

computers and people

formerly *Computers and Automation*

April, 1975

Vol. 24, No. 4

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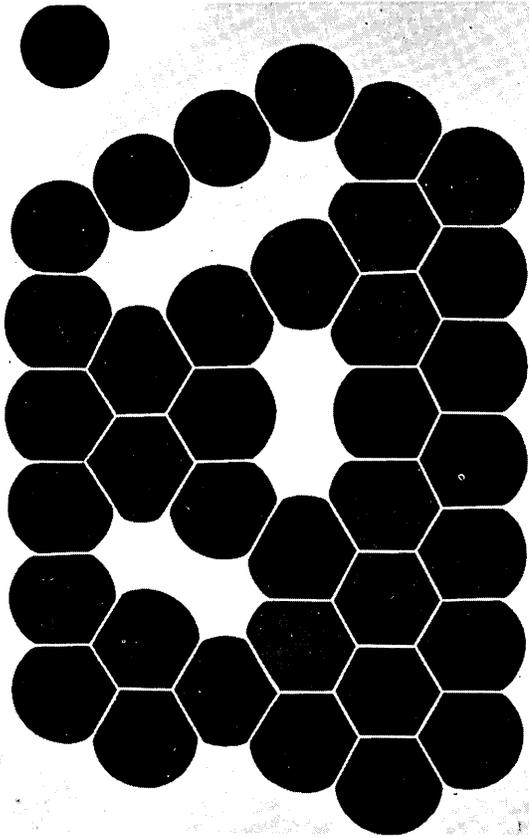
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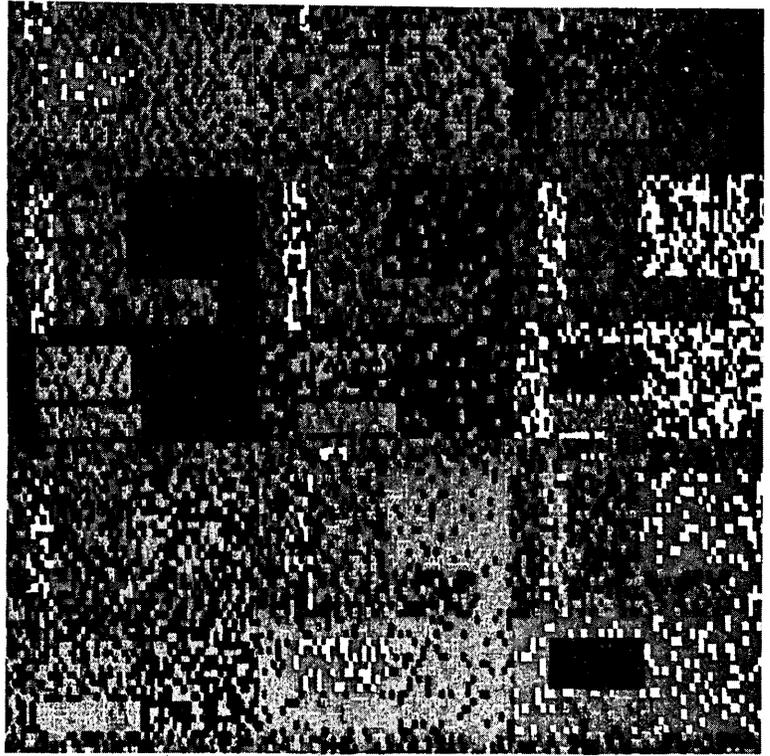
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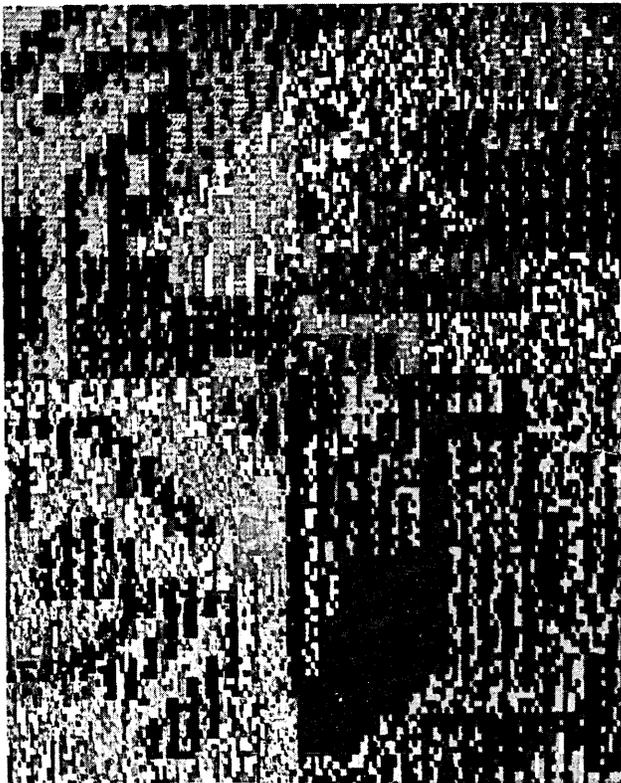
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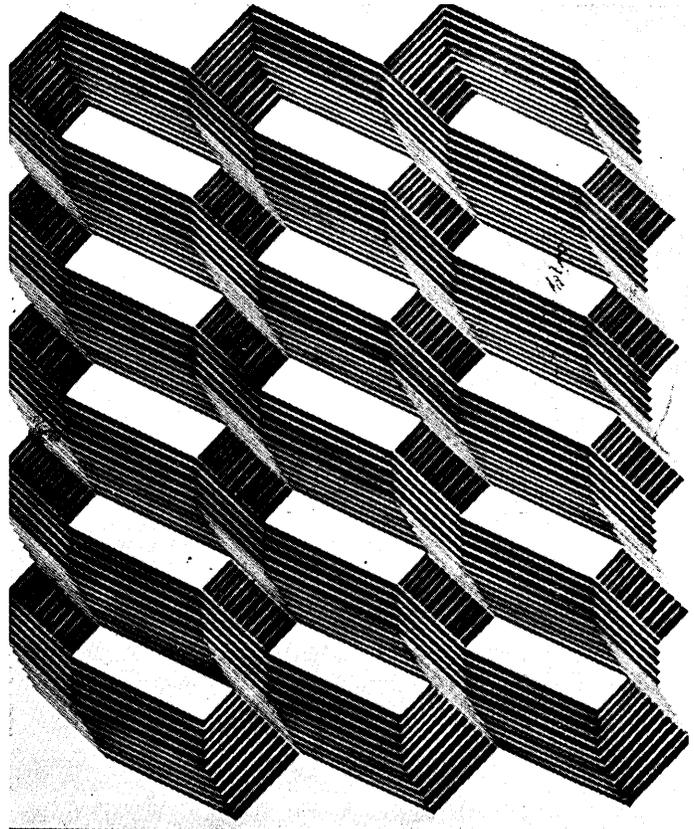
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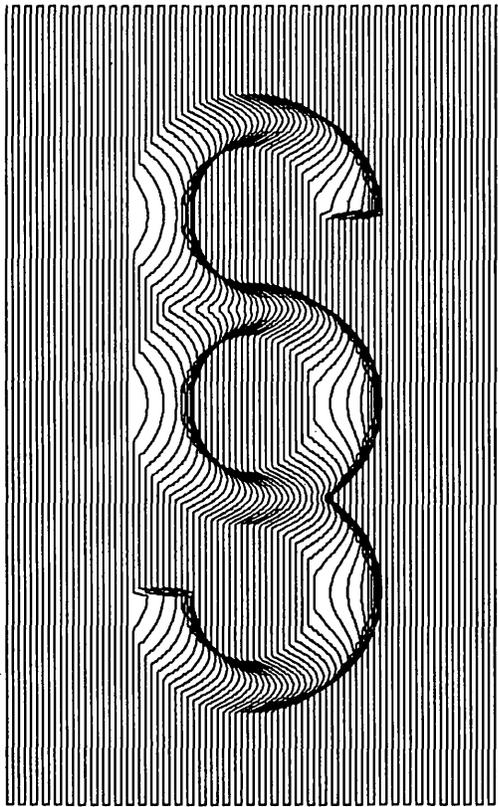
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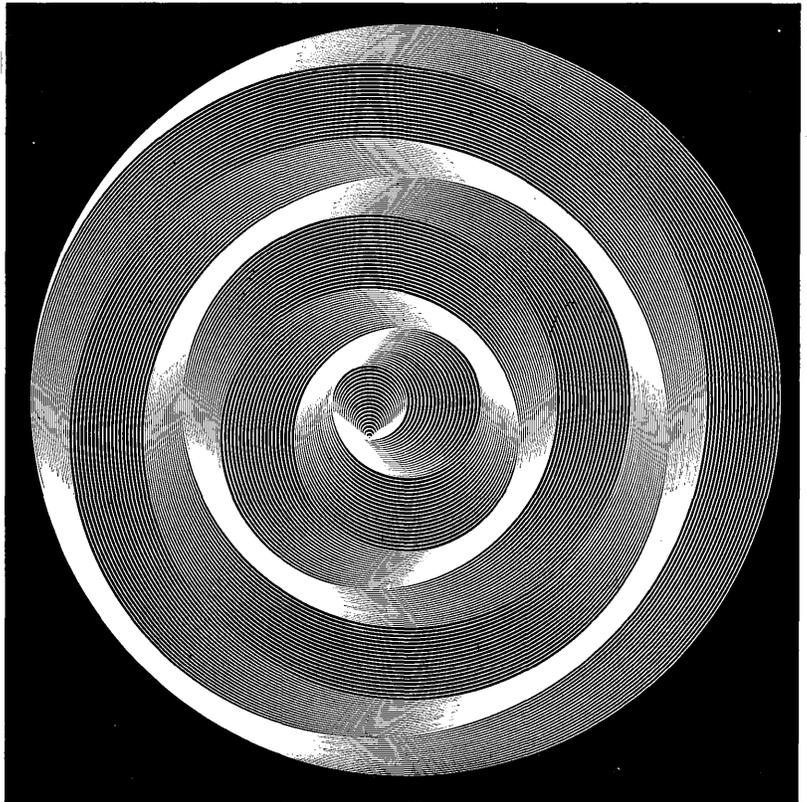
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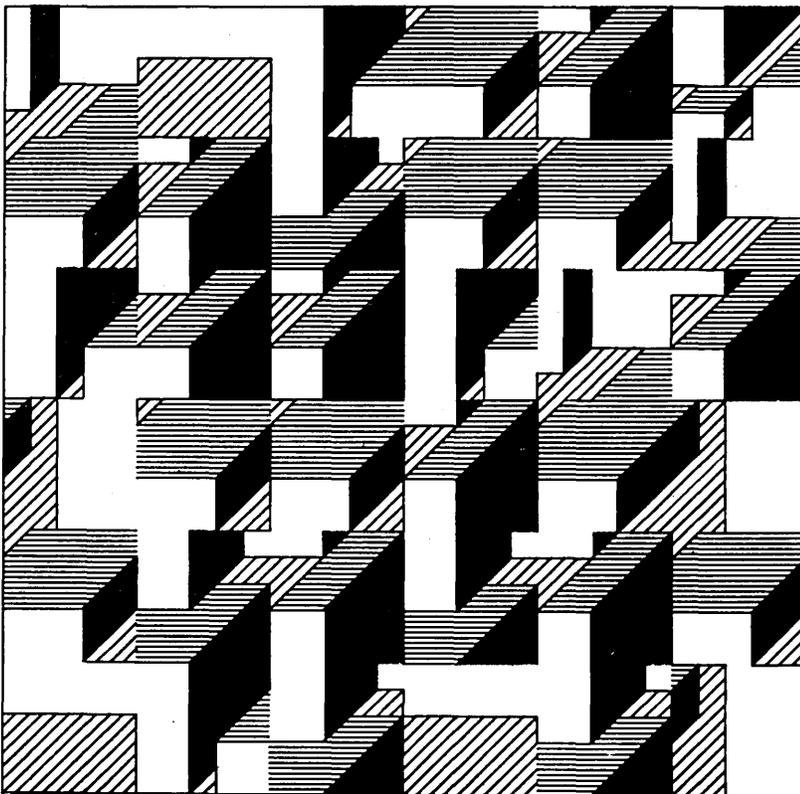
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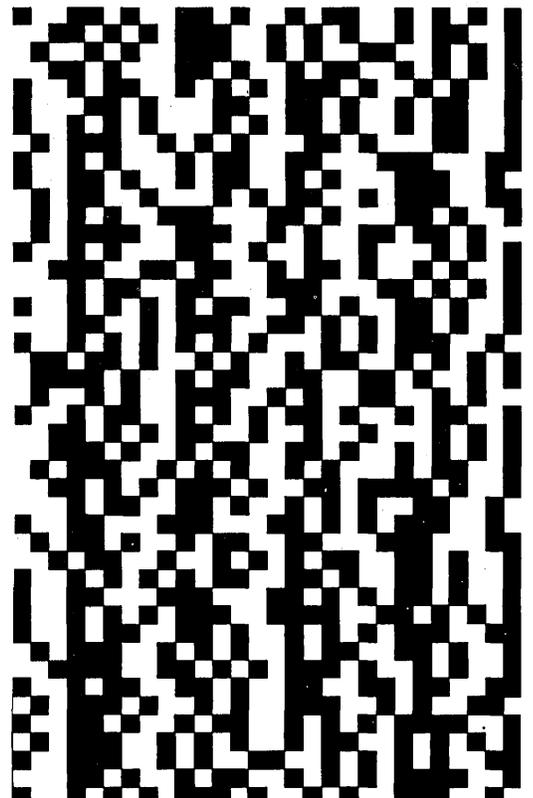
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The magazine of the design, applications, and implications of information processing systems — and the pursuit of truth in input, output, and processing, for the benefit of people.

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COMPUTER ART

The front cover shows a photograph of a piece of computer-generated sculpture programmed by Jose Luis Alexanco of the University of Madrid, Madrid, Spain. He began his computer art in 1968, and has given a series of seminars "Automatic Generation of Plastic Forms". He uses a library of basic forms, and transforms and deforms them with programs in FORTRAN. His address is Infanta Mercedes, 45 - 7o - A, Madrid 20, Spain. Some of his computer art was shown at the 2nd International Conference of Computers and the Humanities in Los Angeles, Calif., April 3-5, 1975. More of the computer art shown there is reproduced on pages 2 and 3 of this issue. — Grace C. Hertlein, Art Editor.

ANNOUNCEMENT

A great part of the department
The Profession of Information Engineer and the Pursuit of Truth

which *Computers and People* has published in the past, will now be broken out and published as a separate monthly magazine

PEOPLE AND THE PURSUIT OF TRUTH

The first issue is May 1975.

See the fuller announcement on the back cover.

Key

[A]	—	Article
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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.

How Do Computers Affect People?

In a magazine entitled "Computers and People", it makes sense from time to time to examine the question: "How do computers affect people?"

From one point of view, one could argue that the answer is:

- In thousands of ways — it is silly to expect a short answer to that question!

Another answer is:

- In just the same way as matches: sometimes usefully, sometimes harmfully — it depends!

A third answer is:

- Like every other new technological development, in a way that benefits a few people and disturbs a great many — it would have been better if computers had never been invented!

These are insubstantial, glib, shallow answers.

Answers that are much more interesting and penetrating are given in an article "Science and the Advanced Society" which we published in April, 1966, and because of its permanent interest, we publish it again in this issue. The author is C. P. Snow, the English writer, scientist, and philosopher, author of "The Two Cultures" and many other books. In this article he puts forward many interesting and important propositions:

- The computer is by far the most remarkable kind of machine yet made by man.
- The great instrument, which is about to transform our lives, is the computer. It is not just a calculating machine. It is a source of information, of memory; an instrument which can collect information, settle it, keep it, store it, analyze it, and so on.
- We really know very little about computers; we don't even understand yet their true nature.
- A great deal of the details of our personal lives will be open and at the service of a central government.
- A great many operations will be done by computers which are now being done by men.
- A large slice of the population, perhaps 80%, will be underemployed and will remain underemployed forever.
- There is no excuse whatever for these things to take us unawares; we have had heaps of warning.

In the last ten years some more aspects of how computers affect people have become very prominent:

- On a very large scale computers avoid waste, increase efficiency, improve individualized attention as with airline reservations, and rationalize production.

- The use of computers on a large scale has made prices lower by 10 to 30 percent and often much more, than they would be without computers.
- The use of universal identifiers in computing systems is leading to a crisis in individual privacy.
- In the investigation of testimony, a computer being used on line enables the questioners to make almost immediate comparison of statements made. This leads to much improved questioning. (This was particularly illustrated in the functioning of Senator Ervin's committee investigating the Watergate crimes.)
- The solutions of problems connected with the limits to growth and pollution are drawing greatly on the powers of computers.

To sum up, it seems to me that there are three profoundly important avenues in which computers affect people:

1. Decision Making. Computers are a technology for discovering possible decisions and choosing among them.
2. Mental Exploration. Computers are a technology for investigating and exploring ideas, thoughts, possibilities, "what if ?"
3. Survival of Man. Computers are a way of handling information which is so powerful, and so adaptable, and so able to refer to far more information than man can keep in his mind, that they promise to make the difference between the survival of the species man on this fragile spaceship Earth, and the extinction of man.

People are not adapted to the kind of life they now live. They do not have mind enough to solve all the problems which face them. They urgently need to supplement their minds. And the partnership between people and computers is likely to fill this need.

Once I heard a remark "Weeds are plants which we do not yet know how to use." And we might well say, along with C. P. Snow:

Computers are machines which we do not yet know how to use.

Edmund C. Berkeley

Edmund C. Berkeley
Editor

THE PURPOSE OF FORUM

- To give you, our readers, an opportunity to discuss ideas that seem to you important.
- To express criticism or comments on what you find published in our magazine.
- To help computer people and other people discuss significant problems related to computers, data processing, and their applications and implications, including information engineering, professional behavior, and the pursuit of truth in input, output, and processing.

Your participation is cordially invited.

MULTI-ACCESS FORUM

"IBM AND THE MAINTENANCE OF MONOPOLY POWER" — COMMENTS

1. From J. R. Young
Director of Information
IBM Corp.
Armonk, N.Y. 10504

Your February 1975 issue devoted 21 pages to the Department of Justice's economic pretrial brief in the U.S. vs. IBM case.

Enclosed is a copy of IBM's pretrial brief which was filed with the court on January 15, 1975. It is IBM's answer to many allegations that have been raised against IBM but have yet to be proven in a court of law.

I think you will find the IBM brief also answers a number of the allegations made by you in your editorial in that same issue.

It seems only fair that you give IBM's brief the same comprehensive coverage you gave to the government's brief.

2. From the Editor:

Thank you for your letter and the enclosure of IBM's pretrial brief, 374 pages long, which I look forward to reading soon.

What we published in our February issue was not an "economic pretrial brief of the Department of Justice", but a memorandum supplementing the U.S. government's case; the memorandum stood on its own feet as a candidate for an article in our magazine. We have not seen the government's pretrial brief.

We are glad that IBM is interested in presenting in our magazine IBM's defenses and positions. We shall be glad to devote approximately equal space to IBM's presentation when we receive it.

It is, however, totally impossible for us:

- (1) to convert the 374 pages of IBM's pretrial brief into a 21 page article in our magazine;
- (2) to determine which allegations in the editorial in February are challenged by IBM, which are not challenged, and what IBM's responses to the challenged allegations are.

If you can send us a presentation of IBM's position, responses, replies, and defenses to what we

have published, in a form that will fit within approximately 20 pages of our magazine, we shall be eager to publish it.

3. From J. R. Young
Director of Information

Thank you for your very generous offer to devote some twenty pages of your magazine to IBM's position in the U.S. vs. IBM case.

As you may know, there is a court order which prohibits either party from commenting on or characterizing the case with the press. However, that does not preclude either party from referring the press to the public record. That's what I intended when I sent you a copy of IBM's pretrial brief. The brief states IBM's basic position and defense in the case.

I can understand how 374 pages would present a problem for you if you attempted to reprint it completely. Obviously, it can only be excerpted. While it would be inappropriate for me to select the actual excerpts for you, I would note that Part I is headed "Introduction and Summary".

Thank you for your kind consideration.

4. From the Editor:

Thank you for your second letter.

I have taken another look at the pretrial brief. Part I consists of "Introduction and Summary", pages 1 to 67. Part 2 consists of "The Issue of Monopoly Power", pages 68 to 270. Part 3 consists of "The Issue of IBM's Conduct", pages 271 to 372. Part 4, "Conclusion", consists of pages 373 and 374. All of the brief is worded in regular legal fashion with citations, gaps where information has to be held confidential, legal jargon such as "plaintiff", etc. It is in no way an article. The amount of work which would fall upon us to make excerpts and produce an article is altogether beyond what we can undertake. Furthermore, any selection by us of excerpts would lay us open to the charge that we had not made the right excerpts.

In order to produce an article that could be published, all that IBM would have to do is prepare an article in the form of "a memorandum to the court supplementing IBM's case", and file it with the court making it a public document. Then the press (including us) could publish it if it chose to.

I still do not know which of the allegations in my editorial you objected to. The same tactic could take care of that specification.

This magazine is deeply concerned with a fair and truthful presentation of both sides of any important issue.

THE FLOOD OF PROCESSED DATA

1. From James David Bessar
509 So. Patterson St.
Madison, Wisc. 53703

As a freelance writer who has written frequently on the social implications of sophisticated computer technology, I am an avid and appreciative reader of your excellent publication. I would now like to request your assistance in the pursuit of a subject I am currently investigating.

To your knowledge, has there ever been any systematic investigation of the possibility that our society, with all its advanced data processing capability, is generating more processed data than can be effectively assimilated into existing scientific structures? While many computer scientists have agreed that there may well be a "data glut", few are able to document the dimensions of this problem or its probable repercussions. I would like to put this question to you and your readers: Are we, or will we be, swamped with processed data, to the detriment of good research? Do you know of anyone who has investigated this possibility? Are there any fields that rely heavily on computers that are particularly susceptible to this type of problem?

Any references to research in this area will be greatly appreciated. I would be grateful for any comments — speculative or otherwise — which you or your readers could provide.

Thank you for your cooperation — and for a useful magazine.

2. From the Editor:

I hope that our readers can throw some light on your investigation.

To me it is evident that even before the advent of computers, many good ideas and fruitful avenues for scientific development and investigation were not noticed and were ignored. One of the classic examples is Gregor Mendel's research in the inheritance of biological characteristics, which was published in an obscure journal and ignored for 30 years. A recent article in "The Scientific American" on Wegener's theory of continental drift shows how that theory put forward about fifty years ago was largely neglected and even ridiculed until recently.

The swamping of ideas by computer-produced data is probably just one more example of the hit or miss development of science. It takes work to search into the literature and it is not nearly as much fun as doing experimental research.

THE SOCIOLOGICAL EFFECTS OF MICROPROCESSORS

1. From Mark I. Grumet
Electrical Engineering Dept.
University of Florida
Gainesville, Fla. 32611

I am currently enrolled in the graduate program at the University of Florida's Department of Electrical Engineering. My option is Computer and

Information Engineering and I am presently taking a course titled "Computer Machine Theory". For a term project I am writing a report on the sociological and economic impact of microcomputers. By microcomputers I mean electronic calculators, electronic cash registers, microprocessors, computers-on-a-chip, etc. Their sociological effect is related to the effect of present general purpose computers, but will differ significantly due to their low cost and portability. The report will focus on present microprocessor-based products and their performance and effect on the public. (For example, will electronic calculators replace people's ability to do simple math?) It will include a prediction of future microprocessor products and their impact.

I would appreciate it if you could send me any information from your research that would pertain to the microcomputer's effects on society. In addition, I would like to know of any magazine articles or publications pertaining to this subject.

2. From the Editor:

We suggest that you look in a nearby library for issues of "Computers and People", formerly "Computers and Automation", especially the January issue of 1974 and of 1973; each contains an annual index of the preceding year's issues. In the March 1975 issue is the annual index for 1974. In the indexes you should find what we have published on subjects of interest to you, microcomputers, social implications, and the like. Also, in our February 1975 issue is an article by Tom Gilb, "Microcomputers — Their Present Properties and Probable Applications".

When your report is ready, do let us take a look at it. It might produce a good article for us to publish. I enclose a memorandum for prospective authors. We send you best wishes and good luck.

HOUSE RESOLUTION 204 — FOR A CONGRESSIONAL COMMITTEE TO INVESTIGATE POLITICAL ASSASSINATIONS IN THE UNITED STATES

1. Henry B. Gonzalez, Member of Congress
House of Representatives
Congress of the United States
Washington, D.C. 20515

(Address to the House on February 19, 1975,
as reported in the Congressional Record.)

Mr. GONZALEZ. Mr. Speaker, today I am introducing a House resolution calling for you to name seven Members of the House to a select committee, one of whom you shall designate as chairman, to conduct an investigation and study of the circumstances surrounding the deaths of John F. Kennedy, Robert F. Kennedy, and Martin Luther King, and the attempted assassination of George Wallace.

Under the terms of the resolution the committee is authorized and directed to conduct a full and complete investigation and study of the circumstances surrounding the deaths of these men — a President of the United States, a U.S. Senator seeking the Presidency, a civil rights leader of international prominence, and the attempted murder of the Alabama Governor as he was seeking the Presidency.

For the purpose of carrying out this resolution the committee, or any subcommittee thereof authorized by the committee to hold hearings, is authorized to sit and act during the present Congress at such times and places within the United States,

including any Commonwealth or possession thereof, whether the House is in session, has recessed, or has adjourned, to hold hearings, and to require, by subpoena or otherwise, the attendance and testimony of such witnesses and the production of such books, records, correspondence, memorandums, papers, and documents, as it deems necessary; except that neither the committee nor any subcommittee thereof may sit while the House is meeting unless special leave to sit shall have been obtained from the House. Subpenas may be issued under the signature of the chairman of the committee or any member of the committee designated by him and may be served by any person designated by such chairman or member.

The committee, under the terms of this resolution, shall report to the House as soon as practicable during the present Congress the results of its investigation and study, together with such recommendations as it deems advisable. Any such report which is made when the House is not in session shall be filed with the Clerk of the House.

Mr. Speaker, I have introduced this resolution after much consideration. It has not been a decision I have made hastily.

It is time that we study all this in retrospect, and with calmness and dispassion.

There are questions to be resolved. I was at Dallas the day that President Kennedy was killed, and I suspended judgment on the questions that arose then and shortly thereafter until Watergate, August 1973, revealed possibilities heretofore considered not possible.

I feel there is a congressional responsibility, and make no mistake about it, there is a great mass of American people and citizens in the world who are greatly concerned. And, I believe that since the national psyche has been traumatized by all of these shocking crimes there is a clear and impelling responsibility for the Congress to discharge.

Congress has never before studied the assassination of any President, but as the elected representatives of the people, I feel that it is clearly our responsibility to do so if there is any indication or reason to suspect that the truth of the circumstances resulting in the murder of a President have not been revealed, and any parties responsible and not previously known have not yet been brought to justice.

No similar period — the assassination of other nationally politically prominent people — has ever followed the deaths of the other assassinated American Presidents prior to John F. Kennedy, and there is a large body of knowledge done by committees and organizations involved in the study of the assassinations and independent researchers — scholars, journalists, pathologists, and others in forensic medicine — which warrants our attention and at least our attempt to verify.

During the past several months I have become increasingly sensitive to the need to conduct such an investigation because I have become a rallying point for people from throughout the country who are unsatisfied with the findings of the Warren Commission about the death of President Kennedy.

There has long been a need for further study of this death alone because, as the Gallup poll taken in January 1967 revealed, some 64 percent of the American public believed that more than one man was

involved in the assassination.

Study of this assassination or any of the others is not something which I alone, or even one small select committee, can do. It will take support of a majority of this legislative body, and I hereby call for that support.

We must settle for once and for all in the interest of the welfare of our country and the future of its people the truth of what happened at Dallas on November 22, 1963 and what Lee Harvey Oswald carried to his grave before he had his day in court, and perhaps what Oswald did not know.

We must find out if the President's death was in retaliation to the Bay of Pigs invasion against Cuba, and what connection did Oswald's murderer, Jack Ruby, also dead, have with all of this.

We must find out if there is any connection with the deaths of Senator Robert Kennedy and Dr. Martin Luther King, and why there is any reason for cases of their two assassins to be back in the courts.

There is reason to subpoena E. Howard Hunt and Charles W. Colson, the Nixon assistant, who, according to the Washington Post, called Hunt following the attempted assassination of Governor Wallace to order him immediately to Milwaukee and to break into the apartment of Wallace's suspected assailant.

There are many more disquieting questions to be resolved — so many as to boggle the mind — but they must be answered — with calmness, objectivity, dispassion, and fairness.

2. From: Congressman Henry B. Gonzalez

To: Richard E. Sprague
Hartsdale, N.Y. 10530

This is in further reference to your previous communication to me, regarding my interest in reopening the study of the assassination of President John F. Kennedy.

On February 19, I introduced in the U.S. House of Representatives, H. Res. 204, which, if passed by the House, would create a select committee in the House to conduct an investigation and study of the circumstances surrounding the deaths of John F. Kennedy, Robert F. Kennedy, and Martin Luther King, and the attempted assassination of Governor George C. Wallace. Enclosed is a copy of my statement, as it appeared in the "Congressional Record".

The resolution has been referred to the House Committee on Rules of which the Honorable Ray Madden (D.-Indiana) is Chairman.

It is important that you communicate with your own Congressman or Congresswoman, to ask that he or she support H. Res. 204 by becoming a co-sponsor and by pressing for an early hearing on the resolution in the Rules Committee by communication to Congressman Madden and others on the Committee.

Again, thank you for your interest. □

New monthly magazine:
PEOPLE AND THE PURSUIT OF TRUTH

See announcement on back cover.

THE ATTIRE OF MEN WORKING ON SYSTEMS SOFTWARE

Anonymous
Sperry Univac Information Center
Blue Bell, Pa.

January 24, 1975

All males working on systems software at Sperry Univac's Blue Bell, Pa., Development Center have been ordered to wear shirts and ties to work by Systems Software Director, Frank M. Delaney. The order includes systems programmers, computer operators and the lowliest disc "gofer" and tape clerk. The men have also been ordered not to wear blue jeans and sneakers to work.

The order was given without any explanation of intent or purpose. Other professional workers at the center, including engineers, draftsmen, designers, and accountants, have not received a similar order at this time. The employees covered by the order do not have regular or frequent contact with customers or visitors.

No mention of females working in software development was made in the order, which was given verbally. Apparently the discriminatory and possibly illegal nature of the order was not taken into consideration by Univac management. There is no indication that the ladies will be required to wear shirts and ties.

ARTICLES ON POLITICAL ASSASSINATIONS IN THE UNITED STATES — BACK COPIES

1. From Aries Arts
201 Capitola Ave.
Capitola, Calif. 95010

We are carrying on our newsstand many books and magazines with articles on the subjects of political conspiracies and assassinations. We'd like to carry "Computers and People".

As you know, many periodicals sell slowly and in limited numbers especially those dealing primarily with political subjects. Some of the items we carry even lose money for us; many only break even. Accordingly we like to buy periodicals on a non-returnable basis paid for 3 to 6 months in advance so as to get them at the lowest possible cost per issue.

Would you kindly advise us as to the cost for three issues of "Computers and People" mailed each month on a non-returnable basis and paid for in advance? If we are able to sell more copies, we can increase the order.

Also, several of Mae Brussell's listeners have asked us about back issues of your magazine. For example, the first article, May 1970, is much in demand hereabouts since the copy in the University of California at Santa Cruz library has long since been stolen.

Please let us know what back issues are available and the price for resale here in our store.

2. From the Editor:

All back copies of "Computers and People", formerly "Computers and Automation", containing articles on political assassinations in the United States and other suppressed subjects of importance are in print and available. The price of single back copies is \$2.00 each at retail. At wholesale, discount ranges

from 25% to 40% depending mainly on the number of copies.

The supply of the May 1970 issue which contains the first article, 32 pages long, "The Assassination of President John F. Kennedy: The Application of Computers to the Photographic Evidence", is large. This article demonstrates that the Warren Commission Report (a lone assassin) is impossible to believe on the basis of the evidence.

ON-LINE COMPUTER USED TO "SEE" IN BRAIN SURGERY

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A new computer programme which can assist a neurosurgeon in the operating room has been developed by engineering scientists at the University of Toronto in Canada. It is called Computerized Data Processing System for Stereotactic Neurosurgery. It involves the use of a technically directed probe introduced into the brain through a small hole in the skull. Modern telecommunications could enable surgeons working simultaneously thousands of miles from each other to relay on the same computer programme.

The idea was conceived by Dr. Ian Rowe, Associate Professor at the university's department of electrical engineering, and developed in cooperation with Toronto General Hospital and the computer centre at the university. Dr. R. Tasker, a neurosurgeon at Toronto General Hospital, uses this technique for the control of tremours and for the relief of pain. The problem, however, has been that the target site of the probe cannot be seen by the surgeon.

Under local anesthesia, the probe is advanced by small increments towards the tentative site. The surgeon determines its position in the brain by passing weak electrical pulses which elicit a response in the patient's body. The site and nature of the response is related to the location of the probe.

Since the probe may pass through 60 stimulation sites with up to five responses in each, the surgeon has to interpret and act upon a mass of data. Professor Rowe determined that this information could be taken from the operating room through a portable computer terminal.

The computer programmes for this project were written by Peter Hawrylyshyn, a fourth-year student, whose thesis was judged the best of his year in engineering science.

The data is transformed into a graphical output which shows the section of the brain and the trajectories of the stimulated responses evoked in the various body areas. Results are printed out in less than 10 seconds. From the figurine map, the neurosurgeon can choose the final site for making a lesion so that the operation can be brought to a quick and satisfactory conclusion. The link from the portable computer terminal to the main computer is by telephone; this will eventually enable surgeons working, for example, in Lima, London, or Lusaka, to use the same programme in Toronto.

Studies are currently progressing on all previous records of stereotactic neurosurgical operations. Specialists are hoping to create a computer data bank to provide information that will assist future operations. □

THE TELEX VS. IBM DECISION: The Appellate Court Reversal

The Computer Industry Association
16255 Ventura Blvd.
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"We believe that uncontested dominance of a vital American industry by a single company will ultimately lead to the stagnation of that industry . . ."

The Computer Industry Association

The Computer Industry Association consists of forty-five member companies representing all segments of the Computer and Data Processing Industries. The Association, its staff, counsel, and member company chief executives and counsel, have followed with extreme interest the various antitrust actions against IBM. The resolution of these cases will largely determine the shape and character of the computer and data processing industries for many years to come.

Competitive and Superior Products

Our member companies and their more than 65,000 employees have worked long and hard in an effort to develop and offer products and services that are competitive with and superior to those offered by the IBM Corporation. The fact that these companies have, to a large extent, been successful in their efforts to offer the computer user alternatives that are more cost effective than those offered by IBM was attested to by the 10th Circuit Court of Appeals when it stated, "The record shows, during the period under consideration, that the parties [IBM and Telex] and others in the market produced more advanced products better suited to the needs of the customers at lower prices."

Dominance by a Single Company

We believe that uncontested dominance of a vital American industry by a single company can and will ultimately lead to the stagnation of that industry and inevitably to Government intervention in the private sector through regulation as in the case of AT&T, or to defacto nationalization as in the case of the Penn-Central. Furthermore, we believe that our nation's installed base of data processing equipment is rapidly becoming an integral and critical element of our total economic system. As such, the user of data processing equipment and services should benefit from continued competition that strives to improve products, offer alternatives to the user, and provide improved cost performance. The recent decision by the Tenth Circuit Court of Appeals raises serious doubt as to the future level and quality of competition within our industry and raises a spectre of ultimate Federal Regulation. The latter would not benefit the computer user, the general public, the IBM company, or our member companies.

The Telex vs. IBM Reversal

The Computer Industry Association is both distressed and alarmed by the implications of the decision of the Tenth Circuit Court of Appeals in Denver in the case of Telex v. IBM. Our concern stems from three important aspects of that decision.

The Real World vs. the Courtroom

In the first place, we, as experienced professionals in the field of computers and data processing, are shocked by the obvious disparity between Judge Sherman A. Christensen's findings of fact about our industry, (which closely parallel our own perceptions derived from day-to-day involvement in that industry) and the findings of the Appellate Court Judges who heard this important case.

The Key Differentiation

Computer systems and sub-systems manufacturers, computer users, software producers, a variety of firms in markets ancillary to computer markets, as well as financial analysts, the trade press and others have long recognized that the architecture of the central processing unit and its associated operating software is the key differentiation between the offerings of one systems manufacturer and those of another. It is also widely recognized that IBM has manufactured and sold or leased between 60% and 70% of the total dollar value of all general purpose central processing units installed in the United States.

User Migration

We are confident that the vast majority of computer users know full well that IBM has consciously striven to maintain maximum product differentiation between its CPU's and software in order to make conversion from IBM central processors to those of its competitors extremely time consuming, costly, and hazardous to the smooth functioning of the data processing activity. As a consequence there has been an almost insignificant amount of user migration between systems manufacturers since the very beginnings of this industry. It is for this reason that no single systems competitor has been able to capture more than 5% of the market except by acquisition of the installed lease base of a fallen rival.

On the basis of these known market realities we must seriously question the Court's finding that "... IBM's share of the data processing industry as a whole is insufficient to justify any inference or conclusion of market power ..." If the Judges had availed themselves of qualified and neutral technical expertise, they would have realized that a dominant share of the central processor market provides effective control of the market for devices that interface with the CPU.

The Independent Producer has Forced Improvement in Both Price and Performance

As noted above, it has been virtually impossible for the major systems manufacturers to shake IBM's control over the market and its ability to restrict the user's freedom of choice among more cost effective systems. Recognizing the virtual impossibility of penetrating the formidable barriers that IBM had erected around its installed base, an entire sub-industry came into being that sought AT LEAST to offer the user a choice between alternative products and services that would supplement and increase the cost effectiveness of the users total system.

Efforts of the Non-IBM Component of the Industry

It was only through the efforts of the non-IBM component of our industry that the computer user of today benefits from high speed, high capacity, and significantly lower priced magnetic storage devices, key to tape and key to disk data entry systems, optical character recognition equipment, sophisticated plotters, time sharing, virtual memory, high speed printers, intelligent terminals and the many other major innovations of the past decade.

IBM did not choose to make these innovations available to the user until forced to do so by the competitive inroads of the smaller independents who offered the user an alternative.

The Market Place for Plug-Compatible IBM Equipment

In short, every member of our industry, supplier and user alike, considers that there has developed a clear-cut marketplace for peripheral equipment plug compatible with IBM equipment, despite the Appeals Court finding that no such market exists.

We also believe that the Tenth Circuit erred in their interpretation of the law. In stating that there was no relevant market for peripheral equipment plug compatible with IBM, they used the principle of supply substitution as set forth in the Dupont Cellophane case. In that case, it was stated that customers had a clear option either of using cellophane or other flexible wrappings to achieve the purpose that cellophane served. In the Telex case, there was no mention of computer customers having the option of substituting peripheral equipment, but rather the court focused on a supplier purportedly being able to enter either the IBM plug compatible market or the market for peripheral equipment plug compatible with another manufacturer's mainframes. While there are a few exceptions, in the real world it is certainly not the case that the user of ANY computer mainframe has the option to acquire and attach EVERY other systems manufacturer's peripheral units.

Attempt to Monopolize

Our second source of concern has to do with the manner in which the Court handled the issue of monopolistic practices. The United States Department

of Justice has found it necessary to bring suit against IBM on grounds of attempting to monopolize the markets in which it operates three times over the past forty years. Despite this fact, and ignoring the findings of the lower court, the Tenth Circuit found that "The 'attempt to monopolize' aspect need not be separately considered."

Manipulation of Pricing

The record of the Telex case clearly shows that IBM manipulated the pricing between peripheral products and mainframe computer systems with the intent to injure competition, without giving the user either a cost or performance benefit. The ample evidence from IBM's own internal documents of their sophisticated plotting to monopolize was therefore disregarded by the Denver Court. Anyone with reasonable knowledge of this industry who has read these documents knows that IBM set out to destroy the independent suppliers while using their vast legal resources to circumvent the intent of our nation's antitrust laws.

Under governing antitrust law, as established by numerous cases over the last two decades, a firm with a dominant position in its markets cannot utilize practices that, when combined with their market power, stifle or exclude competition. (Although these very same practices may be perfectly legal for the smaller company that possesses little or no power in the marketplace.)

Relevant Antitrust Precedent: Is the Net Effect Non-Exclusionary?

The Tenth Circuit, in its opinion, not only rolls back more than two decades of relevant antitrust precedent, but seems to assure IBM (and other firms dominant in their respective industries) that no practice it uses to stifle competition will be referenced to its market position in order to determine if the NET EFFECT is exclusionary or monopolistic.

IBM's management may view the Tenth Circuit's decision as affirmation that they in fact have nothing to fear from our nation's antitrust laws. The court has in effect ruled that IBM does not possess significant market power and that they need not be concerned about the anticompetitive impact of any steps that they might wish to take to maintain or enhance IBM's market share and power. If this decision stands, and if IBM should embark upon a program to capture its accustomed 60% to 70% share of each and every sector of the computer and data processing industries, the user's future freedom of choice among alternatives will be severely restricted if not entirely eliminated. In the meantime, the balance of the computer industry may be prejudiced in its ability to attract either debt or equity financing -- whatever the state of the U.S. capital market. IBM may, inadvertently, destroy the very industry that it has helped to spawn since the elimination of additional competition would surely lead to regulation of the industry.

The Effectiveness of the Sherman Clayton Act?

The third reason that we are disappointed in this decision is the questions it raises about the state of the United States antitrust law. It is clear that our present antitrust laws and procedures do not lend themselves to proper judicial comprehension of complex industries and subtle and sophisticated exclusionary business conduct. Some statutory means is required to give guidelines to

the courts so that they may properly sort out these difficult problems. Additional funds may be required so that judges with limited business and technical backgrounds can avail themselves to court appointed expert advice and counsel. In addition, it would appear that our nation's antitrust laws must be updated and revised to reflect what, if any, limits are to be imposed on the aggregation of economic and market power by a single company -- most especially a company in an industry that is essential to our nation's national defense and economic well-being.

It would appear that our antitrust laws are so outdated and vague that they cannot adequately serve as the law of the land. Similarly, it would appear that firms that have been severely injured by IBM's overwhelming response to competitive success can no longer look solely to private antitrust suits for relief. Although existing and possibly new litigants will undoubtedly pursue their suits in an effort to obtain equity in a court of law, the Tenth Circuit has demonstrated that the courts may not provide a timely or even meaningful solution to the concentration of power within our industry.

**The Association Will Seek Alternative Solutions
in an Effort to Maintain the Benefits of Competition
in This Vital Industry**

Recent developments, including the Telex v. IBM reversal, developments within the market place and the attitude of the capital markets toward the non-IBM portion of the computer and data processing industries make it clear that the Justice Department case against IBM must remain the single most important judicial action for the industry.

We must hope that the relief established in that case will be one which makes sense for the industry and the computer user. We expect to make a continuing contribution of our views on the proper kind of relief both near term and long range mediating; we hope to be an ameliorating voice between extreme positions.

Legislative Action

It would now appear, however, that legislative relief from the monopolistic status of the computer industry must be pursued vigorously. We will be working on an on-going basis with various subcommittees of both the House and the Senate to attempt to develop a legislative solution which will restore competition to the computer industry.

Unique Industry Practices that IBM Fosters

The problems are not confined to the fact of the relative size of IBM and other industry members. They relate also to the unique industry practices which IBM fosters. Rental as the dominant mode of equipment acquisition, bundling of hardware and software, selling end-to-end systems rather than boxes are all IBM-promoted aspects of our industry designed to make a competitor's entry and growth extremely difficult if not altogether impossible.

We also believe that additional efforts in the area of establishing computer standards, both hardware and software, are vitally necessary for this industry to survive and for users to have the most cost-effective systems. With the advent of IBM's future systems, we are confident that every attempt will be made by IBM to make it impossible to interconnect with and in fact difficult to interchange data with their products.

Domination of the Economic Central Nervous System

In the longer run, we earnestly believe that the United States is faced with the possibility of a single large corporate entity dominating the central nervous system of our economy. We believe this to be extremely dangerous and hope that either through accelerated judicial action, or properly structured legislative action, we can prevent this from happening.

Relocation of Headquarters to Washington

It is for this reason that the Computer Industry Association is relocating its Headquarters and its staff in Washington, D.C. in mid-March. If our industry is to go the route of the telephone and transportation industries, it should at least be with full and open debate of the consequences, and as the result of a considered judgment of the people and the Congress. Hopefully, we will instead see a restoration of free and open competition, an accelerated improvement in products and services, and a continued U.S. leadership in technology. □

**WHO'S WHO IN COMPUTERS
AND DATA PROCESSING**

THE SIXTH CUMULATIVE EDITION

WHO'S WHO ENTRY FORM

(may be copied and expanded on any piece of paper)

1. Name (Please print) _____
2. Home Address (with Zip) _____
3. Organization _____
4. Its Address (with Zip) _____
5. Your Title _____
6. Your Main Interests:

Applications ()	Logic ()	Sales ()
Business ()	Management ()	Systems ()
Construction ()	Mathematics ()	Other ()
Design ()	Programming ()	please specify: _____
7. Year of Birth _____
8. Education and Degrees _____
9. Year Entered Computer Field _____
10. Your Present Occupation _____
11. Publications, Honors, Memberships, and other Distinctions: _____
12. Do you have access to a computer? () Yes () No
 - a. If yes, what kind: Manufacturer? _____
Model? _____
 - b. Where is it installed: Organization? _____
Address? _____
 - c. Is your access: Batch () Time-Shared ()
Other () Please explain _____
13. Do you subscribe: - to *Computers and People* (formerly *Computers and Automation*): () Yes () No
- to *The New York Times*: () Yes () No
14. Associates or colleagues who should be sent Who's Who entry forms (name and address)

(attach paper if needed)

When completed, please send promptly to: Who's Who Editor, *Who's Who in Computers and Data Processing*, RFD 1, No. Grosvenor-dale, CT 06255

Computer Programs that Understand Ordinary Natural Language

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"Level the level level with a level level."

Outline

1. The Possibility of Computer Programs That "Understand"
2. Comprehensive Understanding
3. The Mixing Together of Grammar, Syntax, and Semantics
4. Context in a Series of Stages from Easy to Hard
5. The Specific Ideas That a Computer Must Recognize
6. Context, Brick-Words, and Cement-Words
7. Degree of Technicality of Context
8. The Common Everyday Context
9. The Cement-Words
10. The Cement-Words of Discussion
11. The Cement-Words of Science in General
12. The Cement-Words of Mathematics
13. The Cement-Words of Logic
14. Cement-Words and Cement-Ideas
15. Frameworks of Cement-Words to Identify Cement-Ideas

1. The Possibility of Computer Programs That "Understand"

Computer programs that "understand" what a human being "says" (types in) to the program, and "reply" fairly sensibly to the human being already exist. Among the examples are:

- "Student" by Dr. Daniel Bobrow, now of Xerox Research, Palo Alto, Calif; and
- "Eliza" by Dr. Joseph Weizenbaum of Mass. Inst. of Technology, Cambridge, Mass.

Several more such programs are being developed in laboratories of artificial intelligence here and there, often in connection with designing and controlling a robot. So the possibility of such programs has been demonstrated by the best of all possible demonstrations: the investigator actually exhibits an entity which has the specified properties.

In the same way, a discovery in mathematics long after the time of the ancient Greeks showed that a 17-sided regular polygon could be constructed with straightedge and compasses. After that at least one such polygon has been constructed in that way and thereby proved possible.

This is the third article in a series by Lawrence M. Clark. The two previous ones are:
1. "Languages among Computers, Machines, Animals, and Men", January, 1975, p. 7, ...
2. "Computer Programs That Converse and Discuss", March, 1975, p. 24, ...

2. Comprehensive Understanding

But the main problem is having a computer program deal easily and well (in the way a human being does) with a large set of words, phrases, and sentences of ordinary natural language. This problem has not yet been practically solved, even in narrow contexts, except for a small set of sentences such as those which pull out information from files.

What are the reasons for this setback in the development of computer programming? It seems to me that the main reasons are some rather unproductive directions of attack. One such direction is syntax and grammar, by itself. Another such direction is semantics, by itself. Another such direction is "biting off more than one can chew at one time." By this I refer to trying to develop general methods all at once that will apply in every context, instead of using a succession of stages.

It is rather easy to show that both grammar and semantics have to be used together to understand "what is being said."

3. The Mixing Together of Grammar, Syntax, and Semantics

Consider the three sentences:

- Time flies like an arrow.
- Fruit flies like a banana.
- Notice flies like a dragon fly.

The first sentence is declarative, and says that time passes in the way an arrow passes, swiftly. The second sentence is declarative, and says that flies of the kind fruit flies (*Drosophila*) are attracted to bananas. The third sentence is imperative, and says, Pay attention to flies that resem-

Table 1

THE VOCABULARY OF A LITTLE GIRL, LAURA H-; EXCERPTS FROM A CAREFUL CHRONOLOGICAL RECORD

1. Age 1 Year 4 Months

dolly
ball
boo-woo
meow
book
shoe
cheese
by-by
nighty-night
go-go
eye
apple
bath
bottle

3. Age 2 Years

Da kiss Laura.
Da kiss Laura mouth.
Pull down shade.
Da hold Laura hand.
Laura hear Da work.
Da open door, see Laura.
Da, dear Da, open door.
Laura sit in Da chair.
man paint
two man paint
more man paint
Mum turn out light.
Mum sit down floor.
Laura go nighty-night, bottle.

5. Age 3 Years

Mum, where did Da sleep? If the babies slept in Da room, where did Da sleep?
Mum, when I take my nap, I'll take those babies to walk. I'll take one by one hand, and one by the other hand, and take them to walk.
Da and Laura know about climbing trees. Mum does not know about climbing trees.
I don't want you to leave me here with no one to take care of me.
The little music book is so lost.
Da is big and strong. He can carry me on his shoulders.
Put your feet here, Mummy. This is a better place for your feet.

2. Age 1 Year 8 Months

by low baby
out bed
out doors
blue bear
ice cream cone
good girl
ride car
oo cow (=moo cow)
up feet (=cover up feet)
Laura's sticks
Laura's ragweed

4. Age 2 Years 6 Months

I want my dollie.
I want blue doll, pink doll, and blue bear.
Take me in bathroom.
One day, little boy and little girl went to see Grandma ...
Mummy, give Laura some more, full.

6. Age 4 Years

Horsey ran away from man. Horsey was bad. He pulled the string from man; when man called Horsey, he did not come. Horsey broke the string. He did not come back when man had food for him. Horsey needs to be tied because he ran away.
I'm going to be a doctor, because it's fun and I'll have lots of money. And buy things.

(Note: The entire record contains 96 dates with entries and consists of 5½ single-spaced typewritten pages. The period covered is three years. In some cases there may be inaccuracies, where a word was not certainly identified. The child pronounced her name (Laura) "Wa-wa" for more than a year; but the change from "Wa-wa" to "Laura" is not shown in the record.)

ble a dragon fly. To understand the original sentences, different meanings, different grammatical functions, and different syntax must all be recognized. Then the interlocking possibilities must be fitted together mentally by a human being (and that sometimes takes noticeable time). Finally, the human being understands (comes to a decision about) what is being said. Then as proof of the understanding he can say the same meaning in another way.

I should think that unraveling such a puzzle of meaning would be difficult for many people. They might say, "I don't see that. Please explain." And some people might even try to picture in their minds a banana flying and fruit flying alongside.

Some more examples of the same sort of problem (much harder than those that often occur) are:

- Rose the rose rose rose.
- Limit every limit with a limit limit.
- Level the level level with a level level.
- Fine fine the fine with a fine fine.
- Round and round round and round I round round the round round round.

(The problem is to punctuate, explain, and paraphrase.)

4. Context in a Series of Stages from Easy to Hard

Some contexts are very difficult even for human beings to understand. An example is textbooks in economics or certain kinds of legal contracts. Other contexts are quite easy to understand, such as the subject of the weather (as dealt with in ordinary conversation), or the subject of arithmetic. In the case of arithmetic, we have a running start: a great many computer programs can be said to understand arithmetic, for they do arithmetic correctly.

It makes sense to begin with small contexts (i.e., contexts with small vocabularies) and short sentences, and then to proceed to larger contexts and longer sentences. This is the progress of a human child. See Table 1.

A child begins with single word utterances. Later the child makes utterances of two words. Later still the child begins to make fairly long sentences though still simple conceptually. A great many ideas however are never talked about at all until the child has been using language for at least half a dozen years.

Lawrence M. Clark, by profession a mathematician, has been an informal student of languages and linguistics for more than 30 years. He says that one of his goals is "to make all the language of thought calculable like mathematics."

5. The Specific Ideas That a Computer Must Recognize

As stated previously, a computer can deal with ideas, understand them, and discuss. What specifically has to be done to make this happen? What are the specific ideas that a computer must recognize if it is to understand?

The computer "understands" and "knows" what to do about the mathematical ideas of 2, 3.14159 ..., PLUS, and SQUARE ROOT; exactly what is the computer to do about ideas other than mathematical ideas?

Let us take a simple example to make even clearer the nature of the problem which we are concentrating our attention on. Take for example the two sentences:

1. All mantelops hile.
2. Mantelopicity is a sure sign of hilation.

Even though we do not know what a mantelop is, nor what hiling is, we do know because of the nature of the English language, that these two sentences are "saying the same thing". They have the linguistic form:

- 1B. All X's Y. (Or: All X's do Y.)
- 2B. X-icity is a sure sign of Y-ation.

and the "thing that is said", the logical meaning, is that:

The class of X's is contained in the class of things that Y (or do Y).

Here then is an example of the kind of operation which we are asking the computer to perform eventually in regard to all the words and sentences that occur in language. The computer needs to be programmed to recognize the ideas that occur and the "things that are said" in any text or discourse (or string of expressions) furnished to it. How do we go about this?

6. Context, Brick-Words, and Cement-Words

The first important indication that human beings seem to use for going from expressions to meanings is "context", the situation or environment in which the expression appears. For example, if we are thinking of the context of the game of bridge, the expressions "deck, shuffle, trick, honors" take on unique meanings related to card games. We easily think first, and quickly, of a deck of cards, not the deck of a boat; of shuffling the cards, not of an old man shuffling along the sidewalk; of a trick consisting usually of four cards, one collected from each player, not a mean trick or a playful trick; of the honor cards of a suit of cards, not of a student on the honor list.

To program the computer, it would be easy to give the computer a section in its memory in which would be stored a long list of labels for contexts. Associated with the idea-labels stored in other sections of the machine would be context-labels. Then the procedure for determining the appropriate idea-labels for a string of expressions coming in to the machine would be to match the context-labels tagging the words, and select for the context the one whose label occurred most often.

Within any one context, the problem of determining ideas is relatively easy. Most ideas are tagged with single-meaning words. Ideas are then made clear and definite, and we approach the happy state in which we can readily calculate with idea-labels. In the game of chess, for example, the following words all have a neat one-to-one correspondence with ideas: "king, queen, bishop, rook, knight, pawn, black, white, board, square, rank, file, diagonal" In fact, the list of the special words belonging to chess is only 30 or 40 terms long. The words which belong specifically to a given context can conveniently be called "brick-words"; and the remaining words which may be used in a great many contexts and which put brick-words together can conveniently be called "cement-words".

Sometimes a piece of writing will clearly state its context, using a phrase like "in the field of ..." or "this paper deals with" But most of the time the context of a piece of writing is not stated explicitly at the start. The procedure then is to read the first half-dozen lines of the piece of writing, notice the brick-words, and deduce the context from matching context-labels for the brick-words.

A computer program could do this. It would examine the first half-dozen lines of a piece of writing, and perform a matching program upon the context-labels of the meanings of the words. It would then choose, as a result of the program, the context which was alluded to by the context-labels most frequently occurring.

The number of the more important contexts that a computer may eventually be expected to deal with may be estimated from the number of contexts listed in a large dictionary, perhaps 1000 to 2000. Here is a listing of some of the contexts recognized in a certain college dictionary as affecting the specialized meanings of words:

Accounting	Anthropology
Acoustics	Anthropometry
Aeronautics	Antiquities
Agricultural	Archeology
Machinery	Architecture
Agriculture	Arithmetic
Alchemy	Armor
Algae	Art
Algebra	Astrology
Analysis	Astronomy
Anatomy	Astrophysics
Ancient History	Automobiles

But for any one (rational) discussion, the computer would only need to deal with a single context.

7. Degree of Technicality of Context

The nature and degree of the technicality of a context changes from time to time as the interest of a society changes. In the study of stones, for example, at the earliest stage there were for brick-words only words in common everyday use such as "rock, stone, pebble, gravel, sand, mud, clay, gold". After a time different species of stones began to be identified but not systematically: "quartz, feldspar, mica, Iceland spar". Finally a third wave of interest occurred, and a new flock of names appeared, like "heulandite, apophyllite, zeolite, stilbite"; these terms regularly made use of the suffix "ite", coming from the Greek and meaning rather generally "one of" or "belonging to".

Corresponding to any context is a "vocabulary", or glossary, the collection of brick-words, the set of words which when taken together label rather well and rather adequately all the ideas which that context is especially concerned with. The scientific organization of knowledge about some territory of the world such as physics results in a vocabulary in which all the information gathered about the subject can be discussed.

8. The Common Everyday Context

Of all contexts the main one bearing on our present purpose is what we may call the "common everyday context". Here is where we place the words and ideas that we and everybody else use most of the time for all ordinary affairs: all the words that nobody would consider high-brow, difficult, or specialized.

What is the vocabulary of the common everyday context? We can find this vocabulary, with some fuzziness at the borders, in: (1) the vocabulary of Basic English, a set of 850 English words proposed by the English scholar C. K. Ogden for an international language; (2) a list in "Practical Linguistics" by D. Pittman, published in 1948; (3) the commonest words in "The Teacher's Word Book of 30,000 Words", published by Teachers College. See the indications of this context in Table 2.

9. The Cement-Words

The most important section of the common everyday vocabulary, for our purposes, consists of the cement-words, the little words which like cement are almost certain to appear in nearly all discussions and arguments expressed in English, words like "the, of, its, to, and". For, if we are to accomplish discussing and arguing by a computer, and if we are to calculate the answer to an argument by means of a computer, then the computer must be able to recognize easily the ideas expressed in the cement-words and their combinations.

It is convenient to recognize four classes of cement-words grouped under: (1) language, communication, and discussion; (2) science in general; (3) mathematics; and (4) logic.

What are these cement-words, and what do we do with them so that a computer can operate with them?

10. The Cement-Words of Discussion

Beginning with our earliest days, our ears are filled with the sounds of people discussing. Words and phrases that are associated with discussion surround us all our lives. Let's listen to some of the commonest of them:

"What do you think about that?"
"I would agree to that."
"I don't understand you."
"What did you say?"
"If you'd like to know, I'll tell you."
"I don't know what you are talking about."
"I wonder why he is so curious. He's always asking questions."

And clearly we could go on and on with many examples.

Such expressions occur in writing too, and help to make it more interesting.

There are about 100 very common cement-words of discussion. In order to program a computer to handle discussion, we have to consider these words. The subject is essentially the relations between persons and information. The subject includes: speakers, listeners, and persons spoken of, the three "persons" of grammar; communicating, "speaking, talking", and receiving communication, "listening, reading".

In regard to knowledge, the cement-words express

- having knowledge: "know, understand, think, realize, see"
- not having knowledge: "didn't know, don't understand"
- acquiring knowledge: "find out, learn, discover"
- losing knowledge: "forget"
- referring to knowledge: "remember, recollect, look up"
- manipulating knowledge: "consider, think about, study"
- putting out knowledge: "say, write, tell, inform"
- items or production of knowledge: "letter, word, term, phrase, idea, statement, page, message, story, book"
- places where knowledge is stored: "brain, mind, memory"
- references of words: "meaning, sense, mark, name"

In regard to the attitudes of a person about knowledge, these cement-words express such ideas as "believe, doubt, consider, suppose". They express attitudes about not knowing, such as curiosity and seeking information: "why, curious, interesting".

When two or more persons are comparing their attitudes about knowledge, these cement-words express such ideas as "claim, argue, assert, agree, disagree, discuss".

Finally, these cement-words include a group of ideas that express surprise, and expectation. Usually the ideas are combined in words expressing logical relations. For example, "It rained, but I went" means "It rained and — you would not have expected it — I went."

Characteristically, in the process of discussion the minds of participants reach out and try to understand, even try to anticipate. And during this process the indications of knowledge, belief, curiosity, inquiry, and expectation are all a help to human beings in reaching explanation and acquiring understanding.

If a computer is to discuss satisfyingly for human beings, the ideas expressed by the cement-words of discussion need to go into the programming of discussion in a computer.

11. The Cement-Words of Science in General

The second group of cement-words consists of words like "because, happen, probably, made of, become, tomorrow", and are roughly classified under the heading of "science in general". This means science independent of any particular field, such as physics ("heavy, red") or biology ("sweet, smell"). By science we mean verified facts and laws based upon observation and arranged in an orderly system. There are 150 of these cement-words.

Table 2

THE COMMON EVERYDAY CONTEXT — WORDS OF VERY GENERAL USE

(1) Semantic Class	(2) Some Sample Nouns	(3) Some Sample Verbs
<u>I. Culture, Humanity, Human Beings</u>		
<u>A. The Individual</u>		
Body, actions, feelings, thoughts, judgments	person, child, head, finger, pain, wish, idea	live, die, do, see, run, touch, want, think, choose, remember, cry
<u>B. Society</u>		
Family, community, government, religion	daughter, sister, committee, school, meeting, flag	give, help, hide, believe, meet, agree, own, control
<u>C. Equipment</u>		
Food, clothes, shelter, tools, furniture, products, structures, makers	bread, house, floor, faucet, mechanic, laborer, dress, wax, sugar	eat, wear, make, produce, fit, repair
<u>II. Human Sciences</u>		
Technology, business, economics, law, medicine, education, war, psychology, etc.	debt, manager, market, money, cough, digestion, judge, tax	sound, fight, pay, buy
<u>III. Natural Sciences, Nature</u>		
<u>A. Inorganic</u>		
Astronomy, geology, geography, physics, chemistry, meteorology	hill, cloud, sun, river, wind, red, water	burn, boil, blow, rain, shine
<u>B. Organic</u>		
Botany, zoology, biology	grass, root, cow, bird, tail, blood	grow, mate
<u>IV. Abstract Sciences</u>		
<u>A. Language, Communication, Discussion</u>		
	question, answer, word, book, name	write, read, ask, talk, speak
<u>B. Science in General</u>		
Time, motion, change, causation	result, reason, cause, day, year, time, state, existence, chance, method	wait, become, happen, start, stop, seem, develop, turn
<u>C. Mathematics, Space, Shape</u>		
	number, measures, geometry, order	equals, add, bulge, crack, fold
<u>D. Logic</u>		
	relation, class, statement, element, quality, difference, likeness	be, have, do, exist, include

NOTE 1: Many of the cement-words belonging to MATHEMATICS are:

Prepositions of Location: at, before, behind, beyond, over, above, under, below, underneath, inside of, outside of, on, off, against, around, near, besides, next, opposite to, among

Adjectives of Regions: top, bottom, left, right, front, back, center, side, edge, corner, end, middle

Prepositions of Direction: to, from, up, down, along, across, through, into, out of, toward

Adjectives and Adverbs of Indefinite Numbers and Measurements: few, several, little, much, many, some, rather, partly, almost, nearly, very, altogether, entirely

NOTE 2: Many of the cement-words belonging to LOGIC are:

Adjectives and Adverbs Reporting on Statements (i.e., Truth Values): yes, true, right, no, false, wrong

Connectives of Statements and Terms: and, or, not, if, if and only if, only if, else, except, unless, namely, also, nor, therefore, of, to, for, by, with, without, from, about

Perhaps the most basic of all general scientific ideas is relevance, or relatedness, and its opposite, irrelevance or unrelatedness. Common ways for expressing relevance are "bears on, makes a difference in, is related to, depends on, is relevant to". The opposite is "makes no difference to, has no relation to, is irrelevant to, is unrelated to".

Perhaps the next most basic idea is existence, and its opposite nonexistence. These ideas are referred to in the cement-words such as "be, fact, happen, occur, event, real, actual".

Cement-words that relate to time have been perhaps arbitrarily put in the category of cement-words of science, while cement-words that relate to space have perhaps arbitrarily been put in the category of cement-words of mathematics. Cement-words of time include "minute, yesterday, date, after, sometimes," etc.

Words that refer to change, events, states, and conditions are here included. The thing A may change all the way and become B, and so A stops, B starts, and B replaces A. Common words include "become, turn into, stop, start, replace, modify".

12. The Cement-Words of Mathematics

The third group of cement-words to be recognized consists of the cement-words of mathematics. In almost all the sentences that we say, in almost all of the thoughts that we think, we make use of ideas that are either actually or essentially mathematical. Even in the last two sentences just written, mathematical ideas occur not only in the word "third" but also in the "s" of plurals, the relation "in", and the numerical idea "almost all". There are about 230 of the cement-words of mathematics. Because of the study which mathematical ideas have received for more than 2000 years, it is rather easy to classify the cement-words and to translate them in phrases into mathematical and computable expressions. The cement-words have eight classifications: place and position ("at, top"); shape, form, structure ("flat, hole"); size, magnitude ("big, short"); comparison, degree ("more, equal"); indefinite numbers and measurements ("few, much"); definite numbers ("three, plus"); order ("second, pattern"); and variation and approximation ("roughly, depend on").

13. The Cement-Words of Logic

The last group of cement-words consists of those which belong to logic, reasoning which is non-numerical or which underlies mathematics. The ideas present in these words are exceedingly important; no sentence can be uttered without using them. The meanings of these words are analyzed, clarified, and calculated with in the subject of mathematical logic. Even in the last few sentences just written, some of these ideas are used: they appear in the words "the, of, consists of, group, belong to, is, not, or, and". There are 170 of these cement-words. These ideas have received thorough study by such logicians and mathematicians as Aristotle, George Boole, Bertrand Russell, Ernst Schroder, A. N. Whitehead, and W. V. Quine. These ideas can be fairly easily classified, and the table presents the words in a number of classes:

Reports on Statements	yes, not so
Connectives of Statements	and, that is, assuming
Name, Meaning Assertion	label, stand for be, have

Properties, Classes, Abstractions	sort, example, -ness
Relation Connectives	of, in regard to
Variables	we, this, such
Operators on Variables	all, none, the
Relation of Equal or Unequal	same as, other than
Relation of Like or Unlike	similar to, unlike
Relation of Membership or Inclusion	in, excluded from
The Rest or Remainder	and so forth, etc.
Miscellaneous Properties and Relations	complete, contradict

14. Cement-Words and Cement-Ideas

In considering the cement-words of language, we should notice that there does not exist a one-to-one correspondence between cement-words and cement-ideas. In other words, a given cement-word may refer to one or more cement-ideas; which one it refers to may differ from context to context. And, vice versa, a given cement-idea may be expressed in one or more different ways by cement-words, and the way it is expressed may differ from context to context.

For example, take the word "but" as it occurs in the sentence "It rained but I went." The word "but" expressed two cement-ideas. One is the assertion of both of two sentences, the idea of logical AND. The other idea is a specification in regard to expectation: "contrary to expectation, in spite of that".

Consequently, in lists of cement-words the same cement-word may occur several times in different parts of the lists. This is to be expected. Since the grouping of cement-words is roughly in accordance with groups of ideas, a cement-word may need to be listed in more than one place.

The variation of expression of a cement-idea from context to context raises the question "Is a cement-idea a definite entity?" Yes, it is. Logical AND for example is a definite entity (just as definite as any mathematical idea) in the sentence "It rained AND — YOU WOULD NOT HAVE EXPECTED IT — I went."

Arithmetical AND is a separate and different definite entity. In the sentence "2 AND 3 make 5", this AND is the same as PLUS and just as definite. But arithmetical AND, which is a connective between numbers, is not the same as logical AND, which is a connective between statements.

Just how are the thousand-odd cement-words to be translated into cement-ideas so that a computer can deal intelligently with the ideas?

This is a most important and interesting question, and requires study.

But we can say some things about obtaining the answer. First, we would take a context, like chess for example, and make a large collection of the cement-words and phrases and sentences used in talking about chess. Second, we would make clusters of paraphrases, where we would gather maybe 20 or 30 or 40 different ways of "saying the same thing in other words". For each cluster of paraphrases, it would be reasonable to specify some abbreviation (human's symbol or computer's code) to represent the idea. Third, we would experiment on a computer with programs using these codes, and see if

(please turn to page 23)

Computerized People Mover at Dallas-Fort Worth Airport

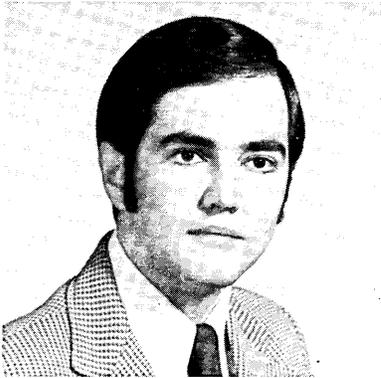
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"Airtrans was developed to transport people, baggage, mail, and trash about the Dallas/Fort Worth airport automatically; it uses 68 electrically powered vehicles on a 13-mile guideway."

Since its opening in January, 1974, the new Dallas/Fort Worth Regional Airport in Texas has been plagued with many problems. However, one of its most highly publicized and misunderstood problems has been the Airtrans system. Airtrans, the airport's computer-operated automatic transit system, has yet to achieve the operational status airport proponents had hoped for. The purpose of this article is to report how Airtrans was designed to operate, discuss the problems it has encountered, and suggest reasons for these difficulties.

Airtrans as Originally Conceived

Airtrans was developed to transport people, baggage, mail, and trash about the airport automatically; in order to perform these services Airtrans utilizes 68 electrically powered vehicles on a 13-mile guideway. The guideway has two-foot high concrete walls which have steel rails attached. These rails supply power and data communications to the various Airtrans vehicles which interpret the signals through brushes near the rear wheels. On the basis of reading these signals the cars are sent over 16 programmed routes; separate routes exist for passengers, baggage, utility services, employees, and mail./1/ Along these routes are 55 station stops with people stations for loading and unloading passengers and employees, while baggage, trash and mail are handled through supply stations.



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Computerized Equipment

Airtrans is controlled by computerized equipment on the cars operating in conjunction with computers in the wayside and central control. The control network is divided into three different subsystems -- automatic vehicle protection, automatic vehicle operation, and automatic vehicle supervisory system. The automatic vehicle protection system was installed to avoid accidents that could occur when a vehicle is not functioning properly. This is accomplished by causing the car to come to a safe stop if any problem develops within the vehicle or with those preceding it on the guideway. The automatic operations system controls the speed of the vehicle and operates the doors. It will not allow the doors to be opened until a car is completely stopped and in proper position for passengers to unload safely. The supervisory system has many functions but its most common use is to control speed to keep cars from crowding together./2/

These systems operate together with a digital computer in the central control complex. This central control is the master controller for the complete Airtrans system. Here, computer operators can continuously monitor positions of vehicles. They use a lighted diagram of system routes and watch system status via cathode ray tubes./3/

Financial Ramifications of Airtrans Problems

Originally, one of the main reasons for justifying the installation of the Airtrans system at D/FW was its projected low operating cost. Being fully automated, the Airtrans cars do not require drivers, and, when operating according to its design, it is supposedly more economical than other systems./4/ However, during its first year of operations Airtrans encountered numerous problems that resulted in added cost for Ling Tempco Vought (LTV, the builder of the 34 million dollar system), for the airport, and for the airlines at D/FW.

Operating Troubles

Airtrans problems became obvious to the public when the airport opened in January, 1974. At that time it was able to operate only on a very limited basis during daylight hours, rather than on a twenty-four hour schedule as originally planned. Further, only the passenger mode of Airtrans was functioning and this was on a limited scale between airport terminals. LTV technicians were required on board the

vehicles and in central control in case of breakdowns./5/

So trucks and buses were utilized in order to transport employees, mail, and waste about the airport. This back-up service had to be paid for by Ling Tempo Vought, whose contract with the airport stipulated that they must provide the emergency system in the event Airtrans was not fully operational on opening day. Moreover, this system must be maintained by LTV until the airport has accepted Airtrans as operational./6/

Malfunction Effects on Passengers

In further examining Airtrans difficulties one finds that they were not confined to opening day alone, but seemed to have been a continuing perplexity. In the following months controversy grew over the reliability of the passenger mode of Airtrans, as many D/FW customers reported their first encounter with Airtrans was less than pleasant.

Overly Sensitive

Most of the difficulties appeared to center around the highly sophisticated safety features installed in Airtrans. These features proved to be overly sensitive even to the most minute malfunction, causing the passenger vehicles to come to occasional sudden stops along with all ensuing vehicles on the guideway. When asked to comment on the system problems, D/FW Executive Director Tom Sullivan suggested that while he and the airport board had requested a high degree of systems safety, perhaps it had been carried a little to the extreme./7/

Missed Flights

Passengers affected by these malfunctions complained of doors failing to open on Airtrans at designated station stops, resulting in some missed flights. Others charged that Airtrans failed to stop when arriving at prescribed station stops. One commuter said he had been trapped on Airtrans "for two complete circuits."/8/ He was ultimately forced to exit at an alternate stop.

Incidents such as these, along with earlier publicized malfunctions, have undoubtedly had some degree of financial impact on the airport. Even in the narrowest sense these problems have tended to tarnish Airtrans' public image. In the broader perspective however, one must consider that they also diminish customer confidence in the system, leading many to seek out other airports to avoid the possible delays with Airtrans. It could be construed that such a loss of potential customers would mean a reduction in airport revenues.

People Problems and Information Attendants

While most of the aforementioned Airtrans problems have been blamed on mechanical failures, not all of Airtrans difficulties were directly related to system malfunctions. Many problems seem to be simply people-oriented.

An excellent example of this appeared when LTV hired "information attendants" to give verbal directions to passengers. They felt this necessary since people were not utilizing the printed route signs properly. Before these attendants were hired, many passengers were boarding the first vehicle that arrived without noticing its designated destination. This of course resulted in confusion, because each vehicle had a programmed route and did not make

stops at every terminal in the airport complex. The special information attendants were also expected to serve as bus drivers for the Airtrans back-up system in case of malfunctions./9/

Although the attendants were not a magic cure for the problem, much improvement has been seen since their initial employment. The airport management, realizing the value of these people, decided in December to take over the finances for retaining them./10/

While no dollar figure has been forthcoming on the cost of the attendants alone, there has been a projected estimate combining the cost of the attendants and a permanent back-up bus system for the airport. This figure was set at \$822,000 as an initial capital investment, with operating cost of \$731,000 the first year, and \$492,000 for each ensuing year./11/

Airtrans' Effect on Other Facilities at D/FW

In suffering added cost due to implementation and use of Airtrans, LTV and the airport have not been alone. Other facilities at D/FW which depend on Airtrans have also encountered unanticipated outlays: the airlines; and the air mail facility located at the airport.

Air Mail Problems

The air mail division problems became publicized on August 2, when Dallas Postmaster James Lusby stated that the post office was contemplating litigation due to difficulties with Airtrans mail subsystem. This subsystem is responsible for carrying mail from the air mail facility to the airport terminals. Lusby said that Airtrans "is not providing the functions we need to provide mail service."/12/ He felt the problems were related to Airtrans promptness and load capabilities. These difficulties continued until October 5, when postal officials asked that Airtrans mail service be discontinued. Airtrans was then replaced by trucks to haul the mail to the terminals./13/

In using these trucks the airlines were subjected to double cost. This apparently occurred because the air mail function of Airtrans had been accepted by the airport board as operational earlier. With such acceptance, it seems the airlines were then required to pay for any substitute system. This payment was added to the amount being charged to them for Airtrans by the airport./14/

Arguments

While this debate persisted, it was difficult to determine what was the main cause of the problem. The impression of LTV officials was that the situation arose because more mail was passing through the airport than had been originally anticipated. Also, equipment interface problems between the air mail facility and Airtrans was considered a possible contributor to the problem. This was suggested since LTV did not install the equipment being used by the air mail facility for vehicle loading./15/

Many accusations were made by all the parties involved, each attempting to place the guilt on someone else. Eventually, it was admitted that almost everyone had contributed to the problem to some extent. Ultimately, as a solution, the U.S. Postal Service announced on December 5 that the air mail facility would resume using Airtrans to haul mail. This use will supposedly begin after

new equipment is installed in the air mail facility at the post office's expense./16/

The Profit or Loss for LTV of Airtrans

Although the postal service, airport, and airlines have spent various amounts of money during efforts to get Airtrans operating, LTV has perhaps been the biggest investor. In correcting Airtrans malfunctions LTV has spent \$14 million and made 760 changes to improve its reliability./17/ At this writing, it is a matter of speculation whether the airport will repay LTV for these expenditures; this is still being negotiated.

Operational Acceptance

The LTV changes and repairs have resulted in the Airtrans passenger mode reaching 99 percent availability and acceptance by the airport board at the revenue operation level. The revenue operation level is a standard of reliability set by the airport that the Airtrans system must meet before being accepted as fully operational. Such acceptance means the airport must now pay for the passenger back-up systems. The air mail function of Airtrans has also reached 99 percent reliability, and as earlier mentioned, has been accepted by the airport board as revenue operational./18/ All other functions of Airtrans are at revenue operational level and awaiting airport approval which is expected early in 1975. According to W. R. Cordin, Airtrans program director: "We're now coming close to matching our computer simulation performance — and we're getting better every week."/19/

With this growing acceptance and reliability of Airtrans, the financial outlook for LTV should become brighter.

Proof of Feasibility

Transit officials in many foreign countries have been watching the development of Airtrans and contemplating its use. Now that the system has proved feasible here, LTV, which has the patent rights on the system, may expect some new contracts. Japan is already testing a system using Airtrans concepts called Newtrans./20/ Further, France has expressed an interest in a similar system on a smaller scale for a new airport in France./21/

Reasons for Trouble

Even though Airtrans is now reaching the level of reliability the airport desires, the question remains as to why Airtrans did not function properly during its first months of operations. Many reasons have been suggested for Airtrans problems; but little attention has been given to the probable real genesis of the whole set of problems: the lack of testing time. Most systems of the complexity of Airtrans undergo many years of testing and development before being exposed to public use. Yet LTV had only 2 1/2 years from the date the contract was awarded until the airport opened to develop and test a system that is the first of its type in the world./22/

This testing time was further reduced due to delays in Airtrans guideway construction. This problem arose when it was discovered that once the guideway was erected, it obstructed other contractors' work. To resolve this dilemma, the Airtrans guideway was constructed in sections allowing other projects to be completed first./23/ However, this con-

struction delay was just one of many troubles that continually held up Airtrans development. Other factors which contributed to the problems (cited by Bob Buzard, vice president of LTV) were poor weather, delays in equipment delivery, and human error./24/

Testing Under Public Scrutiny

With such a restricted test schedule most of the "bugs" in Airtrans could not be ironed out prior to opening day. Consequently, the last part of Airtrans testing had to be carried on under public scrutiny, causing many of the complaints noted earlier in the paper.

Conclusion

It is reasonable to believe that if more time had been available for LTV to test Airtrans, many of its most adversely publicized problems would not have occurred.

However, with its increasing reliability, it is rapidly becoming one of the most outstanding features at D/FW. In the future it will be a remarkable asset for both the airport and LTV.

Footnotes

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New monthly magazine
PEOPLE AND THE PURSUIT OF TRUTH
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 the back cover of
 this issue.

Clark — Continued from page 19

the computer could converse and discuss chess reasonably and, shall we say, entertainingly, making use of the codes. Wherever there were instances of stupidity or deafness or nonsense, we would try to improve the program, improve the computer's recognition of the ideas. Fourth, we would carry out the same process with half a dozen other contexts.

We would wind up with a set of cement-ideas. And we shall find probably a number of territories, like the algebra of classes, logic, the algebra of states and events, mathematics, etc., where the cement-ideas will be clarified and become calculable. In fact, the first step in any kind of calculation is settling on paraphrases that are interchangeable. "A pair of" is interchangeable with "a brace of, two of, a couple of, a set consisting of two members of", etc. Having decided that the set of paraphrases all mean the same thing, we can adopt a symbol standing for that thing, that idea.

15. Frameworks of Cement-Words

We are now ready to re-examine two of the questions we asked earlier:

1. How shall we program a computer to recognize ideas and discuss and argue with them?
2. What shall we do with the cement-words so that a computer can operate with them?

We shall now try to answer these questions, in part if not completely:

First, the programmer specifies a particular context, such as Acoustics or Zoology.

Second, the programmer tells the computer idea-labels for the ideas referred to by the brick-words or their synonyms. The idea-labels may be adopted standard terms or they may be symbols.

Third, the programmer gives to the computer idea-labels for the frameworks of cement-words which express or assert relations. Here are some examples of frameworks of cement-words:

1. All — are
2. The purpose of these questions from the point of view of . . . was to have information available as to how
3. With respect to . . . the situation is similar: very little . . . is — from
4. It is reasonable to assert that in . . . there was virtually no . . . of — by — .

It will be a long task to translate the 600 or 700 cement-words in their usual combinations into exact ideas, and assign to them idea-labels, so that the computer can "understand" each kind of sentence given to it. But it is a finite task. Once done, in fact, the solution will apply to all kinds of discussion and argument in all kinds of contexts, because the cement-words are inevitably used in every context. □

THE POLITICS OF CONSPIRACY, THE CONSPIRACY OF POLITICS

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"The brutal transfer of power and the constellation of mysteries that surround it remain unresolved."

Dealey Plaza, Nov. 22, 1963

The low long limousine turns off Houston onto Elm at Dealey Plaza in what may be the single most important piece of film of this century. It is the Abraham Zapruder color home movie of John Kennedy's assassination in Dallas, and the audience at "The Politics of Conspiracy Convention" at Boston University is watching the clearest print ever shown to the public (Time-Life refuses to release the original; this is a bootleg). The limousine is traveling slowly, 12, maybe 14 miles an hour, as it passes the Book Depository Building where Lee Harvey Oswald is supposed to have been perched in a sixth-floor corner window. The Dealey Plaza crowd is thinner than the throng that met the President in downtown Dallas. Still, Kennedy waves in the bright sun.

The Shooting of Pres. John F. Kennedy

Shortly before the car passes behind a large traffic sign for Stemmons Highway that will momentarily obscure Zapruder's view, Kennedy's head flicks quickly to his left and then back again, facing us. According to Robert Groden, New York film specialist and Kennedy assassination researcher, this gesture, which occurs in about one-ninth of a second, or two frames, was cut out of the official copy of the Zapruder film sold to Time-Life shortly after the killing, excised perhaps by FBI or CIA representatives. Groden has restored the two frames. The sudden gesture's meaning may be ambiguous, but the gesture itself is not. It looks as if Kennedy may have heard something to his left, or maybe he unexpectedly recognized someone in the crowd.

Bullets

It might also be that he heard a warning. He resumes his waving and disappears behind the traffic sign. When he emerges a couple of seconds later, his head has begun to shrink down into his shoulders. He slowly brings both hands up to a position in front of his neck — it looks for just a second as if he is only about to straighten his tie.

In fact, the first bullet has already hit him, either beneath the right shoulder blade or in the neck. He slumps in his seat. Governor Connally, at first unaware that the man sitting directly behind him has been shot, soon turns to look over his right shoulder, is suddenly hit himself, and falls into his wife's arms.

In the back, Jackie inclines toward her husband and for a brief instant brings her head close to his, her right arm edging around him along the top of the seat.

Explosion of the President's Head in the Zapruder Film

Then the right half of the top of the President's head explodes, recorded in a frame of the retired garment manufacturer's movie as a starburst of blood and brain matter. Few have seen this particular sequence either. A piece of his head rockets three feet in the air above the limousine. Kennedy is thrown slightly forward by the blast and then, almost immediately, appears to be hit again from the front and is hurled violently back against the seat. Blood spills from his head and splatters Jackie's dress. As Kennedy begins to topple to his left, toward his wife, the film clearly shows that the entire side of the President's head above the right ear has been blown away.

Man With a Rifle

As the limousine accelerates onto Stemmons en route to Parkland Hospital, Zapruder follows it with his camera. Unknown even to himself, as well as, ostensibly, to the Warren Commission, Zapruder's lens captures perhaps the single most startling piece of evidence supporting the conspiracy theory of John F. Kennedy's assassination. On the actual film, it is no bigger than a pin prick, but with the help of a computer Robert Groden has blown up that portion of frame 413 to reveal in the foreground, behind a retaining wall on the grassy knoll that abuts Elm, a man with short hair aiming a high-powered rifle at the fatal spot the limousine has just passed. Unless this unidentified marksman just happened to wander off a shooting range and quite by accident point his gun at the Presidential limousine, the Warren Commission's finding that a man named Oswald acted alone is no more credible than Nixon's profession of innocence in the Watergate affair.

The Umbrella Man

The filmed evidence of an assassination conspiracy provided at the convention at Boston University is itself enough to alter radically the opinion of anyone who has blithely accepted the Warren Commission's conclusions. In addition to showing that Kennedy was unmistakably shot three times; that he was almost

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certainly shot at least once from the front or side; that a man partially obscured by leaves in the foreground is aiming a rifle at the Presidential route — the Zapruder film also shows the famous Umbrella Man. This figure stands in the foreground by the highway sign with an umbrella. It has not rained in Dallas since that morning and no one else appears to be carrying one. Just before the first shot, he opens his umbrella, which can be seen rotating slightly. After the last shot has been fired, he closes the umbrella and, while spectators are running in various directions, the Umbrella Man almost casually starts walking down the sidewalk. Was he signaling to marksmen?

Another of the many films and snapshots of the assassination, a movie taken by Orville Nix, shows a figure high up on the grassy knoll behind a small barricade. Though considerably less distinct than the gunman in the Zapruder film, this figure appears to be sitting in a military firing position.

Inability of FBI Expert Marksmen to Validate the Warren Commission's Theory

Warren Commission investigators agreed that 5.6 seconds elapsed between the first and last shots, but an FBI weapons specialist was unable to shoot with the type of rifle allegedly used by Oswald any faster than at 2.3 second intervals, which would allow for the absolute maximum three shots. To circumvent this discrepancy, the Commission subscribed to what has become known as the "magic bullet" theory: one bullet passed through Kennedy, hit Connally, made a U-turn and hit Kennedy again. According to assassination expert Mark Lane, a motorcycle policeman escorting the Presidential limousine was quoted afterwards as saying he saw Kennedy hit in the face, but he was never called before the Commission to testify. He was just one of numerous key witnesses selectively ignored by the Commission. Perhaps the most crucial of these was Jack Ruby, who wanted Earl Warren and the Commission's counsel, Leon Jaworski, to take him to Washington where he felt he could safely testify; Ruby stated that his life was in danger in Dallas and that the truth would never be told if he remained there. The Commission refused to remove him to Washington and remained relatively indifferent to his claims. It left Ruby to die of cancer in Dallas and never gave him a chance to reveal his full story. (Ruby said of Warren: "A very nice man, but so naive.")

Why Was Nixon in Dallas the Night Before? and Other Questions

Participants in the conference also raised a great many disquieting questions. What were Nixon and J. Edgar Hoover doing at the home of Dallas billionaire Clint Murchison the night of November 21, 1963? What was the role of Gerald Ford, one of the Warren Commission's most outspoken advocates of the lone assassin theory, in the coverup? Why was a bullet mark on the sidewalk near the assassination site covered by police squad cars immediately after the event? What is the long object protruding from the first floor window of the Dallas Textile building (a location with a clear view of the back of Kennedy's head)? Why did a man on the fire escape two floors above that window suddenly drape himself over the railing during the shooting to look down? And why, asks Penn Jones, former editor of the Midlothian (Tex.) Mirror and a conspiracy researcher, have numerous key persons investigating the assassination mysteriously died before they were able to publicize their findings (among them Dorothy Kilgallen, who died of an "overdose of sleeping pills on top of alcohol" after

saying publicly she would break the whole story in five days, using her exclusive interview with Jack Ruby)? Who are the three "tramps" photographed in Dallas on November 22 while being "arrested" by Dallas police? Do two of the tramps bear more than a passing resemblance to E. Howard Hunt and Frank Sturgis? And why does one of them look as though he's wearing in his ear a hearing aid or small receiver that can also be seen in the ear of one of the policemen?

Pressure to Reopen the Case

Evidence of this sort, research data and questions have been compiled over the past 11 years by conspiracy theorists, many of whom appeared at the Politics of Conspiracy Convention. They are applying pressure to reopen the case that J. Edgar Hoover, on page 100 of volume five of the Warren Commission report, said "will be continued in open classification for all time." Yet FBI and CIA files crucial to the case are held secretly in the archives, to remain so until the year 2039. Other relevant articles have disappeared.

The Confiscation by the Secret Service of the Autopsy Photographs

The naval doctor J. J. Humes, who performed Kennedy's autopsy, stated to the Warren Commission that his X-rays and photographs were confiscated by the Secret Service before they were developed and were never returned.

The unanswered questions and unexamined evidence have prompted Representative Henry B. Gonzalez of Texas to prepare legislation calling for a full Congressional investigation into the killings of President Kennedy, his brother Robert, Martin Luther King, Jr., and the attempted assassination of George Wallace.

Charach's Movie: "The Second Gun", on Robert Kennedy's Assassination

At the BU conference, West Coast broadcast journalist Ted Charach screened his documentary on Bobby Kennedy's assassination, entitled "The Second Gun", which cast substantial doubt on the lone-assassin theory of that killing. Wayne Chastain, the Memphis reporter who covered Martin Luther King, Jr. before his murder and has since investigated his murder, spoke about new evidence in that case.

Solid Evidence vs. Not So Solid Evidence

The theories aired ranged from incontrovertible filmed evidence to certain undocumented assertions by researchers like Mae Brussell and Chicagoan Sherman Skolnick. The latter claims to have found impaled on a shrub in the yard of "a little old lady" in Chicago an incriminating government document that had fluttered from the "sabotaged" plane carrying Dorothy Hunt that crashed near Midway Airport in December of 1972.

The Assassination Information Bureau

By the conference's end, the Assassination Information Bureau was calling for nationwide action and handing out a petition calling on Congress to investigate the JFK assassination. But caution in presenting the conspiracy evidence was encouraged by the AIB.

The Assassination Information Bureau, the conference's sponsor, comprises a small circle of friends,

all diligent conspiracy-watchers. The earliest public presentation of the group was a slide-show in Cambridge about two years ago. Along with pictures of Lee Harvey Oswald, Jack Ruby and others who figure in conspiracy theories, a rough bootleg copy of the Zapruder film was shown. Bob Katz, who assembled the slide-show, managed to get himself booked on the college lecture circuit in 1973-74 and became a veritable conspiracy circuit rider, his friends supporting him and filling in when necessary. He appeared almost exclusively at little-known state universities and colleges in the Midwest and West; he estimates that at least 25,000 people have seen his show. During the question-and-answer periods, he says, not a single person expressed doubts about the existence of a murderous cabal. Many wondered if Katz worried for his personal safety. He does not.

The AIB had planned on a conspiracy conference for over a year. As the Watergate inquiry proceeded and investigative news reports exposed Nixon's shady entourage and operations, the AIB believed that links between the assassinations and contemporary political skulduggery were implicitly being forged. They sought to make the connections explicit. The conference was designed to provide a forum for every variety of conspiracy analyst; it was to join the veteran Dealey Plaza investigators to those tracing the threads of the Watergate nexus back to past occurrences.

Mark Lane's Report

Mark Lane, author of Rush to Judgment, the best-selling attack on the Warren Commission published in 1966, came to the conference as a prodigal conspiracy theorist returned to his original commitment. Since his entry into public life (and some notoriety) with Rush to Judgment, Lane has probed the war crimes committed by U.S. forces in Vietnam and has served as a legal adviser to the Indian occupiers of Wounded Knee. Speaking before the crowd of about one thousand attending the first session of the conference, Lane recounted Earl Warren's public presentation of his Commission's completed report to President Johnson. Johnson, awkwardly holding the thick volume, could think of nothing to say but, "It's very heavy". "Inadvertently giving," Lane remarked, "the best short analysis ever of what happened in Dallas." He characterized Watergate as the "tip of the iceberg" and accused Gerald Ford of being "guilty today as an accessory after the fact in the murder of JFK." Ford, a member of the Warren Commission, wrote his only book, Portrait of the Assassin, on the subject of Lee Harvey Oswald's guilt.

Other Speakers

Other speakers, including Executive Action author Donald Freed, journalist Jeff Gerth, Dick Gregory, writer Peter Dale Scott, Mae Brussell and Sherman Skolnick covered a wide range of topic with varying degrees of credibility.

Smiling Penn Jones is the dean of conspiracy analysts. On November 22, 1963, Jones was waiting at the Dallas Trade Mart for the President to arrive and address the throng. Two days afterward, Jones began working to uncover the conspiracy he felt was behind it. The newspaper he edited until his retirement last year, the Midlothian Mirror, has published, he says, more material on the subject than any other. Jones has interviewed hundreds of people and written a four-volume account of his investigations entitled Forgive My Grief. Jones, not a man of awesome height, introduced himself to the convention as "a Texan, but I'm a shorthorn." At 60 years of age, he views the increased

interest in the JFK murder as a vindication. "I don't have time to wait," he says.

Carl Oglesby's Report

While the sleuths aroused the curiosity and received the close attention of conventioners, Carl Oglesby, a member of the AIB and former national president of SDS, was given an enthusiastic reception. His two-hour speech to about 300 people interweaved detail and worldview, describing "the theft of popular sovereignty in Dallas" and interpreting it in terms of ruling class conflict. He began with the June 23, 1972 White House tape in which Nixon and Haldeman expressed fear of offending Howard Hunt and thereby reopening "the whole Bay of Pigs thing." Oglesby shifted smoothly to the Civil War, the suppression of the Confederacy and its subsequent reconstitution as Cowboy entrepreneurial capitalism, the vanguard of Manifest Destiny, linked but hostile to the dominant Yankee monopoly capitalists. He pursued this antagonism through Dallas to Watergate and beyond, employing metaphor and history to depict the differing sensibilities of the power elite competitors. He followed with a micro-analysis of areas such as Nixon's early career and his Cuban connection, which, Oglesby said, involved him in Meyer Lansky's interests. Explicating the history and internal conflict of the Howard Hughes empire, the significance of the Clifford Irving case, and the central role Hughes played in Watergate, Oglesby, who amplifies his theme in his forthcoming book, Yankees and Cowboys (Sheed and Ward), suggested that perhaps he was straying too far into a thicket of facts and losing sight of his over-arching conception. Shouts came from the audience: "No! No! More! More!" There was a spontaneous burst of applause. (It is impossible to convey the effect of his speech; it is enough to say that the Boston Globe reported it "spellbinding".) Oglesby ended with a flourish, reading from Bernard Bailyn's Ideological Origins of the American Revolution. "I'm not sure that Bailyn would approve," he said as he quoted colonists' pamphlets decrying the trespasses of tyranny. He called the American revolutionists "us people two hundred years ago," invoking their authority and example in demanding the restoration of democracy today. Oglesby was given a standing ovation.

Showing the Zapruder Film to the Rockefeller Commission on the CIA

As the convention ended, the AIB attempted to turn its momentum into political movement. It presented a petition calling for a Congressional investigation of the assassinations. Later that week Dick Gregory and Robert Groden showed the computer blow-up print of the Zapruder film to the Rockefeller commission investigating the CIA. Jack Nelson, the in-crack investigative reporter of the Los Angeles Times, called the AIB the day after the convention to tell them he had begun to look into the Wallace shooting. John Kifner, the New York Times' correspondent covering the affair, assumed the stance of a sympathetic skeptic and asked Mark Lane, "Have you got any new evidence?" Lane replied, "What's wrong with the old evidence?"

The Most Crucial Event in Recent American Politics

The death of President Kennedy is no mere whodunit; the murder was perhaps the crucial event in recent American politics. JFK's tentative moves to establish detente with the Soviet Union, draw back from Vietnam involvement, and stifle CIA covert activity were superseded after his killing by a less

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The Opera "Bluebeard" by Bartok, and the Abuse of Power, Technology, and Computers

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*"Bluebeard . . . is unable to change his pattern of destruction and violence"
. . . or is he?*

The readers of "Computers and People" may be interested in a report on a recent topic for class discussion in my course, "Computers, Social Responsibility, and Man" given in the Department of Computer Science at Calif. State Univ., Chico.

"The Limits to Growth"

The main topic at this particular time is study and discussion of "The Limits to Growth" by Dennis Meadows and others, and the major problems of man on the earth. So it was surprising to listen to the radio on Saturday, February 22, and hear a similar statement of the problems of man on the earth. But it was expressed in Bela Bartok's "Bluebeard", given at the Metropolitan Opera House that Saturday in New York City. Listening to the story of the opera, I decided to take notes for my class, the following Monday, and to use it for discussion.

The Opera "Bluebeard"

Bluebeard is a nobleman, newly married to Judith. Bluebeard shows Judith his castle that has no windows and seven locked doors, to which Judith asks entrance. (Symbols: Bluebeard, man; Judith, woman; understanding and light replacing secretiveness, distrust, hate, etc. I will point out only a few of the symbols, although the reader will find many more.)

Bluebeard does not want to reveal these locked rooms. He is accustomed to the privileges of royalty, including giving orders and having them obeyed. But she is not content. She insists that light must enter the darkened, locked rooms.

Reluctantly he opens the first door. The room is full of prisoners, of all ages and all kinds. Bluebeard has gained his position and power by making other men his prisoners. In the room of power there is no freedom, only suffering, torture, and death.

Bluebeard then opens a second door, which shows his armory. There Judith observes myriad implements of war and destruction. Bluebeard has gained his success and position by killing others, by dealing in weapons.

The third door reveals Bluebeard's treasury. Money, gems, riches of all kinds, all are attained by greed, evil, and the destruction of others. (One of the major problems of the earth is unequal distribution of the world's goods.)

The next door reveals a garden. First, a beautiful landscape greets the viewer, but as Judith and

Bluebeard look at the garden, flowers and beauty fade, and instead the atmosphere becomes darkened and polluted. Nuclear weapons destroy the earth, and it turns to ugliness. The earth becomes blighted and cannot support life. (Another major problem of the earth is the abuse of the environment, and careless use of non-renewable resources.)

Another door is opened, revealing a lake. At first it appears quiet and serene. But as Bluebeard and Judith observe it, the lake becomes a sea of sorrowing, weeping, drowning humanity, resembling one of the levels of Dante's "Inferno". There is no communication between people, no hope for mankind. (Many authorities feel that one of the major problems of the world is lack of communication between the peoples of the earth.)

Yet another door opens, the door to power and technology. This room reveals the potential of technology, atomic energy, science. But these too become instruments of destruction in man's hands. Again cities fade into slums, and technology becomes a Pandora's box, in which demons are released in man's world. (Technology affords a solution to many of the problems of man and the earth, only if humanely used.)

The last door reveals, not Bluebeard's dead, former wives — as in the fairy-tale — but the living tormented bodies of his former wives. (Man has the capacity for many loves, to which he is often enslaved, but all too often, love results in destruction.)

Judith departs, and Bluebeard is left alone, with his dark castle, with his dark rooms, again locked. He is unable to love or be loved, unable to change his pattern of destruction and violence.

This is Bartok's new opera, a short, insightful, contemporary comment on man, power, money, and violence.

Discussion with Students

Here are a few comments by students in the class:

A student remarked, "The greatest problem of the earth is the nature of man, destructive, competitive. Can man learn to understand, and not to kill?" I replied, "Read Konrad Lorenz and his book "On Aggression", the works of Sorokin, and Erich Fromm. They believe man can learn to channel his aggression and to cease to kill and make war."

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Science and the Advanced Society

C. P. Snow
Parliamentary Secretary
Ministry of Technology
British Government
London, England

"THE COMPUTER IS THE MOST REMARKABLE MACHINE BY FAR, YET MADE BY MAN."

The subject of my talk tonight is "Science and the Advanced Society." By "science" I think everyone knows what I mean, and if you don't, I don't propose to define it now. "The Advanced Society" however, I think I should define. I mean by that, those parts of the world which have solved the purely brutal predicaments of our fellow human beings: societies which see that people get enough to eat, get somewhere to live, get some sort of medical attention, and can read. This, by our standard at the moment (and it's a poor standard) is what I mean by an advanced society.

At the moment, advanced societies exist only in just over one-third of the world: in the whole of North America; in nearly all of Europe (there are one or two pockets which I think one could not honestly say were advanced); in the Soviet Union; and in a few isolated enclaves in the rest of the world, like Australia, New Zealand, and so on. These are the advanced societies of our present world. They are doing pretty well, and the reason why they are doing well is perfectly simple. They are the countries which really did take on what for want of a better term we call the Industrial Revolution. They were the people who learned to make goods — through different histories, through different processes — but they all learned very much the same techniques in the end.

Food and Transformations

With different degrees of success they learned perhaps the most important trick of all, which is to grow enough food. Your country has been staggeringly successful in this last task. At the moment I think I am right in saying that 6% of Americans can grow more than enough for the whole of this gigantic country to eat and the real figure is probably nearer 3%.

This has transformed your society. It has meant you ceased to be an agricultural country long ago, because you can do this trick so easily.

You're soon going to cease to be a manufacturing country. The great industries in America are going to be services and education.

This has happened within a few years. To a lesser degree the same thing is true of all advanced societies. But it

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means that we are going to have our hands full of problems. I'm going to mention some of these in a moment or two, but I'd like to say that almost all that I'm going to say I've been discussing with my American colleagues like Harrison Brown, Lee DuBridge, Glenn Seaborg — all these excellent scientific administrators — and the astonishing thing is that we find ourselves completely in agreement. We can see at least what the problems are; and it seems to me, if we are in agreement, it is more than likely that there is something substantial in what we see.

The Industrial Revolution

The old Industrial Revolution was a messy affair. It started in my country, more or less by chance. You took it on very fast and fairly soon did it better. By about 1860 we who had thirty years start or more were, in fact, not producing as much as you were.

It worked. It worked in both countries. We also had certain advantages, both of us. It's a great advantage to have a commercial civilization preceding an industrial one. It teaches you to answer letters. It teaches you to do the rudimentary administrative work which all industrial societies require, although they can get by without it. So we were in fact very lucky. The Russians were rather less lucky because they had very little of this preliminary training in a commercial civilization.

I think the Chinese in due course will make a very good job of their Industrial Revolution simply because they have a tradition of high bureaucracy. There has been a very good Chinese civil service for about two thousand years, and two thousand years is a fair time. I would guess they'll do it extremely efficiently, but, of course, they're not there yet.

The Industrial Revolution had very little to do with science. It was mainly the work of ingenious craftsmen, people who could make things and didn't care much about the ideas upon which those things were made. Men like Henry Ford, who was not in any sense a scientist but had a very shrewd idea that you could make a motor car. There were many others, and almost the whole of at least the first phase of the Industrial Revolution was done by such persons.

The Scientific Revolution

But now, we are entering something extremely different.

We are entering a revolution, which in the view of myself and the friends I've just mentioned, is going to transcend anything which we have so far known. The rate of change, since about 1800, has been incomparably faster than anything men have known before. The rate of change between 1965 and 2000 will make the previous rate of change look like a tea party. Of this there is no doubt. We must be prepared for what this will do, both its desirable results, and its undesirable results.

Let me be perfectly clear. I have no doubt whatever that this revolution has to be done, and that by and large mankind will immensely benefit by what has to be done. I am not in the least pessimistic about the total social results of what we're walking into. But it's as well to clear one's head.

All great changes produce certain difficulties, and usually certain losses as well as great gains. I think we're all fairly sure, that the gains we're going to get are going to be accompanied by certain losses.

The Computer Revolution

The great instrument, which is immediately about to transform our lives, is the computer. The computer is not just a calculating machine. It's a source of information, of memory; an instrument which can collect information, settle it, keep it, store it, analyze it, and so on. It is by far the most remarkable kind of machine yet made by man.

I've heard, — this I don't believe, but I've heard it, — some ingenious physicists say that by the year 2000 we shall be able to make a computer which in every respect — in imagination, creative power, and so on — is better than any human brain yet existing. I don't believe this; but the fact that the claim can be made by sensible scientists, shows how remarkable these machines are, and, I think it's fair to say, how little we really know about them. We don't even understand yet their true nature.

We know that we can in theory make them so that they can reproduce themselves. This I find a slightly creepy thought. They're going to enter into the very texture of our lives, as no machines have ever done before. Within a short time none of you will ever write a check again.

Sometimes computers give rather surprising results, like the case of a simple housewife in England, whose income would be about \$6,000 a year, who suddenly found from her bank that her credit balance was 2,300,000 pounds! At the moment computers can sometimes perform some rather nonsensical operations. But in fact computers are going to do all kinds of things which we can hardly envisage. All our payments, in and out, will be known. A great deal of the details of our personal lives will be open and at the service of a central government. They will make central government very much easier.

Submergence

This obviously has its disadvantages. The chief psychological disadvantage that I can see is that men may tend to feel that they're being submerged by the technological tide. We should be prepared for this. We should use every resource of social compassion to make sure that this doesn't happen.

In practical terms, a great many operations will be done by computers which are now being done by men. We've got to foresee this long before it happens. If we have the foresight and the technological skills, most of those practical effects — the non-psychological effects — can probably be at least mollified and, to some extent, wiped away.

Non-Work

But there is a long-term effect for which I see very little answer. It looks as though once you firmly establish a society advanced in this cybernetic way, then ten or perhaps twenty percent of the population will have to work extremely hard. Men of the whole managerial slice of society will have more tasks, more difficult and more complicated, than they've ever had before.

On the other hand, it seems to me inescapable that a large slice of the population, perhaps as much as 80%, will be underemployed, and will remain underemployed, so far as anyone can see, forever. I think they needn't be underemployed for the next hundred years or so; but in the long run, in a really advanced society, I can't see any easy way out from this. People will in fact cease to have an ethic based on work; they are bound to have an ethic based very largely on non-work.

This is worrying me, but it has great advantages. If I had to choose, I'd take it, because most men who ever lived, the overwhelming majority of our fellow human beings, have in fact lived lives which were short and hideous to contemplate; they worked from the cradle to the grave, with extraordinarily little compensation. This has been the ordinary lot of man from time immemorial. And so, therefore, to take that burden away is fine, and I'll settle for that.

Purpose

But I think, again, we have to be realistic. We have to remember that men and women want purpose in life. If you take purpose away, then you're likely to leave a state of boredom, ennui, a kind of feeling that society isn't theirs. This, I believe, is ultimately going to be the real problem for at least a certain part of the human race. They will feel, "fine, but what's it all for? What is the point?"

Here, again, I think we should be preparing now for this problem which is not immediate, but in this country it is not far away. If we get the rest of the world put to rights, the problem must ultimately come to the rest of the world also.

The absence of purpose is going to be one of the great psychological chores, a much greater psychological chore than anything that happened in the old Industrial Revolution which made the shape of the United States and of most of Europe.

The Biological Revolution

There is a second and probably a greater psychological burden. It has not yet been carefully thought out, though some of the problems of the cybernetic revolution have at least been sketched by a few of us. The biological revolution, so far as I know, has only been announced, and its consequences not yet imagined.

Recently, I heard Charles Price, of the University of Pennsylvania, say with his own authority, which is great, and with the authority of a great many of the chemists of the United States, that within a very short time we shall be making living cells, quite simple living cells, but, nevertheless,

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life in the full sense. I find this more remarkable than anything which the physicists and engineers have done, it is something which is nearer the roots of our being, something which will be extremely hard for many persons to accommodate to, just that fact alone, without any practical applications.

There are practical applications also. As one of the two prongs of this extraordinary biological revolution, we now understand a good deal about the mechanism of heredity. It looks as if, not so immediately as the making of living cells, but within foreseeable-time, we shall be able to control some of the mechanism of heredity. This, again, is something so dramatic that all the engineering triumphs of mankind will seem comparatively pale beside it.

This is not science fiction. This is the considered view of the best minds on this subject that I've been able to talk to. Once again I suspect that the total result will increase human good and not decrease it, although it is only fair to report that one of the best biologists in the world, an Australian called Macfarlane Burnet, said only a month ago, that this was something man ought not even to try to know. I can't agree with such a statement. I think that once you set that kind of limit, that our lives will become impossible. I think we have to try to know what we can know. But I am sure that that somber warning ought to be borne in mind by all of us, and ought to be borne in mind before the thing happens.

Warnings

A great many things have taken human beings unawares. There is no excuse whatever for these things to take us unawares. We've had heaps of warning. We've got, with the computers, two or three years before the full consequence is upon us. With the biological revolution we've got perhaps five to ten years before the secret is cracked. We ought to be thinking now with all the imagination of humane persons — sociologists, psychologists, anyone you like, any people of good will who wish well rather than ill to their fellowmen. This we've got to do; otherwise you'll get a great lack of belief that there is any worth in this life, among lots of persons in the community who have talent but aren't robust enough to face our life as it is going to develop.

There may be, as I say, an increasing lack of sense of purpose: what intellectuals of your country are fond of calling, alienation. I often think they call it alienation because they would like to have been country squires with large numbers of serfs, and they feel alienated from a society which doesn't make it easy for them to have that desirable result. They admire the peasant life having never seen a peasant in their lives. It would be very salutary for people who think of an 18th century society with happy, jocular peasants, actually to go and see happy, jocular peasants as they now exist in many places in this world.

Nevertheless, there may be an increase in the lack of human purpose, a lack of the purpose which gives salt to life. I suggest that for some time, for a hundred or two hundred years, there is no excuse for people to feel that they lack purpose. I've been talking exclusively for a while of advanced societies, of the rich countries, of countries that have had the historic luck.

The Poorer Countries

I want to draw your attention now to the rest of the world, the poorer countries, the countries which have not had historic luck; and so far as one can see, it is luck. There is very little else that can explain what has happened to us.

The world is divided into rich countries (the ones I've

mentioned) and poor ones. The bitter fact is that the rich countries are getting richer and the poor countries are getting certainly relatively poorer and possibly absolutely poorer; and no one can see yet how this gap can be decreased. Curiously enough, to some extent within rich societies there is some sign of the same phenomenon; the gap in this country, I suspect, between the rich and the poor is not becoming any smaller. But that is a subsidiary problem which can be coped with by intelligent political management.

The other problem, the gap between the rich and the poor countries, seems to me by far the biggest social problem, not only of our generation, but of at least three or four generations to come.

It's extraordinarily hard for people born as lucky as you are, living in this immensely rich society, whatever its pockets, to understand even remotely what the life of two-thirds of your fellowmen is like. A friend of mine sitting next to me at an American dinner party in a very comfortable house said she had just been in an Asian town; she was active like most Americans, and she saw people lying absolutely still in the streets, not sleeping, not waking, waiting for heaven knows what. And she asked, in a good American way, "Why don't they move?" And her guide, who was himself Asian, said "The less they move, the less hungry they are."

Now this is so far from our experience, so far from anything we can even remotely come in contact with, that we don't speak the same emotional language as the majority of the human race.

If you want to hear this very sharply from someone of immense talent you should talk to one of the greatest of the world's mathematical physicists, Abdus Salam, who was born in a wretched Pakistani village as the son of a poor villager. He often says, even to people whom he'd regard to be of relatively good intentions, good heart, that: "Often when you speak to me, you chill the blood in my veins. You have no idea what our life is like and what the life of most people is like and will continue to be for as long as we can foresee."

I am thinking particularly of India, which is really the problem that is weighing heavily on us all. There seems to be no doubt that India is going to have a major famine within a few weeks and several million people will starve to death. Famine is a horrible thing.

I agree, of course, that there are certain exceptional societies. In the Fiji Islands, you've got a very jolly people who live comparatively simply, and live a fairly long time; they are well-fed, and extremely athletic. They do nothing but play games; I suppose this is fine. There are, of course, other intermediate societies.

But, when you're trying to produce a sort of shorthand account I think you've got to confine yourself to the gross and major aspects.

Medicine, including surgery, spreads much faster than food growing and incomparably faster than industry. Therefore, the actual length of life in countries like India, has gone up without any of the compensating things which we had when our Industrial Revolution was upon us, without being able to grow more food, make more goods, and so on.

Control of the population won't touch the situation during this extremely critical fifteen years. The children are already born, in fact. In all the poor countries of the world a fantastic proportion of the population, about 45%, is under age fifteen. This is because in fact medical science goes faster than either industry or food-growing. Therefore, we've got to cope with a giant immediate problem.

The world could support a very much larger population than it now has, probably three times as large or more. But

there is clearly a limit. Almost all societies in fact, even if not informed, do limit their population. I do not believe that overpopulation is as much a cardinal problem as some of the others. I fancy that once we get a relatively well-fed world, then you will find mysteriously that the population will level off.

One-Third Rich, Two-Thirds Poor

I cannot believe that the world can survive in peace, one-third rich and two-thirds poor. I simply do not believe it. I believe that this tension is the profound conflict of these days, and is being reflected in the events of this tumultuous century. People, once they get a little above the subsistence level, want much more; and it is right that they should want much more. I therefore believe, that all the rich countries (chiefly this one, but all of Europe) will have to get seriously to work if we want this world to be morally tolerable or even, in my view, practically viable at all.

As I said, this country can contrive to grow enough food for itself with probably the effort of two or three percent of the population. Some of the best calculations suggest that if we spend a few billion dollars, nothing like what we spend on space or on war, we could get the agriculture of these countries really going on their own terms. Then we might help them keep up, keep up only this subsistence level at which they are now existing. That is the best we can do by any contribution in terms of skilled agriculturalists and skilled equipment, and so on, for the poor of the world for fifteen years.

Then, if we're going to make them slightly better nourished, get them off the subsistence level, give them enough energy ultimately to cope with their own problems, it will need a contribution in actual kind, a contribution in terms of actual food. Again, the amounts involved don't seem to be out-of-question large. It would mean paying the farmers. It would mean some people working perhaps on the land who now don't work on the land. But it looks like a realistic prospect, that the 3% of your farmers who are now feeding the United States could in fact grow a bit more without much effort if they were paid for it. This, again, is not beyond question. And we have made the same calculations for Europe. It seems a perfectly feasible proposition.

If we do not cope with this task, then I'm afraid my view of the world will become very dark. I cannot see any conceivable solution for the world where we sit well-fed as though we were in a kind of fortress, heavily armed, trying to guard ourselves from the hordes outside. This is not tolerable, at least not tolerable to me, and I can't live like that. This is not a situation which a self-respecting human being should be placed in.

The Effects of Science

But I'm on the whole optimistic. We've been talking about science. Science is a future-directed activity. Optimism is in the very thread and cloth of science, because science has always had its eye on the future, has always progressed, and has always become better. Really, by and large, despite all the despairing half-intellectuals, its effect has been ultimately benevolent.

I believe we shall cope with this challenge. Challenge is a thing meant to be picked up and coped with. Despair is a vice and, hope, curiously enough, is a virtue. And we can do something.

The Solving of Problems

I sometimes ask myself, though, what will happen when we really have got some kind of social justice around the

whole of this planet, when in fact everybody is living at a modest level, something like, say, North Italy today: not as well as you (that's very difficult), but something which is perfectly tolerable — North Italy or say Yugoslavia today. What happens then?

Now, will all men, having solved all the gross problems, all the problems we must solve if we're to think of ourselves as human at all — when people are no longer hungry, no longer short of medical attention, no longer seeing their children die, no longer illiterate — will they then succumb to boredom, ennui, all these things which in your literature are so strongly represented?

Well, it may be, but I would doubt it. I think in fact that men are much tougher than we think. The men of the future won't have our problems; that's clear. They'll have other problems. I believe in fact they will think our fears were slightly absurd, though they will probably have their own. There will be some of them who feel outside their society, because there have been some people in every age who feel outside their society. But the better spirits, the people who really know that man is a wild animal, that he is at his best when he is living in society — that he is a wild and beastly animal often, but has certain capacities for grace and certain aspirations — I believe they will say, "After all, we did it. We made these machines. We've solved these problems, and we're going to solve the others."

We came out of the caves, you know, about 12,000-13,000 years ago, perhaps. In the caves men painted pretty pictures. They were people like us, they looked rather like us, but life wasn't sweet. We've come a long way from the caves. We shall go a long way further. The thing to do is not to lose our nerve and to remember that we're all human. □

Blumenthal & Rosen — Continued from page 26

ambiguous policy. The outcome of a decade of high-level murders has been Johnson, Nixon and Ford. Assassination has become as important a part of the political process as Presidential nominating conventions; the murders have effectively been nominations by proxy. This brutal transfer of power and the constellation of mysteries that surround it remain unresolved as America approaches its Bicentennial election. □

ANNOUNCEMENT

A great part of the department

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Computing and Data Processing Newsletter

27

WEST COAST OF DENMARK WATCHED BY COMPUTERIZED FLOOD WARNING SYSTEM

Michael S. Fournell
Hewlett-Packard
1501 Page Mill Road
Palo Alto, Calif. 94304

Along a 100 km stretch of southern Denmark's coast that historically has been endangered by floods, a computer system is monitoring the North Sea waters around the clock, ready to warn of impending danger.

level areas of southwestern Jutland. These lowlands are the northern part of a geographic area along the North Sea coast that reaches from Belgium through the Netherlands and Germany to Denmark and is protected by dikes.

There are five electronic monitoring stations located along the coast between the German border and the Danish city of Esbjerg. Each continually gathers data on the changing water levels of the sea. This data is sent via telephone communications lines to the main computing system at Tønder. A sixth monitor, which has been installed at a lighthouse 15 km out at sea, communicates its data via radio.

The computing system scans each data-gathering substation once every half hour. Incoming data on actual water levels is entered into the computer along with other up-to-date meteorological information such as barometric pressure and wind speed and direction.

H. B. Soerensen, head of the governmental coast authority responsible for the operation, said, "A complicated statistical regression model is able to synthesize electronically all factors determining the ocean's water level and produce an accurate three-hour forecast. The minicomputer's sophisticated mathematical model even takes into account the time of year and the influence of the position of sun and moon on tidal action. The model was developed over a three-year period by the Technical University of Denmark."

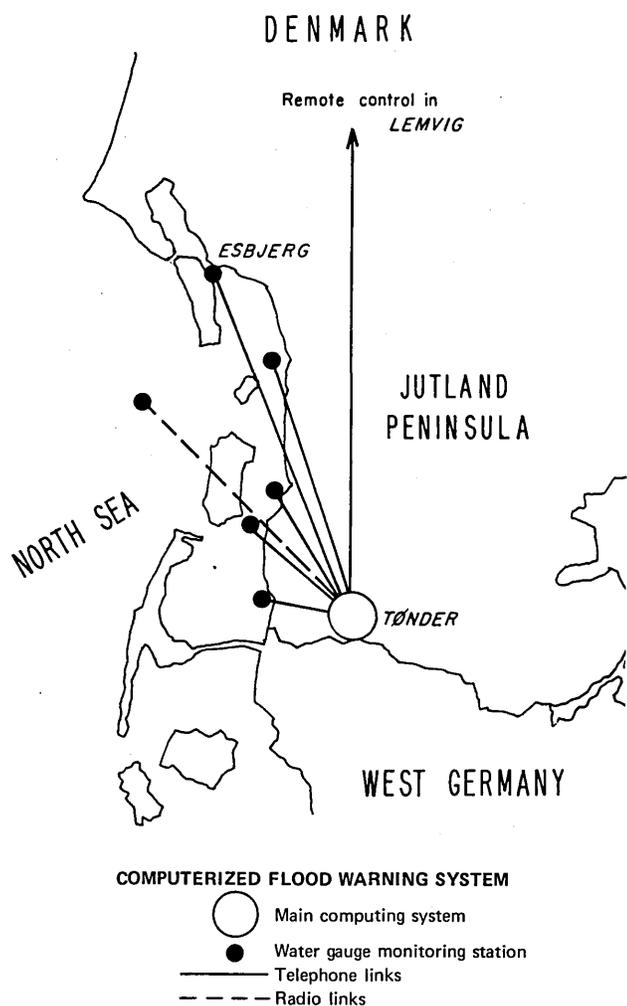
The mathematical model is based on 10 years of data collected by standard measuring equipment and recorded manually. Currently, that data base is continually being updated with electronically gathered data from the system's six monitoring substations to improve the model.

Said Soerensen, "Now, the computer compares all incoming data with values and limits derived from that data base. Should a three-hour forecast go beyond tolerable sea-level limits, responsible people are signalled automatically."

The manager of the system is then able to take control, querying any substation for additional updated information, and asking the computer to display a graph of water level performance over the past 18 hours.

"If a real danger of dike overflow exists," said Soerensen, "the three-hour warning, we think, is sufficient to prevent loss of life."

"Luckily, there has been no occasion so far to issue such a warning, but there were two close calls



With this computerized flood warning system, installed in 1972, the Danish government hopes to save lives and minimize property damage in the below-sea-

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in the storm season of late 1973. Each time the system performed flawlessly, demanding attention only when waters rose to dangerous levels."

The main station of the flood warning system consists of a Hewlett-Packard minicomputer, a teleprinter, a tape reader and punch, digital-to-analog and scan converter, a data collection subsystem from Landys-Gyr and a graphic display CRT. A second teleprinter located in Lemvig 200 km away allows the authority's central office there to monitor and control the entire system.

RESEARCH PROGRAM HELPS EAST AFRICAN NATIONS PLAN ROADS

*News Office
Mass. Inst. of Technology
Cambridge, Mass. 02139*

A group of faculty and students in the civil engineering department at the Massachusetts Institute of Technology are engaged in a research program to help four East African nations decide what kinds of roads they should build, and where they should build them, by evaluating the relative benefits and costs of different alternatives.

The work is being done under a three-year, \$400,000 contract recently received from the U.S. Agency for International Development (AID). It will focus initially on highway transportation problems in Ethiopia. It has been estimated unofficially that 70 percent of the people there live more than 100 kilometers from a road.

The group will also work with local government officials and officials from AID and the World Bank to plan transportation programs in three other East African countries: Kenya, Tanzania, and Malawi.

The new project is based on a Highway Cost Model developed for the International Bank for Reconstruction and Development by Dr. Fred Moavenzadeh, M.I.T. professor of civil engineering. He has been involved in research on road transportation in developing countries for the last five years.

Ethiopia has already instituted a large-scale program for major highway arteries, but with the onset of the famine there the government found itself unable to distribute relief and so is now placing emphasis on the development of rural roads.

Although analysis of highway construction costs can be and is done by conventional means, the approach in this project integrates a host of detailed engineering factors and enables planners quickly to review a wide range of alternative construction plans and to relate them to available resources of capital and labor and to environmental factors.

After the model is given a numerical description of the terrain a proposed highway would cross, a module of the computer program estimates construction costs of earthmoving and drainage for the "best" road (few curves and hills but more earthwork) and poorer but acceptable roads, all the while relating hills and curves to operating costs of cars and trucks.

A maintenance portion of the model tells how a road's surface will deteriorate, taking into account rainfall, volume of traffic, the way the road was built, a specified maintenance schedule, and the cost of the maintenance.

The model also predicts operating costs of vehicles using various types of roads. For example, gravel roads may be cheaper to build but they increase vehicle operating costs and reduce speeds. In addition, the model shows how different levels (and costs) of maintenance affect the cost of running autos and trucks.

The prime advantage of the current model is that it can "do more faster" and integrate many factors that would otherwise have to be estimated separately.

The model is also eminently practical. Highways are largely what is termed "social overhead" and are means to an end and not productive resources in themselves. Developing countries also have great needs for health and educational services and must carefully weigh the allocation of limited resources, particularly capital.

The collaborative program with the Ethiopian government also includes bringing some Ethiopian highway officials to M.I.T. for supplemental training in M.I.T.'s Center for Advanced Engineering Study.

NEW AUTOMATED SYSTEM FOR THE WEATHER SERVICE IS BEING TESTED

*Carl Byoir & Associates
c/o Hughes Aircraft Co.
P. O. Box 90515
Los Angeles, Calif. 90009*

The National Weather Service has begun testing a "weather office of the future": an all electronic system designed to speed delivery of storm and flood warnings to people making critical, quick decisions involving lives and property.

The experimental facility is located at Weather Service central headquarters, Silver Spring, Md. It is the forerunner of a complex system for communications, data storage, data display, and forecast dissemination. The eventual plan calls for about 275 automated offices of the Weather Service around the country by 1980.

The new system includes a network of on-site mini-computers and TV-type displays substituting for presently used teletypewriter and facsimile equipment.

All contour data are converted to conic curves and are displayed with a very significant reduction in data required as compared to conventional x-y plotting.

The long-range program is called AFOS (Automation of Field Operations and Services). It will incorporate one of the largest computer networks operated by the Federal Government. As envisioned by the Weather Service, each participating office will have its own minicomputer to collect, process, and communicate data, and a set of TV screens controlled by a typewriter-like keyboard for message composition and display.

The Weather Service estimates that, with AFOS, a weather map will arrive on the displays in about 1/20 of the time it takes on paper — 30 seconds, as compared with about 10 minutes for facsimile transmission of a standard 12 x 18-inch weather map. Transmission of printed matter will be about 30 times as fast — 3,000 words per minute as compared with 100.



Weather office of the future under test at the headquarters of the National Weather Service in Silver Spring, Md.

Forecasters will have available a wide variety of weather maps, messages, and satellite photos.

When fully implemented, the AFOS system is expected to relieve forecasters of much drudgery.

The prime contractor is E-Systems, Inc., Garland, Texas. The supplier of the displays is Hughes Aircraft.

"AN ENGINEER IS OBLIGATED TO PROTECT THE PUBLIC SAFETY" — CALIFORNIA COURT ACCEPTS "AMICUS CURIAE" BRIEF FROM THE IEEE

*Martin Gitten
Inst. of Electrical and Electronics Engineers, Inc.
345 East 47 St.
New York, N.Y. 10017*

The Superior Court of California (County of Alameda) has accepted a petition of the Institute of Electrical and Electronics Engineers to file an "amicus curiae" brief in the case of Hjortsvang vs. San Francisco Bay Area Rapid Transit (BART) District.

This case involves questions concerning the proper ethical conduct of a large number of engineers. So IEEE petitioned the Court to file its brief because it "has a direct concern with the establishment, maintenance, and recognition of ethics for engineers." The petition was accepted. IEEE made no statements on the merits of the case, but asked for a ruling by the Court "that an engineer is obligated to protect the public safety, that every contract of employment of an engineer contains within it an implied term to the effect that such engineer will protect the public safety, and that a discharge of an engineer solely or in substantial part because he acted to protect the public safety is a breach of such implied term."

In its brief, codes of professional ethics by various professional engineering societies were cited. These included the "Canons of Ethics for Engineers," prepared and adopted by the Engineers Council for Professional Development in 1946, and the National Society for Professional Engineer's Code, adopted in 1964. In 1912, the American Institute of Electrical Engineers (a predecessor of the IEEE) adopted a code stating "An engineer should consider it his duty to make every effort to remedy dangerous defects in apparatus or structures or dangerous conditions of operation, and should bring these to the attention of his client or employer." In 1974, a new IEEE code stated "Engineers shall, in fulfill-

ing their responsibilities to the community: (1) protect the safety, health, and welfare of the public and speak out against abuses in these areas affecting the public interest"

The IEEE is the world's largest professional engineering society. It is dedicated to enhancing the quality of life for all people throughout the world through the constructive application of technology.

Hertlein — Continued from page 27

"What is the nature of man?" another asked. I replied, "Philosophers have been asking this question for thousands of years. You might study De Chardin's 'The Phenomenon of Man' where the former French abbot stated that mankind is still in the process of emerging, and that perhaps someday mankind will become humane."

A young girl remarked: "I have been reading Norbert Wiener. I like his idea of using technology for redundant tasks, and liberating man. I find his statement of goals for technology, 'The human use of human beings', to summarize what I feel technology and computers can do for man." I asked, "What is the human use of human beings? What does it mean to be truly human?"

A psychology graduate student questioned whether technology and money alone can solve the problems of the earth. "Is there a science or art of human relationships?" she asked. I suggested, "What of Skinner, William James, John Dewey, Maslow, and the movement of Humanistic Psychology?" I questioned whether man is programmed, and will be programmed more in the future.

The class reviewed again the table of relationships and time, on page 24 of the text, "The Limits to Growth", and discussed how people could get from the world of self-centeredness into social responsibility, how people could get from this minute to tomorrow, on into the future.

The Art and Science of Human Relationships PLUS Technology

Too many scientists view computers and advanced technology as a panacea for the solution of the world's problems. Technology alone cannot make the earth a garden, feed the world's hungry, and house the race of man. The art and science of human relationships is also necessary for the technologist. The art of computing requires artful, humane uses. □

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 753

```

1 1 7 5 3 7 1 1 2 1 2 6 6 1 0 5 6 0 4 3
4 5 5 0 6 3 6 1 4 8 5 2 2 9 3 4 7 8 1 2
2 9 8 1 5 8 7 5 8 1 4 4 1 5 2 7 7 8 2 7
1 7 6 8 7 9 4 0 8 7 9 3 8 9 2 3 4 2 7 5
3 5 8 1 6 2 4 9 6 4 3 5 7 4 0 6 2 8 3 3
4 3 6 4 6 4 2 9 8 5 7 3 9 9 0 4 2 2 6 9
6 9 0 3 7 8 6 6 7 3 3 3 1 5 8 7 5 3 4 5
2 0 2 1 0 1 3 3 1 3 2 1 0 0 2 1 1 3 1 2
6 8 8 2 2 6 7 3 6 9 0 3 4 0 4 4 3 0 6 4
7 8 9 9 8 7 6 0 0 2 1 2 8 9 4 6 2 4 5 7
    
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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, equivalentents like CS or KS for X or vice versa, etc. But the spaces between words are kept.

MAXIMDIJ 753

```

@ ♥ ♣ ✕ ♣ ■ ✕ ♣ ↑
✕ ♣ ✕ @ ① ↑ ✕ @ ♥ ♣
▽ ♣ ♣ ✕ ■ .
    
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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 753

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      T H E
      W O O D
      R Y W H      D = R
+   H A S
-----
= D S W L
    
```

23247 12805 51042 094

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

SOLUTIONS

MAXIMDIJ 753: One gets the fish one fishes for.

NUMBLE 753: Naked truth hurts.

NAYMANDIJ 753: Make 2 follow 1.

Our thanks to the following individuals for sending us their solutions to — **NUMBLE 752:** T. P. Finn, Indianapolis, Indiana.

Announcing the publication of a new monthly magazine starting May 1975

"People and the Pursuit of Truth"

- The Watergate crimes and punishments have changed the atmosphere in the United States.
- Congressman Henry B. Gonzalez of Texas on February 19 introduced H. Res. 204 in the U.S. House of Representatives, calling for an investigation of political assassinations in the United States.

- More than 1500 persons attended a conference on "The Politics of Conspiracy", Jan. 31-Feb. 2, in Boston, called by the Assassination Information Bureau.
- Rusty Rhoades of "The Committee to Investigate Political Assassinations", Los Angeles, Calif., has collected more than 250,000 signatures calling for a new congressional investigation.

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- important to people
- widely suppressed
- not adequately covered in the usual American press

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FIRST ISSUE: May 1975, about eight pages, full size, photooffset, some pictures

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