

This Week's Citation Classic

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Finney D J. *Probit analysis: a statistical treatment of the sigmoid response curve*. Cambridge: Cambridge University Press, 1947. 256 p.
[University of Oxford, Oxford, England]

This book gives a systematic account of maximum likelihood estimation for quantal response data, with comparison of methods. Special problems considered include relative potencies, bivariate tolerance, mathematical formulations for the tolerance of mixtures of poisons, and aspects of experimental design. [The *Science Citation Index*[®] (SCI[®]) and the *Social Sciences Citation Index*[®] (SSCI[®]) indicate that all editions of this book have been cited in over 2,930 publications since 1961.]

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"About 1940, as a young statistician at Rothamsted Experimental Station, I had to continue with the help, previously provided by W.G. Cochran, on research on insecticides. The little I knew about probits I had learned a year or two previously from W.L. Stevens at the Galton Laboratory. When I realized the range of theoretical and computational complications, I suggested to Stevens that he should write a book on the subject. 'Why don't you?' he replied. The outcome was one of the first statistical texts that presented a group of relatively advanced techniques rather than a standard introduction to basic methods. I wrote of techniques that were unfamiliar even to most professional statisticians, but I discussed experimental data in a detail intended to make analyses accessible to biologists. In particular, I showed computations step-by-step for the calculators of the day; I emphasized strongly the practical interpretation of the results.

"The book clearly met a need. It showed the methods as applicable not only to insecticides but to estimation of drug potencies,

psychometric data, educational tests, and other problems. It also demonstrated that iterative maximum likelihood computations were practicable for a biologist, provided that he organized them with care. Perhaps few scientists under the age of 45 can imagine a time when even simple mechanical calculators were rarely available to biologists. This placed a high premium on a standardized arithmetical routine, easily followed by technicians, and made popular various ingenious types of approximate analysis. The computer revolution has completely changed the situation; with good software, full maximum likelihood estimation is as easy and inexpensive as the approximations. Today, the latter methods have no more than historic interest. My second¹ and third² editions introduced new applications and updated the computational schemes; though the classical maximum likelihood probit iteration is still presented, recommended procedures are now entirely in terms of comprehensive computer software. My own program, BLISS (named for the originator of probits), is used in illustration, but of course many others would serve.

"I believe that *Probit Analysis* was one stimulus to the subsequent production of many books on special topics in statistical science. More personally, it initiated my own broader interest in biological assay, which has remained one of my major interests in statistical practice for 35 years and on which I later published another and possibly better book.³ Though I was certainly not the first statistician active in this field, I believe I have made a substantial contribution to its systematic presentation and terminology. Fifteen years ago, I thought that practical applications had gone as far as would ever be necessary; since then, the explosive growth of immunoassay techniques has called for methods very close to those of probits, and the need for generalizations and improved design and computation continues. At least, in 1982, confusion with 'probate' seems almost to have vanished! Yet, even within the last few weeks at a conference on immunoassay, a biochemist remarked to me, 'Is it not strange that you, a statistician, should have developed an interest in data?'"

1. Finney D J. *Probit analysis: a statistical treatment of the sigmoid response curve*. Cambridge: Cambridge University Press, 1952. 318 p.
2. ————. *Probit analysis*. Cambridge: Cambridge University Press, 1971. 333 p.
3. ————. *Statistical method in biological assay*. London: Griffin, 1978. 508 p.