If n, p, R^2, and x represent, respectively, the number of degrees of freedom, the number of records, the true coherence, and the square of the sample coherence, then under appropriate conditions [1], the sample multiple coherence is approximately distributed with probability density function

$$C(x|n, p, R^2) = \frac{\Gamma(n)}{\Gamma(p-1)\Gamma[n-(p-1)]}(1-R^2)^n x^{p-2} \times (1-x)^{n-p}F(n, n, p-1; R^2x)$$

where $F(n, n, p-1; R^2x)$ is the hypergeometric series

$$\sum_{k=0}^{\infty} \frac{\Gamma^2(n+k)\Gamma(p-1)}{\Gamma^2(n)\Gamma(p-1+k)} \frac{(R^2x)^k}{k!}.$$

The tables presented in these nine volumes give 5D values of the cumulative distribution function $\int_0^x C(u|n, p, R^2)du$ for $p = 2(1)10$, $n = p(1)25$; $R^2 = 0(0.01)0.69$, $x = 0(0.01)1$, and $R^2 = 0.70(0.01)1$, $x = 0(0.01)0.66(0.005)1$. Each volume contains the tabular entries for a specific value of p, with the values of n arranged in ascending order.

The tables are in agreement with Pearson's tables of the incomplete beta function [2], which correspond to $R^2 = 0$, and with the Amos-Koopmans tables [3], which give the cumulative distribution of sample multiple coherence for $p = 2$. The tables were also checked internally. It is believed that the tabular errors do not exceed a unit in the final decimal place.

The tables can also be used for the distribution of the square of the multiple correlation coefficient [4]. Thus, if p', n', R^2, and x represent, respectively, the number of variables, the number of degrees of freedom, the true square of the multiple correlation coefficient, and the square of the sample multiple correlation coefficient, then the tables include entries for $p' = 3(2)19$, $n' = p + 1(2)50$, with the same ranges for R^2 and x as before.

AUTHORS' SUMMARY

1. N. R. GOODMAN, "Statistical analysis based on a certain multivariate complex Gaussian distribution (an introduction)," *Ann. Math. Statist.*, v. 34, 1963, pp. 152–177.
2. KARL PEARSON, *Tables of the Incomplete Beta-Function*, Cambridge Univ. Press, Cambridge, 1956.
3. D. E. AMOS & L. H. KOOPMANS, *Tables of the Distribution of the Coefficient Coherence for Stationary Bivariate Gaussian Processes*, Sandia Corporation Monograph SCR-483, March 1963.
4. R. A. FISHER, *Contributions to Mathematical Statistics*, Wiley, New York, 1950.

61[K, P, W, X].—W. GRANT IRESON, Editor, *Reliability Handbook*, McGraw-Hill Book Co., New York, 1966, 720 pp., 24 cm. Price $22.50.

This closely packed 720-page volume contains such a wealth of practical and useful information that it is difficult for a reviewer to write an analytical description. No other work in the reliability area comes to mind with the broad scope, the depth of detail, and the clarity of exposition of this *Handbook*. The editor and authors can justifiably take pride in the fruit of their labors.

To say that the first five sections, for example, are concerned with background mathematical and statistical concepts and tools, does not give the flavor of the content. The section on system effectiveness provides a basis for the quantitative evaluation of a system. This section, as is true of most of the others, has an aura of

authority based on the author's evident intimacy with his subject. The section on characteristic life patterns contains a large portion on the construction and uses of probability paper which is too frequently completely overlooked, or arbitrarily dismissed, in statistical texts.

Test plan selection is the topic of the third section. Consideration is given to both practical and theoretical considerations. However, it might have been better to introduce this problem after the following section which is a self-contained exposition of the "Application of Mathematics and Statistics to Reliability and Life Studies." This section, running 75 pages, commences with set theory as an introduction to probability and goes through sequential analysis and the analysis of variance. Frequent graphs, tables, and examples illustrate the text.

The section on reliability estimation is at its strongest in its discussion of practical problems. Looseness exists in the statistics, such as writing the equation at the top of page 5.6 and saying "This technique is based on assumptions that are usually obtained," without specifying the assumptions. One wonders, too, what value is served by specifying, on page 5.26, that the circuit analysis program is written for the IBM 709. There is nothing in the text or the extensive flow charts which is machine-related.

Section 6 provides a comprehensive discussion of the acquisition, organization, storage, manipulation and retrieval of reliability data. The 59 pages can stand alone as a detailed introduction to this aspect of the information sciences.

The balance of the book tends to be less mathematical and machine-oriented, but no less important for a balanced exposition of the total problem area. Sections are devoted to such engineering aspects as test programs, failure analysis, engineering design and development, maintainability, human factors, and production. Practical experience pervades all these sections as it does the concluding four managerial sections on specification and procurement, acceptance testing, organization, and cost aspects.

As indicated above, the coverage is encyclopedic. The vast amount of content led the publisher to use a small type which makes extended reading or browsing more difficult. The text is supplemented by three appendices of useful tables, charts, and references. A 14-page index completes the volume. The index shows some carelessness in referring to N. Sobel and C. Moer instead of M. Sobel and C. Mooers, respectively. The term "Jacobian" has one reference in the index which neither is the first nor the only place Jacobians are mentioned. It is possibly due to the individual judgment of different authors as to importance and a consequence of a joint endeavor such as this *Handbook*. A puzzling observation, which was jarring when first noticed, was the use of the symbol "$\lesssim$" in the table of contents of the appendix, even though the actual table or chart used the more customary "$\leq$".

Minor points aside, the enthusiasm shown in the initial sentences of this review remains. It is a handbook; it is a reference work; and in many cases it is a complete introductory treatment of many individual facets of reliability which may profitably be used in its own right.

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