

ARTICLES AND PAPERS OF ACTUARIAL INTEREST

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ROYAL STATISTICAL SOCIETY

Journal, Series A

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The Teaching of Statistics in Schools

This Report considers the teaching of Statistics in schools and the inclusion of Statistics as a subject in the General Certificate of Education Examination on the basis of two assumptions:

- (1) the purpose of education is to help each individual to realize the full powers of his personality—body, mind and spirit—in and through active membership of a society (quoted from the Report of the Norwood Committee);
- (2) the most fundamental result of a statistical training is that it encourages a habit of disciplined thinking about ordinary affairs in terms of quantities.

The common fallacies that are always creeping into popular literature are mentioned, and it is thought that a grounding in Statistics will cultivate a critical attitude of mind which will help in the recognition of these errors.

The important point is made that weight should be given to the statistical aspects of various subjects rather than that teaching should concentrate on formal statistical method as a subject in itself. The Report suggests an elementary syllabus to be included in 'a general education for citizenship'.

In discussing Statistics in the sixth form more weight is given to the vocational aspect; careers requiring a knowledge of Statistics are mentioned. However, it is recommended that the subject should not be taught at an advanced specialist level because it is unlikely that the universities or professions will grant exemption from any part of their examinations concerned with Statistics. These bodies would prefer entrants with a sound knowledge of elementary ideas.

An Appendix sets out the Statistics syllabuses for the General Certificate of Education, 1951, for those educational bodies which include the subject in their examinations.

Vol. CXV, Part 2, 1952

HERBERT, A. G. and CLARKE, R. D. *The Statistics of British Insurance.*

Messrs Herbert and Clarke give a brief description of the main types of insurance and assurance written by offices and associations of underwriters in this country, and of the benefits provided by friendly societies, trades unions and superannuation funds. Extracts are given of the more important statistics obtainable from the summary of the Board of Trade returns, from the statistical summary of the Chief Registrar of Friendly Societies and from other sources. Reference is made to benefits under the

National Insurance Scheme and to the contribution made by insurance to national saving. A brief final section discusses possible improvements in insurance statistics.

Vol. cxv, Part 4, 1952

ROY, A. D. *An Exercise in Errors.*

This paper considers the extent to which certain official estimates are affected by errors in the constituent data. It is first assumed that these errors have a probability distribution and then shown that the estimates are much more unreliable if this assumption cannot be made.

The author draws the conclusion that 'the best estimates that can be made under given circumstances are only meaningful if it can be stated how good these estimates are', and suggests that the question whether it is reasonable to assume that errors which occur in economic statistics have some sort of probability distribution cannot be evaded much longer.

BOWLEY, A. L. *Index Numbers of Wage-Rates and Cost-of-Living.*

Reproduces tables of

- (1) Index numbers of Wage-Rates: Monthly from January 1925 to June 1952 and yearly average from 1924 to 1952, with some additional details for important industries at intervals over the last 40 years, and of average weekly earnings and wage-rates at annual intervals for the last 12 years.
- (2) Cost-of-Living Index Numbers: Monthly from January 1924 to June 1947, with some supplementary information relating to certain sections of this period.
- (3) Index numbers of Retail Prices: Monthly since June 1947.

Journal, Series B (Methodological)

Vol. xiv, Part 1, 1952

GOOD, I. J. *Rational Decisions.*

This paper first discusses the relationship between the theory of probability and the theory of rational behaviour. The author contends that our methods of making rational decisions should not depend on whether we are statisticians; he believes that consistency is important. He holds the view that for a scientific theory to be really satisfactory it must be deducible from a precise set of axioms, there must be a precise set of rules of application, and there should be suggestions for using the theory. Before proceeding to his axioms and rules for the theory of probability he makes twelve penetrating 'remarks' about degrees of belief and then defines certain notions such as theory of reasoning (= logic + probability), reasonable bodies of belief (i.e. those which do not lead to a contradiction), principle of rational behaviour, etc. He then expresses the view that, once the theory of probability is taken for granted, the maximization of expected utility per unit time is the only fundamental principle of rational behaviour. For example, the older we become the more important it is to use what we already know rather than to learn more!

The paper concludes with (a) a discussion on fair fees for expert advice, (b) a comparison of legal and statistical procedures, (c) a section on the

Bayes and minimax solutions in Wald's theory of statistical decision functions and (d) some ideas on the use of chains of probabilities of probabilities.

EUGENICS SOCIETY

Annals of Eugenics, Vol. 16, Part 4

KEMSLEY, W. F. F. *Body Weight at Different Ages and Heights*.

In a previous paper 'Weight and height of a population', published in Vol. 15 of the *Annals of Eugenics*, Mr Kemsley gave some data obtained from an investigation of body weight and height of the civilian population in 1943. This later paper amplifies the data by giving the mean weights for each height and age together with tables of the 1st, 5th, 95th and 99th centiles. The results are compared with those of the investigation of the Scottish Life Insurance Company for the period 1881-1915, the medico-actuarial tables relating mainly to the years 1885-1900 and those of seven British Life Offices for the years 1921-22.

British Management Review, Vol. x, No. 4, March 1952

FERNEY, L. A. *Mathematical Testing of Planning Policies—An Appraisal of some Econometric Methods of Plan Optimization*.

This paper claims as its 'modest aim' the giving of a 'popularized description of the difficult concepts involved in Linear Programming'. In pursuance of this aim it outlines the 'current economic methods of plan optimization' and indicates, in very general terms, the nature of the techniques used. The mathematics required for the theory is concerned with maximizing a function subject to linear inequalities. This branch of mathematics is also used in the Theory of Games, and appendices indicate how the results of this theory can be used in problems of planning. There is also an appendix criticizing the planning of the 'Groundnuts Scheme' and an extensive bibliography, mainly of American books and papers.

AMERICAN STATISTICAL ASSOCIATION

Journal

Vol. XLVII, No. 258, June 1952

DAVIS, D. J. *An analysis of some failure data*.

The paper summarizes the theory and statistical techniques employed in the analysis of some data of failure occurring in operations performed by machines and persons. Three theoretical frequency distributions are considered; they assume that the probability that a system fails at time t follows:

- (1) the Normal distribution,
- (2) the Exponential distribution,
- (3) the distribution of the life-time of human beings.

Thirteen examples taken mainly from industrial processes are considered and it is concluded that most of the systems examined are best described by the exponential theory of failure.

New England Journal of Medicine, No. 247, July 1952

BRADFORD HILL, A. *The Clinical Trial*.

Dr Bradford Hill's lecture to the Department of Preventive Medicine, Harvard Medical School, gives a lucid exposition of the principles on which statistical experiments should be planned, with illustrations from medical research and a justification of the techniques employed.

INSTITUTE OF STATISTICS, OXFORD

Bulletin, Vol. XIV, No. 8, August 1952

Monetary policy—a symposium.

This issue continues the discussion of monetary policy in the April and May 1952 issues (*J.I.A.* LXXVIII, 374). The writers are R. V. Roosa (an American economist), R. Frost, J. R. Hicks, E. Victor Morgan, R. F. Kahn, Joan Robinson and E. Nevin; H. G. Johnson writes a concluding article.

Messrs Roosa, Frost, Morgan and Kahn are concerned generally with the 'new monetary policy', and, as in the previous discussions, there is a great difference of opinion as between the value of indirect and direct controls.

Prof. Hicks puts forward an alternative scheme based on the imposition of a tax on bank and other forms of short-term lending. The object is to break the relationship between the terms on which the Treasury and the banks lend and the terms on which they borrow, so that at a time when private industry is paying interest on the basis of high rates, the Government can borrow at a low rate.

Mrs Robinson contributes a historical note on 'orthodox theory' and Mr Nevin some original work on the banks' liquidity ratios during the period 1925-39.

BRITISH MEDICAL ASSOCIATION

British Medical Journal, No. 4785, September 1952

GEARY, R. C. *Statistical aspects of mortality in early adult life.*

In this paper the Director of the Central Statistics Office in Dublin compares the mortality statistics of sixteen European countries for the age-group 15-44. For the purpose of the comparison an equivalent average death rate, based on the mean of the crude death rates for quinary age groups, is used.

An attempt is made to correlate mortality rates and standards of living for the countries examined, and a comparison of British and Irish death rates from nine principal causes of death is given for the years 1900, 1938 and 1949.

The British Journal of Industrial Medicine, Vol. IX, No. 4, October 1952

HUGHES, J. P. W. *Sickness absence recording in industry.*

DENERLEY, R. A. *Some effects of paid sick leave on sickness absence.*

BUZZARD, R. B. and SHAW, W. J. *An analysis of absence under a scheme of paid sick leave.*

The first paper gives a simple method of recording the sickness of industrial workers and suggests methods of statistical analysis and presentation of results.

The second paper considers the effects on sickness absence of two schemes for the payment of wages during illness and injury. One large industrial organization controlling many factories started a scheme in 1948 under which employees received their standard pay less National Insurance benefit during absence on account of sickness; the other large organization had had a similar scheme for established staff in operation since 1928.

The sickness experiences of both organizations are examined, and it is shown that in the first case sickness absence more than doubled after the introduction of the scheme. In one department, however, where bonus earnings were exceptionally high, the introduction of sick pay had no effect on sickness absence until earnings were substantially reduced. In the second organization sickness absence for established men was roughly double that for non-established men, and was about the same as that for the first organization after the introduction of the scheme.

The third paper is concerned with an investigation similar to that in the second paper. The data consist of the sickness records of industrial workers in Government employment. A scheme for paid sick leave was introduced in 1948, and the main object of the investigation was to compare the sickness absence before and after the introduction of the scheme. A sampling technique was used, and the data were classified to show the results for skilled and unskilled workers separately and also to show the effects of incentive payments on sickness absence.

Sickness absence increased by more than 50% after the introduction of the scheme. The sickness absence of workers on a flat rate of pay was higher than that for workers on incentive rates of pay both before and after the introduction of the scheme.