# Letters

## Experimenter and Subject

The article by James G. Holland [*Science* **128**, 61 (1958)] on experiments on human vigilance arouses in me certain immediate and delayed reactions based on long experience as a chemical engineer dealing with observation of experimental phenomena. The author's observation that an empirical examination of the data per se must come first, without too early a development of theories, is most pertinent; such an approach is the basis of good experimental work. I do feel, however, concern over seeing data presented and not correlated (though perhaps the author has attempted correlations, with little success). Examples of such data are the length of the period following detection in which no observing responses are emitted as a function of the fixed-interval length; the slope of the response curve as a function of time of exposure to the type of interval, and so on. The data on the behavior of two different subjects, given in the same graph (in Fig. 7), together with the more elegant and meaningful treatment in Fig. 9 of a group of high-response versus a group of low-response subjects, certainly suggests the need for a reexamination of earlier work in terms of subject ability.

In raising these and other questions I realize that the immediate response will be that this is "outside one's field," an area in which one has "no competence," and so on. This brings to mind the general separateness of the specialties, deplored by some and rigidly maintained by most. A pertinent remark is that of a physicist who criticized a piece of chemical research and was told off for getting out of his field of competence. The physicist replied, "I may not be a chemist, but I know poor research when I see it." This is not to imply, I hasten to add, that the subject research, or all other research in that field, is poor research work, but rather that there is a common basis of examination characteristic of good research men confronted by data from any field. A virtue of *Science* is its presentation of fairly raw data with sufficient description of the experimental conditions to enable one to begin to assess the experiment as an experiment, without regard to the background literature. To paraphrase what Holland notes, one can criticize and correlate data without a theoretical basis pertinent to the literature and without development of theoretical concepts relating to other work.

To return to the experiment at hand, it would appear pertinent to consider the ability of the subject at the job in question and his demonstrated skill for the work. Thus, taste tests must utilize subjects with taste-discrimination, if sensitivity is required. Pertinent in this case is the response of subjects with radar search experience on live targets, as compared with subjects new to this type of operation.

A related question is the inherent or partially developed ability to correlate experiences, such as is found in a trained investigator studying an apparatus, who must develop suitable controls to make it operate properly. Similarly, a nonprofessional operator of a distillation tower or a furnace or other device will often develop an unusual ability to relate cause and effect in controlling the operation. Is this learning, or is it a demonstration of ability to think deductively about one's relation to the environment? How often did Newton observe the fall of an apple before wondering about it?—if we may believe the simple story of our childhood. In a sense, the described experiment is a contest between the experimenter and the subject, and perhaps it should be examined in that light.

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## European Degrees

The article "Basic research in Europe" [*Science* **128**, 227 (1958)] by D. M. Gates, is most interesting—but I can't agree with his "translation" of European degrees [for example (page 228) *licentiat* as "poor Ph.D."]. It's true, it's most difficult to find the American equivalent for earned European degrees; I know it from personal experience. I hold the degree of "Dipl. Ing., Dr. techn."—that is, "Diplom-Ingenieur, Doktor der Technischen Wissenschaften," generally abbreviated "Dr. Ing." (set before one's name)—but no United States authority could give me a dependable answer to the question of how to "translate" these degrees. I'm using "D.Sc. (Tech.)"; others call themselves Ph.D.'s. The "Dipl. Ing." (in chemistry) is sometimes "translated" as Ch.E. or M. Eng.

I believe it would be desirable for some authority—federal or organizational—to standardize the "translation" of foreign degrees, and for the holders of honorary degrees to indicate them by setting an "h.c." (*honoris causa*) after the "Dr." or "D.Sc.," as is customary in (Central) Europe.

Couldn't the AAAS, together with the American Institute of Chemists, the American Chemical Society, and others, initiate steps to end the confusion?

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