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13. ABSTRACT (Maximum 200 words)
A computer tape, from the Univac 1108 at Brooks AFB, was transported and prepared for use on the UNIVAC 9300 at Morgan State University , Baltimore, Maryland. The tape contains test items developed at Brooks AFB, TX.

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RESEARCH TITLE

An Investigation of One and Three Parameter Item Response Models in a Field Setting, with Implications for Computerized Adaptive Testing

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Principal Investigator

The proposed efforts were to compare one and three parameter models in a student population. The student population were to be Black ROTC Students presently enrolled at Morgan State University, Baltimore, Maryland. A computer testing environment was to eventually emerge from this study and from a Military standpoint this would reduce test taking time 25%, therefore reducing the cost of such efforts by 30%.

The following things were accomplished:

One trip to Human Resources Laboratory, Brooks Air Force Base, Texas resulted in a two day conference with the authors of the test in order to ascertain the nature and scope of the test material.

Secondly, a three track computer tape was purchased so that those test items and test data already prepared at Brooks Air Force Base in the Human Resources Lab under the direction of Drs. Valentine and Ree could be utilized here at Morgan State University. This called for making data that was intended for the Univac 1108 compatible with Morgan State College Univac 9300. The turn around time for a finished product took approximately three months.

Air Force Office of Scientific Research
Air Force Systems Command USAF
Attention: Dr. Haddad
Bolling Air Force Base
Washington, DC 20332

SUBJECT: Scientific Report Mini Grant AFOSR-80-0191

This report will take the following format:

1. Research Title and Number
2. Description of the Problem
3. Description of Results
4. Discussion of the Results
5. Conclusions in form of a Proposal as an outgrowth of this mini grant

RESEARCH TITLE: An Investigation of One and Three Parameter Item Response Models in a Field Setting, with Implications for Computerized Adaptive Testing

1. OBJECTIVE ADAPTIVE TESTING

"Adaptive" testing is one of a number of terms used to describe a procedure whereby the test items that comprise an individual's test are selected during the test itself. Some of the other terms used interchangeably with adaptive testing include tailored testing, branched testing, programmed testing, and individualized testing. The term "adaptive" was chosen because these tests adapt themselves to the examinee; different persons answer different items, with the items chosen sequentially to suit the individual examinee's performance.

The general objective of computer driver adaptive testing is to accurately estimate an individual's position on the underlying trait the test purports to measure. Conventional paper-and-pencil test administration typically suffers from several sources of error in the measurement of an individual's ability. Conventional peaked tests are designed to discriminate most effectively at a single ability level and thus assume that most individuals taking the test fall into this category. When they do not, the accuracy of estimation of their status on the trait becomes progressively more inaccurate as their ability deviates from this point.

The result of this lower precision of measurement is lower overall reliability, and lower validity as well (Weiss, 1974). Lord (1970, 1971a, 1971, 1971d, 1971e) and Hick (1951) have concluded that a test score most accurately reflects an individual's ability when the probability of a correct response to an item is .5 for that individual. Conventional tests obviously cannot meet the requirements of .5 probability for all examinees as all items must be given to all examinees.

A second source of errors results from not extracting all the information contained in an examinee's answers to questions. Conventional tests typically use number of proportion of items discrimination. Two recent developments have enabled the psychometrician to more accurately assess the status of individuals on measurable traits: adaptive testing and latent trait test theory. Adaptive testing enables adapting each test to fit characteristics of each individual tested. Thus, it allows the presentation of the most informative items to an examinee to be used as the basis of that individual's test score. Latent trait test theory allows the calculation of ability estimates in the same metric for each examinee and permits comparisons among scores even though each may have taken a different subset of items (Lord, 1970, Wood, 1973).

The following contractors to the Office of Naval Research are engaged in adaptive testing studies: The Psychometric Methods Program, University of Minnesota; the Tailored Testing Research Laboratory, University of Missouri; Department of Psychology, University of Southern California. The AFOSR and AFHRL have adaptive testing contracts with Professors Ron Hambleton and Hariharan Swaminathan at the University of Massachusetts. The proposed study does not duplicate other efforts, but rather is complimentary. Results of the proposed effort will advance the state of knowledge in this important area.

As was evident from paper presented at the 1979 adaptive testing conference (CAT, 1979), there is an interest in real data comparisons of one and three parameter item response models. It is possible that adaptive testing procedures might have a high utility for small groups when the one parameter model is used.

The problem involved in this study was to copy onto a computer tape those test items developed by Drs. Valentine and Ree, Human Resources Laboratory, Brooks Air Force Base, Texas. These items were prepared for a Univac 1108, Brooks Air Force Base and written in FORTRAN.

The tape was received here on or about November 1980. Several operations had to take place before the Project Director could ascertain how to prepare the tape for assemilination and compatibility with our system. The tape was finally converted and made compatible with Morgan State University Univac 9300.

The tape conversion involved the following computer personnel:

1. Mr. Ronald Gale, IBM specialist on loan to Morgan State University for one year.

2. Mr. Charles Rogers, Human Resources Laboratory, Brooks Air Force Base, San Antonio, Texas.

3. Dr. M. Ree, Human Resources Lab, Brooks Air Force Base, Texas

The tape is now marented, converted and ready for Phase II of this project.

Phase II of this project consists of a major proposal to be presented to interested Armed Forces Research Agencies

for funding beginning the school year 1981-82. A copy of this proposal is hereby submitted for your examination.