

AD-A111 213

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER F/G 12/1
RESEARCH IN STATISTICAL ASSURANCE METHODS.(U)
FEB 82 N R MANN N00014-80-C-0684
UNCLASSIFIED SC5278.1FR NL

1 OF 1
AD
A111213



END
DATE
FILMED
3-82
DTIQ

SC5278.1FR

12

Copy No. 11

SC5278.1FR

RESEARCH IN STATISTICAL ASSURANCE METHODS

FINAL REPORT FOR THE PERIOD
July 1, 1980 through October 31, 1981

AD A111213

CONTRACT NO. N00014-80-C-0684

Prepared for

Office of Naval Research
800 North Quincy Street
Arlington, Virginia 22217

DTIC
SELECTED
FEB 22 1982
H

N.R. Mann
Principal Investigator

FEBRUARY 1982

This research was sponsored by Office of Naval Research under
Contract No. N00014-80-C-0684, Project No. NR047-204 (434)



**Rockwell International
Science Center**

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

DTIC FILE COPY

82 02 22 032

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
	AD-A111 213	
4. TITLE (and Subtitle)		5. TYPE OF REPORT & PERIOD COVERED
RESEARCH IN STATISTICAL ASSURANCE METHODS		Final Report 07/01/80 - 10/31/81
		6. PERFORMING ORG. REPORT NUMBER
		SC5278.1FR
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)	
N.R. Mann	N00014-80-C-0684	
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
Rockwell International Science Center P.O. Box 1085 Thousand Oaks, California 91360		Project No. NR047-204 (434)
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE
Office of Naval Research 800 North Quincy Street Arlington, Virginia 22217		February, 1982
		13. NUMBER OF PAGES
		3
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report)
		UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)		
Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Reliability, Weibull distribution, outliers, life-testing, extreme-value distributions		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
Two papers describing research dealing with the analysis of reliability data were written during the past year and are to be published. Another has been written and submitted for publication, two others were revised for publication, and another was published. Several invited presentations were made at scientific meetings. ←		

DD FORM 1473
1 JAN 73EDITION OF 1 NOV 68 IS OBSOLETE
S/N 0102-LF-014-6601

UNCLASSIFIED 389949

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)



The paper, "Sampling Plans for the Two-Parameter Weibull Distribution with Unknown Parameters," was published in *Technometrics*.

The paper describing tests for Weibull outliers that can be used to identify treatment effects was revised for publication in a volume being edited by Professor Jagdish Rustagi and Professor Stelios Zanakis. The volume is devoted to *Optimization in Statistics* and is to be published by North Holland in the series of TIMS Studies in the Management Sciences.

The study on goodness-of-fit tests for Weibull versus lognormal alternatives has been extended to include lognormal hypotheses versus Weibull alternatives. The Monte Carlo analysis has been completed, and a paper describing the results is being put into final form.

Investigation involving quantile estimation of the Weibull shape parameter for cases in which three parameters are unknown has been made with Professor Stelios Zanakis of West Virginia College of Graduate Studies. An expression for the asymptotic variance of a proposed asymptotically unbiased three-order-statistic estimator was derived, and this expression was used to find the three sample quantiles that minimize the asymptotic variance as a (very insensitive) function of the unknown shape parameter only.

A Monte Carlo study that uses these results demonstrates that for moderate sample sizes, an estimator based on the first, last, and one other (early) order statistic provides both nearly zero bias and nearly minimal variance. For shape parameter values of unity or less, the estimator is about as efficient as the maximum-likelihood estimator.

Preliminary results were written up for an invited presentation at the national meeting in November, 1980 of the Institute for Decision Sciences and for publication in the proceedings of that meeting. A version incorporating additional results has been submitted for journal publication.

Accession For	<input checked="" type="checkbox"/>
NTIS GRA&I	<input type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced?	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special





An article on life testing was written with Prof. N.D. Singpurwalla for publication in a volume of *The Encyclopedia of Statistical Sciences*, edited by N.L. Johnson and Samuel Kotz and to be published by John Wiley and Sons. This article and one on extreme-value distributions, also written with Professor Singpurwalla for publication in an (alphabetically) earlier volume of the encyclopedia, were published as Rockwell Science Center Technical Reports and distributed to those on the ONR Assurance Sciences distribution list. Galley proofs of the article on extreme values were corrected, and work was begun on a third encyclopedia article on the Mann-Grubbs method for obtaining confidence bounds on system reliability.

The paper on use of Reliability methodology to analyze habitual behavior in U.S. military personnel was presented at the annual TIMS/ORSA meeting in 1980.

The paper, "Weibull Prediction Intervals for Finite Lots When Testing Occurs at Stress Levels Other Than Nominal," has been accepted for publication in *Technometrics*, subject to revision. The revision has been completed and submitted to the editor.

Work is currently proceeding on evaluation and tabulation of constants that will allow for determination of confidence bounds on exponential parameters from time-censored data. The problem of obtaining such confidence bounds is a classical one, and one which publication of the necessary constants will make tractable. The results of this research were presented at an invited talk given at an Institute for Mathematical Statistics (I.M.S.) Special Topics Conference on Survival Analysis in October, 1981, at Ohio State University. The proceedings of that meeting will be published in the I.M.S. Monograph Series and will contain results obtained as of this date. The results have been written and submitted. Further research involves simulation and smoothing techniques, and more extensive tabulations will be submitted for publication.



Rockwell International

Science Center

SC5278.1FR

Immediately following the meeting at Ohio State University, the results obtained on Weibull outliers were given as an invited presentation at Gatlinburg, Tennessee, at the Fall Technical Conference, sponsored by the American Society for Quality Control and the Section on Physical and Engineering Sciences of the American Statistical Association. This topic (Weibull outliers) was discussed also in 1980 as an invited presentation at an I.M.S. regional meeting held at the University of California at Davis.

**DAT
FILM**