

ABSTRACTS OF PAPERS

(Presented on December 26, 1940, at the Chicago meeting of the Institute)

On the Calculation of the Probability Integral on Non-Central t and an Application. C. C. CRAIG, University of Michigan.

It seems not to have been noted that the probability integral for non-central t can be calculated by means of an infinite series in incomplete β -functions which converges rapidly for small samples. The application here considered is to a test based on the randomization principle which is the subject of E. J. G. Pitman's paper: *Significance tests which may be applied to samples from any populations* (*Roy. Stat. Soc. Jour.*, Vol. 4 (1937), pp. 119-130). In case the samples come from normal populations with equal variance but with unequal means, the chance that the hypothesis of equal population means will be accepted on this test is given by this probability integral which is evaluated in some illustrative numerical examples.

On Some New Results in the Sampling of Discrete Random Variables. WILLIAM G. MADOW, Bureau of the Census.

Many statistical tables may be regarded as the result of subsampling finite populations classified into $r \times s \times \dots$ tables. The main aim of this paper is to derive the associated statistical theory including both the finite and limiting distributions. After evaluating the fundamental distributions and the moments it is shown that under certain conditions, the limiting distribution is multinomial, while under other conditions the limiting distribution is multivariate normal. These results are then applied to determine the adequate size of sample, and the sampling proportions from various strata.

On the Use of Inverse Probability in Sample Inspection. W. EDWARDS DEMING and WILLIAM G. MADOW, Bureau of the Census.

The theory of inspection by sampling is abstractly equivalent to one part of the theory of subsampling. The theory of subsampling finite populations is considered in this paper in order to investigate the differences that occur when the methods of fiducial inference and inverse probability are used, particularly in regard to determining the adequate size of sample. In sample inspection, the prior distribution of failures is almost always known, at least approximately. In using any system of sample inspection, a number of failures will pass undetected. On the basis of certain prior distributions of failures, distributions are derived for the number and percent of failures remaining after each of several different possible systems of sample inspection has been applied. Formulas giving the cost of partial inspection are used together with these distributions in order to determine methods of sample inspection having various desired properties.

On a Convergent Iterative Procedure for Adjusting a Sample Frequency Table When Some of the Marginal Totals are Known. FREDERICK F. STEPHAN, Cornell University and W. EDWARDS DEMING, Bureau of the Census.

The 5 per cent sample taken with the 1940 Population Census presents an interesting problem of estimation in which the estimates are connected by equations of condition.