

sequences of such a reality would need urgently to be divined and contemplated.

2. The fact that individuals bind themselves with strong emotional ties to machines ought not in itself to be surprising. The instruments man uses become, after all, extensions of his body. Most importantly, man must, in order to operate his instruments skillfully, internalize aspects of them in the form of kinesthetic and perceptual habits. In that sense at least, his instruments become literally part of him and modify him, and thus alter the basis of his affective relationship to himself. One would expect man to cathect more intensely to instruments that couple directly to his own intellectual, cognitive, and emotive functions than to machines that merely extend the power of his muscles. Western man's entire milieu is now pervaded by complex technological extensions of his every functional capacity. Being the enormously adaptive animal he is, man has been able to accept as authentically natural (that is, as given by nature) such technological bases for his relationship to himself, for his identity. Perhaps this helps to explain why he does not question the appropriateness of investing his most private feelings in a computer. But then, such an explanation would also suggest that the computing machine represents merely an extreme extrapolation of a much more general technological usurpation of man's capacity to act as an autonomous agent in giving meaning to his world. It is therefore important to inquire into the wider senses in which man has come to yield his own autonomy to a world viewed as machine.

3. It is perhaps paradoxical that just, when in the deepest sense man has ceased to believe in—let alone to trust—his own autonomy, he has begun to rely on autonomous machines, that is, on machines that operate for long periods of time entirely on the basis of their own internal realities. If his reliance on such machines is to be based on something other than unmitigated despair or blind faith, he must explain to himself what these machines do and even how they do what they do. This requires him to build some conception of their internal "realities." Yet most men don't understand computers to even the slightest degree. So, unless they are capable of very great skepticism (the kind we bring to bear while watching a stage magi-

cian), they can explain the computer's intellectual feats only by bringing to bear the single analogy available to them, that is, their model of their own capacity to think. No wonder, then, that they overshoot the mark; it is truly impossible to imagine a human who could imitate ELIZA, for example, but for whom ELIZA's language abilities were his limit. Again, the computing machine is merely an extreme example of a much more general phenomenon. Even the breadth of connotation intended in the ordinary usage of the word "machine," large as it is, is insufficient to suggest its true generality. For today when we speak of, for example, bureaucracy, or the university, or almost any social or political construct, the image we generate is all too often that of an autonomous machine-like process.

These, then, are the thoughts and questions which have refused to leave me since the deeper significances of the reactions to ELIZA I have described began to become clear to me. Yet I doubt that they could have impressed themselves on me as they did were it not that I was (and am still) deeply involved in a concentrate of technological society as a teacher in the temple of technology that is the Massachusetts Institute of Technology, an institution that proudly boasts of being "polarized around science and technology." There I live and work with colleagues, many of whom trust only modern science to deliver reliable knowledge of the world. I confer with them on research proposals to be made to government agencies, especially to the Department of "Defense." Sometimes I become more than a little frightened as I contemplate what we lead ourselves to propose, as well as the nature of the arguments we construct to support our proposals. Then, too, I am constantly confronted by students, some of whom have already rejected all ways but the scientific to come to know the world, and who seek only a deeper, more dogmatic indoctrination in that faith (although that word is no longer in their vocabulary). Other students suspect that not even the entire collection of machines and instruments at M.I.T. can significantly help give meaning to their lives. They sense the presence of a dilemma in an education polarized around science and technology, an education that implicitly claims to open a privileged