# ABSTRACTS OF PAPERS

(*Abstract of a paper presented at the Western Regional Meeting, Eugene, Oregon, June 20–21, 1963. Additional abstracts appeared in the June and September, 1963 issues.*)

## 10. **Representation of Uniform Distributions as Convolutions.** RALPH STRAUCH, University of California, Berkeley.

This paper gives necessary and sufficient conditions for the existence of distributions $P$ and $Q$ such that $H = P * Q$, where $H$ is uniform on $\{0, 1, \cdots, n\}$, as follows. Let $\{d_t: 1 \leqq t \leqq \tau\}$ be a sequence of integers such that (i) $d_t > 1, 1 \leqq t \leqq \tau$; (ii) $\prod_{t=1}^{\tau} d_t = n+1$. Let $\{p_t: 1 \leqq t \leqq \tau\}$ be distributions such that $p_t(k \prod_{j=1}^{t-1} d_j) = 1/d_t$, for $0 \leqq k \leqq d_t - 1$, where $\prod_{j=1}^{0} d_j = 1$ by convention. If $A$ is a finite set of distributions, let $*A$ denote the convolution of the elements of $A$. Then there exist distributions $P$ and $Q$ on the nonnegative integers such that $H = P * Q$ if and only if $P = *\{p_t: t \varepsilon T_1\}$ and $Q = *\{p_t: t \varepsilon T_2\}$, where $T_1$ and $T_2$ are disjoint sets of integers such that $T_1 \cup T_2 = \{1, \cdots, \tau\}$.

(*Abstracts of papers presented at the Annual Meeting of the Institute, Ottawa, August 27–29, 1963. Additional abstracts appeared in the March, June and September, 1963 issues.*)

## 26. **The Monotonicity of the Power Functions of Test Procedures for Two Multivariate Problems.** T. W. ANDERSON and S. DAS GUPTA, Columbia University.

Let $\mathbf{X} = [x_{ij}]: p \times m$ and $\mathbf{Y} = [y_{ij}]: p \times n$ be two random matrices $(n \geqq p)$ such that the elements of $\mathbf{X}$ and $\mathbf{Y}$ are mutually independent, and $x_{ii}$ is distributed according to $N(\theta_i, 1), i = 1, \cdots, t = \min(p, m)$, and each of the elements of $\mathbf{Y}$ and the other elements of $\mathbf{X}$ is distributed according to $N(0, 1)$. It is shown that for testing the hypothesis $\theta_1 = \cdots = \theta_t = 0$, the power function of any test, based on the roots of $(\mathbf{XX}')(\mathbf{YY}')^{-1}$ and having the acceptance region convex in each column vector of $\mathbf{X}$ for each set of fixed values of $\mathbf{Y}$ and of the other column vectors of $\mathbf{X}$, is a monotonically increasing function of each $\theta_i$. This result is used to obtain another sufficient condition for a test to have a monotonically increasing power function in each of the invariant parameters for (i) testing a set of multivariate linear hypotheses in the usual linear normal model, and (ii) for testing independence between two sets of normally distributed variates. This result is a generalization of an earlier result by Das Gupta (*Ann. Math. Statist.* **33** (1962) p. 1504).

## 27. **Adequate Subfields and Almost Sufficiency.** OLE BARNDORFF-NIELSEN and MORRIS SKIBINSKY, University of Minnesota. (By title)

Let $X_1, X_2, \cdots, X_n$ and $\Theta$ be random variables and let $T = t(X_1, X_2, \cdots, X_n)$ be a statistic. Suppose that we want to use $T$ as a predictor for $\Theta$. Then the question naturally arises: does $T$ summarize all the "information" concerning $\Theta$, which is contained in the sample $X_1, X_2, \cdots, X_n$? The theory developed in this paper originated in an effort to give a precise meaning to questions like this. Of course the problem is basically similar to that encountered when one wants to estimate a paramter $\theta$ by a statistic $T$. While the relevant notion for the estimation-problem is that of sufficiency, for the prediction-problem it seems to be what we have chosen to call adequacy. Loosely speaking $T$ is adequate (w.r.t. $\Theta$)