

# MACHINES,

# MEDIA AND

# MEANING

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EVER since Icarus flew too high with his man-made wings, and suffered terrible consequences, warnings have been sounded to every would-be Daedalus who presumes to amplify human physical or intellectual powers by mechanical invention.

## Machines

No one has come out openly for the smashing of television receivers, teaching machines, or even computers, but there is an uneasy feeling among some educators that technology is dehumanizing education. There is concern that the student is becoming a programmed robot; that decision making in matters of school management, methodology, and even curriculum, is slipping into the hands of impersonalized computer-programmers; and that the ever-widening, ever more rapid flood of electronic, photographic, magnetic, automated instructional systems is turning the teacher into a button-pusher.

If we discount the continuing resistance of some classroom instructors when faced by the simple task of threading a motion picture projector as temporary and superficial, the obvious

fact is that educational technology is here to stay.

From the moment that man first used a club, his evolution has been in the direction of artificial extensions of his senses. Except for this peculiar mastery of technology, unlike all other living forms, man has not changed since the Stone Age—a point which has not escaped the attention of humanists such as Emerson who once mused “. . . our nineteenth century is the age of tools. They grow out of our very structure.”<sup>1</sup> Such sentiments, echoing faintly for a century, are strangely amplified today by cyberneticists who point out that in a very real sense the development of the thermionic valve or vacuum tube, for example, is simply a part of man's evolution; a way of extending and conserving his limited energy.

Seen as a natural and inevitable consequence of human curiosity and inventiveness, it is possible to examine the machine and technology as not just ancillary to our existence, but central to our very survival in the same sense

<sup>1</sup> Ralph Waldo Emerson. *Society and Solitude*. Boston: James R. Osgood and Co., 1875. p. 141.

that the use of a club first "equalized" man with the hairy mammoth thus enabling him, puny creature that he is, to live at all. Today, man continues to face mammoth problems—hunger, the pollution of his environment, the education of the equivalent of a whole new country the size of Italy or Brazil coming into the world every 12 months, and that whole complex of situations created by what modern day primitives lump under the general heading of "The Bomb."

Highly specialized tools are needed with which to attack these problems. Yet just as the effectiveness of the primitive club depended upon the strength and skill of its wielder, so the effectiveness of the machine depends upon the designer, engineer, and user—upon human beings whose brain structure is infinitely more complex than the most sophisticated analog computer yet devised.

Norbert Wiener, pointing out that the neuron of the gray matter of the brain is in the order of 1/1,000,000 of a cubic millimeter compared to the smallest transistor obtainable, which is in the order of a cubic millimeter, concludes:

Actually, it would be impossible to construct a computer with anything like the relative closeness of the texture of the brain, and any computer with powers comparable with the brain would have to occupy a fair-sized office building, if not a skyscraper.<sup>2</sup>

Remembering that Ulysses lost a half-dozen men to Scylla while he and his voyagers were wholly concerned with avoiding Charybdis, let us not be wholly concerned with the "threat" of

the machinery or hardware of communication at the expense of ignoring the dangers of message-medium programming—the heartland of modern learning systems.

## Media

To many teachers, an increase in the amount of programmed, self-instructional, and packaged materials creates a vision of an over-organized, one-way flow of manipulated information originating from centralized sources, with "thought-control" as the inevitable consequence.

Equally ominous to others is the vicariousness and ambiguity of the experiences which the media create. Reality and imagery—the concrete and the contrived experience—often do become confused as in the story of the woman who, when complimented on the beauty of her little daughter, replied, "Yes, but you should see her photographs!" The ambiguity thus created by audio-visual imagery is characterized by historian Daniel Boorstin as "the central paradox of our time," since, as he puts it:

By a diabolical irony the very facsimiles of the world which we make on purpose to bring it within our grasp, to make it less elusive, have transported us into a new world of blurs.<sup>3</sup>

While media, like machines, generate problems, they also generate answers. The image, stored on film, tape, or computer card, *may* be more illuminating than the "firsthand" experience. Astronaut Pete Conrad, when he first saw a color photograph of southern California he had made from 100 or so

<sup>2</sup> Norbert Wiener. *God and Golem, Inc.* Cambridge: The M. I. T. Press, 1964. p. 73.

<sup>3</sup> Daniel J. Boorstin. *The Image*. New York: Atheneum, 1962. p. 213.

miles above the earth, shouted, "It looks better than it did for real!"<sup>4</sup> Media may help organize, clarify, simplify, dramatize, and thereby reduce the ambiguities of a world of increasing entropy.

Knowledge must also be organized and systematized if experiences are to be made usable and transferable at all and here, media, from filmstrip to auto-instructional programs have proven effective, especially in the information and skills areas. Recent attention to media design has resulted in the improvement of feedback systems, flexibility through branching patterns, and a recognition, as Bruner says, that:

The art of programming a machine is, of course, an extension of the art of teaching. . . . A program for a teaching machine can be as personal as a book; it can be laced with humor or be grimly dull, can be playful activity or be tediously like a close-order drill.<sup>5</sup>

### Meaning

Through more artfully designed, carefully tested materials, such as the "open-ended" film suffused with suggestibility; simulation programs using a variety of audio-visual experiences; teacher-centered presentation systems; and instructor-planned, locally produced 8 mm films, transparencies, exhibits, and other audio-visual displays, the stimulation of thinking and the excitement of individual intellectual discovery may be immensely enhanced, and the hazards of overcentralization and overstandardization diminished.

<sup>4</sup> *Life*, Sept. 24, 1965.

<sup>5</sup> Jerome S. Bruner. *The Process of Education*. Cambridge: Harvard University Press, 1961. p. 83-84.

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The business of education is to invest experience with meaning and organize it in a way which will expand the individual's capacity for further learning. Developments in educational technology are amplifying and accelerating this process.

The significant effect has been to force both teachers and learners to clarify their objectives and methods, and assume more, not less, responsibility in the search for meaning in a world of ambiguity, change and stress.

The sophistication and proliferation of machines, and more carefully designed media programs offer no hope at all to those who believe that someday man's thinking will be done for him.

On the contrary, the more able the machine to carry out human purposes and the more precisely designed the media to serve the human learning process—the more that will be demanded of the human intellect. Decision making on the part of teachers and students will become more critical because of improved feedback systems by which the results of their actions become immediately known—a phenomenon now seen in programmed instruction, in simulation techniques, and in computer-centered systems of many types.

According to Bruner:

Clearly, the machine is not going to replace the teacher. Indeed, it may create a demand for more and better teachers if the more onerous part of teaching can be relegated to automatic devices.\*

Wiener predicts:

The world of the future will be an ever more demanding struggle against the limita-

\* *Ibid.*

tions of our intelligence, not a comfortable hammock in which we can lie down to be waited upon by our robot slaves.<sup>7</sup>

Emerson, a hundred years ago, wrote:

One definition of man, is an intelligence served by organs. Machines can only second, not supply, his unaided senses . . . and there is no sense or no organ which is not capable of exquisite performance.<sup>8</sup>

Instructional technology, at its best, seems to be demanding rather than inhibiting such exquisite performance. Thoughtfully designed media can clarify and disseminate the highest expressions of man's knowledge and understanding; responsibly utilized machines can implement the exploration of what it means to be human by providing both student and teacher with time to ask not just "What are we doing with our lives?" but also "What *should* we be doing?"

What we should be doing, if we are to escape the fate of Icarus, is developing a race of literate, responsible critics who neither fear nor worship technology, but who thoroughly understand not only what it can do *to* us, but what it can do *for* us. We need a generation of people technically trained to control machines and media, and humanistically educated to give them socially responsible direction.

We need schools which use the best fruits of man's genius for invention to generate more elegant human performance in the continual search for meaning. On such schools and on such teachers future generations depend for responsible machines, responsible media and responsible education of human beings. ❧

<sup>7</sup> Wiener, *op. cit.*, p. 69.

<sup>8</sup> Emerson, *op. cit.*

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