quency ratios (= No. of 1's/No. of 0's) (a) converge to 1, (b) repeat periodically, (c) assume relative extrema by geometric progression of iteration order, (d) behave irregularly, i.e. neither (a), (b) nor (c),—if, and only if, the initiating process is (a) randomized, incl. conditioned processes, (b) periodic, (c) transient (single peaks or steps), (d) inductive. To (b): M. Kochen and E. H. Galanter (*Inform. Contr.* 1, 267–288 (1958)) determined the elements of minimal generating sets (mgs) for λ-placed binary numbers (here: periods), from which all others could be deduced by completion or by translation. By iterated addition (mod. 2), any periodic process generates periodically repeated arrays (of periodic processes), whose elements are exactly those of the mgs's, none of them occurring more than once. Since these arrays, in the average, imply more than 1 element, as λ increases, their number becomes progressively small if compared to the number of elements of the mgs's.

(Additional abstract for the Cambridge Meeting of the Institute, August 25–29, 1958)

30. On the Bounds for the Variance of Mann-Whitney Statistic. J. S. Rustagi, Michigan State University (By title)

Let $X_1, X_2, \cdots, X_m$ and $Y_1, Y_2, \cdots, Y_n$ be two random samples from strictly increasing continuous cumulative distribution functions (cdf's) $F(x)$ and $G(y)$ respectively. Then the Mann-Whitney statistic U is given by U = number of pairs (X_i, Y_j) such that $Y_j < X_i$, $i = 1, 2, \cdots, m$; $j = 1, 2, \cdots, n$. Let $L(t) = F(G^{-1}(t))$. Then variance of U, $V(U) = mn[(m-1)\int_0^1 (L(t) - kt)^2\,dt + A]$ where A is a constant free of $L(t)$ and $k = (n-1)/(m-1)$. Utilizing the techniques and results of an earlier paper by the author (*Ann. Math. Stat.*, Vol. 28, pp. 309–328), lower and upper bounds for $V(U)$ are determined in terms of $p = P(Y < X) = \int_{-\infty}^{\infty} F(t)\,dG(t) = 1 - \int_0^1 L(t)\,dt$. The problem essentially is that of minimizing and maximizing $\int_0^1 (L(t) - kt)^2\,dt$ over a class of cdf's $L(t)$ defined over [0, 1] such that $\int_0^1 L(t)\,dt = 1 - p$. Lower bounds are also obtained for $V(U)$ under an additional restriction that X is stochastically smaller than Y or $L(t) \geqq t$ for $0 \leqq t \leqq 1$. (Received July 7, 1958, revised November 24, 1958).

NEWS AND NOTICES

Readers are invited to submit to the Secretary of The Institute news items of interest

Personal Items

Frances Campbell Ameniya, formerly chairman of the Department of Mathematics at George Pepperdine College in Los Angeles, California, has been appointed Associate Professor of Mathematics at California Western University in San Diego, California.

R. E. Barlow is now working on a doctorate at Stanford while employed at Sylvania Electronic Defense Laboratory, Mt. View, California, as a mathematical statistician.

Ishu Bangdiwala is on a leave of absence from his position as Head of the Department of the Statistics Section of the Agricultural Experiment Station of the University of Puerto Rico, to accept the position as Assistant Director of Research in the Superior Council on Education, which is the governing board of the University.

Jerome Cornfield, assistant chief of the Biometrics Branch, Division of Re-