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ABSTRACTS OF PAPERS

(*Abstracts of papers presented at the Eastern Regional meeting, Chapel Hill, North Carolina, May 5–7, 1970. Additional abstracts have appeared in earlier issues.*)

125-52. Nonparametric tests in the presence of nuisance parameters (preliminary report). C. B. BELL AND V. KUROTSCHKA, University of Michigan.

Let Ω be a family of distributions on the sample space $\mathscr{X}$ and $\Omega_\tau := \{H \circ \tau;\ H \in \Omega\}$ where τ is a nuisance parameter with values in a "nuisance parameter group" T. For the family $S(\Omega(H_0))$ of all similar sets with respect to (wrt) $\Omega(H_0) := \bigcup_{\tau \in T} \Omega_\tau$ one has THEOREM A. (i) $S(\Omega(H_0)) = \bigcap_{\tau \in T} S(\Omega_\tau)$ (ii) *A is similar of size α* wrt $\Omega(H_0)$ iff *for every $\tau \in T$ the set $\tau(A)$ is similar of size α* wrt Ω. (iii) *Let A be invariant* wrt *T. Then A is similar* wrt $\Omega(H_0)$ iff *A is similar* wrt Ω. THEOREM B. *Let $\mathscr{X} = R_N$ and Ω be symmetrically complete. ϕ is similar of size α* wrt. $\Omega(H_0)$ iff $\sum_{\gamma \in S_N} \phi(\tau(\gamma(Z))) = N!\alpha$ *for all $\tau \in T$ and $\Omega(H_0)$—almost all $z \in \mathscr{X}$*. COROLLARY C. *The above results hold in particular, for the two-sample problem when $\Omega = \Omega_2(N)$ and when T is the scale or the location group applied to the coordinates of the second sample only.* Work is in progress to apply and extend to problems arising in analysis of variance settings like testing for interactions in a two-way layout. (Received March 17, 1970.)

125-53. Asymptotic properties of branching renewal processes. PETER A. W. LEWIS, Imperial College and IBM Watson Research Center. (Invited)

Branching renewal processes (BRP) and generalized branching renewal processes (GBRP) are defined and their properties investigated. Analogs of the elementary renewal theorem and Blackwell's theorem are proved for generalized branching renewal processes, and convergence of the intensity function is discussed. Structural theorems on boundedness of the number of events in finite intervals and existence of moments of counts of events are given. Finally, two limit theorems on the asymptotic distribution of the numbers of events in the branching renewal process and in the generalized branching renewal process are proven. (Received May 18, 1970.)

(*Abstracts of papers to be presented at the Annual meeting, Laramie, August 25–28, 1970. Additional abstracts have appeared in earlier issues.*)

126-5. The asymptotic configuration of Wishart eigenvalues. C. L. MALLOWS AND K. W. WACHTER, Bell Telephone Laboratories.

Suppose, A, B are independent $p \times p$ Wishart matrices on m, n degrees of freedom respectively. We consider the empiric distribution of the eigenvalues of A and of $B^{-1}A$, as $p \to \infty$ with $m/p, n/p$ fixed; these converge in probability to remarkably simple forms, making feasible some methods of graphical analysis of observed matrices. Normality is not an essential assumption in the one-matrix case. There are some similarities between these results and those of Wigner and his colleagues (see e.g., Wigner, *SIAM Rev.* (1967)) for symmetric random matrices, though our problems are much more difficult combinatorially; in one special case our result can be related to Wigner's semi-circle law. (Received March 18, 1970.)

126-6. Small sample properties of estimators for the gamma distribution. L. R. SHENTON AND K. O. BOWMAN, University of Georgia and Union Carbide.

The exact distribution of the maximum likelihood estimators $\hat{\rho}$, $\hat{a}$ of the parameters ρ, a of the gamma density $f(x) = e^{-(x/a)}(x/a)^{\rho-1}/a\Gamma(\rho)$ is only known theoretically and in intractable form,