Title.

Tukey, John Wilder

Dates.

Born: New Bedford, Mass. 16 June 1915 Died: New Brunswick, N. J. 26 July 2000

Biographical Details.

Parents: Adah M. Tasker and Ralph H. Tukey

Spouse: Elizabeth Rapp

Education.

Brown University (B.Sc., M.Sc. Chemistry) 1933-1937 Princeton (M.A., Ph.D. Mathematics) 1937-1939

Major awards.

1938-39 Jacobus Fellowship, Princeton University

1949-50 Guggenheim Fellow

1958 Wald Lecturer, Institute of Mathematical Statistics `The mathematical foundations of fiducial inference"

1961 Member, National Academy of Sciences

1962 Member, American Philosophical Society

1964 Member, American Academy of Arts and Sciences

1965 S. S. Wilks Medal, American Statistical Association `... for his contributions to the theory of statistical inference, his development of procedures for analyzing data, and his influence on applications of statistics in many fields."

1956 Statistician of the Year, American Statistical Association Chicago Chapter

1967 Fisher Lecturer, "Some perspectives on data analysis"

1973 National Medal of Science `For his studies in mathematical and theoretical statistics, and for his outstanding contributions to the applications of statistics to the physical, social and engineering sciences."

1975 Hitchcock Lecturer, University of California, Berkeley

1975 Scott Lecturer, Cambridge University, England

1977 Shewhart Medal, American Society for Quality Control

1982 Medal of Honor of the IEEE, ``For his contributions to the spectral analysis of random processes and the fast Fourier transform algorithm."

1982-3 Deming Medal, American Society for Quality Control

1984 James Madison Medal, Princeton University

1991 Foreign Member, Royal Society of London

1989 Monie A. Ferst Award, Sigma Xi

1990 Educational Testing Service Award "Distinguished service to measurement"

1999 M. Zelen Leadership Award, Harvard

Honorary Doctorates..

1962 Case Institute of Technology

1965 Brown University

1968 Yale University 1969 University of Chicago 1978 Temple University 1998 Princeton University 1999 University of Waterloo

Professional societies.

National Academy of Sciences American Philosophical Society American Academy of Arts and Sciences American Statistical Association Institute of Mathematical Statistics Royal Statistical Society Royal Society of London

Astronomical Contribution and Significance

Abstract

The entry provides a brief description of John Tukey's impact on astronomy via a paper with Lyman Spitzer and his development of statistical methods particularly suitable to astronomy. References that are typical of those in the literature are provided.

John Tukey was renowned for research and service to each of academia, industry, and government and in particular worked with \and influenced renowned astronomers. A literature search displays that Tukey's statistical methods are continually employed in astronomical data analyses. He re-energized the field of descriptive statistics, for example as presented in Trumpler and Weaver.

An apt beginning is to note that the Princeton Professors M. Schwartzschild, L. Spitzer, and J. Wheeler met regularly with Tukey for lunch in the 1950s to share their ideas on science. They called their group the "Chowder and Marching Society" There is a 1951 Spitzer and Tukey paper on the polarization of interstellar waves.

That last is perhaps the one paper appearing in the astronomy literature, but Tukey reached out to astronomers though his statistical work. Amongst other things he created and publicized: robust methods, exploratory data analysis, dynamic graphics, boxplots, stem and leaf plots, a fast Fourier transform, and an effective numerical spectrum estimation procedure that extends to multivariate and higher order cumulants. Tukey's spectrum analysis shows its importance itself through the many citations to the Blackman-Tukey book and to the Cooley and Tukey version of a Fast Fourier Transform.

Selected References.

Beers, T. C., Flynn, K. and Gebhart, K. (1990), Measures of location and scale for velocities in clusters - a robust approach. Astronomical Journal100, 32-46. (robustness).

Blackman, R. B. and Tukey. J. W. (1958). The Measurement of Power Spectra. Dover, New York.

Brillinger, D. R. (2002). John W. Tukey: his life and professional contributions; John W. Tukey's work on time series and spectrum analysis. Annals of Statistics 6, 1535-1575 and 1595-1518.

Cooley, J. W. and Tukey, J. W. (1965). An algorithm for the machine computation of complex Fourier series. Mathematics of Computation 19, 297-301.

Feigelson, E. D. and Babu, G. J., eds. (1992). Statistical Challenges in Modern Astronomy. Springer, New York.

Goodman, A. A. (2012). Principles of high=diemnsional data visualization in astronomy. Astron..Nachr. 333, 505-514. (interactive EDA visualization, PRIM-9)

Muller, R. A. and McDonald, G. J. (2002) Ice Ages and Astronomical Causes: Data Spectral Analysis and Mechanisims. Springer (Blackman-Tukey)

Pelt, J.(2003) Astronomical Time Series Analysis, Lecture Notes. Tartu Observatory. http://www.aai.ee/~pelt/main.pdf (FFT)

Petard, H. (L. Spitzer and J. W. Tukey +2 others).(1938). A contribution to the mathematical theory of big game hunting Amer. Math. Monthly 45, 446-447

Scargle, J. D. (1982). Studies in astronimical time series analysis. Astrophysical J, 263, 835-853. (Blackman-Tukey)

Spitzer, L. Jr. and Tukey, J. W. (1951). A Theory of Interstellar Polarization," *Ap.J.* **114**, 187-205

Trumpler, R. J. and Weaver, H. F. (1953). Statistical Astronomy. Dover, New York. (descriptive statistics).

Wood, J. H., Irwin, M. J. and Pringle, J. E. (1985) A digital technique for the separation of the eclipses of a white dwarf and an accretion disc. Mon. Not. R. astr. Soc. 214, 475479. (median filtering)

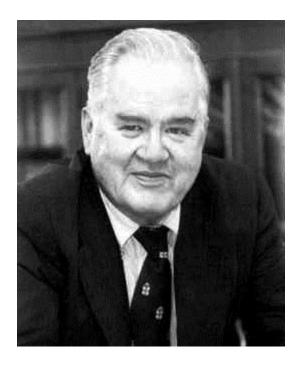
Author.

David R. Brillinger

Affiliation.

Statistics Department, University of California, Berkeley

John W. Tukey



http://www-history.mcs.st-andrews.ac.uk/BigPictures/Tukey.jpeg
(I believe this is public domain so only the source needs to be referred to.).