

people 75

IN HIS OWN WORDS

AN M.I.T. EXPERT FORESEES COMPUTERS THAT CLEAN, MOW LAWNS AND BECOME PLAYMATES

Like it or not, computers keep tabs on every man, woman and child in the United States. The fact that these remarkable machines do our arithmetic and accounting, maintain criminal and credit records, guide our missiles, help land our planes and even help compose music has spawned concern that our society will someday become an Orwellian nightmare in which people are ruled by computers.

Not so, says Michael L. Dertouzos, director of the Laboratory for Computer Science at the Massachusetts Institute of Technology. Instead, he predicts that judicious use of computers could actually enhance life by relieving people of tedious and repetitive tasks.

Dertouzos is conducting a study on the future impact of computers that will include essays by 20 social scientists and computer technologists—"Nobel Prize winners and also some humans," he jokes—to be published in 1977.

Athens-born Dertouzos, a cigar-chomping, 6'4" former Fulbright scholar, lives with his German-born wife, Hadwig (herself an MIT-trained chemist), and their children, Alexandra, 9, and Leonidas, 6, in a two-story brown-shingled house in Waban, Mass. He counts among his hobbies cabinetry, weaving, pottery, downhill skiing and sailing. He found some time to discuss with Gail Jennes of PEOPLE the role of computers in our lives.

Gould a computer ever become as "human" as the one named Hal in 2001: A Space Odyssey?

A computer has already taken over a "human" mission on the Viking mission to Mars. But control over humans is a different issue. In open-heart surgery where a computer monitors blood-stream and vital functions, are we not under a machine's control? A human being is often under the control of a machine and, in many situations, wants to be.

Will machines ever be more intelligent than humans?

That is the important question, and the one on which scientists are split. One side says it's impossible to



Photographs by Steve Hansen

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In the ninth-floor computer room at MIT, Michael Dertouzos predicts that by 1985 many homes will have compute...

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make machines with the same intelligence, emotions and abilities as humans, and that therefore machines will only be able to do our bidding. The other side believes that it's possible to make machines learn much more. Both sides argue from faith; neither from fact.

What do you think?

I think progress will be a lot slower than predicted. Computers will get smarter gradually. I don't know if they will get as smart as we are. If they did, it probably would take a long time.

What's the current trend in computer technology?

Hardware [basic machinery and circuits] is becoming faster, smaller and less expensive. Since 1960 it has dropped in price drastically. Between now and 1985 the cost for computer hardware will probably be one hundredth or even one thousandth of today's cost. Individual circuits will also require much less energy. An example: computer circuitry which used to fit in many rooms can now be printed on an area the size of a thumbtack.

What things are computers doing now?

More than 90 percent of the computer activity today is business data processing like the management of payroll and accounting. IRS auditing is strictly data processing, as is banking. The computer dating process matches the attributes of one person with those of another. Some computers are used for little games like PONG. The other major use of computers is guidance and control, to help land lunar modules, guide the Viking mission to Mars and guide missiles.

Can computers run a war?

They are nowhere near our intelligence. Therefore computers can't wage a war against smart humans.

Is too much information about us stored in government computers?

That's like asking a librarian what he or she knows. There's a great store of knowledge in the books of a library, but coordinating it is nearly impossible for a human being. Government has a huge stockpile on taxes and crimes, but to my knowledge such data have not been pulled together in a major way. It's in such diverse government agencies that I don't think it could be.



Dertouzos chats with colleague Joel Moses. "I don't buy the jeremiad that computers will take over," he says.

Doesn't this constitute a dangerous centralization of information?

I don't think there is a big danger. In totalitarian societies the game is different. Since people can't object, the prospect of centralized control is more real. A totalitarian government can require every citizen to bear a card for entry to any city or town. Computer programs could tell if people of a certain class or type were getting together somewhere. You can't pull that in our society.

Don't computers offer a great opportunity for fraud, embezzlement and espionage?

Whenever there is a new medium, people explore it in both good and bad ways. It's true that you could write a deposit slip on which you show in regular ink \$10 and with magnetic ink characters \$100,000. The computer will think you have just made a \$100,000 deposit. This has been done. But it gets discovered.

Will computers be widely used by the average person in coming years?

We don't see technical limitations in computer development until the mid-1980s. Until then, decreased cost will make computers smaller, cheaper and more accessible. In 10 or 15 years, one should cost about the same as a big color TV. This machine could be-

come a playmate, testing your wits at chess or checkers. If a computer were hooked up to AP or UPI news-wires, it could be programmed to know that I'm interested in Greece, computers and music. Whenever it caught news items about these subjects, it would print them out on my console—so I would see only the things I wanted to see.

Will they transmit mail?

We are already hooked into a network spanning the U.S. and part of Europe by which we send, collect and route messages easily. Although the transmission process is instant, you can let messages pile up until you turn on your computer and ask for your mail.

Do you foresee computers as a tool for the average child?

It already is for some. When my 6-year-old son Leonidas visited MIT, he couldn't understand why all the secretaries had "computers." He'd seen my computers before he'd seen their typewriters.

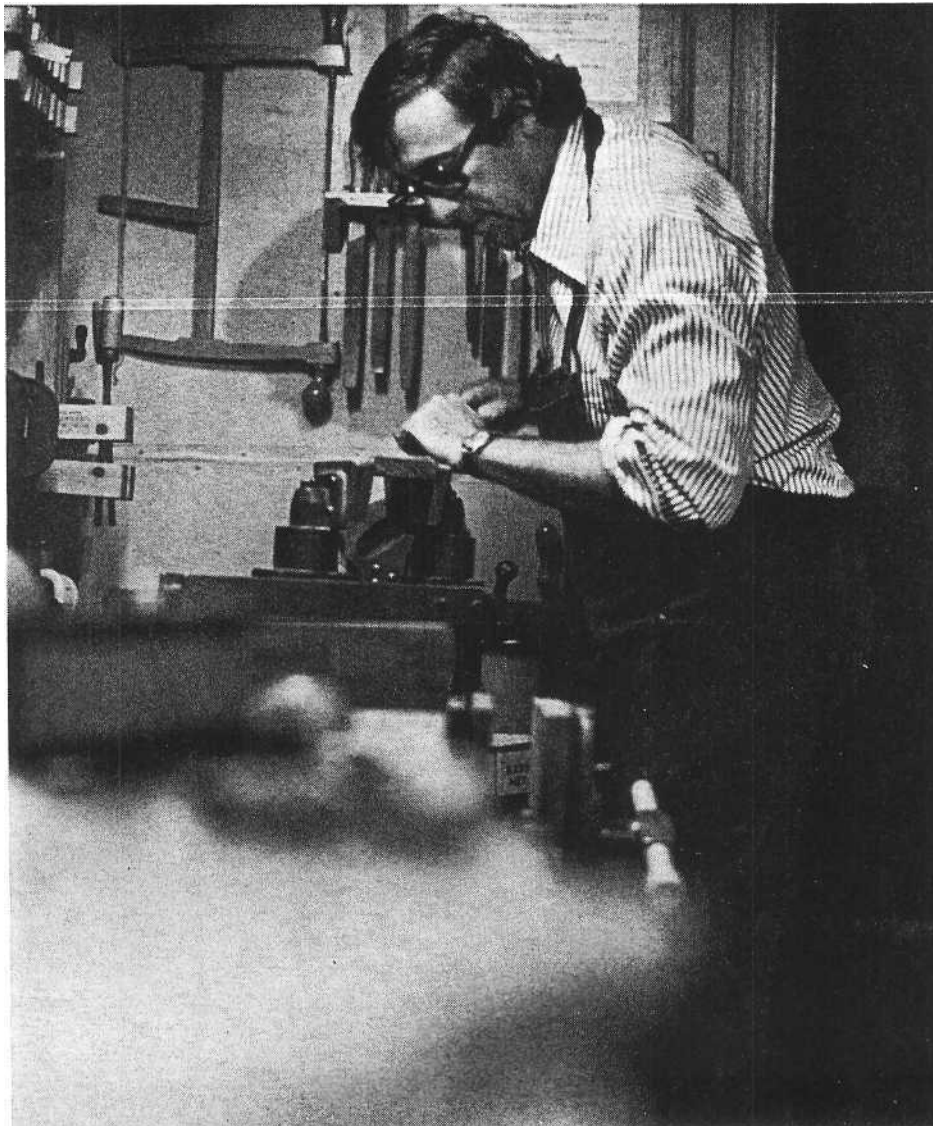
Will the computer eventually be as common as the typewriter?

Perhaps even more so. It may be hidden so you won't even know you're



At home, the kids have computer terminals linked to MIT. Dad works while Leonidas and Alexandra play.

Dertouzos' many interests include woodworking. In his downstairs workshop, he builds and finishes cabinets.



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using it. Don't be surprised if there is one in every telephone, taking over most of the dialing. If you want to call your friend Joe, you just dial "JOE." The same machine could take messages, advise if they were of interest and then could ring you. In the future, I would imagine there could be computerized cooking machines. You put in a little card that says Chateaubriand and it cooks the ingredients not only according to the best French recipe, but also to your particular taste.

Will robots ever be heavily relied upon?

Robots are already doing things for us—for example, accounting and assembling cars. Two-legged robotic bipeds are a romantic notion and actually pretty unstable. But computer-directed robot machines with wheels, for example, may eventually do the vacuum cleaning and mow the lawn.

How might computers aid us in an election year?

Voters might quickly find out political candidates' positions on the issues by consulting computers. Government would then be closer to the pulse of the governed. If we had access to a very intelligent computer, we could probe to find out if the guy is telling the truth by having them check for inconsistency—but that is way in the future.

Should everyone be required to take a computer course?

I'd rather see people choose to do so. Latin, the lute and the piano used to be required as a part of a proper upbringing. Computer science will be thought of in the same way. If we can use the computer early in life, we can understand it so we won't be hoodwinked into believing it can do the impossible. A big danger is deferring to computers out of ignorance.

Are there other dangers?

The human mind might atrophy a little bit from an excessive reliance on computers to do our mental work.

How do we overcome this?

How do we deal with the atrophy of the human muscle since the Industrial Revolution and the automobile? You scream about it and get Presidents to set up physical fitness programs. Maybe someday we'll have to have mental fitness programs. •