Letters

Computers and Society

I find myself in fundamental disagreement with the negative philosophical tone of Joseph Weizenbaum's article "On the impact of computers on society" (12 May, p. 609) and am disturbed by a number of logical and factual errors in it. Even if we discount the distortions of the mass media, computers are having a substantial impact on society generally, and not on a tiny, affluent fraction of society, as Weizenbaum would have us believe. There is considerable evidence of this from many quarters (health care, education, banking, and so forth). It is also clear that this impact is growing and is becoming increasingly uniform in all walks of life.

As far as society as a whole is concerned, the primary effects of computer technology are more important than their side effects. It is only the more philosophically inclined who find the potential side effects more important. Moreover, the example of the microscope used to illustrate this point is questionable. Even if we allow that the microscope was an essential precondition for the emergence of Darwinism, which in turn led to a diminished power of the Church, the average person would still consider that the primary effects of the microscope were more important than its claimed secondary effects.

Concerning another point, the self-esteem of the average person has survived intact the revelation that the earth is not the center of the universe. It takes a rare person to spend more than a few hours pondering the philosophical implications of that proposition. Even allowing for some astonishing progress in computer technology, I believe it is an exaggeration to assert, as does Weizenbaum, that news from the computer laboratory may bring us to "the beginning of a crisis in the mental life of our civilization."

Weizenbaum argues that the artificial intelligence (AI) branch of computer science is responsible for "something terribly wrong." The argument is clouded by poetic metaphor, but the essence is that AI researchers seek to expose the whole of man's nature to be nothing more than a "clockwork." Weizenbaum gives the erroneous impression that Herbert Simon is one of the chief architects of this viewpoint. Simon did not argue that a computer program governed by simple general laws, whose complex behavior reflects the complexity of the environment with which it has interacted over time, remains simple. If you consider the internal data structures built up in computer memory as a result of experience with a complex environment to be a part of the computer system, as I believe you must, then the system which may start out simply will itself become increasingly complex as its experiences enrich its understanding of its complex environment. Thus, the conclusion that man, successfully modeled by a computer, becomes as simple as computers precludes the equally legitimate deduction: Computers become as complex as man. Of course, others have argued that such a development is impossible in principle (*1*), but this controversy is still current within the AI community.

. . . Weizenbaum suggests that computer technology may be a self-fulfilling nightmare, that the very formulation of questions in technological terms, by virtue of their assumptions, almost always permits only technological answers. The success of the computer technique has "tricked us into permitting technology to formulate important questions for us." Later, he says, "It is possible to ask human questions and to find humane answers."

Instead of being a nightmare, computer technology is a welcome and powerful addition to our box of tools for exploring our universe and ourselves. We have already formulated our human questions: Who are we? How are we unique? and so forth. If computer technology can help to shed some light on these questions, why should the answers be inhumane? If the pre-Copernicans chose to build the edifice of their self-esteem on the earth being the center of the universe, about which all other heavenly bodies revolve, then the revelations of the telescope (technology) were certainly unwelcome. However, one should not characterize them as "inhumane." They merely revealed human assumptions to be inconsistent with reality. This provided us with an opportunity to reassess the basis for our self-esteem, which in turn allowed us to exchange our false pride for added maturity and wonder.

. . . I agree that the moral responsibility for the negative impact of computers on society rests in part on the individual computer scientist. But it also rests with society as a whole. Computer technology is no different in this respect from other important technologies, such as the applications of nuclear energy or molecular biology. In every case there are potentially evil consequences that derive from their misuse. It is up to society to legislate against these misuses if it is to enjoy the benefit of their humane use—to legislate against nuclear weapons, the cloning of monsters, or the spying on private communications by speech-recognition computer networks, if it is to enjoy the benefits of nuclear power for the generation of electricity, the elimination of certain birth defects, or the augmentation of human intellect by means of a computer utility.

Weizenbaum could have better served his audience by telling us how we might begin to protect ourselves against the potentially evil consequences of the misuse of computer technology (*2*) rather than implying that computer scientists should not build such systems at all. Most AI researchers I know don't feel we have surrendered our humanity, or lost control, or regard evil consequences as inevitable. We do indeed claim autonomy, freedom, and dignity. Yet we consciously design and implement large computer speech-understanding systems and computer networks in the sincere belief that the potential advantages are enormous while the evil side effects can be legislated against.

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References

1. H. L. Dreyfus, *What Computers Can't Do: A Critique of Artificial Reason* (Harper & Row, New York, 1972).
2. One of Weizenbaum's colleagues at the Massachusetts Institute of Technology, R. Fano, has already done so in "Implications of Computers to Society" (remarks made at the dedication of the Kiewit Computation Center, Dartmouth College, Hanover, N.H., 1966).

Joseph Weizenbaum states that linguists have observed that in all human languages declarative sentences can often be transformed into questions by a simple change in word order. This principle does not hold for Chinese, a language spoken by about 800 million people, or for Tamil, a language of southern India, which is spoken by more than 30 million people and which is thought to be the world's oldest living language.

Questions are formed in Chinese by adding the word *ma* to the end of a declarative sentence; by using a question word meaning "who," "where," "what," and so forth; by offering a choice (John is busy, not busy?); or in the spoken language by intonation.

In Tamil, as well, questions are never formed by the mere rearranging of declarative sentences. The verb is changed into an interrogative form that is essential for asking questions. Further, this interrogative form of the verb cannot be used in declarative sentences.

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Karunakaran, Manoharan, and Chen have discovered a blemish in my paper. The sentence in question should have read ". . . in *many* human languages declarative sentences can often be transformed into questions by a permutation of two of their words." All authors should always guard against sentences containing words such as "all" and "always." However, my point is not lost. That point (briefly restated) is that no theory serving merely local criteria of parsimony can be sufficient to account for the structure of human languages. The problem is deeper than that and therefore engenders awe and humility in serious investigators.

Although Coles opens by charging me with "a number of logical and factual errors," he actually alleges only one of each. (Oh well, I suppose *I* counts as a number.) My presumed factual error lies in the assertion that "the direct societal effects of any pervasive new technology are as nothing

compared to its much more subtle and ultimately much more important side-effects." Coles' argument, based, as it is, on the authority of the average person, and on the dismissal of any possible authority of the philosophically inclined, does not deserve rebuttal. As to the presumed logical error in my citation of Herbert Simon's remarks, I can only come to Simon's defense. Simon never spoke of either the complexity of computers or of the complexity of man. He spoke only of the "apparent complexity of . . . [their] behavior (*1*)." This he attributes "to a considerable extent, [to the] complexity of the environment[s]" in which each finds itself and in which each behaves. A crucial distinction! Simon then goes on to say "a man, viewed as a behaving system, is quite simple. . . . I believe this hypothesis holds even for the whole man." My disagreement with Simon is fundamentally that I think it improper to view "the whole man" as a behaving system, or as a moving target, or as a psychiatric patient, or indeed as anything but a whole man.

In an important sense, Coles' letter documents the tragedy to which I tried to call attention in my article. Apparently the fact that *only* the *rare* person who philosophizes comes to ideas different from those attributed by Coles to the average person is sufficient to falsify those ideas without any argumentation or counterdemonstration. It was precisely this kind of anti-intellectualism that I was trying to illuminate when I wrote about the distinction between performance- and theory-based computer systems.

Of course, once the scientist abdicates all responsibility for thinking philosophically to others whose thoughts he may dismiss in favor of the ideology of the average person, then he *needs* to appoint the politician as a guardian of his morality.

I have already declined to accept Coles' invitation to serve him better by telling him what to do. In the last paragraph of my article I wrote: "The fundamental question the computer scientist must ask himself . . . is not 'what shall I do?' but rather 'what shall I be?' "

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Reference

1. H. A. Simon, *The Sciences of the Artificial* (M.I.T. Press, Cambridge, Mass., 1969).