ABSTRACTS OF PAPERS

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Contributions to the Theory of the Representative Method of Sampling. William G. Madow, Washington, D. C.

The theory of representative sampling may be regarded as a dual sampling process; the first of which consists in the sampling of different random variables and the second of which consists in repeating several times the experiments associated with each of the different random variables. It follows that while the theory of sampling from finite populations without replacement may be required for the first process, the second leads directly into the theory of sampling from infinite populations. There is, however, one difference. Although the usual theory is concerned with the evaluation of fiducial or confidence limits for parameters the theory of sampling is concerned with the evaluation of fiducial or confidence limits for, say, the mean of a sample of N, when n, $(N \geq n)$, of the values are known.

It is thus possible to use the usual theories of estimation in obtaining estimates of the parameters and to allow the effects of subsampling process to show themselves in the different values of the fiducial limits. It is shown that the limits obtained are almost identical with those obtained by the theory of sampling from a finite population. Distributions of the statistics used in these limits are derived.

Besides these results, the theory is extended to the theory of sampling vectors, and conditions are stated under which the "best" allocation of the number in a sample among several strata is proportional to the kth roots of the generalized variance of a random vector having k components.

A Generalization of the Law of Large Numbers. Hilda Geiringer, Bryn Mawr.

Let $V_1(x)$, $V_2(x)$, $\cdots$, $V_n(x)$ be n probability distributions which are not supposed to be independent and let $F(x_1, x_2, \cdots, x_n)$ be a "statistical function" of n observations in the sense of v. Mises,—$V_i(x)$ $(i = 1, 2, \cdots n)$ indicating as usual the probability of getting a result $\leqq x$ at the ith observation—. Then *it can be proved* that under fairly general conditions $F(x_1, x_2, \cdots, x_n)$ *converges stochastically toward its "theoretical value"*; or in other words, that under these general conditions *a great class of statistics* $F(x_1, x_2, \cdots, x_n)$ *is "consistent"* in the sense of R. A. Fisher.

Well known particular cases of this theorem result if (*a*) we take for $F(x_1, x_2, \cdots, x_n)$ the *average* $(x_1 + x_2 + \cdots + x_n)/n$ of the n observations, (*b*) we assume that the $V_i(x)$ are *independent* distributions.

On the Problem of Two Samples from Normal Populations with Unequal Variances. S. S. Wilks, Princeton University.

Suppose O_{n_1} and O_{n_2} are samples of n_1 and n_2 elements from normal populations π_1 and π_2 respectively. Let a_1, σ_1^2 and a_2, σ_2^2 be the means and variances of π_1 and π_2 and let O_{n_1} and O_{n_2} have means $\bar{x}_1$ and $\bar{x}_2$ and variances s_1^2 and s_1^2 (unbiased estimates of σ_1^2, σ_2^2) respectively. It is shown that there exists no function (Borel measurable) of $\bar{x}_1$, $\bar{x}_2$, s_1^2, s_2^2, $a_1 - a_2$ independent of σ_1 and σ_2, having its probability law independent of the four population parameters. It is therefore impossible to obtain exact confidence limits