# History of Statistics on Timeline

**V.K. Gupta, B.N. Mandal and Rajender Parsad**
*ICAR-Indian Agricultural Statistics Research Institute*
*Libray Avenue, Pusa, New Delhi – 110012, INDIA*

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**SUMMARY**

The purpose of this article is to give the historical developments in the theory and applications of Statistics starting from pre-historic times till the beginning of the 20$^{th}$ century when the foundations of modern statistics were laid. Some selected contributions of prominent Indian statisticians have also been listed. The development of some selected statistical journals on the time line is also given. No claim is being made on the coverage being exhaustive.

*Keywords*: Statistics in the ancient times, Modern statistics, Important selected journals.
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*Corresponding author:* B.N. Mandal
*Email address:* mandal.stat@gmail.com

## 1. HISTORY OF STATISTICS ON TIME LINE

*Note: BCE ~ Before Common Era (or BC ~ Before Christ); CE ~ Common Era (or AD ~ Anno Domini)*

| Time | Contributor | Contribution |
|---|---|---|
| Dwaparyuga – Kalayuga | Mahabharata; Vana Prarva; Nala – Damyanti Akhyan | Nala and king Bhangasuri were moving in a chariot through a forest. Bhangasuri told Nala that if he can count how many fallen leaves and fruits are there, he (Bhangasuri) can tell the number of fruits and leaves on two strongest branches of Vibhitak tree. One above one hundred are the number of leaves and one fruit informed Nala after counting the fallen leaves and fruit. Bhangasuri avers 2095 fruits and five ten million leaves on the two strongest branches of the tree (actually it is 5 koti leaves and 1 koti is 10 million). Nala counts all night and is duly amazed by morning. Bhangasuri accepts his due "I of dice possess the science—and in numbers thus am skilled." said Bhangasuri. Vahuca replied; "That science—if to me thou wilt impart, In return, O king, receive thou—my surpassing skill in steeds." This indeed is a strong application of survey sampling. |
| 4500 – 3000 BCE | Ancient Rome and China | Babylonians and Egyptians carried censuses; censuses of agriculture. A population census conducted in ancient China; determine the revenue and military strength of its provinces. Census of people and registration of property was conducted in ancient Rome. |
| 433 - 357 BCE | Bhadrabahu | The concept of probability was recognized in the Indian-Jaina philosophy as is evident from the writings of Bhadrabahu on syadvada or 'the assertion of possibilities' (syat = 'may be', vada = 'assertion'). Mahalanobis (1954) and Haldane (1957) refer to the actual text in Sanskrit of the dialectic of seven fold predication (Saptabhanginaya) and relate it to the concepts of probability theory with examples of 'tossing of a coin' and 'study of the physiology of the sense organs'. |
| 27 BCE – 17 CE | Roman Emperor Augustus | Roman Emperor Augustus conducted surveys on births and deaths of the citizens of the empire as well as the amount of livestock each owned and the crops each harvested. Romans also developed methods of collecting, organizing, and summarizing data. |

| Time | Contributor | Contribution |
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| Middle ages | | Censuses of population, household goods and land were conducted. |
| Fourteenth Century CE | | People began keeping records on births, deaths and accidents in order to determine insurance rates. |
| 24 April 1620 – 18 April 1674 | John Graunt | Established the first English school of political arithmetic, a scientific school much closer to the modern understanding of Statistics. Karl Pearson considered Graunt as "father of the modern Statistics." <br><br> John Graunt was one of the first demographers and expert in epidemiology. He along with William Petty, developed early human statistical and census methods. These methods later provided a framework for modern demography. He was one of the pioneers to produce the first life table attaching probabilities of survival to each age. Studying the number of males and females born, Graunt found that slightly more males were born than females, but also noted that more males than females died during the first year of life. He published a "Observations" which has five editions. |
| 27 May 1623 – 16 December 1687 | William Petty | Sir William Petty, an English economist, scientist, a Professor of Music and philosopher studied anatomy, medicine. He suggested efficient methods to survey the land that was to be confiscated and given to Cromwell's soldiers. He is best remembered for his contribution in economics and political arithmetic. He is known for having started the philosophy of 'laissez-faire' in relation to government activity. Petty prepared a land register of Ireland, which was also called as "Down Survey." He mostly used simple averages. By today's standards, he would not be a statistician but during his time a statistician was merely one that employed the use of quantitative data. Because obtaining census data was difficult, if not impossible, especially for Ireland, he applied methods of estimation. To estimate the population of England, he would estimate the population of London by either estimating exports or deaths. His logic was that a 30 percent increase in exports corresponds to a similar proportionate increase in population. To obtain the population of all of England he would multiply the population of London by 8. |

| Time | Contributor | Contribution |
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| 1701-7 April 1761 | Thomas Bayes | Thomas Bayes is well known for the Theorem called Bayes' Theorem. Bayes never published what would eventually become his most famous accomplishment; his notes were edited and published after his death by Richard Price. |
| 20 October 1719 – 1 May 1772 | Gottfried Achenwall | Gottfried Achenwall was a German philosopher and statistician. He is considered among the inventors of the term "statistics". He first began to read a new course "statistics" in the University of Göttingen, which explained how the state was arranged. |
| 19 June 1623 – 19 August 1662 | Blaise Pascal | Pascal was a famous mathematician who helped create two major new areas of research: projective geometry and probability theory. He wrote a significant treatise on projective geometry at the age of 16, and later corresponded with Pierre de Fermat on probability theory which strongly influenced the development of modern economics and social science. |
| 17 August 1601 – 12 January 1965 | Pierre de Fermat | Fermat's favourite subject was the theory of numbers. He along with Pascal, founded the theories of probability. The mathematical theory of probability has its roots through games of chance and gambling. |
| 8 February 1700 – 17 March 1782 | Daniel Bernoulli | Daniel Bernoulli FRS was a Swiss mathematician and physicist and was one of the famous mathematicians in the Bernoulli family. The Bernoulli principle is credited to him. The principle describes the mathematics of the mechanism underlying the operation of two important technologies the carburetor and the airplane wing. In 1738, Daniel Bernoulli was authored the book *Specimen theoriae novae de mensura sortis (Exposition of a New Theory on the Measurement of Risk)*. In that book he described the St. Petersburg paradox which is considered as the basis of the economic theory of risk aversion, risk premium and utility. In 1766 he analyzed smallpox morbidity and mortality to evaluate the efficacy of vaccination. This was one of the earliest works on censored data analysis. |

| Time | Contributor | Contribution |
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| 23 March 1749 – 5 March 1827 | Pierre-Simon Laplace | Laplace established fundamentals of statistics in the book *théorie analytique des probabilités*. The treatise discussed probability methods and problems and statistical methods and applications, normal curve, regression through study of astronomy. |
| 30 April 1777 – 23 February 1855 | Carl Freidrich Gauss | Carl Friedrich Gauss made tremendous contribution in many fields of mathematics and science and is considered as one of most influential mathematicians of all time. In the area of probability and statistics, Gauss introduced which is now known as Gaussian distribution, the Gaussian function and the Gaussian error curve. To represent probability, he introduced a bell-shaped or "normal" curve which peaks around the mean value and quickly falls off towards plus/minus infinity. Gauss-Markov theorem is another major contribution by Gauss. |
| 22 February 1796 – 17 February 1874 | Adolphe Quetelet | Adolphe Quetelet was a Belgian astronomer, mathematician, statistician and sociologist. At that time, the science of probability and statistics was mainly applied in astronomy. Realizing the complexity of social phenomena, Quetelet pioneered in applying the statistical principles in social science. He wanted to understand how other social factors influenced the values of various social phenomena such as crime rates, marriage rates or suicide rates. These ideas did not well went with other scientists at the time who considered these theories as a contradiction to the concept of freedom of choice.<br><br>Adolphe Quetelet established several statistical journals and societies and was especially interested in creating international cooperation among statisticians. He organized the International Statistical Congresses. There were 9 congresses from 1853 till 1975. They gathered statisticians of the world to discuss and develop a unified state statistical methodology. Starting from those times, national statistical procedures had been conducted by governments of corresponding countries. In 1846, the first Belgian population census carried out based on scientific principles of organization and methodology. |
| 16 February 1822 – 17 January 1911; | Francis Galton | Galton studied genetic variation in humans through regression and correlation. |

| Time | Contributor | Contribution |
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| 27 March 1857 – 27 April 1936 | Karl Pearson | Karl Pearson is considered to be the father of modern statistics which emerged from his seminal work in mathematical biology and biometry. He has laid foundation to the discipline of mathematical statistics. His contributions range from the fields of biometrics, meteorology to the theories of social Darwinism and eugenics. In 1911, he founded the world's first university statistics department at University College London Department of Applied Statistics. The department is now known as the Department of Statistical Science. He first defined correlation coefficient (first conceived by Francis Galton) as a product moment and studied its relationship with linear regression. Other significant contribution attributed to him are Pearson's chi squared test, foundation of statistical hypothesis testing theory and statistical decision theory, chi distance, a precursor and a special case of Mahalanobis distance, Pearson's family of continuous curves classification of distributions, methods of moments and principal component analysis. |
| 10 September 1863 – 17 September 1945 | Charles Edward Spearman | He pioneered the idea of factor analysis and Spearman's rank correlation coefficient. In statistics, Spearman developed rank correlation (1904) is a non-parametric version of the Pearson correlation. |
| 5 August 1874 – 29 October 1948 | Wesley Clair Mitchell | Wesley Clair Mitchell is well known for his empirical work on business cycles and for guiding the National Bureau of Economic Research in its first decades. |
| 13 June 1876 – 16 October 1937 | William Sealy Gosset (known under the pseudonym Student) | William Sealy Gosset, an English statistician published under the pen name Student, and developed the Student's $t$-distribution. Studentized residuals are named in Student's honour because, like the problem that led to Student's $t$-distribution, the idea of adjusting for estimated standard deviations is central to that concept. |
| 12 April 1878 – 11 November 1939 | Kirstine Smith | Smith developed minimum chi-squared estimation of the correlation coefficient. She initiated research on optimal design theory where she computed G-optimal designs for polynomial regression of order up to 6, and explicitly obtained some of these designs. This was later studied by Keifer in 1959. Her work on fraternal and paternal correlation coefficients has great importance in the study of natural selection. |

| Time | Contributor | Contribution |
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| 17 February 1890 – 29 July 1962; | Ronald A. Fisher | Sir Ronald Aylmer Fisher was an English mathematician, geneticist, statistician, evolutionary biologist and eugenicist. His breeding experiments conducted at Rothamsted Experimental Station led to the theories of gene dominance and fitness and selection. The problem of biased selection in plant breeding experiments led him to introduce the principle of randomization. He made fundamental contributions to the mathematical theory of statistics and laid foundations of experimental design, analysis of variance, statistical inference. He introduced the concepts of randomized block designs, Latin square designs and split-plot experiments. He promoted factorial experiments and foreshadowed the notion of confounding. His other important contributions include method of maximum likelihood, fiducial inference and the derivation of various sampling distributions, including the sampling distribution of correlation coefficient from a bivariate normal population , which led the foundation of exact sampling distributions. The $\tanh^{-1}$ transformation obtained for the correlation coefficient to make its sampling distribution close to the normal distribution, so that tables of the standard normal distribution could be used in testing significance of the correlation coefficient, was a landmark contribution of Fisher. Fisher's six books entitled *Statistical Methods for Research Workers*; *The Genetical Theory of Natural Selection*; *The Design of Experiments*; *Statistical Tables for Biological*, *Agricultural and Medical Research*; *Theory of Inbreeding*; *Statistical Methods and Scientific Inference*. He is considered one of the three principal founders of population genetics. Anders Hald called him "a genius who almost single-handedly created the foundations for modern statistical science", while Richard Dawkins named him "the greatest biologist since Darwin". |
| 22 April 1891 – 18 March 1989 | Harold Jeffreys | Sir Harold Jeffreys, FRS was an English mathematician, statistician, geophysicist, and astronomer. He published his book *Theory of Probability* in 1939. The book revived the Bayesian view of probability. |
| 02 September 1892 – 18 November 1965 | Frank Wilcoxon | Wilcoxon developed Non-parametric Wilcoxon signed-rank test and the Wilcoxon rank-sum test. |

| Time | Contributor | Contribution |
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| 29 June 1893 – 28 June 1972 | P C Mahalanobis | Prasanta Chandra Mahalanobis is best known for the Mahalanobis distance. He made pioneering studies in anthropometry in India and contributed to the design of large-scale sample surveys. He is founder of Indian Statistical Institute. |
| | | At the 1920 Nagpur session of the Indian Science Congress, he met Nelson Annandale, then the director of the Zoological Survey of India. Annandale asked him to analyse anthropometric measurements of Anglo-Indians in Calcutta. Mahalanobis was interested to know what factors influence the formation of European and Indian marriages. He wanted to examine whether the Indian side came from any specific castes. He analyzed the data collected by Annandale and the caste specific measurements made by Herbert Risley and came to the conclusion that the sample was a mix of Europeans mainly with people from Bengal and Punjab but not with those from the Northwest Frontier Provinces or from Chhota Nagpur. He found that the intermixture happened more in the higher castes than the lower ones. He published this result in his first scientific paper in 1922. Around this time, he found a way of comparing and grouping populations using a multivariate distance measure which is now known as $D^2$, Mahalanobis distance and is independent of measurement scale. |
| | | He was highly inspired by *Biometrika* and mentored by Acharya Brajendra Nath Seal. Initially he worked on analysing university exam results, anthropometric measurements on Anglo-Indians of Calcutta and some meteorological problems. He worked as a meteorologist for some time. In 1924, while working on the probable error of results of agricultural experiments, he met Ronald Fisher and established a lifelong friendship with him. He also worked on schemes to prevent floods. |
| | | His most important contributions are related to large-scale sample surveys. He introduced the concept of pilot surveys and advocated the usefulness of sampling methods. Early surveys began between 1937 to 1944 and included topics such as consumer expenditure, tea-drinking habits, public opinion, crop acreage and plant disease. Harold Hotelling wrote: "No technique of random sample has, so far as I can find, been developed in the United States or elsewhere, which can compare in accuracy with that described by Professor Mahalanobis" and Sir R. A. Fisher commented that "The ISI has taken the lead in the original development |

| Time | Contributor | Contribution |
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| | | of the technique of sample surveys, the most potent fact finding process available to the administration".<br><br>He introduced a method for estimating crop yields by cutting crops in a circle of diameter 4 feet. For this statisticians should sample the fields At that time, P. V. Sukhatme and V. G. Panse were working on crop surveys with the Indian Council of Agricultural Research and the Indian Agricultural Statistics Research Institute suggested that a survey system should make use of the existing administrative framework. Bitterness between them developed due to these differences in opinion and there was little interaction between Mahalanobis and agricultural research in later years. |
| 16 April 1894 – 5 August 1981 | Jerzy Neyman | Jerzy Neyman was a Polish mathematician and statistician. He first introduced the concept of a confidence interval into statistical hypothesis testing and in collaboration with Egon Pearson, he co-devised null hypothesis testing and presented Neyman-Pearson lemma, the basis of hypothesis testing. The method of Stratified Sampling and the Method of Purposive Selection", given at the Royal Statistical Society on 19 June 1934, was the groundbreaking event leading to modern scientific sampling. |
| 19 June 1901 – 31 October 1987 | R C Bose | Raj Chandra Bose was an Indian American mathematician and statistician best remembered for his work in design theory and the theory of error-correcting codes in which the class of BCH codes is partly named after him. He along with S. S. Shrikhande and E. T. Parker disproved the famous conjecture made by Leonhard Euler dated 1782 that there do not exist two mutually orthogonal Latin squares of order $4n + 2$ for every $n$. In the years at Chapel Hill, Bose made important discoveries on coding theory (with D.K. Ray-Chaudhuri) and constructed (with S. S. Shrikhande and E. T. Parker ) a Graeco-Latin square of size 10 and thus provided a counterexample to Euler's conjecture that no Graeco-Latin square of size $4k + 2$ exists. |
| 12 May 1902 – 17 June 1994 | Frank Yates | Yates mainly worked on the design of experiments and made many contributions to the theory of analysis of variance, the Yates's algorithm and the balanced incomplete block design. |

| Time | Contributor | Contribution |
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| 31 October 1902 – 13 December 1950 | Abraham Wald | Abraham Wald was an Austrian mathematician who contributed to geometry, economics, econometrics and seasonal movements in time series. He pioneered the concept of statistical sequential analysis. Wald made important contributions to metric spaces, particularly the infinite dimensional vector spaces and differential geometry. Wald introduced Statistical decision problem and showed that the two major problems of statistical theory, viz., testing hypotheses and estimation, can both be regarded as special cases of statistical decision problem. He coined the terms loss functions, risk functions, a-priori distributions, Bayes decision rules, admissible decision rules and minimax decision rules. He established that a minimax decision rule has a constant risk under certain regularity conditions. |
| 25 April 1903 – 20 October 1987 | Andrey Kolmogorov | Andrey Nikolaevich Kolmogorov was a 20th-century Soviet mathematician who made significant contributions to the mathematics of probability theory, algorithmic information theory and computational complexity. Kolmogorov and the British mathematician Sydney Chapman independently developed Chapman–Kolmogorov equations in the field of stochastic processes. |
| 06 September 1907 – 29 March 1983 | Maurice George Kendall | Sir Maurice George Kendall was a British statistician. His main contribution is the Kendall tau rank correlation which is named after him. Around 1939 he along with Bernard Babington-Smith, developed one of the first early mechanical devices to produce random digits and formulated a series of tests for statistical randomness in a given set of digits. These tests were widely used. He revised the statistical book *Introduction to the Theory of Statistics* which was originally authored by G. U. Yule. He also published a monograph on *Rank Correlation* in 1948. |
| 19 March 1910 – 16 July 1981 | J. Wolfowitz | Wolfowitz's main contributions were in the fields of statistical decision theory, non-parametric statistics, sequential analysis, and information theory.<br><br>One of his results is the strong converse to Claude Shannon's coding theorem. While Shannon could prove only that the block error probability cannot become arbitrarily small if the transmission rate is above the channel capacity, Wolfowitz proved that the |

| Time | Contributor | Contribution |
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| | | block error rate actually converges to one. As a consequence, Shannon's original result is today termed "the weak theorem" (sometimes also Shannon's "conjecture" by some authors). |
| 27 July 1911 – 28 January 1997 | P V Sukhatme | Pandurang Vasudeo Sukhatme was an Indian statistician who during his early days in late 1930's came under the influence of eminent authorities of that era Sir R. A. Fisher, Jerzy Neyman and E. S. Pearson. His two major contributions were to bipartitional functions, for which he worked under the guidance of Sir R. A. Fisher and the contributions to the theory of the representative method, for which he worked under the guidance of J. Neyman and E.S. Pearson. Prof. Sukhatrme also made important contribution to the problem of plot-size in large scale yield surveys, in general and use of small size plots in yiled surveys, in particular. Prof. Sukhatme developed statistical models for assessing the dimensions of hunger and future food supplies for the world. He also developed methods for measuring the size and nature of the protein gap, and studied the size and nature of the protein problem. Professor Sukhatme was well known in the field of nutrition for the Sukhatme-Margen hypothesis which in plain language implies that "At low levels of calorie intake, stored energy in the body is used with greater metabolic efficiency and that the metabolic efficiency decreases as the intake increases over the homeostatic range." He also made significant contribution towards autoregulatory homeostatic nature of energy balance.

The Government of India honoured P V Sukhatme with the civilian award, Padma Bhushan, and also instituted a cash award in honour of P V Sukhatme to be given once in two years to a senior statistician for outstanding and meritorious research in statistics and for significant life time achievements in applied / theoretical statistics benefitting the Indian Statistical System. |
| 05 November 1912 – 12 October 1998 | W. Allen Wallis | Wilson Allen Wallis was an American economist and statistician. He was president of the University of Rochester. He along with William Kruskal presented the Kruskal–Wallis one-way analysis of variance. |

| Time | Contributor | Contribution |
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| 16 June 1915 – 26 July 2000 | John Tukey | John Wilder Tukey has made numerous contributions in the field of statistics. He was an American mathematician best remembered for development of the FFT algorithm and box plot. His major contributions are the Tukey range test, the Tukey lambda distribution, the Tukey's test of additivity, and the Teichmüller–Tukey lemma. He along with James Cooley developed Cooley–Tukey FFT algorithm. In 1970, he developed the jackknife estimation also knonw as Quenouille-Tukey jackknife. In 1977 Tukey published "Exploratory Data Analysis" where he introduced the box plot. He is credited for the terms such as trimean and Median-Median line.<br><br>He in collaboration with Jerome H. Friedman, proposed the concept of the projection pursuit in 1974. Tukey coined many statistical terms that have become part of common usage, but the two most famous coinages attributed to him were related to computer science. While working with John von Neumann on early computer designs, Tukey introduced the word "bit" as a contraction of "binary digit". The term "bit" was first used in an article by Claude Shannon in 1948. |
| 03 January 1917 - | Sir David John Finney | David Finney's main contribution is on probit analysis and biological assays in pharmacology and pencilin assays in forestry. He was a pioneer in the development of systematic monitoring of drugs for detection of adverse reactions, an undesired harmful effect resulting from a medication or other intervention like surgery. He worked on a table of logarithms to the base of 2. He first introduced the concept of fractional replication. |
| 10 October 1919 – 21 April 2005 | William Kruskal | William Henry Kruskal was an American mathematician and statistician. He is best remembered for developing the widely used non-parametric test Kruskal–Wallis one-way analysis of variance in collaboration with W. Allen Wallis. |
| 10 September 1920 - | C R Rao | Calyampudi Radhakrishna Rao, popularly known as C R Rao has made outstanding contributions in statistics. His path-breaking contributions are the Cramér-Rao bound and the Rao-Blackwell theorem. Rao also introduced second-order efficiency, |

| Time | Contributor | Contribution |
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| | | which initiated studies on higher order asymptotics. Rao introduced a new asymptotic test, termed as Rao's Score Test, as an alternative to the likelihood ratio and Wald tests, the three known as holy trinity. The test appears in books on econometrics and its merits are discussed in various conferences. Rao introduced the concept of orthogonal arrays an important cornerstone in the field of design of experiments. These arrays have also received wide applications in industrial experimentation to determine the optimum mix of factors using observations on small number of factor combinations (or runs). Taguchi made extensive use of orthogonal arrays in what is now known as the Taguchi methods in industry for determining an optimum combination of factors, which gives a high output and is robust to environmental changes. Rao has contributed in multivariate analysis, Rao's canonical factor analysis, estimation theory and differential geometry, Analysis of Diversity (ANODIV) as a generalization to ANOVA, Rao's Quadratic Entropy, as a general measure of variance, which is used by ecologists, characterized probability distributions, characterized probability measures and solved problems of stochastic modelling of data and statistical analysis. A major contribution of Rao to the theory of matrices is the introduction of the concept of generalized inverse of a matrix ( singular or not). This became a valuable tool in developing unified theory for linear stochastic models used in prediction problems and characterizing probability measures and solving problems of stochastic modelling of data for statistical analysis. Rao has to his credit 14 books and over 400 journal publications.<br><br>Rao has been conferred with numerous honorary degrees and awards. Prof Rao has received Samuel Wilks Medal of American Statistical Association 1989, the highest award given to a statistician in USA; the US National Medal of Science 2003 awarded by the President of USA, the highest award given to a scientist in USA; India Science Award 2009, the highest recognition given to a scientist in India and awarded by the Prime Minister of India; Guy Medal in Gold of the Royal Statistical Society 2011, the highest award given to a statistician in UK; International Mahalanobis Pruize 2003, awarded by International Statistical Institute. The Times of India listed Rao as one of the top 10 Indian scientists of all time. |

| Time | Contributor | Contribution |
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| | | The Government of India honoured C R Rao with the second highest civilian award, Padma Vibhushan, for "outstanding contributions to Science and Engineering / Statistics", and also instituted a cash award in honour of C R Rao, "to be given once in two years to a young statistician for work done during the preceding 3 years in any field of statistics". |
| 25 January 1924 – 10 August 1981 | Jack Carl Kiefer | Kiefer is one of the pioneer in optimal experimental design theory. The *American Statistician* obituary calls him "undoubtedly the foremost worker in optimal experimental design". He is known for golden section search in his master's thesis work and the Dvoretzky–Kiefer–Wolfowitz inequality and the Bahadur-Ghosh-Kiefer representation (with R. R. Bahadur and J. K. Ghosh). |
| 15 July 1924 - | Sir David Roxbee Cox | D R Cox, may be considered as one of the world's leading living statisticians. He has made several important contributions in numerous areas of statistics and applied probability. He presented ground breaking proportional hazards model which is widely used in the analysis of survival data. The Box-Cox transformation is introduced by him. His other major contributions are towards design of experiments and analysis of binary data. The Cox point process, also known as a doubly stochastic Poisson process or mixed Poisson process, was named after him. |
| June 1933 – 13 November 2010 | J N Srivastava | JN Srivastava has immensely contributed in the development of Statistics. His major contributions towards statistics are in design of experiments. Some notable contributions in this field are the mixed factorial, search linear models and search designs, which is a path breaking research, self relocating designs, etc. Srivastava improved the BCH codes, which are known as Srivastava's codes. Srivastava also developed MANOVA with complete and incomplete data. Srivastava developed the theory of optimum balanced designs for fractional factorials, introduced balanced arrays and multidimensional partially balanced association schemes leading to the non-commutative algebra of Bose and Srivastava. He introduced a very general class of estimators in sampling theory, popularly known as Srivastava's estimators. He attempted to connect spirituality with mathematical logic, quantum mechanics, meta-physics. In 1973 conference he |

| Time | Contributor | Contribution |
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| | | organized a conference on "Statistical Design and Analysis of Experiments and Linear Models" and started a new era of statistical design by bringing together leaders from different areas of statistics and demonstrating that both "good" design and "efficient" inference are fundamental for extracting the relevant information from data collected for scientific studies. He founded the *Journal of Statistical Planning and Inference* in 1975. |
| May 23, 1937 - | Jayanta K Ghosh | Jayanta Ghosh has made monumental contributions towards Bayesian inference and Bayesian non-parametrics, asymptotics, modeling and model selection, invariance in testing and estimation, high dimensional data analysis, non-parametric regression and density estimation, survival analysis, statistical genetics, multiple testing, mixture models, etc. His outstanding contributions include Bahadur-Ghosh-Kiefer representation and the Ghosh-Pratty identity. |
| May 24, 1938- | Bradley Efron | Bradley Efron is known for introducing the bootstrap resampling technique. The bootstrap technique has made a significant impact in the field of applied statistics. It is one of the first computer-intensive statistical techniques which has the capability to replace traditional algebraic derivations. Some of hi major contributions in theoretical and applied statistics are empirical Bayes analysis, analysis of survival data and statistical inference for microarray gene expression data. He has published a monograph entitled *The Jackknife, the Bootstrap and Other Resampling Plans* in 1982 and a book entitled *An Introduction to the Bootstrap* in 1994 with R Tibshirani. |

## 2. SOME USEFUL AND IMPORTANT JOURNALS ON TIME LINE

| 21 February 1834 | Royal Statistical Society https://mc.manuscriptcentral.com/jrss | Around 1645, a group of scientists started regular meetings to establish a society for statisticians. William Petty was one of members in the first group of scientists. On 28 November 1660, twelve men held first meeting. The Royal Statistical Society was founded as the *Statistical Society of London* in 1834. Florence Nightingale was its first female member. The first part of the *Journal of the Statistical Society of London* was published in May 1838. On 31 January 1887, the Society was incorporated by Royal |

| | | Charter and became the Royal Statistical Society. In 1887 the name of the *Journal of the Statistical Society of London* was changed to the *Journal of the Royal Statistical Society.* |
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| 27 November 1839 | American Statistical Association https://mc.manuscriptcentral.com/ amstat | A team of five people William Cogswell, Richard Fletcher, John Dix Fisher, Oliver Peabody, and Lemuel Shattuck organized a Statistical Society called American Statistical Society. On February 5, 1840, it was renamed as the American Statistical Association (ASA) at its first annual meeting held in Boston. Fletcher was elected as the first president (1839-1845). Lemuel Shattuck, the first secretary, was the true pioneer in founding the association. In 1888, the association started publishing *Publications of the American Statistical Association* which resulted in increased national interest in the association and as a result, number of members increased to more than 500 in 1898 from 160 in 1889. The publication series introduced by Walker is now known as *Journal of the American Statistical Association* (*JASA*). JASA today is one of the most important journal in the field of statistical science. |
| 1885 | International Statistical Institute https://mc.manuscriptcentral.com/ insr | The International Statistical Congresses (ISC) was founded in 1853. In 1885 it was renamed as The *International Statistical Institute* (ISI). It is a professional association of statisticians. The Institute's activities include publication of a variety of books and journals and holding an international conference every two years. The biennial convention of the ISI was commonly known as the *ISI Session*. Since 2011 it is known as the *ISI World Statistics Congress*. The permanent office of ISI is located in Den Haag - Leidschenveen (The Hague), in The Netherlands. ISI publishes the well renowned journal The *International Statistical Review*. |
| 1901 | Biometrika https://mc.manuscriptcentral.com/biometrika | The Journal *Biometrika* was established in1901. Karl Pearson was the editor for the first 35 years of its existence. Francis Galton and Walter Weldon were the other two who helped in establishing the Journal. |

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| 1925 | Annals of Eugenics (now Annals of Human Genetics since 1954 ) https://mc.manuscriptcentral.com/ahg | Karl Pearson in 1925 founded the Journal *Annals of Eugenics*, which devoted its pages wholly to the scientific treatment of racial problems in man. In 1954, the Journal adopted a new name, *Annals of Human Genetics*, which it still bears today. |
| 1930 | Institute of Mathematical Statistics https://www.e-ublications.org/ims/submission/index/login | *Annals of Mathematical Statistics* was a statistics journal published by the Institute of Mathematical Statistics from 1930 to 1972. In 1938, Samuel Wilks became editor-in-chief of the Annals and recruited a remarkable editorial board comprising of Sir R A Fisher, Jerzy Neyman, Harald Cramér, Harold Hotelling, Egon Sharpe Pearson, Georges Darmois, Allen T. Craig, William Edward Deming, Richard Edler von Mises, Henry Louis Rietz, and Walter A. Shewhart. It was superseded by the Annals of Statistics and the Annals of Probability in 1973. |
| 1933 | Sankhya sankhya_a@isical.ac.in | Sankhya, an Indian Journal of Statistics was founded by Late Professor Prasanta Chandra Mahalanobis and is being published since then by the Indian Statistical Institute. Prasanta Chandra Mahalanobis was the founder editor of the Journal and remained so till his death. |
| 03 January 1947 | Indian Society of Agricultural Statistics http://epubs.icar.org.in/ejournal/index.php/JISAS/about/submissions#onlineSubmissions | Sir C.V. Raman, the then President of the Indian Science Academy, during 1945-46 felt that agricultural scientists and agricultural statisticians should knit themselves together for exchange of views and pooling up of experiences as Statistics had made the largest contributions in agriculture. So he advised to form a scientific society for the promotion of study and research in agricultural statistics which would provide an opportunity for publishing at one place their research papers and their contributions to AGRICULTURAL STATISTICS. Accordingly on 03 January 1947 the Indian Society of Agricultural Statistics was founded at a meeting of statisticians and other agricultural scientists who had gathered together in Delhi on the occasion of the 34th session of Indian Science Congress. Hon'ble Late Dr. Rajendra Prasad, the then Union Agricultural Minister, Government of India was its founder President. Hon'ble Dr. Rajendra Prasad continued to be the President of the Society even after becoming the President of the Republic of India. He remained President of the Society for 16 years since its formation and it was under his guidance that the society grew in its stature. |

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| | | The Society also started publishing a journal called Journal of the Indian Society of Agricultural Statistics right since the inception of the society. |
| 6 September 1947 | International Biometrics Society<br>biometrics@tibs.org | The International Biometric Society was founded September 6, 1947 at the Marine Biological Laboratory in Woods Hole, Massachusetts, USA. The Society founded a Journal which was originally published in 1945 under the title Biometrics Bulletin. Later, the journal adopted the shorter title of Biometrics in 1947. |
| 1977 | Journal of Statistical Planning and Inference<br>http://ees.elsevier.com/jspi/ | Professor J. N. Srivastava established Journal of Statistical Planning and Inference in 1977. The Journal covers all classical aspects of statistics and probability and the emerging interdisciplinary topics that have potential impact on the subject. The journal's core strengths are statistical inference, design of experiments, classical probability theory, and large sample survey methods. It also encourages emerging topics in other disciplines with connections to statistics. |
| January 1991 | Statistica Sinica<br>http://www.stat.sinica.edu.tw/statistica/submission | Statistica Sinica is a professional journal that was founded in January 1991. It publishes original work in all areas of statistics including theory, methods, and applications. Statistica Sinica is co-sponsored by the Institute of Statistical Science, Academia Sinica, Taipei, Taiwan, Republic of China and the International Chinese Statistical Association in Delaware, USA. |