

The Computer Age: Let your fingers do the walking

by Marc Le Gras
of the McGill Daily

The basic function of computers seems simple enough: they are composed of electronic circuits capable of millions of arithmetic operations per second. These devices accomplish the incredible feat of storing, comparing, and classifying large amounts of information in the blink of an eye. The revolutionary uses of computers and their applications to our everyday lives, however, are quite astounding. It now seems that computer technology is advancing at such a rate that the consumer is often unaware of new developments or unable to absorb them.

The advent of intercomputer communication may very well reshape methods of financial transactions. At the moment, the forerunners of a futuristic electronic monetary system—electronic banking and multi-branch banking services—are gaining acceptance from an often computer-weary public. Only time will tell if one day bills will be paid with "bytes" from the home computer terminal. Such possibilities hint at what an electronic economy would mean to a nation.

Interestingly enough, newspapers have taken advantage of an industry which may one day threaten their very existence, by bringing the news into the viewer on electronic "pages." For the past few weeks the *Toronto Globe and Mail* has ceased to be flown to Montreal; instead it is now being coded and beamed using computers and a telecommunications satellite.

Perhaps one of the greatest innovations in the communications field was the development of the light pen. This tool enables both architects and engineers to draw upon a large memory of graphic elements to create technological masterpieces which may otherwise have been impossible. A light pen can superimpose the cross sections of a ship's blueprint to produce a three dimensional view from any angle. It can also calculate any parameters required, such as the best position for the vessel's pump stations, the master drawings can immediately be coded and transmitted by satellite around the world.

A project which may very well signify that computers are already knocking at the front door will be introduced in January 1981. Bell Canada will begin experiment "Vista" in which computer terminals will be provided to approximately 600 residential customers in Quebec and Ontario, most of whom, however, will be in the Toronto area.

The two-year trial will incorporate the Telidon system developed by the Canadian Department of Communications, in which a video terminal is coupled to a coding system which communicates with a main computer bank via conventional telephone lines. In the first phase of the trial, randomly chosen customers will have access to approximately 80,000 pages of information listings supplied by various organizations such as Statistics Canada, *Le Soleil* and various universities. In the final phase, subscribers will reap the benefits of interactive computing, a system in which the programmer can have two-way communications with the computer, rather than leafing through its data banks.

Communications companies are now working on the feasibility of widespread use of such information and communication systems, a development which could drastically influence everyone's life. Grocery shopping from one's living room could be a very popular feature of interactive computing.

One of the challenges in the computer industry seems to be who can build the biggest "brain," the ability to create the most

voluminous memory. Bell's wonder is called the "Bubble Memory"; it can store four times the amount of information of conventional memories with 10 times the speed.

The presence or absence of a single bubble represents a 1 or a 0 respectively in the binary code [the computer's counting system]. A magnetic field regulates the position of the bubbles. When information is needed the field is altered and the bubbles pass by a detector which strikes up 1s or 0s, voilà! Bell Telephone in the United States is already using these mighty memories for telephone recordings and it seems that great potential lies ahead in communications equipment, including word processing systems.

A recent development that nearly escaped Western scrutiny was put forward by a Soviet mathematician named Khachian. The theory involves a new method of solving "linear programming" problems in which there is a large number of variables and side conditions which require hours of computer time in order to obtain an optimum solution. For example, a factory may try to cut production costs by eliminating wasted material while varying the manufacturing methods and rescheduling production on certain items. In addition, complex economic and scientific models may be solved once the yet-to-be-named method becomes practical for computers.

Another facet of the "Computer Revolution" may one day make our present system of education look prehistoric. At this very moment Stanford is offering introductory courses in Armenian, solely taught by computers. According to a U.S. Federal Government Defence Language Institute study, students assimilate languages much better in the absence of feedback from a professor and exposure to faulty pronunciation of fellow students. Stanford has followed this study to the letter by implementing courses in which computers are the professors by virtue both of their ability to synthesize prerecorded bits of sentences into speech and the machines' talent for withholding their dismay at the atrocities being uttered.

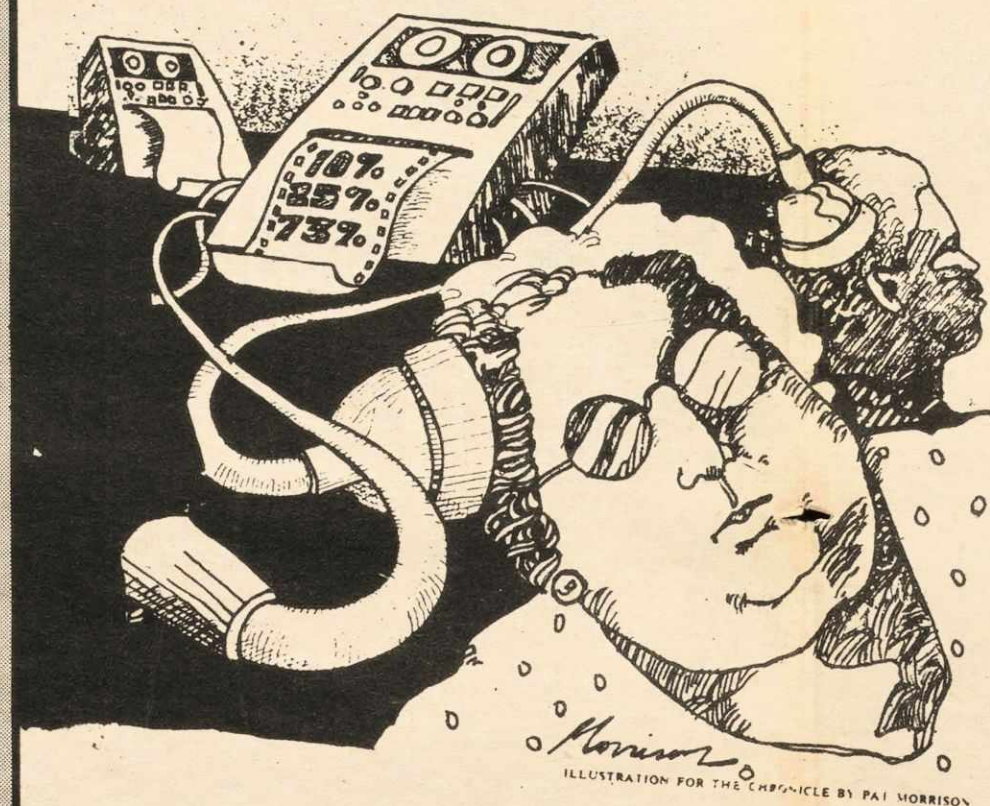
Computers can also be very useful in the humanities. In Minnesota, where a large part of the school population has access to computers, students have learned about election by holding a statewide student vote on the computer network.

The domain which will see the most change is the home. Home-computers for entertainment, household financial planning and self-education. It seems the multitude of home applications would boggle even Jules Verne's mind.

Certainly, however, one of the greatest benefits of computers will be in helping the handicapped. The blind have been actively using computers for some time, as is shown by the increasing number of blind computer programmers. For the many cerebral palsy victims who have severe motor and communicatory impediments, recent developments in touch-activated keyboards and audio feedback equipment will now permit a new flexibility in learning and communicating.

From managing household budgets to the rapid transfer of information, computers may soon revolutionize our lives, if they have not already started to do so. Both the developments in computer technology and their applications have left a profound mark on the way society functions and evolves. When one considers how television and radio affected the world, it will be interesting to see what changes computers will afford us.

Computers may soon revolutionize our lives But watch out for crime— and personal privacy



"One day, the little computer learned that in the world there existed a great many computers of sorts, great numbers of them. Some were small like himself, but some ran factories, and some ran farms. Some organized population and some analyzed all kinds of data. Many were very powerful and very wise, much more powerful and wise than the people who were so cruel to the little computer.

"And the little computer knew then that computers would always grow wiser and more powerful until someday—someday—someday—"

—Isaac Asimov



by Julian Betts
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On October 25, 1978, Stanley Rifkin, a California-based computer consultant, gained access to secret banking codes and, posing as a bank executive, managed to have \$10.2 million transferred from Security Pacific National Bank in Los Angeles to a New York bank. Reputedly the largest robbery in U.S. history, the crime went undiscovered for over a week.

Last February, thieves electronically stole \$2 million from a Florida bank, and kept the funds travelling from one computer to another for several days before depositing them in a Palm Beach Bank.

In 1978, Federal MP Dan McKenzie told Parliament that "computer frauds are now expected to exceed \$300 million annually."

The list goes on. Clearly, ensuring the security of computer systems is no easy task. As an early '70s issue of *Canadian Datasystems Magazine* points out: "It is self-evident, but absolutely true, that there is no way of guaranteeing absolute security, of guaranteeing that someone who wants access to confidential data cannot with sufficient time and money do so."

Sometimes technical oversights may leave the door wide open for would-be thieves. Just before British banks began using a new coding system for interbank fund transfers, a computer analyst discovered that crooks could make undetectable transpositions in the codes, changing a \$100,999 transfer to a transfer of \$999,100.

Still, banks continue the trend toward greater computerization. A Bank of Montreal official told the *Daily* that inter-bank transactions "go through normal communications facilities, but the information is safeguarded in a number of ways. . . Over the last 10 years there has been no intrusion into the system." Despite the assurances of banks, the number of computer wire thefts that has already occurred reveals the fallibility of computer-run systems.

The problems of computer security do not restrict themselves solely to banking. Last April, students at Dalton High School in New York used their school computer and normal telephone lines to gain access to 21 Canadian computer databanks, including two run by the federal government. In the process, they destroyed information stored in the computer of the Canada Cement La Farge Company. Several weeks later, Donald Johnston, President of the Federal Treasury Board, could not assure Parliament that the government databanks involved had not contained "sensitive" materials.

These events spurred Parliamentarians to question the security of the over 1,500 federal databanks containing personal information about Canadian citizens. Opposition MPs quickly leaped on the fact that the two government databanks the New York students tried to gain entry to belonged to Bell Canada's Datapac system, which provides phone access to the computers of every major university in North America, including McGill's.

To contact a certain computer on the Datapac system, a would-be thief need only dial a phone number. He must then print in the correct code and password on his portable terminal to obtain access to a particular file. Guessing a complex code and the proper four to nine letter password may seem difficult. But computer expert Edward Glazer told the *Globe and Mail* that he could break such codes in five minutes, presumably by using automatic number sequencing devices. One enterprising University of Waterloo professor devised a method to store a person's codewords in the computer's

memory, leaving the person slightly bemused by the computer's odd behaviour, but most likely unaware that the computer had stolen his secret identifying code.

Evidently, the ability to manipulate databanks in such ways poses a threat to the privacy of citizens. Masses of data have been collected about all of us. The flow of this information between different databanks results in a person having little or no idea of who knows what about his personal life.

The *Canadian Police Information Centre*, which has computerized files on 600,000 individuals convicted of no offense, allows the FBI full access to its records. The *Associated Credit Bureaus of Canada* exchange credit information with 3,000 businesses in Montreal alone. Provinces sell their motor vehicle records to private auto companies. Any householder who receives junk mail can testify that his name and address has ended up in unwanted places. Hundreds of other tidbits are stored in various databanks. Income tax returns, medical files, lists of phone calls made, dates of U.S. border crossings, credit card bills, all remain in vast computer repositories.

An example of the ease with which computers exchange information occurred in Winnipeg several years ago, when a high school student incorrectly coded his Scholastic Aptitude Test (SAT) form, causing the computer to record that he was studying at a school in Kabul, Afghanistan. Several weeks later, when Canadians were being evacuated from Afghanistan due to the Moslem uprisings, the principal of the school received a phone call from the federal government, asking if one of the school's students was presently studying in Kabul. Apparently, the Canadian government had gained access to the SAT computer files in the US during its search for Canadians in Afghanistan.

In the last few years, opposition MPs have expressed concern about the flow of data between computers. They have worried in particular that the growing use of the social insurance number (SIN) by private firms would transform it into a national identify number, facilitating a tyrannical control over the private lives of individuals.

Indeed, one survey conducted by the *Department of Communications* revealed that 62 per cent of Canadians fear computers "will reduce us to numbers". But in a 1978 debate, Bud Cullen, then Minister of Employment and Immigration, made the telling remark that the transfer of private data between companies "would be possible using an individual's name, even if the social insurance number did not exist. I will concede that the SIN makes it easier. But if we did not have SIN, the computer could make the linkage anyhow." In other words, the SIN was only the tip of the iceberg.

Nevertheless, Parliament has passed several laws including the Canadian Human Rights Act and the Protection of Privacy Act which prevent the government from disclosing any personal information held in its files without the specific approval of the individual involved. The Freedom of Information Act, Bill C-43, will reinforce the rights of the individual as regards government files.

Many Members of Parliament view the SIN and protection of privacy issue as a tempest in a teapot as if government agencies could never possibly infringe upon the privacy of Canadians. Perhaps they have forgotten that in 1978, 32 years after the Cabinet had rescinded an order allowing the RCMP free access to income tax files, the Mounties were still

obtaining income tax information in all sorts of cases. And perhaps they have forgotten that in 1973 the RCMP, under directions from Ottawa, stole a computer tape listing the Parti Quebecois membership.

Superintendent Melvin Deschenes of the RCMP's Security Service told the *Daily* that under present laws, only the individual can obtain information on his file. As for income tax returns and SIN information, "those are protected. We need a warrant to get that."

It seems that the new legislation controls the flow of government data quite stringently. But data transfers in the private sector are much more difficult to regulate. One firm, the Retail Credit Company, states in its 1972 Manager Manual that "our function is primarily the making of character reports on individuals. . . Most of our information is hearsay. . . The company cooperates with federal authorities in the United States and Canada. . . (R)quests (sic) usually come from. . . RCMP and other federal departments in Canada."

According to Edward Ryan, member of the 1972 Ontario Law Reform Commission, Retail Credit has several million Canadian files, which are "never to be shown" to the individuals involved. Ryan outlines the implications of such a system: "No one can doubt that the network linking together employers, police, insurance companies, governments and the marketplace represents massive, hidden, anonymous, arbitrary power. The individual is isolated—completely along—and absolutely vulnerable when he comes up against this system. No law protects him. No court can help him. . . Opinions once freely expressed will remain unspoken. Political views will tend to become popular and conformist. Assertion of legal rights, particularly against the government and others who are on the information network, will be able to be done only at the risk of being classified by the system as a 'troublemaker.'"

Grave implications indeed. But effective legislation can curb the problem. U.S. Congressman Koch once proposed that all agencies holding files on a person must:

- Notify the individual that such a record exists.
- Notify the individual of all transfers of information.
- Disclose information only with consent or when legally required. Require the agency to keep a record of all persons inspecting the files.
- Permit the individual to inspect his records, make copies of them, and supplement them. (The associated Credit Bureaus of Canada already allow people free access to their own personal files.)

Such regulations would greatly diminish the potential for abuses of personal information. They would practically ensure that databanks would serve society better than they now do.

Doubtlessly, computer communications networks have much to offer society. In emergencies, they can track down badly needed medical records or rare antitoxins. They also allow a person to extend his line of credit around the world. But society must guard against the dangers which these services entail. As American Senator Sam Ervin once told a Senate hearing, "Privacy, like many other attributes of freedom, can be easiest appreciated when it no longer exists. A complacent citizenry only becomes outraged about its loss of integrity and individuality when the aggrandizement of power in government becomes excessive. By then, it may be too late."