Letters

Batteries in England

I was interested in the editorial comments [*Science* **123**, 1059 (15 June 1956); 1099 (22 June 1956)] to the effect that the "customer's" appraisal of a product can be very different from the scientific evaluation, and that the difference may persist even when the result of the scientific evaluation is known.

You may be interested in a small controversy over batteries that occurred in England in the early 1930's. A columnist in a radio magazine expressed the opinion that some 120-volt dry batteries, then on the market at 5 shillings (when the cost of a similar battery from a reputable manufacturer would have been about 12 shillings), could not be very good. By a simple piece of arithmetic he proved that it could not possibly be economic to market a carefully made battery at less than a penny per cell. In response, he got several letters from people who said that they were using such batteries in their radios with "excellent results" and suggested that "he must be in league with the manufacturers" of the more expensive batteries. He then tested the cheap battery by a series of intermittent discharges through a resistance, designed to represent the effect of ordinary use in a radio set, and compared its performance with that of a more expensive battery. For some weeks he gave in his column a blow-by-blow account of the test and clearly demonstrated that, although the cheap battery worked well at the beginning of each discharge period, its performance fell off rapidly toward the end, compared with the more expensive one, which was just what might have been expected.

The response to this was a crop of letters to the editor, claiming that the writers "had performed similar tests with much better results," etcetera, etcetera. One of them ended: "I think 'Thermion' must have chosen a dud." ("Thermion" was the pen-name of the columnist.) At this "Thermion" gave up the argument in despair, concluding that the intense desire of people to justify themselves (and to "prove" that the reputable manufacturers were making an excessive profit on their batteries) had clouded their judgment, both of the performance they were getting from their radios and of the results they claimed to have been getting on the test-bench.

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What Is Behavioral Science?

The expression *behavioral science* has come into use in recent years. This designation appears to be an outgrowth of the interest of the Ford Foundation in Program V, "scientific activities designed to increase knowledge of factors which influence or determine human conduct, and to extend such knowledge for the maximum benefit of individuals and of society." This area has been repeatedly referred to as "behavioral science" in more recent writings, and recently a journal with this name was founded.

Behavioral science would be equated by some to psychology. Besides limiting behavioral science unduly, this would not suit some psychologists, inasmuch as it would appear to overemphasize the behavioristic approach. The recently instituted journal is an interdisciplinary effort, for the editorial staff includes not only psychologists and psychiatrists but also a political scientist, a neurophysiologist, an economist, a mathematician, and an educationist. The interdisciplinary aspect of this venture seems clearly desirable.

The question that I wish to raise before the term *behavioral science* takes on an unfortunate restricted meaning is that of the status of genetics, biochemistry, and biophysics. My concern is not prompted by a desire to emphasize a mechanistic approach to the subject, but I have real misgivings about attempting to build a superstructure without any concern for the foundation.

It is no secret that the trend in the social sciences is environmentalistic. When it comes to an interdisciplinary study as broad as behavioral science, however, geneticists need to be called into action because no one can question but that there is an interplay between genetic and environmental influences, and that in order to understand either, one must understand both.

Behavioral science certainly has its roots in biology, and the foremost frontiers of biology lie in biochemistry and biophysics. To leave biochemistry and biophysics out of behavioral science is to be superficial and hedge it about on the basis of a priori assumptions which are quite unwarranted. It is preposterous in view of all we know to exclude nutrition and endocrine balances from the "factors which influence or determine human conduct." It would seem very unfortunate just when genetics is beginning to throw light on these subjects to invite it to stay out.

One of my own interests in this field is related not to the uniformity of human behavior but to the nonuniformities. It is interesting to know as much as we can about why people act alike, but it is also worth while (and crucial in my opinion) to know why people *do not behave alike*. Biochemistry has much to offer in the way of insight into this problem, as is brought out in a forthcoming book on *Biochemical Individuality*.

If biochemistry and genetics were minor disciplines and could contribute only in a trifling way to behavioral science, their exclusion would not be so serious. Very recently, in a principal address at the Chicago meeting of the American Psychiatric Association, Percival Bailey, a neurosurgeon, neurologist, and psychiatrist, indicated that future progress in dealing with mental disease is largely in the hands of biochemists. This bears out the crucial need for interdisciplinary study of behavioral science in which biochemistry is an important part. In line with this need, we have recently instituted, with the support of the Welch Foundation of Houston, a cooperative study at the University of Texas and the Austin State Hospital (for mentally ill) in an attempt to discover the biochemical roots of mental disease.

Roger J. Williams
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I agree with the point made by Roger J. Williams. The term as it applies to the Center for Advanced Study in the Behavioral Sciences covers all scientific efforts directed toward an understanding of human behavior. Last year, the fellows of the center included three biologists. Among the current seminars is one on the biological bases of human behavior. One of the biologists who will be a fellow next year is a geneticist. Many scientists studying human behavior recognize the interdependence of biochemical, biophysical, and social factors. More

This department will appear occasionally. For suggestions concerning acceptable items, see the editorial in this issue.