for his children. I would say "yes," but I do not regard the problem as an easy one. Perhaps the "trend of voting on this issue in towns of the highest socio-economic and educational levels" represents not a victory of "antiscience" but a simple difference of opinion on a difficult problem of public policy.

GORDON TULLOCK
University of South Carolina, Columbia

Experimental Design

The arguments of Cronbach and Gleser (*1*) and Loewe (*2*) would have been fairly clear if they had made careful distinctions between individual characteristics, population characteristics, and estimates of population characteristics.

Lowe is apparently treating the "graded-response" curve as if it were the sample mean value of E as a function of D, since he refers to "test curves for individuals." Most statisticians would consider the "graded response" curve to be the expected value of E as a function of D.

At any rate, Loewe's first conclusion, that the quantal-response curve (at a single E level) cannot replace the graded-response curve, is quite obvious. If his second conclusion amounts to suggesting an analysis in which the graded-response data is converted to quantal-response data for each of several values of E_0 (that is, dichotomies), then I agree. These values should be spaced uniformly, unless there is some information about the type of distribution (which is true less often than the normal distribution is used). As for the dosage levels, there should be only one dose for each individual, and dosage levels should be repeated on a second individual only rarely, if at all. Testing many items at exactly the same level is vestigial experimental design: probit analysis is passé, and some form of stochastic approximation (*3*) should be used for sequential design of response experiments.

Cronbach and Gleser have overlooked the main practical reason for quantal experimentation: a two-valued scale is cheapest. It requires hardly any effort to detect a dead animal, or a metal plate with a hole in it. It would take a great deal more effort to measure some functional impairment in a poisoned animal, or to measure some characteristic of a projectile's remains after it had penetrated a plate of armor.

Also, the reason for one dose per individual is not simply because there may be variation in time of the individual's responses, but because this variation may not be of the same nature as the inter-individual variation. For example, a small initial dose of poison may repeatedly permit animals to withstand second doses which would have originally been fatal.

DAVID ROTHMAN
Systems Laboratories Division, Electronic Specialty Company, Los Angeles, California

References

1. L. J. Cronbach and G. C. Gleser, *Science* **133**, 1924 (1961).
2. S. Loewe, *ibid.* **133**, 1925 (1961).
3. A. Dvoretzky, "On stochastic approximation," in *Berkeley Symposium on Mathematical Statistics and Probability, Proceedings of the Third Symposium*, J. Neyman, Ed. (Univ. of California Press, Berkeley, 1956), vol. 1, pp. 39–55.

"Hospitalism"

King [*Science* **133**, 1642 (1961)] has urged that those readers interested in the discussion concerning the effects of environmental factors upon intelligence [G. Allen, *Science* **133**, 378 (1961); H. Knobloch and B. Pasamanick, *Science* **133**, 379 (1961)] read the work of Spitz on the effects of "hospitalism" [R. A. Spitz, in *Psychoanalytic Study of the Child* (International Universities Press, New York, 1946), vol. 1, pp. 53–74]. King states that Spitz's report is "carefully documented and lucid." I think it only fair to inform the interested reader that Spitz's work has been critically reviewed by Pinneau [*Psychol. Bull.* **52**, 429 (1955)], who concluded that, because of methodological and other inadequacies, "the results of Spitz's studies cannot be accepted as scientific evidence supporting the hypothesis that institutional infants develop psychological disorders as a result of being separated from their mothers" (p. 448).

VICTOR H. DENENBERG
Department of Psychology, Purdue University, Lafayette, Indiana

Age Factor in Hilo Disaster

The report by Lachman, Tatsuoka, and Bonk *Science* **133**, 1405 (1961)] is a significant contribution, particularly since it illustrates one way in which the scientific community can be of service in the world of practical affairs.