ABSTRACTS OF PAPERS

(Presented on December 27, 1939, at the Philadelphia meeting of the Institute)

On the Unbiased Character of Certain Likelihood-Ratio Tests when Applied to Normal Systems. JOSEPH F. DALY, The Catholic University of America.

Consider a random sample of N observations on a set of variates $x^1, \cdots, x^q$, where $x^1, \cdots, x^k$ are assumed to be normally distributed about means which are linear functions $m^i = \Sigma b^i_\sigma x^\sigma$ of the fixed variates $x^{k+1}, \cdots, x^q$. One is sometimes required to decide whether the sample tends to contradict the further hypothesis, H_0, that the coefficients b^i_μ belonging to a certain subset of the fixed variates, say $x^{k+1}, \cdots, x^{k+h}$, have the specific values $b^i_{\mu 0}$. Such a situation occurs, for example, in the generalized analysis of variance. In this paper it is shown that the Neyman-Pearson method of the ratio of likelihoods yields a test of H_0 which is (at least locally) unbiased; in other words, this test is less likely to reject H_0 when the sample is in fact drawn from a normal population in which $b^i_\mu = b^i_{\mu 0}$ than when it is drawn from a normal population in which the b^i_μ are different from but sufficiently close to $b^i_{\mu 0}$. In the special cases $k = 1$ or $h = 1$ the proof goes through even without the restriction that the true b^i_μ be close to $b^i_{\mu 0}$, a result which is also implicit in the papers by P. C. Tang and P. L. Hsu (*Stat. Res. Mem.* Vol. 2).

Similarly with respect to the hypothesis H_I that the deviations $x^i - \Sigma b^i_\sigma x^\sigma$ fall into certain mutually independent sets the λ-test is at least locally unbiased; and it has the additional property that the expected value of any positive integral power of $\sqrt[N]{\lambda}$ is greater when H_I is true than when the sample is drawn from any other normal population.

The Product Seminvariants of the Mean and a Central Moment in Samples. C. C. CRAIG, The University of Michigan.

The method used by the author in calculating the product seminvariants of a pair of central moments in samples is not adapted without modification to the present problem. In the present paper the necessary modification is developed which gives a routine method for the calculation of these sampling distribution characteristics. The calculation is a little heavier than in the previous case but the results for the mean and the second, third, and fourth central moments are given up to the fourth order except in one case in which the weight is 13. It is planned to follow this with a further study of the distribution of Fisher's t in samples from a normal population.

A Method for Minimizing the Sum of Absolute Values of Deviations. ROBERT SINGLETON, Princeton Local Government Survey.

E. C. Rhodes (*Philosophical Magazine*, May 1930) presented a method for the estimation of parameters in a linear regression where it is desired to minimize the sum of absolute values of the deviations. In this paper the structure of the deviation surface is analyzed and a method of steepest descent is developed which for computational purposes is an improvement over Rhodes' method. The process is finite and leads to an exact solution. The method and the formulae used are such as to permit the successive additions of new observations or sets of observations to the original data, or the exclusion of an observation from the original set, and the determination of the parameters for the sets of data so derived, with little additional labor.