# Raghu Raj Bahadur

Born April 30, 1924, Delhi, India; died June 7, 1997, Chicago, Illinois.

## Education

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| B.A. | Mathematics (Honours) | Delhi | 1943 |
| M.A. | Mathematics | Delhi | 1945 |
| Ph.D. | Mathematical Statistics | North Carolina (Chapel Hill) | 1950 |

## Professional Career

Research Associate in Applied Statistics, Indian Statistical Institute, Calcutta, 1946-47.
Research Associate in Mathematical Statistics, University of North Carolina, 1949-50.
Instructor in Statistics, University of Chicago, 1950-51.
Professor of Statistics, Indian Council of Agricultural Research, New Delhi, 1952-53.
Visiting Assistant Professor of Mathematical Statistics, Columbia University, 1953-54.
Assistant Professor of Statistics, University of Chicago, 1954-56.
Research Statistician, Indian Statistical Institute, Calcutta, 1956-61.
Associate Professor of Statistics, University of Chicago, 1961-65.
Professor of Statistics, University of Chicago, 1965-91.
Distinguished Visiting Professor, Indian Statistical Institute, 1972-97.
Professor Emeritus, University of Chicago, 1992-97.

## Professional Memberships

Fellow, Institute of Mathematical Statistics.
Member, International Statistical Institute.
Fellow, Indian National Sciences Academy.
Fellow, Indian Academy of Sciences.

## Professional Activities and Honors

John Simon Guggenheim Fellow, 1968-69.
Ten lectures on limit theorems in statistics at the SIAM regional conference at Tallahassee, Florida, in
    1969.
Associate Editor, *Annals of Mathematical Statistics,* 1964-1973.
Member, Council of the Indian Statistical Institute, 1972-74.
Member, Editorial Board of *Sankhya*.
Wald Lecturer, 1974 Annual Meeting of the Institute of Mathematical Statistics.
President, Institute of Mathematical Statistics, 1974-75.
Invited to Department of Mathematics, University of Maryland to deliver six lectures (September 1975)
    as part of their "Year in Probability and Statistics" program.
Chairman of Editorial Board of the IMS-University of Chicago Monograph Series, from April 1977.
Fellow, American Academy of Arts and Sciences, from 1986.
Outstanding Statistician of the Year, Chicago Chapter of the American Statistical Association, 1992.

## Publications

(1)    "On a problem in the theory of k populations," *Ann. Math. Statist. 21* (1950), 362-375.
(2)    "The problem of the greater mean" (with H. Robbins), *Ann. Math. Statist. 21* (1950), 469-487.
(3)    "A property of the *t* statistic," *Sankhya 12* (1952), 78-88.
(4)    "Impartial decision rules and sufficient statistics" (with Leo A. Goodman), *Ann. Math. Statist. 23* (1952), 553-562.

(5)      "Sufficiency and statistical decision functions," *Ann. Math. Statist.* 25 (1954), 423-462.

(6)      "Two comments on sufficiency and statistical decision functions" (with E. L. Lehmann), *Ann. Math. Statist.* 26 (1955), 139-142.

(7)      "A characterization of sufficiency," *Ann. Math. Statist.* 26 (1955), 286-293.

(8)      "Statistics and subfields," *Ann. Math. Statist.* 26 (1955), 490-497.

(9)      "Measurable subspaces and subalgebras," *Proc. Amer. Math. Soc. 6* (1955), 565-570.

(10)    "The nonexistence of certain statistical procedures in non-parametric problems" (with L. J. Savage), *Ann. Math. Statist.* 27 (1956), 1115-1122.

(11)    "On unbiased estimates of uniformly minimum *variance,*" *Sankhya 18* (1957), 211-224.

(12)    "Examples of inconsistency of maximum likelihood estimates," *Sankhya 20* (1958), 207-210.

(13)    "A note on the fundamental identity of sequential analysis," *Ann. Math. Statist.* 29 (1958), 534-543.

(14)    "Some approximations to the binomial distribution function," *Ann. Math. Statist. 31* (1960), 43-54.

(15)    "Simultaneous comparison of the optimum and sign tests of a normal mean," *Contributions to Probability and Statistics: Essays in Honor of Harold Hotelling,* Stanford University Press, (1960), 79-88.

(16)    "Stochastic comparison of tests," *Ann. Math. Statist. 31* (1960), 276-295.

(17)    "On the asymptotic efficiency of tests and estimates," *Sankhya 22* (1960), 229-252.

(18)    "On deviations of the sample mean" (with R. R. Rao), *Ann. Math. Statist. 31* (1960), 1015-1027.

(19)    "On the number of distinct values in a large sample from an infinite discrete distribution," *Proc. Nat. Inst. Sciences, India, 26,* A (Supp. 11), (1960), 67-75.

(20)    "A representation of the joint distribution of *n* dichotomous items," *Studies in Item Analysis and Prediction,* H. Solomon, ed., Stanford University Press, (1961), 158-168.

(21)    "On classification based on responses to *n* dichotomous items," *Studies in Item Analysis and Prediction,* H. Solomon, ed., Stanford University Press, (1961), 169-176.

(22)    "Classification into two multivariate normal distributions with unequal covariances" (with T. W. Anderson), *Ann. Math. Statist. 33* (1962), 420-431.

(23)    "On Fisher's bound for asymptotic variances," *Ann. Math. Statist. 35* (1964), 1545-1552.

(24)    "An optimal property of the likelihood ratio statistic," *Proc. Fifth Berk. Symp. Math. Statist. Prob., 1,* (1965), 13-26.

(25)    "A note on quantiles in large samples," *Ann. Math. Statist. 37* (1966), 577-580.

(26)    "Rates of convergence of estimates and test statistics," *Ann. Math. Statist. 38* (1967), 303-324. (This was a Special Invited Address to the Institute of Mathematical Statistics.)

(27)    "Substitution in conditional expectation" (with P. J. Bickel), *Ann. Math. Statist. 39* (1968), 377-378.

(28)    "On conditional test levels in large samples" (with P. J. Bickel), *University of North Carolina Monograph Series in Probability and Statistics,* No. 3 (1970), 25-34.

(29)    "Some asymptotic properties of likelihood ratios on general sample spaces" (with M. Raghavachari), *Proc. Sixth Berk Symp. Math. Statist. Prob., 1* (1970), 129-152.

(30)    *Some Limit Theorems in Statistics.* NSF-CBMS Monograph, No. 4 (SIAM, 1971).

(31)    "Examples of inconsistency of the likelihood ratio statistic," *Sankhya 34* (1972), 81-84.

(32)    "A note on UMV estimates and ancillary statistics." *Contributions to Statistics* (Hajek Memorial Volume), Academia (Prague), 1979, 19-24.

(33)    "On large deviations of the sample mean in general vector spaces," (with S. L. Zabell), *Ann. Probability, 7* (1979), 587-621.

(34)    "Large deviations, tests, and estimates" (with J. C. Gupta and S. L. Zabell). *Asymptotic Theory of Statistical Tests and Estimation* (Hoeffding Volume), 1979, 33-67. Academic Press.

(35)    "Hodges Superefficiency," 1980. *Encyclopedia of Statistical Sciences,* Vol. 3 (F-H). John Wiley.

(36)    "On large deviations of maximum likelihood and related estimates." Tech. Report No. 121, Department of Statistics, University of Chicago, 1980.

(37)    "A note on the effective variance of a randomly stopped mean." *Statistics and Probability: Essays in Honor of C. R. Rao,* 1982, 39-43, North-Holland Publishing Co.

(38)     "Some further properties of the LR statistic in general sample spaces" (with T. K. Chandra and D. Lambert), 1982. *Proceedings of the Golden Jubilee Conference,* 1-19, Indian Statistical Institute, Calcutta.

(39)     "Large deviations of the maximum likelihood estimate in the Markov chain case." *Recent Advances in Statistics* 1983, 273-286. Academic Press.

(40)     "Distributional optimality and second-order efficiency of test statistics" (with J. C. Gupta), 1986. In *Adaptive Statistical Procedures and Related Topics,* Proceedings of a symposium in honor of H. Robbins, IMS Lecture Notes Monograph Series, Vol. 8, 315-331.

(41)     *R. R. Bahadur's Lectures on the Theory of Estimation* (Editors: Stephen M. Stigler, Wing Hung Wong and Daming Xu). Institute for Mathematical Statistics: Beachwood, Ohio, 2002