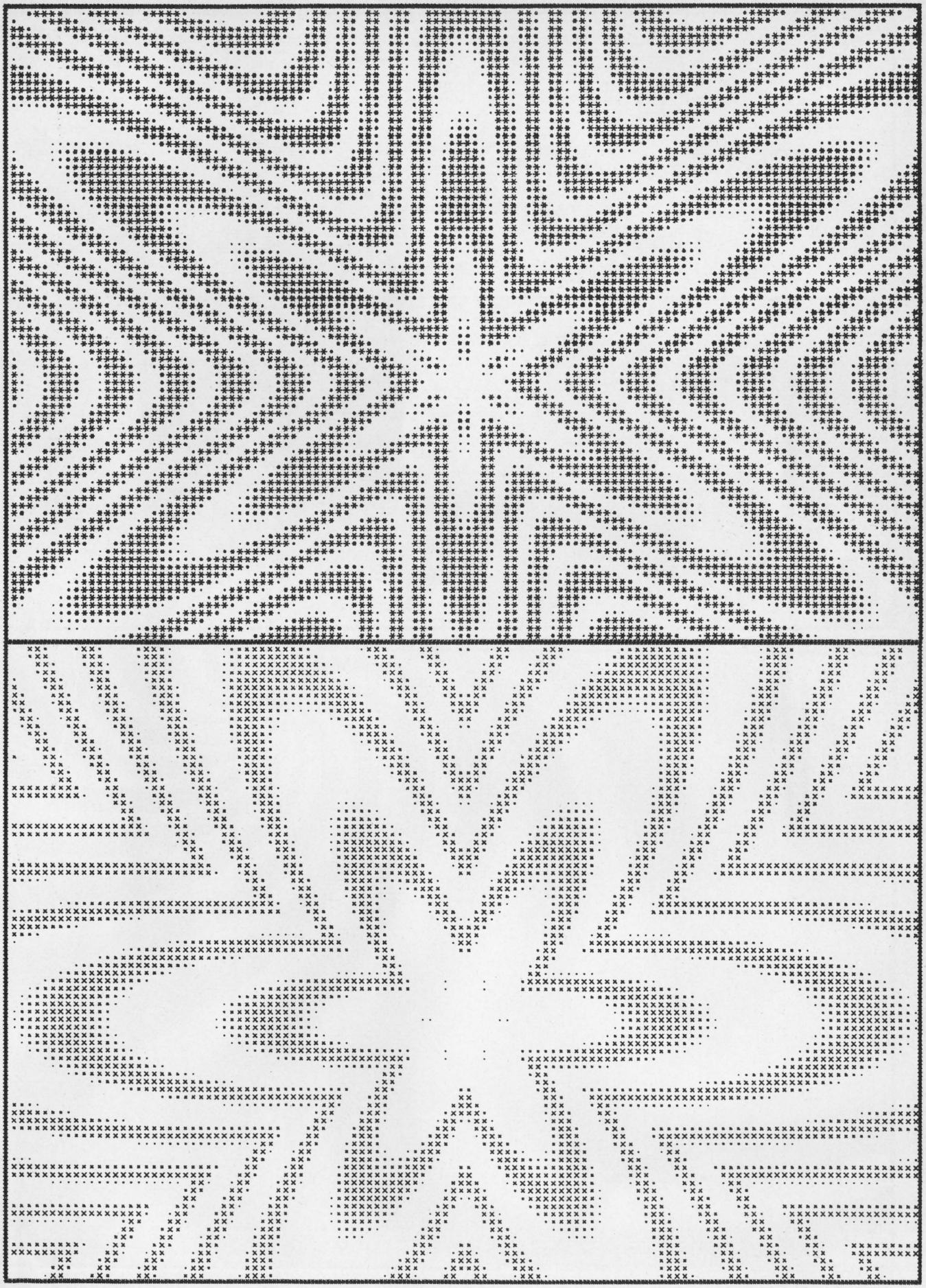
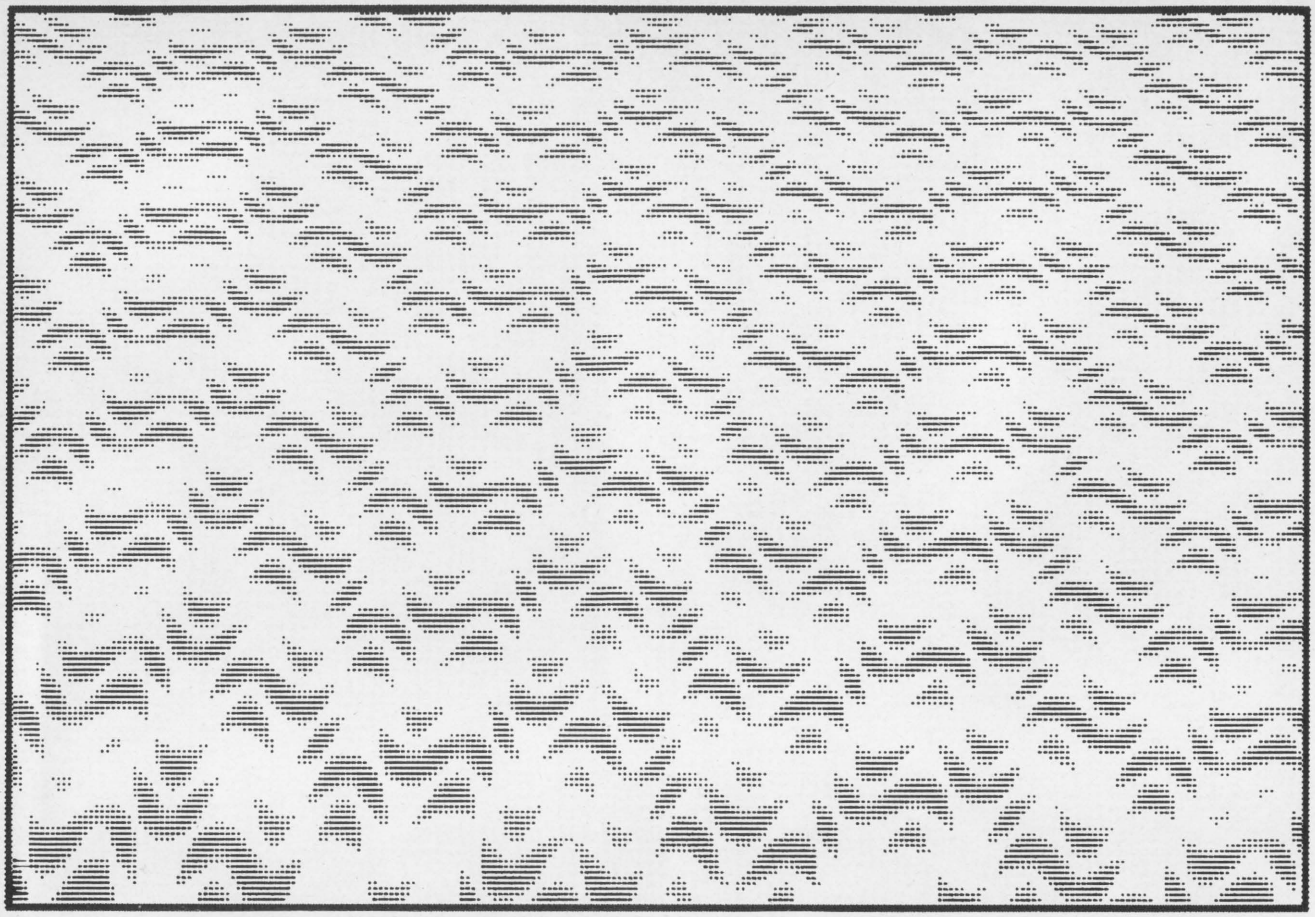
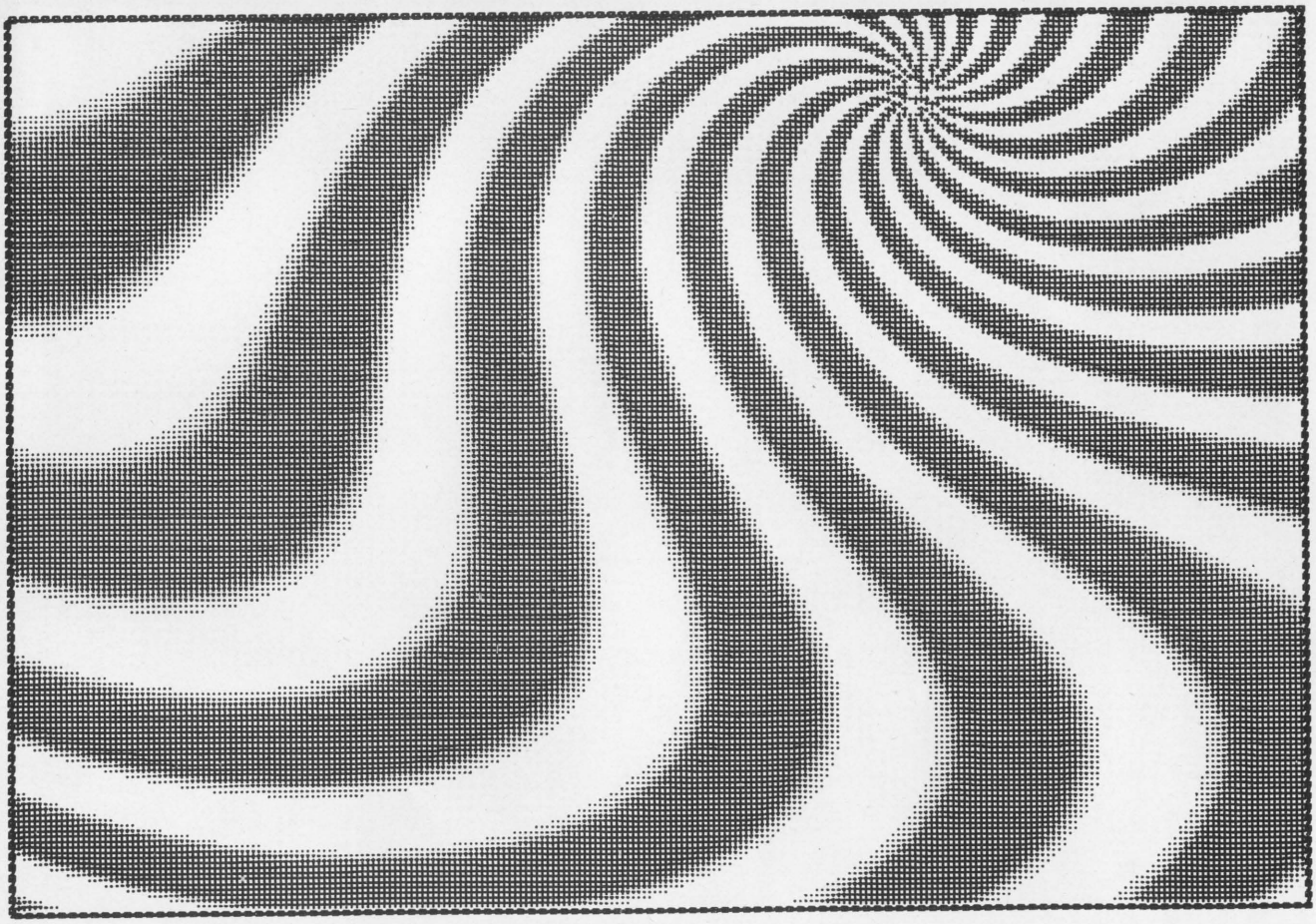


FIGURES 3 and 4





FIGURES 5 and 6

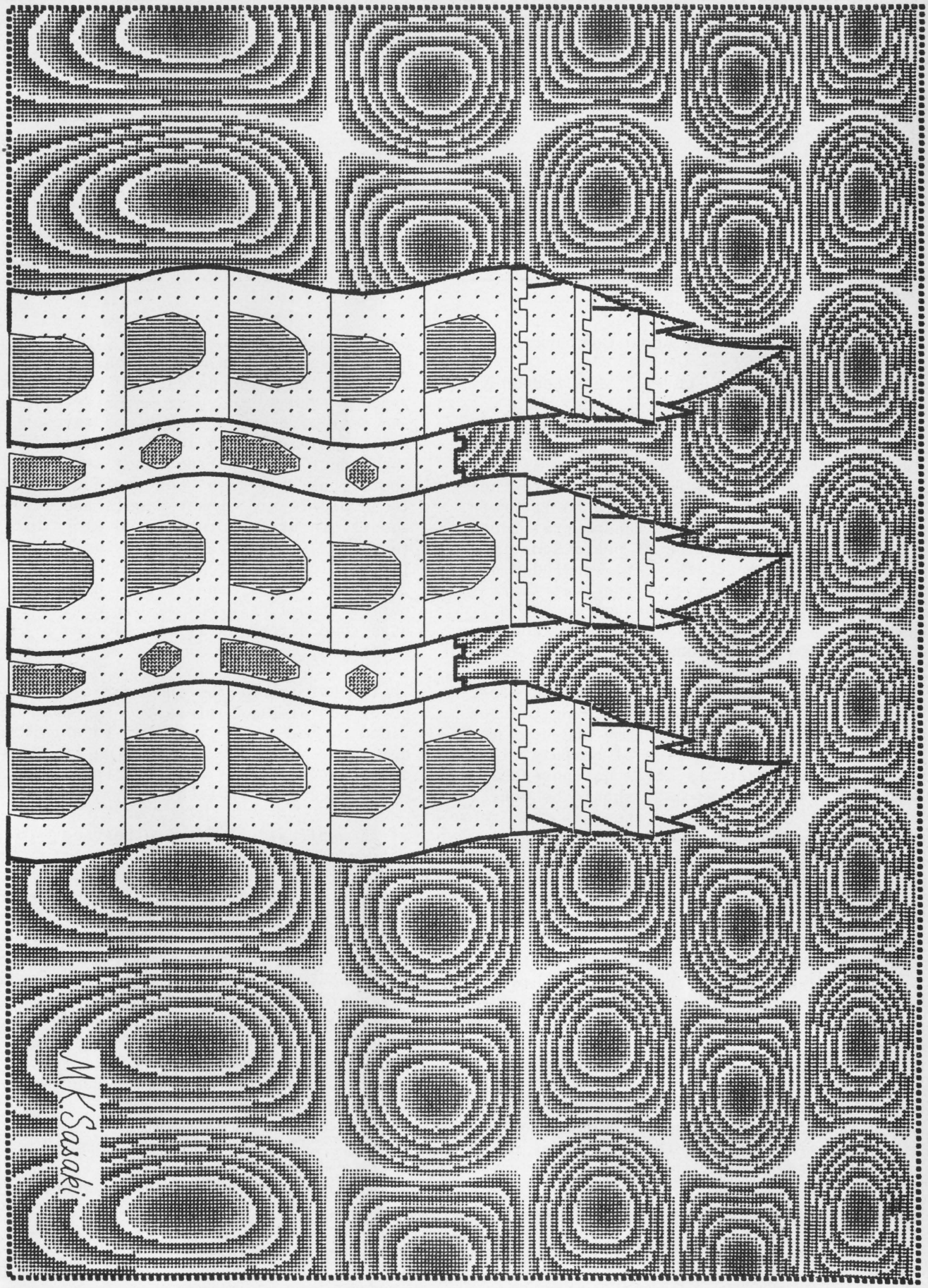


FIGURE 7

Pressure, by Mutsuko K. Sasaki

(please turn to page 28)

Computer Literacy: New Directions and New Aspects

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"Personal computers may become the pivot of a child's environment as television did for the last generation."

1. The Need to Know About Computers

The term "computer literacy" has become very popular over the past few years as a catchphrase for a new type of understanding. In the past, the term "literacy" has been reserved for the knowledge of basic skills of reading and writing and familiarity with the "great books" of our culture. To be literate means to be educated in the fundamental ideas and modes of communication of one's society. Applying the term "literacy" to knowledge of computers is a way of signifying that this sort of knowledge is as important to one's education in contemporary society as knowledge of reading and writing has been in the past.

While most people now agree that the proliferation of computers and their application in virtually every area of human endeavor requires us to take the notion of computer literacy seriously, there is still no consensus as to how this educational goal should be achieved. The difficulty lies in the fact that there is no universally accepted definition of computer literacy. Until we are clear about our goal, effective ways to reach it are unclear.

Several popular interpretations of computer literacy are listed below. After briefly describing each, I will make some suggestions for creating a balanced course in computer literacy. This course would focus on some interpretations and would ignore others.

- Hands-on experience as an end-user
- Programming experience
- Knowledge of computer science
- Knowledge of large-scale computer applications and their societal consequences

2. Hands-on Experience as an End-User

In the early days of computers the only people who ever saw or touched the machines were computer professionals. In many instances, the same person was responsible for writing programs, punching cards, and operating the system. Today, the vast majority of people who deal with computer systems through interactive terminals are totally unfamiliar with any aspect of computing other than the I/O operations they have been trained to perform. These people are ticket agents and real-estate agents, insurance brokers and stock brokers, teachers, scientists, and businessmen. The list is long and it grows longer each day. It is safe to say that within a decade or two better than two-thirds of our work force will have some direct daily interaction with a computer.

The earmark of the end-user as such is that he or she simply follows the instructions provided by the system in order to obtain some desired result. No programming is undertaken and no knowledge of the principles of computer science are required.

As application software becomes more sophisticated, through clever idiot-proofing and the introduction of artificial intelligence methods, the level of computer knowledge of the end-user drops proportionally. To oversimplify somewhat: the more the computer "knows" about the user, the less the user must know about the computer. The development of "user-proof" software, together with the evolution of microprocessors and large-scale networks, guarantees that more and more people who have had no special training in computer science will be getting hands-on experience.

3. Programming Experience

A growing number of people, however, are becoming more deeply involved in computer usage by learning how to write programs of their own. Many elementary schools are taking advantage of the minimal cost and high per-

formance of microcomputers to begin teaching programming to children between the ages of five and ten. Programming skills can vary enormously from individual to individual. A working knowledge of a particular language, such as BASIC, does not imply an understanding of the principles of computing. The child of ten who writes an efficient program for playing tic-tac-toe is a universe away from the computer scientist who designs a new architecture or operating system. Yet the child shares with the computer scientist a fundamental grasp of concepts such as iteration, nesting, variable assignment, branching, etc., which are unknown or opaque to people who are not familiar with programming techniques. In this respect, programmers at every level of expertness share a common knowledge-base.

4. Knowledge of Computer Science

A small number of people take computers and computing as the focal point of their professional interest. These people develop extensive knowledge in areas such as data structures, operating systems, microprocessing, compilers, logic design, memory hardware, or other major branches of computer science. The study of computer science is as technically demanding as that of any other "hard" science and the number of individuals capable of achieving real expertness in it will always be limited, despite the expanding growth in computers. The number of people who will design, build, and maintain computers will always be far smaller than the number of programmers and end-users.

5. Knowledge of Computer Applications and their Consequences for Society

The uses to which computers are put are often comprehensible without technical knowledge of computer science. Nearly everyone can understand that the automatic pilot of a modern airplane is actually a computer, although very few can say how it works. Hands-on experience, programming skills, and knowledge of computer science permit an ever-increasing appreciation for the details of different computer applications, but most applications can be described in a meaningful way to a layman who is familiar with the task as it was originally performed by a human.

The consequences of computer applications are also relatively easy to understand, once they are identified. The problem lies in the task of identifying them. Our intuitions about long-term effects of large-scale computerization are not very helpful: nothing in our history is comparable to the use of computers. As with most forms of high technology, we are often forced to adopt a wait-and-see attitude with respect to computer applications. Unfortunately, the potential risks of a new technology are sometimes so great that a wait-and-see attitude can lead to disaster. Investigation and discussion of the possible impact of computerization is a necessary adjunct to studying their applications; it is, moreover, a task which may be undertaken by the professional and layman alike.

6. Overshooting the Target of Computer Literacy

If we want to promote computer literacy, we should embed computer science courses in curriculum designs for computer education.

Quite naturally, we turn to experts: computer scientists. Unfortunately, this path leads to the same problems we encounter when we turn to any scientist for help in designing a broad-based curriculum: we wind up with a distillation of central methods and concepts which are too advanced for the layman and too diffuse for the specialist. The computer scientist focuses on science and tries to summarize basic principles of binary arithmetic, hardware implementations, programming principles of binary arithmetic, hardware implementations, programming principles, the fundamentals of architecture and operating systems, and so forth. Any of the "general" texts written for "computers and society" courses quickly reveals this tendency towards the smorgasbord approach to computer literacy.

The main problem with this approach is that it is ill-suited for its intended audience. People who have a strong interest in computer science find such courses (and texts) to be dissociated and superficial. They are much better off pursuing a standard sequence of computer courses which covers each topic in depth. Moreover, these are not the people we are concerned about when we consider the problem of computer literacy. Our real worry is for the vast number of people who are not disposed, either through taste or talent, to make computers a focal point of their studies. And these people have neither the background nor the motivation to assimilate the bits and pieces of real computer science that they are likely to find in a general survey course.

In a sense, the problem of the survey course is that it attempts to provide the introductory student with a global view of computing and, in the process, overshoots the mark. People who are being introduced to computers for the first time need concrete experience of those facets of computing with which they can interface directly. The global understanding

of computing principles, if it is ever achieved, needs to be based on a concrete familiarity with computer-related human activities.

7. Undershooting the Target

In an apparent reaction to the problem just described, many educators have gone in the opposite direction. They have devised curricula which will maximize "hands-on-experience" with computers. Unfortunately, the notion of hands-on-experience is often viewed under the hands-on interpretation of computer literacy. People who are not themselves computer specialists mistakenly believe that the mere use of a computer is sufficient to eliminate the ignorance of computing. This puts us at the mercy of our own technology. Thus, many educators introduce computers as teaching devices (via computer assisted instruction (CAI) packages) or research devices (with canned programs for statistical analysis, experiment monitoring or database query). They view computers in much the same way that they view microscopes or television, as tools which need not themselves be understood by the end-user.

Unfortunately, this approach can aggravate, rather than alleviate, the problem of computer illiteracy. Using a tool without any knowledge of how it works puts the user at the mercy of the machine. If the system fails, the end-user is stymied.

More importantly, though, the relationship between the individual and the computer becomes inverted. Seymour Papert has forcefully argued in his latest book, "Mindstorms" (Basic Books, 1980) that the computer winds up programming the user, rather than vice versa. The user who simply supplies the answers in CAI drills, or who feeds data to a statistics package, is responding to, and being rewarded by, a program which is totally opaque.

Rather than coming to know and understand the computer through such use, the individual builds up a host of misconceptions about what the computer "knows" and "doesn't know", what the computer is and isn't capable of doing. Familiarity with the machine in this manner produces a subtle "mystification" rather than any true understanding. The computer becomes an object of blind trust (or contempt, in some cases). Moreover, regular contact and use of the computer tends to obscure the user's ignorance even from himself. Superstitious attitudes and spurious beliefs about how the computer works take the place of genuine understanding. The user may develop an unfounded sense of security about his or her ability to control the machine.

8. The Analogy of Teaching Reading without Teaching Writing

There is yet another reason why the simple "hands-on" approach is dangerous: it is analogous to teaching someone how to read without teaching them how to write. Literacy (in the traditional sense) involves both comprehension and production. To learn one skill without learning the other may be possible, but it is certainly not prudent. The active skill of writing gives a student greater appreciation for, and insight into, the books which he reads.

The same is true of computer use: knowledge (even at a general level) of how a program works, how information is represented, stored, and accessed, how "bugs" arise and how they can be corrected, etc., gives the user a far more sophisticated sense of the tool which he is using. It enhances the student's use of the machine at the same time that it removes the feeling of "mystification." Even if the user never has the occasion to write his or her own software (and few end-users ever do) the knowledge of how programs work will still be effective. It will eliminate frustration, helplessness, ill-founded contempt, blind trust, uncritical dependence on experts, and general technological alienation.

9. A Prescription for Computer Literacy: a) Fundamental Principles of Programming

There are three things which the layman can and should know about computers: the fundamental principles of programming; the computer applications most relevant to his own interests and requirements; and the general impact which computing will have on him as an individual and as a member of society. All three of these topics can be addressed in a single course.

Unlike traditional introductory computing courses, this course should view programming as a means for assimilating basic principles of computing, rather than vice versa. A simple language, such as BASIC, Pascal, or LOGO, should be used instead of languages like FORTRAN, ALGOL, or PL/1. Emphasis should be laid on the human-machine interface, with students writing simple programs for games or CAI packages, rather than for data-processing or numerical analysis.

No more than a minimal amount of attention should be paid to non-programming concepts such as hardware principles, telecommunications, and the like. Hands-on programming experience will give the student far greater

insight into non-programming aspects of computing than lectures on timesharing and distributed networks.

10. b) Applications of Computers

Once the student has mastered the art of writing and running simple programs, the focus of the course should immediately change to the applications area. Many students who become skilled in software design are often woefully ignorant of the many uses to which computers can be put. The best way, of course, to teach applications is to give the student access to different packages and let the student acquire the perspective of the end-user. Coupled with a prior knowledge of programming, the student is likely to develop a quick understanding of both the flexibility and the limitations of the applications packages available. At this point it is worthwhile to provide some background material for the more exotic application areas such as robotics, artificial intelligence and the like.

11. c) Impacts on People

The final third of the course should be devoted to a consideration of the impact of computers on individuals and on society. This is the area of computer literacy which, until recently, has been the most neglected. The introduction of personal computing signals a revolutionary change in modern technology. Until now, high technology has remained almost exclusively in the hands of the trained specialist. With easy-to-use, inexpensive microprocessors, nearly everyone will have access to (and will therefore be affected by) computers.

Consider the impact that this will have on children. "Toys" will be able to carry on intelligent conversations, providing a form of companionship previously unthought of. Such toys may turn out to be more patient, more compassionate, more intelligent, and more trustworthy than the human beings in the child's world. They may also eliminate the need for imagination.

A non-computer doll to be played with compels a child to make-believe a great deal; a computerized doll may not call forth from the child even a quarter as much imagination.

12. The Computer as a Pivot of the Child's Environment

Personal computers may become the pivot of a child's environment, as television did for the last generation. How will the child feel about the computer after such exposure? Will the machine be thought of as a necessary companion, an indispensable tool, an intelligent partner, an omniscient supervisor, or a hated competitor? What emotional ties will children have to their computers and to machines in general? And what about the child's relationships with other children? Will the computer become "part of the gang" or a social intermediary? Will it be preferred to human companionship? (There is already mounting evidence that some "hackers" prefer the company of their console to that of other human beings....) Most importantly, how will such exposure affect the child's self-image? Will the personable, intelligent, computer conversationalist become the role-model par excellence?

The philosophical questions are so subtle and so numerous that they can hardly be answered in a course on computer literacy; the important thing, however, is that they be asked. Every student should at least be aware of the enormous impact which computerization has (and will have) on society.

If these three topics are adequately addressed in an introductory course, we can be reasonably sure that the student who takes it will acquire the broad-based understanding which is necessary for computer literacy.

Note by the Author: These observations are based on the design and teaching of a computer literacy course for undergraduate liberal arts majors at Vassar College from 1978-1981. I welcome comments and other views on the topic of computer literacy. -M.R. Ω

The Computer Almanac and Computer Book of Lists — Instalment 22

Neil Macdonald
Assistant Editor

6 PSEUDONYMS AND CORRESPONDING NAMES (List 811101)

Voltaire / Francois Marie Arouet

Mark Twain / Samuel Langhorne Clemens

Saki / Hector Hugh Monroe

AE / George William Russell

McConachie / James Matthew Barrie

Neil Macdonald / Edmund C. Berkeley

(Source: Neil Macdonald's notes)

(please turn to page 24)

The Reagan Administration Design:

More Monopoly, Less Competition, Less Exports, More Disincentives for America's Progress, . . .

"In the face of these facts, high level policy makers within your Administration insist on equating the U.S. telecommunications industry with one company – AT&T."

Editorial Note: The conservative, right-wing, poorly informed and often ignorant elements in the administration of President Reagan (people whose minds are closed) are calling forth some important opposition from strong elements of American business.

Here are two significant expressions of opposition. - ECB

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1. Open Letter to President Ronald Reagan, August 20, 1981, from:

Charles P. Johnson
Chairman of the Board
General DataComm Industries, Inc.
One Kennedy Ave.
Danbury, Conn. 06810
(203) 797-0711

With very deep concern I communicate with your office once more. I have read and heard further of your Administration's plans concerning policies to be established for the telecommunications and information industries.

From this, it seems apparent that you are not receiving all the information necessary to assess the truly adverse effects those policies would have on competition and monopolization in the telecommunications and information industries.

General DataComm Industries is a manufacturer of highly innovative data communications equipment. My Company, and others similarly situated, have made significant contributions to advancements in the data communications field. The telecommunications and information industries are made up of numerous companies, both small and large, many of which have contributed to the industry and to the U.S.'s world leadership in data communications and computer products.

Unlike AT&T, my Company and other independent companies export a large percentage of what we manufacture, which provides a favorable U.S. balance of trade in regard to those products.

The record will also clearly show that in the past ten years the major innovations in these industries have been made by companies like mine -- not by AT&T. It is unrefuted that during this time AT&T has been a follower, not a leader, in high technology data communications and computer equipment.

In the face of these facts, high level policymakers within your Administration insist on equating the U.S. telecommunications industry with one company -- AT&T. The fact that AT&T is the dominant company within the U.S. telecommunications industry is undisputed just as it is undisputed that AT&T has abused its government-granted monopoly power to thwart or eliminate competition.

On recommendation of your advisors, your Administration apparently supports dropping the Government's antitrust case against AT&T and thus pardon AT&T for its past antitrust abuses. At the very same time, your Administration supports a dangerously flawed and mistitled piece of legislation, "The Telecommunications Competition and Deregulation Act of 1981" (S. 898), which would provide ample opportunity for and encourage the proliferation of such abuses by AT&T in the future.

I have tried unsuccessfully to meet personally with Commerce Secretary Baldrige who apparently is the Administration's chief policymaker for telecommunications and information policy. Those that he has recently met with have come away from those meetings with the decided impression that the Secretary was strongly biased in favor of AT&T to

the exclusion of all others in the telecommunications industry and the using public.

His apparent unwillingness to seek a balanced public interest telecommunications policy as well as the extent to which he appears to be influenced by AT&T must be recognized when considering his advice to your Office. The policies promoted by Secretary Baldrige will adversely affect the telecommunications and information industries within the U.S. and, because of the critical importance of those industries to the U.S. economy, will have serious adverse effects on that economy and upon the ability of U.S. manufacturers to continue to compete in world markets. I would be most happy to detail such effects if you wish.

I urge you to open your Office to those who are bringing the benefits of competition to the telecommunications and information industries and to the public.

Decisions in this vital sector of the U.S. economy must consider all the facts.

I recommend that you establish a task force made up of members of the competitive sector of the telecommunications and information industries to develop recommendations and give advice to your Office concerning proper policies for these important U.S. industries.

I request a meeting with you at your earliest convenience to pursue this vital matter. I would arrange to have other key members of the industry attend and participate.

2. Statement to John S. Shad, Chairman, Securities and Exchange Commission, from:

Jerome L. Dreyer
President
Association of Data Processing Service Organizations
1300 N. 17th St.
Arlington, VA 22209
(703) 522-5055

The Association of Data Processing Service Organizations, Inc. (ADAPSO) is the trade association of the computer services industry. Its members provide the public with a broad range of computer services, including batch data processing, software development and consulting services as well as timesharing and other remote processing services. The ADAPSO membership totals over 460 corporate members, with approximately one thousand branches located primarily within the continental United States. Its membership includes such major organizations as IBM Corporation and American Telephone & Telegraph Company. Most of its members, however, are small, computer services firms with but one or two offices. ADAPSO estimates that its membership represented approximately 52 percent, by dollar volume, of the independent computer services market in the United States during calendar year 1978.

ADAPSO welcomes new competition and new companies into the computer services industry; however, ADAPSO also believes that any entry must be in a manner which is both fair and serves the public interest. In this regard, ADAPSO is concerned with the effects on fair competition posed by the aggressive entry of certified public accounting firms into the computer services marketplace. It is ADAPSO's view that the public marketing of computer products and services is a non-accounting activity wholly inappropriate for certified public accountants because such marketing poses a serious threat to free and fair competition in the computer services industry and compromises the independence required of all CPA's. However, to the extent it is deemed appropriate by state or federal authorities for CPA firms to continue or expand their aggressive activity in the computer services marketplace, this non-accounting activity should be strictly governed by the principles of "maximum separation" so that free and fair competition will be maintained and the public interest will be served.

The Computer Services Industry

The computer services industry adds value to computer hardware usefulness and communications resources by linking people, expertise, products, distribution networks, and education. In the phrase "computer services," the emphasis is on "services" because the function of this industry is to aid the businessperson in finding more productive solutions to the complex problems of better business management. This service involves the use of equipment -- computers. However, computers are only the means of achieving an end rather than an end in itself.

As an industry, computer services is relatively new. It had its origin in the 1956 IBM Consent Decree wherein the computer services activity of IBM was required to be conducted via a separate company with a different name, Service Bureau Corporation ("SBC"), and different personnel. Since 1956 this new and dynamic industry has grown by leaps and bounds, with an unbroken history of annual

revenue growth of at least 15 percent since 1967.

The computer services industry promises to be unique in its broad impact on the very health and flexibility of the American economy. The computer society will soon arrive and in the not-too-distant future the American economy will be dominated by computer-based transactions. It is the computer services industry which will bring the benefits of the computer to the lay person. In the United States, computer services have already become a thriving means of furnishing sophisticated and normally expensive technology to broad classes of users, ranging from the sole proprietorship to the largest of corporations. The computer services industry has been growing 50 percent faster than the hardware manufacturing industry, suggesting the success of the industry in bringing the computer to the lay person. Computer services technology has been continuously improving, and with its record of innovation and productivity enhancement this industry stands in sharp contrast to the general trend of inflation which is of vital concern to all. Clearly, computer services represent an important economic frontier for American industry. This is an exciting industry, full of modern success stories, and as fine an example as one could find that the free enterprise system still works.

Relevance to Auditing

With rapidly advancing technology, computer machine costs have decreased dramatically leading to an ever-increasing use of computers in business. Today the financial systems of most major American corporations are regularly maintained by computers. Reliance upon computers is so pervasive that even the paychecks and other disbursements of most major businesses are routinely drawn up and signed by computers without direct human participation. In fact, except for certain upstream checks and summary verifications, computer programs perform most of the day-to-day verification and financial controls in modern business. This means that the computer program developer actually implements most of the routinely-performed accounting controls when he incorporates these functions into his computer program. For this reason, ADAPSO agrees that auditors need computer expertise in order to audit clients for whom these crucial verification and control functions are performed by computer programs. However, when audit firms develop and/or market their own computer products and services, they dilute their performance in the specialized area of auditing as well as compete unfairly with independent computer services businesses.

Competition That Is Not Free and Not Fair

The marketing of computer products and services, without restraint, by audit firms threatens free and fair competition within the computer services industry.

By virtue of their governmentally-granted license to certify financial statements, audit firms are given free access to the proprietary trade secrets of both computer services companies operating as independent businesses and computer software companies which have sold or licensed products to audit clients. During the audit, all documentation and information regarding computer systems and programs are exposed for review. Moreover, because the audit staff is regularly assisted by management advisory services ("MAS") personnel, those persons, who themselves are responsible for designing and developing computer products to be marketed by the firm, gain valuable insight and information not ordinarily available to other competitors in the industry. Thus, by governmental license audit forms which develop and market computer products and services are granted review of the valuable trade secrets of their competitors.

In addition, this same license grants audit firms the power of approval or disapproval over competitors' computer products. That is, in reviewing the adequacy of a client's internal financial controls, an audit firm must either approve or disapprove the computer services which regularly perform these controls.

Likewise, accounting firm personnel gain access to the proprietary information of competitors in their role of assisting management in evaluating computer systems and consulting services. All too often, these evaluation services result in the recommendation that the accounting firm either install its own "packaged" system or that it design and develop a custom system for the client. This recommendation follows a lengthy evaluation process which has cost the independent competitor valuable time and money not to mention the exposure of proprietary information to a competitor. Moreover, such a course of practice violates the professional standards of independence, a topic to be more fully discussed later.

"Tying"

The marketing of computer products and services, especially by large, economically powerful public accounting firms, also presents increased dangers of tying or "voluntary tying." A "tie-in" is an arrangement whereby a seller conditions the sale of one product or service over which it has sufficient economic power upon the purchase of another, separate product or service, thereby appreciably restraining free competition in the market for the second product or service. Under Section 1 of the Sherman Antitrust Act, such an arrangement is unlawful if it involves a "not insubstantial" amount of interstate commerce, and the condition is neither necessary to protect the goodwill associated with the first product nor justified as an effort by a smaller company to break into the market. As the Supreme Court has observed, a tie-in sale is per se unlawful because it compels the buyer to forego his choice among competing products or services and denies competing suppliers free access to to the consuming market. Northern Pacific Railway Co. v. United States, 356 U.S. 1,6,11 (1958). In such an arrangement, selection is based not upon the quality of services or better price but rather upon the economic power of the seller in its primary line of commerce.

"Voluntary Tying"

A more subtle but equally insidious phenomenon is that of "voluntary tying" whereby a customer, hoping to obtain advantages in the seller's primary line of commerce, "voluntarily" grants special consideration to the seller's secondary line offerings. Turning to the present matter, an audit client, for example, may consider it the better part of valor to look to his certified public accountant for data processing services in the belief that such might enhance the chances for a more favorable or less onerous audit report. It is also inevitable that sometimes an audit client may be induced to purchase the auditor's computer services based upon promises, either explicit or implicit, of "easier" or "less expensive" audits.

Consequently, by virtue of their access to competitors' trade secrets combined with the power over the audit and the dangers of "voluntary tying," CPA firms which market computer products and services have an unfair competitive advantage over independent computer services businesses.

The Fact (and the Appearance) of Independence is Jeopardized

Without at least the restraints of maximum separation, the public marketing of computer products and services by accounting firms jeopardizes both the fact and the appearance of independence.

The fact as well as the appearance of independence are required of each and every certified public accountant. The Securities and Exchange Commission, for example, views the independence of CPA's charged with the responsibility of examining financial statements as central to the implementation of the federal securities laws. 44 Fed. Reg. 36156 (1979). Likewise, the American Institute of Certified Public Accountants ("AICPA") has stated that a CPA's professional stature and client reliance upon that stature depend upon independence in all matters relating to client service. (AICPA Professional Standards, vol. Sec. 110.01). Thus, for certified public accountants, independence is not merely desirable, it is the sine qua non for their service to the public, both with regard to their auditing and tax practices as well as the full range of management advisory services.

The SEC has described independence as implying "an objective analysis of the situation by a disinterested third party." 37 Fed. Reg. 14294 (1972). Although the concept of independence may be easily described, it is not always easy to delineate its boundaries in any particular subject area. This has been especially so with regard to the public marketing of computer products and services. It has consistently been ADAPSO's position that independence in fact and appearance is jeopardized when public accounting firms provide such products and services without restraint.

When CPA firms publicly market computer products and services to an audit client, they place themselves in the position of auditing their own work product. That is, by designing and installing a computer system, with its capabilities for handling data, maintaining internal controls, security provisions, and otherwise, the CPA firm has, in fact, developed and created the financial information which it will later review during the audit. The very real dangers to auditor independence from this type of self-review have been highlighted by the SEC. According to the Commission, an accounting firm cannot be deemed independent with regard to auditing the financial statements of a client if it

has participated closely, either manually or through its computer services, in maintaining the basic accounting records or preparing the financial statements. 42 Fed. Reg. 64307 (1977). Additionally, when an auditor becomes so enmeshed in designing a client's accounting system or structuring its internal controls, the client loses the benefits which normally result from the dispassionate review of those systems by an outside auditor. As architect of the system, the auditor can no longer provide management with that "second look" normally expected from an independent, professional accountant. 44 Fed. Reg. 36158 (1979). Thus, the quality of their service to the public is diluted when CPA firms market the computer systems and programs which will be reviewed later during the audit.

Management Advisory Services

Besides the audit function, public accounting firms also provide a whole range of management advisory services, including assistance to management in evaluating computer systems and consulting services. Here, too, both the fact as well as the appearance of independence are required. The AICPA has mandated that every CPA maintain independence in rendering management advisory services and that "a practitioner may undertake only those engagements in which he can maintain an independent mental attitude." (AICPA Professional Standards, MS Sec. 110.03).

With their own computer products and services on the market, and generating ever-growing revenues, it is highly unlikely that a public accounting firm can review and evaluate competing products and services on an independent, objective basis. The AICPA has recognized this fact and has stated that a practitioner should not accept an engagement to evaluate computer service proposals which are in competition with his own because in this evaluation it would be difficult to remain objective and independent in mental attitude. (AICPA Professional Standards, MS Sec. 110-1.03). Yet, every day major certified public accounting firms propose to evaluate competing computer products and services proposals while suggesting that their independent mental attitude, the attitude of a disinterested third party, remains unimpaired. These major accounting firms persist in this course of action despite the mandate of the AICPA as well as common notions of independence and objectivity.

Recommendation

ADAPSO welcomes competition and the entry of new companies into the computer services industry, provided that entry can take place in a manner which is both fair and serves the public interest. It is ADAPSO's position that certified public accounting firms should be precluded from marketing computer products and services. To the extent that public accounting firms may be allowed by state or federal authority to continue or expand their non-accounting activity in the computer services marketplace, that activity should be governed by the principles of "maximum separation."

The doctrine of maximum separation, which for the computer services industry had its genesis in the 1956 IBM Consent Decree, requires that the commercial activities of economically powerful organizations, operating in separate lines of commerce (such as auditing and computer services), be kept separate and apart, except to the extent that interaction may be justified by sound considerations (such as real economies of scale). In other industries, notably the communications industry, maximum separation has worked well to limit "voluntary tying" and improper economic cross-subsidization.

With regard to the marketing of computer products and services by public accounting firms, adoption of maximum separation would mean, among other things, the use of totally separate facilities and personnel, different names, and independent financing for computer services operations. Maximum separation would mandate as much separation as is necessary to avoid economic cross subsidization and tying effects in the public mind. Application of the principles of maximum separation would at least to some degree insure that audit personnel remain independent and objective as well as alleviate any problems relating to the misappropriation of trade secrets.

Conclusion

Computer services is a young and dynamic industry which has prospered in an environment of free and fair competition. This free competition, as well as the best interests of the public, will be preserved but only if certified public accounting firms are confined to the limited area of providing financial, auditing, and related services. However, should CPA firms be allowed to continue or expand their non-accounting activity in the computer services marketplace, that activity should be governed by strict application of the principles of maximum separation. Ω

Air Impurities: Radioactive Carbon Dating and Computerization

Lloyd Currie
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National Bureau of Standards
Washington, DC 20234

". . . Whereas a geological scientist generally uses 1 to 10 grams of carbon from an artifact, . . . we designed our system to deal with 10 milligrams of carbon."

Outline

1. Smog
2. Radiocarbon Dating
3. "Living" vs. "Dead" Carbon
4. Soot and Other Particles
5. Fossil and "Life-Produced" Carbon
6. Ten Milligram Samples
7. Iron from World War I
8. Wines from the 1950's
9. Individual Particle Counting
10. Mu-Meson Exclusion
11. Samples from Many Areas
12. Samples from Many Times of Day, etc.
13. The Environmental Protection Agency's Tough Job
14. The Exciting Future

1. Smog

In the journal "Science" about 6 years ago, I read that trees pollute the atmosphere. The authors of that article suggested that a serious amount of urban pollution may come from nearby forests. It occurred to me that a superb way to get an answer to that question was measuring radiocarbon.

Atmospheric pollution is smog. What is smog? What makes it happen? Where does it come from? What is it composed of? and for example, how much of the "Denver brown cloud" is due to the breathing processes of trees, and how much to the burning of "natural" fuels like wood or fossil fuels like coal?

We in the Gas and Particulate Science Division of the National Bureau of Standards have sought answers to these questions by applying dating techniques using radiocarbon, carbon isotope 14.

2. Radiocarbon Dating

Radiocarbon dating, a method frequently used to establish the age of archeological artifacts or geological samples, involves measuring the ratio of unstable carbon-14 (C-14) to its stable isotope carbon-12 (C-12). During the late 1940's Willard Libby discovered that carbon-14 is produced in the atmosphere by cosmic rays and is distributed in the form of carbon dioxide, throughout living matter by the respiration of plants. As long as a plant or animal remains alive it continues to exchange carbon-14 with the environment at a steady pace. After an organism dies, however, its level of carbon-14 is reduced gradually through radioactive decay.

After about 5700 years only half the original concentration of C-14 is left. This means that for artifacts younger than about 40,000 years old, scientists can calculate an approximate age by comparing the radiocarbon level found in the artifact with the level found in living matter.

It also means that measurements of radiocarbon can be used to discriminate between carbon compounds produced by the burning of fossil fuels and those produced by trees or by wood burning.

3. "Living" vs. "Dead" Carbon

Fossil fuels such as coal and oil are dead -- that is, they lived some 300 million years ago, therefore the radiocarbon in them has long since decayed. In contrast, wood and organic compounds (for example, terpenes and isoprenes) which are emitted by trees, contain about the same level of C-14 as living matter.

4. Soot and Other Particles

An overbalance of atmospheric carbon produced by any of these sources can cause a number of problems. Particles of black elemental carbon (soot) are a major cause of pollution haze that reduces visibility. These particles also tend to absorb the sun's radiation, causing warming, and can reinforce the so-called "greenhouse effect" produced by excess carbon dioxide in the atmosphere. Some carbon compounds, such as certain forms of polycyclic aromatic hydrocarbons (PAH's), are known carcinogens or mutagens, while others can cause respiratory ailments. Certain organic carbon compounds can also cause formation in the lower atmosphere of ozone (which is toxic to humans and other animals). Paradoxically, still other organic compounds, like methane, can diffuse to the upper stratosphere and cause a breakdown of the beneficial ozone layer, which screens out harmful ultraviolet radiation from the sun.

It's important how much man contributes to the level of carbon in the atmosphere, because we don't have much control over nature. It doesn't make much sense to place strict controls on industry if their emissions are trivial compared to those from nature. On the other hand, we have plenty of evidence suggesting that industry's contributions are considerable. In order to help put environmental regulations on the soundest possible scientific base, we're trying to determine how much carbon comes from each.

5. Fossil and "Life-Produced" Carbon

While many scientists are analyzing the chemical and physical properties of pollutants in order to track down sources, our research group is using a radiocarbon technique to discriminate between fossil and biogenic pollution.

The principle is beautifully simple, but very difficult to carry out in practice.

6. Ten Milligram Samples

A first obstacle we encountered was to design a carbon-14 measurement system that could handle very small samples. In radiocarbon dating, a geological scientist generally uses 1 to 10 grams of carbon from an artifact to determine its age. But when even the most polluted urban areas seldom contain more than 50 micrograms (0.00005 gram) of carbon per cubic meter of air, it would take several years to collect a 10 gram sample.

We designed our system to deal with 1,000 times less of a sample, or only 10 milligrams. We used all the techniques of conventional radiocarbon dating, plus a few extra electronic and chemical techniques to make the measurements feasible.

7. Iron from World War I

For instance, one of our first steps in constructing a small sample radiocarbon measurement device involved scavenging a World War I cannon barrel. By a stroke of good fortune, we managed to locate this gun barrel at the U.S. Naval Weapons Laboratory in Dahlgren, Va., just as it was scheduled to be recycled into new steel. Instead, a 1.7 meter (5.5 foot) section, weighing about 6 metric tons, was cut out of the center of the barrel and shipped to the Bureau's chemistry building where it is now an integral part of the measurement apparatus.

Vintage iron, it turns out, provides an excellent radiation shield. When making precise measurements of C-14 it is important to protect the sample from extraneous natural background radiation coming from cosmic rays, building materials, even from people. Unlike modern steel, the World War I barrel does not contain minute amounts of radioactivity from fallout or from industrial tracers that would interfere with carbon-14 measurements. (People, by the way, contain about 1 million times as much radioactivity as we're trying to measure).

This brings up another problem. Because there is only about one carbon-14 atom for every trillion carbon-12 atoms in the atmosphere, a small absolute increase in the amount of carbon-14 produced can cause a large change in its relative concentration. Scientists believe that the concentration of C-14 has been close to equilibrium for much of the earth's histroy. That is, approximately the same number of C-14 atoms were being formed by cosmic rays as were disintegrating by radioactive decay, keeping the overall concentration stable.

Then from 1900 to about 1950, the huge amounts of "dead" fossil fuel carbon introduced into the atmosphere depressed the carbon-14 concentration by 2 to 3 percent from its "normal" level. After about 1950 a spate of atomic bomb testing overcompensated for this decrease by creating 100 percent more C-14 than would have been present naturally. (Free neutrons from nuclear explosions have the same effect in the atmosphere as neutrons from cosmic rays in producing C-14.) Since the mid 1960's the C-14 concentration has been gradually decreasing, approaching its historic level.

8. Wines from the 1950's

These variations made calculating an "average" contemporary concentration of radiocarbon difficult, until a researcher in Portugal devised an ingenious solution to the problem. J.S. Lopes and coworkers in the Laboratory of Physics and Engineering in Scavém, Portugal, have measured the radiocarbon content of vintage Portugese wines dating from 1950 to the present. The result is an accurate record of radiocarbon concentration levels stretching back for several decades.

We use this record as a calibration curve to correct our measurements.

9. Individual Particle Counting

The actual determination of the C-14 content of an air particulate sample begins when the researchers burn the sample completely to convert all of the elemental and organic carbon to carbon dioxide. The CO_2 is transferred to a gas proportional "counter" which consists of a high purity quartz cylinder lined with copper foil and containing a central tungsten wire. The counter is then enclosed in a shield of high-purity copper about 13 centimeters thick, inserted into the center of the gun barrel, and protected against outside interferences with two heavy steel doors.

Now the counting can begin. A negative potential is applied to the foil lining, leaving the central tungsten wire with a relative positive potential. Each time a C-14 atom decays, an electron is ejected from the atom's nucleus and is accelerated toward the positively charged wire. This produces an electrical pulse which is recorded and stored by a minicomputer.

With the help of a mathematical chemist, Robert Gerlach, we made sure that each signal had an energy level and "pulse shape" matching those of radiocarbon, and was not caused instead by random electrical breakdown or by residual radioactive impurities in the counter or shielding materials.

10. Mu-Meson Exclusion

The design of the counting system also eliminates the possibility that signals produced by mu-mesons will be mistaken for decaying C-14. Mu-mesons are high energy particles produced by cosmic rays, and they will penetrate many meters of earth or many shields. To avoid having to go underground, the NBS researchers enclosed the sample with its copper shield in a second gas proportional counter. This counter is analogous to the primary system except that it contains many tungsten wires rather than just one. The electronics of the NBS system are designed to cancel any signals detected simultaneously within both the outer and inner counters. Simultaneous signals indicate a particle has penetrated through the entire apparatus and consequently could not have been produced by radiocarbon within the sample chamber.

11. Samples from Many Areas

Of course, the most interesting part of our experiments are the results. We've been cooperating with a number of universities, other government agencies, and corporations, in the analysis and sampling of particulates from different types of areas. So far, we have received particulate samples collected in a number of U.S. cities, in the Utah desert, in a remote forest in Russia, in the Virginia Shenandoah Valley, and in places with apparently unique pollution problems like Barrow, Alaska.

At Barrow, residents are subjected each spring to pollution comparable to that of major metropolitan areas. There has been some speculation that the Point Barrow haze is coming over the North Pole from Russia or Europe. It will be very interesting to find the radiocarbon concentration of these samples.

In other places, we have found that the percentage of biogenic carbon in particulate samples varies considerably depending on the time of the year and other factors. We've found the full range of concentrations from nearly all biogenic to nearly all fossil in a number of our studies.

12. Samples from Many Times of Day, etc.

In a project carried out in December 1978 in Denver, Colo., with General Motors, the researchers found that the percentage of "living" carbon in air particles varied from as low as 10 percent to as much as 55 percent depending on factors such as the time of day, the day of the week, and the outside temperatures. A large percentage of living carbon, for example, was recorded on a day when there was known to be a high degree of residential wood burning.

Another study, done in cooperation with the Oregon Graduate Center in Portland, Oreg. found that on days when local lumber and grass-seed companies carried out a process called slash and field burning, nearly 100 percent of the carbon in the haze over downtown Portland came from "living" carbon sources.

In a suburb of Los Angeles, the weather was the determining factor. A study with the University of California showed that the concentration range depended most strongly on which way the wind was blowing, from the traffic-congested center of the city or from the neighboring forests.

13. The Environmental Protection Agency's Tough Job

Having to deal with so many complex variables in determining pollution sources makes the Environmental Protection Agency's (EPA) job a lot harder. So EPA is helping to fund a number of research projects, to try to get as much chemical and physical information as possible about air particulate samples. The more detailed these analyses become, the more likely it is that sources of specific portions of the particulates can be traced accurately.

14. The Exciting Future

The field of radiocarbon chemistry has an exciting future. Advanced measurement techniques make it possible for the first time to detect radiocarbon in individual chemical fractions of very small samples. This, together with high-resolution sampling, will greatly increase our understanding of the flow of carbon throughout the environment.

Ω

CACBOL – *Continued from page 15*

7 AXIOMS FOR EXPLANATION (List 811102)

- Almost nobody understands the first time.
- Almost nobody reads more than one page.
- Nobody reads the fine print, even when writ large.
- People like examples spoken.
- People like examples on paper even more.
- People like examples that have happened, that run on a computer, most of all.
- To be impatient, to show irritation at lack of understanding, is a splendid highway to failure and defeat.

(Source: Neil Macdonald's notes.) Ω

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B. PAID CIRCULATION 1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES	0	0
2. MAIL SUBSCRIPTION	3014	3018
C. TOTAL PAID CIRCULATION *(Sum of 10B1 and 10B2)*	3014	3018
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES	80	80
E. TOTAL DISTRIBUTION *(Sum of C and D)*	3094	3098
F. COPIES NOT DISTRIBUTED 1. OFFICE USE, LEFT OVER, UNACCOUNTED, SPOILED AFTER PRINTING	606	502
2. RETURN FROM NEWS AGENTS	0	0
G. TOTAL *(Sum of E, F1 and 2 - should equal net press run shown in A)*	3700	3600

11. I certify that the statements made by me above are correct and complete

SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER

Edmund C. Berkeley

PS Form June 1980 3526 (Page 1) *(See instruction on reverse)*

Newsletter – *Continued from page 2*

The retailers of women's wear (served by this facility) will notice a reduction of the time to fill an order; this helps forward the company's objective of providing customers with the best service and selection in the industry.

The computers are provided by IBM; and the software was developed by a team at Waco headed by Dennis Britt.

FEAR BY EXECUTIVES OF ELECTRONIC DATA PROCESSING

R.G. Taylor, Pres.
Datacrown, Inc.
650 McNicoll Ave.
Willowdale, Ont., Canada M2H 2E1
(416) 499-1012

Many senior executives are fearful of data processing because they do not know enough about it.

This is a serious problem. Senior executives should insist their EDP managers explain computing in the language of the executive suite, and not in computer jargon.

Effective management of data processing enables an executive to do a better job, and helps companies to make more money. But no organization can realize the full benefit of computerization (or avoid the costly pitfalls that come from poor computer planning) without:

- active participation and
- thorough understanding

by senior management. Computer processing is not only a function that supports other corporate activities - but also a vital ingredient in the direction of a company.

The reason for this viewpoint of "only a support function" is (I am convinced) that many chief executive officers are actually terrified of data processing.

This fear terrifies me.

(Excerpted from a talk before the annual meeting of the Grocery Products Manufacturers of Canada in Toronto.)

ANTIDOTE TO EXECUTIVE FEAR OF DATA PROCESSING

Edmund C. Berkeley, Editor
"Computers and People"

The fear of data processing and computer processing is natural in these days for senior executives, who are confronted with trying to understand a new and important environment in which old wisdom and knowledge seem not to apply.

And the fear of managers of data processing for their senior executives is also very natural, and DP managers often resort to jargon in defense of what they conceive as the best way to do their job as they see it.

One of the ways out is the creation of a good language (a selection of natural English) which is common to the DP professional and the senior executive. In this way they might understand each other. The number of entries that might be needed in the glossary of "DP Lingo / Executive Lingo" might be 50 to 70. This would be like a phrase book for an English tourist in Afghanistan.

The persons who are developing courses in computer literacy might be the logical persons to compose such a phrase book. It seems to me that some of the entries in that book should be as follows:

- algorithm / an effective calculating rule
- computer program / a procedure for a computer to use
- FORTRAN / a language for specifying instructions to a computer; the word comes from "formula translation"
- artificial intelligence / behavior by a machine which in a human being would be called intelligent

I can imagine a conference between a senior executive and a data processing manager where each has a copy of the phrase book, and a humorous situation would develop when the DP manager uses a computer buzzword not in the phrase book, and the senior executive cheerfully exclaims "Foul!"

CLASSIFIED ADVERTISING AND COMPUTER FRUSTRATION

Edmund C. Berkeley, Editor
"Computers and People"

Recently we tried to put into the classified section of the "Boston Globe" a six line ad for "ALERT clever persons to work as Mag Publ Assts" at Berkeley Enterprises. We found a stupid program, which would not permit squeezing out characters and punctuation and using abbreviations to save characters and the number of lines being billed.

For example, we tried "Enterpr" at the end of one line and "ises" at the beginning of

the next. The computer refused both, and put "Enterprises" on the next. We tried "Enterpr" at the end of one line, and nothing on the next. The computer refused both, and put "Enterprises" on the next line. We tried "Ent-" on one line, and "erprises" on the next. The computer refused both, and put "Enterprises" on the next line, denying the option of unusual hyphenating. At last we hit on something the computer would accept, "Enterpr."

The effect of this stupid program is to make ads longer, insert waste space, bill customers for more money, and increase customer dissatisfaction.

I would guess that somebody at the "Boston Globe" made the decision that just the same program for editing reporters' reports, controlling and preventing spelling and hyphenating errors, etc., would apply to classified advertising. But that is not correct.

"WINGLETS" THAT SAVE FUEL ARE BEING FLIGHT-TESTED BY NASA ON A TEST PLANE LEASED FROM CONTINENTAL AIRLINES

Ken Atchison
National Aeronautics and Space Admn.
Washington, DC 20546

Maurice Parker
Langley Research Center
Hampton, VA 23665

A "winglet" is a small wing-like structure fastened to the tip of an airplane wing, almost perpendicular to the wing surface. The winglet cuts drag that consumes fuel by lessening the effect of the vortices at the wing tips. The vortices are turbulent swirls of air that form at the wingtips of all aircraft in flight. (Anybody who has rowed in a row boat can see the same kind of whirls in the water at the tips of the oar-blades.) In the test plane (a DC 10 jetliner leased from Continental Airlines) there are two winglets attached to each wingtip. One is 3.2 meters long pointing upward. The other is 0.8 meters long attached beneath the wing and pointed downward.

Based on wind tunnel tests, a fuel reduction of about 3 percent is expected with the DC-10 winglets. That amounts to a saving per year of about 250,000 gallons of fuel, now priced at more than $1 per gallon.

The winglet concept was developed by Richard T. Whitcomb, an aeronautical designer at Langley who has recently retired. Instead of extending the wingspan of an airplane (which adds fuel consuming weight), winglets can reduce drag with much less weight penalty. The design and placement of the winglets for trial was a function of Dr. Whitcomb. They are already in use on two commercial planes, the Gates Learjet 55 and the Grumman Gulfstream III.

The test plane, leased from Continental Airlines, and the test program are contracted by McDonnell Douglas Corp. with Langley Research Center of NASA.

If the test program is a success, it could lead to the use of winglets on all DC-10 commercial aircraft.

CONQUERING THE "DIAL AND DIE" CONDITION WITH COMPUTERIZATION

Bill Bradley
Honeywell, Inc.
200 Smith St.
Waltham, MA 02154
(617) 895-3247

"We're sorry, but all lines are temporarily busy. Please stand by. Your call will be answered by the first available operator."

Then you are left hanging for what seems an eternity, and often is thoroughly exasperating, while you can't even think because music comes on to distract your thinking.

Most people have had experiences like this when calling an airline, hotel, credit card company, or similar organizations. The name for this condition or scenario is often "dial and die."

But dial-and-die may soon be a thing of the past. A company, Cybernetics Systems International Corp., Miami, Fla., has developed and is marketing an employee planning and control system which helps to:

- estimate the number of operators needed to reduce customer waiting to a reasonable minimum
- predict reasonably the number and duration of incoming telephone calls
- schedule the employees needed and when they should report for work
- provide for operators, supervisors, and managers as needed
- make daily adustments for absenteeism, break times, vacations, etc.

The system is a modular interactive software system, called Employee Management and Planning System. It operates on two Honeywell Level 6 Model 53 small computers. Ω

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 programming 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"). 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 must display some kind of evident, systematic, rational order and completely remove some kind of randomness; the operation must be expressible in not more than four English words. (But Man can use more words to express the solution and still win.)

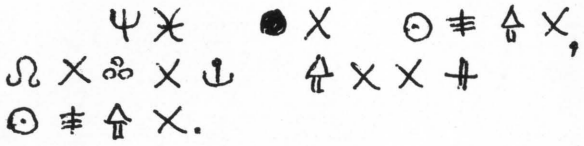
NAYMANDIJ 8111

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

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, plus a few more signs. To compress any extra letters into the set of signs, the encipherer may use puns, minor misspellings, equivalents (like CS or KS for X), etc. But the spaces between words are kept.

MAXIMDIJ 8111



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, expressed in numerical digits, is to be translated (using the same key) into letters so that it may be read; but the spelling may use puns, or deliberate (but evident) misspellings, or may be otherwise irregular, to discourage cryptanalytic methods of deciphering.

NUMBLE 8111

```
a     M E A D O W
    *         H A S
  ---------------
    H D E W R W S
  E H D S M S A
  W H O E O H
---------------
= R S Y E O S Y S

      1 1 4 7 8
```

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

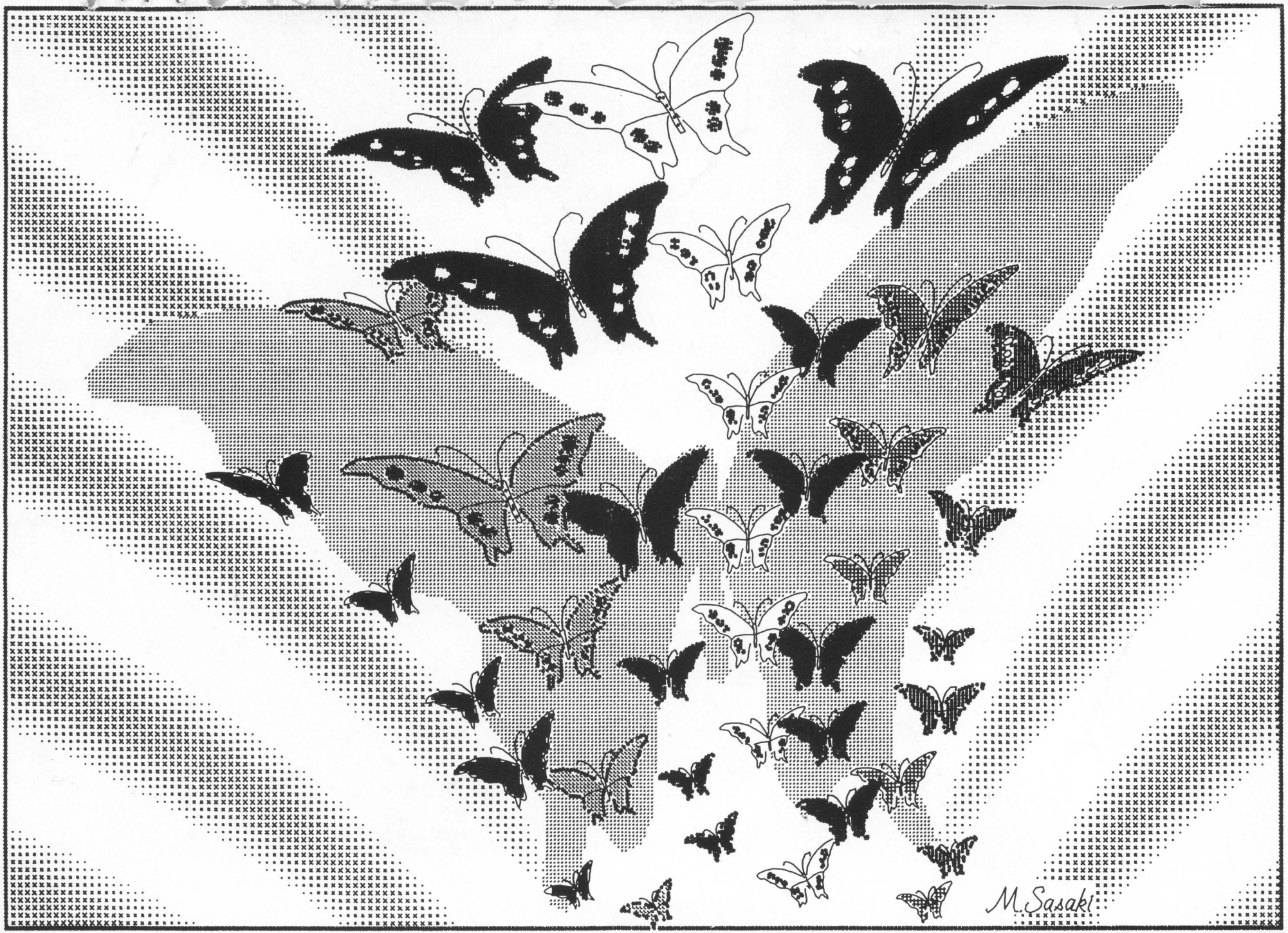
SOLUTIONS

NAYMANDIJ 8109: Make 13 double zeros.

MAXIMDIJ 8109: There is nothing so well known as hope.

NUMBLE 8109: Death makes brevity.

Our thanks to the following people for sending us solutions: T.P. Finn, Indianapolis, IN – Maximdij 8109; Steve Werdenschlag, Livingston, NJ – Maximdij 8109, Numble 8109, Naymandij 8109.



Cont. from page 11

FIGURE 8

Butterfly Dance, by Mutsuko Sasaki