

Eminent Statistician C. R. Rao Awarded 2023 International Prize in Statistics

C. R. Rao, an Indian professor whose work over 75 years ago continues to exert a profound influence on science, has been awarded the 2023 International Prize in Statistics.

In his remarkable 1945 paper published in the *Bulletin of the Calcutta Mathematical Society*, Calyampudi Radhakrishna (C. R.) Rao demonstrated three fundamental results that paved the way for the modern field of Statistics and provided statistical tools heavily used in science today. The first, now known as the Cramér-Rao lower bound, provides a means for knowing when a method for estimating a quantity is as good as any method can be. The second result, named the Rao-Blackwell Theorem (because it was discovered independently by eminent statistician David Blackwell), provides a means for transforming an estimate into a better – in fact, an optimal – estimate. Together, these results form a foundation on which much of Statistics is built. And the third result provided insights that pioneered a whole new interdisciplinary field that has now flourished as “information geometry.” Combined, these results help scientists more efficiently extract information from data.

Information geometry has recently been used to aid the understanding and optimization of Higgs boson measurements at the Large Hadron Collider (LHC), the world’s largest and most powerful particle accelerator. It has also found applications in recent research on radars and antennas and contributed significantly to advancements in artificial intelligence, data science, signal processing, shape classification and image segregation.

The Rao-Blackwell process has been applied to stereology, particle filtering, and computational econometrics among others, while the Cramér-Rao lower bound is of great importance in such diverse fields as signal processing, spectroscopy, radar systems, multiple image radiography, risk analysis and quantum physics.

“In awarding this prize, we celebrate the monumental work by C. R. Rao that not only revolutionized statistical thinking in its time but also continues to exert enormous influence on human understanding of science across a wide spectrum of disciplines,” said Guy Nason, Chair of the International Prize in Statistics Foundation.

The International Prize in Statistics is awarded every two years by a collaboration among five leading international statistics organizations. The

prize recognizes a major achievement by an individual or team in the statistics field, particularly an achievement of powerful and original ideas that has led to practical applications and breakthroughs in other disciplines.

Rao will receive the prize, which comes with an \$80,000 award, this July at the biennial International Statistical Institute World Statistics Congress, which will be held in Ottawa, Ontario, Canada.

The first International Prize in Statistics was awarded in 2017 to David R. Cox for the development of the Cox proportional hazards model, which allows researchers to investigate patient survival rates in complex studies. Bradley Efron received the award in 2019 for a statistical method known as the bootstrap, a clever computational method for assessing uncertainty in applied statistics. Nan Laird received the award in 2021 for the development of powerful methods that have made possible the analysis of complex longitudinal studies.

More information about the life and work of C. R. Rao can be found in many places, including:

- <https://mathshistory.st-andrews.ac.uk/Biographies/Rao/>
- <https://www.psa.gov.in/article/prof-calyampudi-radhakrishna-rao/347>
- https://en.wikipedia.org/wiki/C._R._Rao