

# Commentary

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ECONOMIC INVESTMENT AND ACTUARIAL RESEARCH

## A 175-year History of Statistics and Statisticians

The Royal Statistical Society celebrated its 175<sup>th</sup> anniversary year in 2009. Founded in 1834 as the Statistical Society of London, it has a history of progress and accomplishment in academic research and professional practice in the field of statistics. Celebration of this 175-year history provides an opportunity to reflect upon the accomplishments of British statisticians over the centuries and to focus on statistical topics that present challenges to be confronted in the twenty-first century by today's generation of statisticians.

Prince Albert, Consort to Queen Victoria, became the Society's Royal Patron in 1840. The Society was granted a Royal Charter in 1887, then becoming the Royal Statistical Society. Today the Society has over six thousand Fellows in 89 countries around the world and it operates with ten sections for specific areas of statistical research and practice. There have been many prominent Fellows of the Society including Sir William Beveridge, the intellectual godfather of the British welfare state, and John Maynard Keynes, the renowned economist who has had a profound influence on global economic policymaking over many decades.

England has provided the world of statistics with several pioneers since the seventeenth century. John Graunt (1620-1674) is regarded as the father of modern statistics; he produced the first life table and founded the English School of Political Arithmetic. John Arbuthnot (1667-1735) applied the first test of statistical significance. Abraham de Moivre (1667-1754) developed the calculus of probabilities and solved problems of games of chance and life annuities. Thomas Bayes (1701-1761) solved the inverse probability problem of passage from sample to population statistics. Thomas Robert Malthus (1766-1834) produced empirical studies of human populations. Frederick Morton Eden (1766-1809) studied poverty through statistical surveys with extensive analyses of the living conditions of the poor, leading to the development of insurance protection

and Friendly Societies. Augustus de Morgan (1806-1871) contributed to probability theory, particularly its use in actuarial mathematics. William Farr (1807-1883) developed vital statistics and epidemiology. George Boole (1815-1864) introduced symbolic logic and advanced the theory of probability and statistical inference. Florence Nightingale (1820-1910) used statistical methodology to bring about social reforms including mitigation of unsanitary conditions and provision of proper hospital care for wartime military patients. Francis Galton (1822-1911) developed statistical regression and correlation and produced work on heredity and climate. John Venn (1834-1923) worked on the logic of chance and inductive logic. William Stanley Jevons (1835-1882) used mathematics in economics, particularly in the area of economic time series. Francis Ysidro Edgeworth (1845-1926) developed index numbers and the calculus of variations. Karl Pearson (1857-1936) founded biometrics and contributed to statistics, eugenics and the scientific method, building the foundation for much of modern mathematical statistics. Pearson originated many common statistical terms such as standard deviation, mode, homoscedasticity, heteroscedasticity, kurtosis, and the product-moment correlation coefficient. Arthur Lyon Bowley (1869-1957) developed sampling techniques for social and economic statistical measures of wages, poverty, industry, national income and foreign trade. George Udny Yule (1871-1951) developed time series analysis and genetics. William Sealy Gosset (1876-1937) developed the important t-distribution, small sample theory and experimental design. John Maynard Keynes (1883-1946) produced a classic treatise on the philosophy of probability, rationality and statistical inference. Egon Sharpe Pearson (1885-1980) advanced the theory of hypothesis testing. Ronald Aylmer Fisher (1890-1962) transformed statistics into a systematic body of concepts and methods; he also set the foundations for modern theoretical population genetics.

Austin Bradford Hill (1897-1991) conducted epidemiological surveys and was a leading proponent of randomized clinical trials.

These individuals have contributed to the development of statistics and have provided a platform on which today's generation of statisticians can build for the future by means of continuing research and development and the application of statistical methodology and techniques. Today's social and economic challenges that are amenable to statistical analysis and policy development include: climate change and global warming; infrastructure development; depletion of the earth's natural resources; pollution control; development of alternative energy sources and technology; increasing human longevity trends and the provision of income support for the elderly; medical research and the eradication of diseases; infant mortality; containment of epidemics; provision of universal health care; testing and improving efficacy of pharmaceuticals; poverty and social and economic development; globalization and fair trade; global security and terrorism; global financial stability; financial institutions, governance, regulation and risk management; population migration; human rights; elimination of gender discrimination and provision of equal rights and opportunity for women. A recent article in *The New York Times* stated: "the current generation of statisticians uses powerful computers and sophisticated mathematical models to hunt for meaningful patterns and insights in vast troves of data; the applications are as diverse as improving internet and online advertising, and culling gene sequencing information for cancer research."

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