ABSTRACTS OF PAPERS

(Abstracts of papers presented at the European Regional Meeting of the Institute, Dublin, Ireland, September 3–5, 1962. Additional abstracts appeared in the June and September, 1962 issues.)

8. **A Note on Sequences of Attributes** (Preliminary report). FRANCISCO AZORIN-POCH, University of Santiago de Compostela, La Coruna, Spain.

Some situations of "intrinsic" lack of randomness in finite sequences (ordered populations or samples) of attributes are examined. A simple case consists of m classes or "levels", each with $\bar{n}$ items, and $\bar{n}/h$ periods of mh items. The extreme cases are $h = 1$ and $h = \bar{n}$, corresponding to maximum and minimum (non random) mixture. A diagram of serial association is considered as a characteristic feature of these attribute sequences. The contingency tables for successive values of: $t = (k-1)h + a$, $(a < h)$, are obtained for $m = 2$ (cases: $k - 1 \equiv 0 \pmod 2$) and $k - 1 \equiv 1 \pmod 2$, and for $m = 3$ (cases: $k - 1 \equiv 0, 1, 2, \pmod 3$). As measures of association, taking the value 1 for $t = 0$, $X^2/r(m-1)$ (r = number of pairs), Yule's Q (in the case of two letters or classes), and Wallis and Roberts coefficients are calculated. The diagrams show as expected a succession of ones (preceded alternatively by + and − if association and dissociation are distinguished), in the extreme case $h = 1$, and diminishing values until 0 in case $h = \bar{n}$. Another approach is based on intraclass association. The usual formulae of intraclass correlation is now applied to the analysis of variance identity, for absolute frequencies of attributes instead of values of x in quantitative situations. The association refers to successive clusters of equal size in which the sequence is divided.

9. **Inequalities Applicable in Reliability Theory.** Z. W. BIRNBAUM, University of Washington.

A function $f(p)$, increasing for $0 < p < 1$, is called S-shaped when $f(0) = 0, f(1) = 1$, $f'(0) = f'(1) = 0, f'(p) > f(p)[1 - f(p)]/[p(1-p)]$ for $0 < p < 1$, and $f(p) = p$ has a unique solution in $(0, 1)$. It has been previously shown (Birnbaum, Esary and Saunders (1961) *Technometrics* **3** 55–77) that under certain general assumptions the reliability functions of multi-component structures are S-shaped. The number $S_f = 1 - \int_0^1 f(p)[1 - f(p)]/[p(1-p)]\,dp$ is now introduced to describe the degree in which $f(p)$ is S-shaped. Inequalities are obtained which show that the closer S_f is to 1 the more S-shaped f is in an intuitive sense. Furthermore, if f and g are S-shaped, and $h = f(g)$, then $S_h > S_f$ and $S_h > S_g$. If $f(p) = \sum_{i=0}^{n} A_i p^i (1-p)^{n-i}$, then S_f can be written explicitely in terms of the A_i.

10. **Minimax Almost Invariant Confidence Procedures and Related Optimal Ones.** RUDOLF BORGES, University of Cologne, West-Germany. (Introduced by G. Elfving)

Let the indexing set Θ of the family $(M, \mathfrak{R}, P_\vartheta)$, $\vartheta \in \Theta$, of probability fields be a group. The elements of Θ are assumed to be transformations of the sample space M onto itself which leave the family $(M, \mathfrak{R}, P_\vartheta)$, $\vartheta \in \Theta$, invariant. Furthermore, there is a σ-finite measure field $(\Theta, \mathfrak{B}, \nu)$ on the group Θ. If τ denotes the true parameter and $B \in \mathfrak{B}$ the confidence region (decision), the loss is given by $\nu(\tau^{-1}B) + c - cI(\tau, B)$, where c is some non-negative constant and $I(\tau, B) = 1$ for $\tau \in B$ and 0 otherwise. Under weak assumptions the class of all almost invariant confidence procedures is given which is minimax within the class of all almost invariant confidence procedures. Under additional topological assumptions on the