Letters

Responsibility

As a very "average" person, I would like to address myself to the apparent controversy between Joseph Weizenbaum and L. Stephen Coles (Letters, 10 Nov., p. 561) stemming from the article "On the impact of the computer on society" (12 May, p. 609).

I picked up *Science* magazine for the first time only because I am a secretary at the University of British Columbia in Canada for a professor who has a subscription. I am not an intellectual or in any way connected with science, or particularly intelligent for that matter. So, since the academic community can become pretty exclusive at times, I thought you might be interested in the average person's reaction to a statement like "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."

There are different kinds of intelligence, and Coles has displayed one of them. But don't belittle the average human being. My friends and I have spent many hours just talking among ourselves about the impact of technology and computer sciences and the modern society on ourselves and others. And there is no way that I could account for all the hours I have wondered and worried and tried to understand our fragile position here on Earth. As for the people who are not vocal about it—believe me, they feel it.

I am in no position to make a judgment, except maybe a personal one, on the advisability of computers. The point I want to make is that Coles seems to care primarily about one side of things, that is, the analytical mind, research, and so forth. Weizenbaum appears to concentrate more on the human, emotional, and sociological aspects of life. Both men make valid contributions. But I am inclined to feel that the Coleses in the world should try to understand and heed the warnings of the Weizenbaums. Science is a good thing, but we are in control of our destinies here on Earth, and there are no supermommies and superdaddies to fix things for us if we go too far.

Remember Revelations, remember Hiroshima, remember *Brave New World*, and, at the risk of becoming overemotional, remember *Horton Hears a Who* by Dr. Seuss. It is all our responsibility.

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A Private Experiment

In reference to the article by Plumb and Bridgman (9 June, p. 1129) do we really need another theory of sap ascent? The old Dixon-Joly one looks quite adequate to me, and the evidence for the new one is ineffably tenuous. Both before and after Scholander *et al.* (*Science*, 16 Apr. 1965, p. 339) used Dixon's (*1*) pressure bomb, quite sophisticated work has implied that xylem sap tension does indeed exist. For instance, Milburn and Johnson (*2*) detected vibrations they interpreted as being produced by the collapse of sap columns under tension. In ring-porous species like oak, there are many small-diameter vessels, even in the earlywood, which could retain intact sap columns long after those in the typical earlywood vessels collapse. A very old, very simpleminded, but very effective experiment to "prove" that tension exists is to insert a dissecting needle into the bark of species such as oak, and then withdraw it. With a shallow insertion, and the luck of hitting a sieve tube, very sweet phloem sap will exude, under pressure. Reinserting the needle more deeply, and then removing it, will rupture a xylem sap column, and the tension in this column will be released by inrushing air (and the phloem sap). The hissing can be heard for several seconds. Is that syneresis? The experiment should be performed out of view of the public, whose worst fears may be confirmed by the sight of tree pricking, bark licking, and intent listening.

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References

1. H. H. Dixon, *Transpiration and the Ascent of Sap in Plants* (Macmillan, London, 1914).
2. J. A. Milburn and R. P. C. Johnson, *Planta* **69**, 43 (1966).

Clever experiments are needed to decide whether the method for constructing columns of liquid higher than a barometric column by means of chemical activity gradients is used by nature. There is the germ of an idea for such an experiment in Worrall's letter.

Perhaps avoiding the public would lead to an interesting result. We suggest the hours just before dawn or the second day of a continuous rainstorm—when all normal people know better than to be out tramping in the forest. Relaxation of a dynamic transpiring column when it is punctured is consistent with the chemical activity gradient theory which we have proposed. However, it would surprise us if hissing could be heard in a static column such as would obtain when "water stresses" are relaxed and the tree trunk is at full turgor.

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The Shipment of Carcinogens

On recently receiving a 100-gram quantity of dimethyl nitrosamine (DMN) from a well-known chemical distributor, we were most disturbed to find that this had been shipped via regular United Parcel Service, and that the bottle label contained no reference whatsoever to the highly toxic and volatile nature of the contents.

The carcinogenicity of *N*-nitrosamines has been well known for more than 15 years. They are remarkable for their potency (a dose of 1 part per million may suffice to produce tumors) highly sensitive bioassay. This would be

and for their versatility (most *N*-nitrosamines are active by various routes of administration).

We find it incredible that manufacturers can be apparently unaware or unconcerned about the toxic nature of such volatile carcinogens, which are so hazardous that they should be handled under conditions as stringent as those required for radioactive materials.

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Politics and Engineers

Ladd and Lipset, in the article "Politics of academic natural scientists and engineers" (9 June, p. 1091) argue that two factors give engineers a conservative viewpoint: the practical orientation of engineering and the close link existing between engineering and the business corporation. However the first factor simply reflects the nature of engineering and does not cause conservatism. Although Ladd and Lipset point out that, within other cultures, engineers can become radicals, their argument leads the reader to associate conservatism with a practical orientation.

The model on which modern engineering schools were founded, the École Polytechnique, formed a hotbed of radical thought and mothered a technocratic philosophy. In the hands of those who possess radical ends, engineering becomes radical; in the hands of the conservative, it becomes conservative. American engineering, because it lives only for all practical purposes within the business corporation, has adopted the values of the corporate enterprise and has therefore a conservative orientation.

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McKeon is quite right that a given discipline may manifest sharply divergent political orientations in different societies. Lipset and I noted that in the contemporary United States the social sciences are the most left-of-center, critical, and change-demanding disciplines. In the Soviet Union, by contrast, political dissidence and critical activity appear more pronounced among faculty and students in the natural sciences. It is not scholars in social science, but Andrei Sakharov, Andrei Tverdokhlebov, and Valery Chalidze, three prominent physicists, who founded the Committee for Human Rights, an organization which is devoted to strengthening legal norms and essential civil liberties. As the more politically relevant fields, the social sciences are particularly hampered by ideological control.

We do not agree, however, that the relative conservatism of academic engineers in the United States is totally unrelated to the *intellectual* nature of their subject matter. The link between intellectuality and proclivity for a critical politics, so often discussed, has been shown by our analyses of survey data on faculty opinion to be exceptionally strong. When a field places greater emphasis upon originality, creativity, and the application of standards involving the ideal or theoretical, with reference to its subject matter, it appears to encourage a general conceptual approach which is carried over to other areas, including orientations toward the social system.

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