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Progress Report for July--September 1955
on
Research in Applications of Mathematical Statistics to Problems of the Chemical Corps
(NBS Project 1103-40-5118)

NBS

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Progress Report for July-September 1955

on

Research in Applications of Mathematical Statistics to Problems of the Chemical Corps

(NBS Project 1103-40-5118)

This report contains a summary of the work done during the quarter. Results of this work are briefly stated. Technical reports written in connection with this project are mentioned but are transmitted separately.

I. Fractional Replication Designs

The catalogue of fractional replicated designs of the 2^n series has been extended to n = 13, 14, 15, 16 factors, and to fractional replicates of 1/64, 1/128, 1/256 of a full factorial. These results are being combined with those of NBS Report 3481 for publication in the NBS Applied Mathematics Series. These latest results are contained in NBS Report 4417 "Fractional factorial Designs for th $1/2^s \times 2^n$ Series for n = 12(1)16 and s = 6, 7, 8" dated 17 July 55

II. Combining Statistical Tests of Significance

A manuscript on "Exact Tests of Significance for Combining Intra- and Inter-block Information" has been written for submission to a technical journal. The SEAC code for computing the power of these tests is ~~nearly~~ completed and computation of the power points is underway.

III. Computation Methods for the Analysis of Variance.

The method for analysis proposed in NBS Report 3950 has been programmed for IBM machines. The analysis of a 2^{10} factorial will be run on the 604 as a test problem to check the time involved. A first draft of a manuscript on "Some examples of the use of high speed computation in Statistics" by [illegible] has been prepared for inclusion in the proceedings of a conference on the [illegible] Army Research Development and Testing".

IV. Bio-Assay Tables

A code for computing $U(\alpha,\beta,h)$,

$$U(\alpha,\beta,h) = \sum_{d=1}^{\infty} \frac{e^{-h}h^d}{d!} \int_{-\infty}^{\alpha+\beta \log d} \frac{e^{-1/2}}{\sqrt{2\pi}} dt$$

has been written for SEAC and the code checked. A note describing the features of the code has been written and will be submitted during January.

V. Programming the Calculation of Probabilities Associated with Observed Values of Common Statistical Tests

The usual formulas for computing $p\{T > T_o\}$, where T_o is an observed value of some statistic such as t, F, X^2, etc., are not in the best form for computation. Some work has been done on seeking an alternate formula for the mechanization of such computations. A note giving a number of alternate formulas has been prepared and will be submitted in January. ~~is awaiting some analysis of the error involved if only a few terms are used. The formula for $p\{F > F_o\}$ will be coded for IBM.~~

VI. Miscellaneous

A number of miscellaneous advisory activities were performed this quarter.