REFERENCES

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ABSTRACTS OF PAPERS

(*Abstracts of papers presented at the Montreal meeting of the Institute, September 10–13, 1954*)

1. On Quadratic Estimates of Variance Components in Balanced Models, A. W. Wortham, Chance Vought Aircraft and Oklahoma A and M College.

A balanced model is defined as a model whose analysis of variance mean squares are symmetric in the squares of the observations. Included in this class of models are: (1) Completely Randomized, (2) Randomized Blocks, (3) Latin Squares, (4) Graeco-Latin Squares, (5) Split Plots, (6) Factorial Arrangements, etc.

The "analysis of variance estimates" of the variance components are the estimates obtained by solving the system of equations which result when the observed and expected mean squares in the analysis of variance table are equated. For any infinite population let the general balanced model be $y_{i_1 i_2 \cdots i_n} = \mu + \sum_{k=1}^{n} A_{kik} + e_{i_1 i_2 \cdots i_n}$, where μ is a constant, A_{kik} and $e_{i_1 i_2 \cdots i_n}$ are independent random variables with zero means, finite fourth moments, and variances σ_k^2 and σ_0^2 respectively. Let $\hat{\sigma}_k^2$ and $\hat{\sigma}_0^2$ be "the analysis of variance estimates" of the variance components σ_k^2 and σ_0^2. It is shown that the quadratic estimate of $\sum_{k=0}^{p} g_k \sigma_k^2$ (g_k known) which is unbiased, independent of μ, and has minimum variance is given by $\sum_{k=0}^{p} g_k \hat{\sigma}_k^2$. That is, the best quadratic unbiased estimate of the linear combination of the variance components is given by the same linear combination of "the analysis of variance estimates" of the variance components.

2. The Coefficients in the Best Linear Estimate of the Mean in Symmetric Populations, A. E. Sarhan, University of North Carolina.

In a previous paper ("Estimation of the Mean and Standard Deviation by Order Statistics" by A. E. Sarhan, *Ann. Math. Stat.* Vol. 25 (1954), pp. 317–328) the best linear estimate of the mean of a rectangular, triangular and double exponential population were worked out. By considering some other symmetric distributions with different shapes, it is found that the coefficients in the estimates form a sequence. From the sequence, it is observed that the coefficients in the estimates are influenced by the shape of the distribution. The variances of the estimates are also so affected.

3. Distribution of Linear Contrasts of Order Statistics, Jacques St. Pierre, University of North Carolina.

Consider $n + 1$ independent normal populations with unknown means, $m_0, m_1, \cdots, m_n$, respectively, and with a common known variance $\sigma^2 = 1$ (say). Suppose a sample of size N is available from each population; and let $x_{(0)} > x_{(1)} > \cdots > x_{(n)}$ be the ordered sample means. Consider the linear contrasts $z = x_{(0)} - c_1 x_{(1)} - \cdots - c_n x_{(n)}$, where $\sum_{i=1}^{n} c_i = 1$, $c_i \geqq 0$, $(i = 1, 2, \cdots, n)$. The probability density function of the contrasts z is derived under the null hypothesis $H_0: m_0 = m_1 = \cdots = m_n$. The density of the contrasts z is also