LETTERS

Computers as "Therapists"

In her comment on my computer parody of the Rogerian technique of responding to a "client's" remarks, Constance Holden writes (News and Comment, 7 Oct., p. 32):

> Many lessons could be drawn from [people's reactions to interacting with Weitzenbaum's pseudo-Rogerian computer program], one of which is that even the *appearance* of empathy (combined, of course, with the computer's quite genuine nonjudgmentalism) can be extraordinarily powerful [emphasis in the original].

This comment itself may be a source of lessons. It reveals, among other things, how extraordinarily problematic attempts to come to grips with relationships between computers and human beings can be. Holden asserts quite simply and as a plain matter of fact that the computer is "of course" genuinely nonjudgmental. I entirely agree. But the to us obvious truth that computers perform calculations and that there are crucial differences between calculations and judgments is dismissed as mere superstition and even species chauvinism by a whole generation of workers in that branch of computer science known as artificial intelligence.

Consider also Holden's assertion that the mere appearance of empathy on the part of the computer can be "extraordinarily powerful." Again, I agree. But some psychiatrists (*1*), even some scientists (*2*), infer from this that computers can not only *parody* the Rogerian interviewing style but can actually serve the therapeutic function intended for the client-therapist interaction.

Lest this mistaken idea be let stand, it may be useful to quote Carl Rogers' own characterization of psychotherapy (*3*):

> It appears possible that one of the characteristics of deep significant therapy is that the client discovers that it is not devastating to admit fully into his own experience the positive feeling which another, the therapist, holds toward him. Perhaps one of the reasons why this is so difficult is that essentially it involves the feeling that 'I am worthy of being liked.' . . . This aspect of therapy is a free and full experiencing of an affectional relationship which may be put in generalized terms as follows: 'I can permit someone to care about me, and fully accept that caring within myself. This permits me to recognize that I care, and care deeply, for and about others.'

Not a single word of the above can possibly be interpreted as having anything whatever to do with machines. Of what help could it possibly be to anyone to know that he is worthy of being liked *by a computer*?

Perhaps a significant portion of the psychic disorders prevalent in modern societies derives from the fact that people *do* embrace the idea that the machine-like institutions they serve care about them and are the source of their individual worthiness. But the sort of caring that machines, however metaphorically that term is taken, can deliver is very impoverished indeed. It is certainly incapable of nourishing the emotional processes which may lead individuals to realizing the possibility of their being worthy to be affectionally cared about, to care for themselves, and finally to care for and about others.

The power of which Holden writes in connection with my computer program is no more and no less than the power to deceive. No humane therapy of any kind ought to be grounded on that.

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References

1. K. M. Colby, J. B. Watt, J. P. Gilbert, *J. Nerv. Ment. Dis.* **142**, 148 (1966).
2. C. Sagan, *The Dragons of Eden* (Random House, New York, 1977), pp. 206–209.
3. C. R. Rogers, *On Becoming a Person* (Houghton Mifflin, Boston, 1961), p. 86.

Carcinogens in Industry

Some clarifications are required concerning "Carcinogens in the workplace: Where to start cleaning up" by Thomas H. Maugh II (Research News, 23 Sept., p. 1268). The topic of the article is a draft final report, "Development of an engineering control research and development plan for carcinogenic materials," prepared for the National Institute for Occupational Safety and Health by investigators at the Research Triangle Institute. The article states that this document will be available from the Government Printing Office in Washington, D.C. This is not correct. The final report will be submitted to the National Technical Information Service (NTIS) in Springfield, Virginia, and copies will be available from that source.

Maugh implies that a definitive ranking of the most hazardous industries and chemicals in the United States has been established in the report. This places the report's contents very much out of context. The prime and only objective of the rankings mentioned was to aid in establishing priorities for engineering control research in the future to prevent occupational exposure to carcinogenic materials. Maugh also highlights information that serves to confuse rather than enlighten readers. For example, nowhere in the report is it concluded that the manufacture of scientific and industrial instruments is "the most hazardous industry in the United States" in terms of exposure of workers to carcinogens.

The practice of basing an article on a draft final report does little to add to *Science*'s credibility; in this case, it has provided the scientific community with inaccurate information. We encourage readers to obtain a copy of the final document from NTIS to learn exactly how the study was performed and what conclusions have been reached.

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Chitin Synthesis Inhibitors: Effects on Fungi?

I was surprised to find no mention of fungi in Jean L. Marx's article "Chitin synthesis inhibitors: New class of insecticides" (Research News, 16 Sept., p. 1170). The cell wall of most fungi is composed chiefly of chitin (*1*). While it is apparent that a considerable amount of work has been done to assess the environmental impact of chitin synthesis inhibitors used as insecticides, these efforts have apparently been directed largely at birds and mammals. Fungi are abundant and important in both natural and agricultural ecosystems. Mycorrhizal associations and decomposition (nutrient release) are obvious ecosystemic processes which could be potentially altered by chitin synthesis inhibitors in the environment. The effects of insecticides such as diflubenzuron upon fungi should be investigated.

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1. J. M. Aronson, in *The Fungi*, G. C. Ainsworth and A. S. Sussman, Eds. (Academic Press, New York, 1965), p. 49.

Several investigators, including the Philips-Duphar group and Gary Booth, have found no effect of diflubenzuron on several species of fungi. They have suggested two possible explanations for this unexpected finding: either the insecticide does not penetrate into fungal cells, or else the chitin-synthesizing enzymes of fungi are structurally different from those of insects and consequently not inhibited by the agent.—J.L.M.