

# This Week's Citation Classic

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Rao C R. *Linear statistical inference and its applications.*

New York: Wiley, 1965. 522 p.

[Indian Statistical Institute, New Delhi, India]

This is a comprehensive treatise on statistical inference presented in a logically integrated and practical form. In addition, there is an adequate discussion of results in matrix algebra and foundations of probability needed for a rigorous treatment of statistical inference. [The Science Citation Index®(SCI®) and the Social Sciences Citation Index™(SSCI™) indicate that this book has been cited over 1,220 times since 1965.]

C. Radhakrishna Rao  
Department of Mathematics  
and Statistics  
University of Pittsburgh  
Pittsburgh, PA 15260

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"In 1952 I wrote the book *Advanced Statistical Methods in Biometric Research* with the objective of providing an integrated approach to advanced statistical theory and applications.<sup>1</sup> Of special interest in the book is a discussion of multivariate statistical methods developed by the Indian School of Statisticians for applications in biology, psychology, and related disciplines. I was glad to see that this book was on the list of 72 'highly cited works in applied mathematics during 1961-1972.'<sup>2</sup>

"The success of *Advanced Statistical Methods* encouraged me to write a more comprehensive text to introduce statistical inference to theoretically oriented mathematical statisticians, while emphasizing the need to keep in touch with practical problems which only can provide stimulus for basic research in and enrichment of statistical methodology. This was the motivation for writing *Linear Statistical Inference (LSI)*.

"I was exposed to statistics when the subject was still in its initial stages of development and there were no standard books on the subject describing the major trends of research and current controversies. I thought it was a good idea to write a book for my own understanding

of the newly emerging science. I wanted the book to be useful to those who wished to study statistics in all its logical, mathematical, and computational aspects and not confine themselves to narrow areas of specialization or be unduly influenced by advocates of particular modes of statistical inference. It was difficult to write a book with such a mission in view.

"However, I was gratified to see that *LSI* was well received; it was translated into the Russian, German, Japanese, and Czech languages and a cheap edition was brought out for sale in developing countries. I have received numerous letters mentioning that a particular lemma in the text or an isolated result mentioned in 'Complements and Exercises' has been useful in solving problems. The book contains a wide variety of results in matrix algebra and probability useful in research in mathematical statistics. Besides comprehensiveness, there are several novel features such as the unified theories of linear models and multivariate normal distribution including the case when the variance-covariance matrix is singular. This was possible through the use of generalized inverse of matrices, to which I have made extensive contributions, and density free approach in studying properties of random variables. Surprisingly, the unified approach is simpler, more elegant, and intuitive. 'It removes the mathematical trees and allows us to see the statistical wood.' It makes the study of statistics more interesting and provides the necessary inspiration for research.

"*LSI* is a comprehensive source for reference for all research workers as it provides a logically documented account of all aspects of statistical inference both in theory and applications. This, I think, accounts for its high citation.

"I have discussed numerous practical examples in my book involving the testing of a hypothesis. But one thing I may not like to do for obvious reasons is to test my wife's claim that the book is frequently cited because it was dedicated to her."

1. Rao C R. *Advanced statistical methods in biometric research.* New York: Wiley, 1952. 390 p.
2. Garfield E. Highly cited works in mathematics. Part 2. "Applied" mathematics. *Current Contents* (48):5-9, 28 November 1973. (Reprinted in: Garfield E. *Essays of an information scientist.* Philadelphia: ISI Press, 1977. Vol. 1. p. 509-13.)