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Impermanant Balance between Man and Computer

The sciences and technologies of computers, automation, and electronics are comparatively new. They differ in many respects from older sciences. Major confrontations can be expected—and are already occurring—as the domain of these new sciences overlaps that of individuals.

Except for medicine, science and technology has previously been rather aloof and removed from the individual. The atom bomb killed people, but in a depersonalized massive way. The machines of the industrial revolution replaced people to a considerable extent, but they were replacements of their muscle power, not their brains and control power.

For good reason, man has always zealously guarded his rights to intellect, control, and power. As individuals we have always wanted to increase our intelligence, our ability to control our environment, and our ability to use power for our own ends.

Thus, it is not surprising that people have always wanted to understand these phenomena, to produce artifacts that would increase their own intelligence, control, and power, and to create artifacts in their own image which would themselves exhibit these traits.

Significantly, man's attempts to understand such phenomena have led to many important inventions. These include telescopes, cameras, the printing press, the gun, television, and the computer. Man's attempts to produce artifacts in his own image that possess intelligence, power, and control capabilities have resulted in prosthetic sensors, mechanical limbs, robots, and the computer.

Thus, man has attempted to use the computer to help him understand himself, to help him gain more intelligence and power, and to replace himself in performing tasks demanding intelligence and the capability to control. It is this varying and contradictory role that we have ourselves assigned to computers that results in the honest confusion, mistrust, and fear surrounding them. And there is presently no balance between man and computer that possesses any permanence because of the changing roles man is assigning both to himself and to computers.

Experience tells us that the balance of power and the ratio of intelligence between man and computer is still indeterminate. Further, it is not entirely under man's control. In particular, as computers increase their capacities to perform more of the tasks formerly considered only within man's intellectual province, man must equip himself for other functions or his survival will seem less important to himself, leading to a physical and intellectual ennui.

There is already a societal schism in the growing gap between those with access to a computer and those without. The balance of power and intelligence is tipped in favor of the man-computer partnership. It is apparent in the comparative efficiencies of handling paper work in companies with and without computers. Chemical companies employing process-control computers operate much more efficiently than those without. And finally, the individual with a computer at his command is favored in his intellectual endeavors.

The increasing imbalance is also suggested by the observation that man appears to be increasing the number of "intelligent" tasks for computers faster than he is for himself.

Nonetheless, two positive predictions are offered which promise a more comfortable balance between man and computer. They are that computers will make possible the realization of intelligent behavior that is essentially limitless, transcending man and computer taken separately, and that computers will confer on the individual more control over his personal environment that he has ever before been able to exercise.

It is a future worth awaiting.—RUTH DAVIS, *Director, Institute for Computer Sciences and Technology, National Bureau of Standards, Washington, D.C. 20234*