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TITLE: CONTINUED PERFORMANCE ASSESSMENT METHODOLOGY (PAM) RESEARCH (VORPET)

SUBTITLE: Refinement and Implementation of the JWGD^3 MILPERF-NAMRL Multidisciplinary Performance Test Battery (NMPTB)

PRINCIPAL INVESTIGATOR: Efrain A. Molina

CONTRACTING ORGANIZATION: Naval Aerospace Medical Research Laboratory, Research Department
Pensacola, Florida 32508-5700

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Efrain A. Molina

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Procurement of voice recognition system interfaces, and display interfaces for two NMPTB test stations. VORPET test programs were transferred to operate in a Zenith Z-248 computer using Turbo Basic and interfaced to the automatic voice recognition system and tested. Initial test evaluation of the voice recognition showed 80% to 90% accuracy in voice recognition of spoken numbers. The VORPET software, available in BASIC language (Turbo basic), was then converted to the C-language to improve on the percent accuracy of the voice language recognition system. Software library routines that support the voice recognition hardware were written and optimized with programs implemented in the C-1 language. The use of Votan software library routines provides for best control of the Voice Automated Interface card. Experimental test design to evaluate and compare

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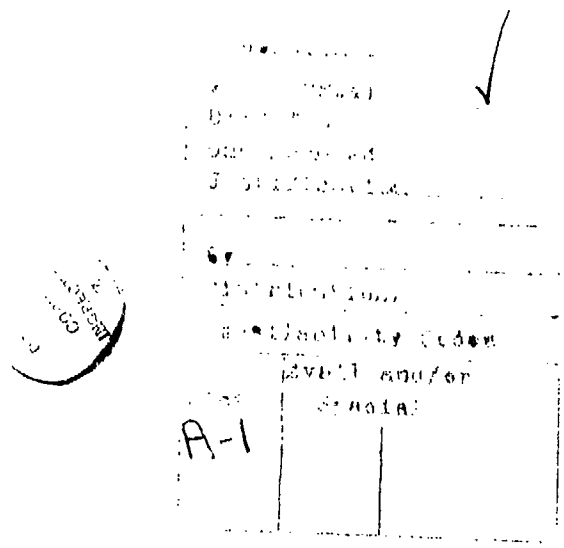
13. Abstract (Continued)

the automated voice data collection system with the manual method of collecting numerical responses (two through four numerical digits in rapid succession) from subjects was completed. Execution of the experimental test design was carried out starting in the month of November. At least nineteen subjects from the Naval Aviation School Command has been tested.



FOREWORD

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__✓__For the protection of human subjects, the investigator(s) have adhered to policies of applicable Federal Law 45CFR46.

_____In conducting research utilizing recombinant DNA technology, the investigator(s) adhered to current guidelines promulgated by the National Institute of Health.

Efrain A. Molina 10 January 1991.

Principal Investigator's Signature Date

OBJECTIVES: Through Tri-service coordination and cooperation the main objectives of this work unit are:

(a) To complete and refine the automation of test instructions and computerized scoring of the VORPET test using voice actuated subject response and test instructions.

(b) To construct two to four (number dependent on cost, space, and acoustical isolation requirements) automated VORPET test stations, and install them in NAMRL's Mobile Field Laboratory trailer # 5 after appropriate modification of the trailer required for additional test stations.

(c) To conduct base line validation studies such as test/retest reliability studies.

(d) Perform systematic follow-on studies to port appropriate additional tests derived from, the NAMRL Multi-Disciplinary Performance Test Battery which has been developed for assessing performance effects of chemical defense antidote/pretreatment drugs.

USA REQUIREMENT: 5-A313, Side Effects of CW Medication.

DEVELOPMENT REQUIREMENT DOCUMENT:

DESCRIPTION OF RESEARCH PROTOCOLS: The project involves one line of research that calls for incorporating a fully automated version of the Vestibulo-Ocular-Reflex Performance Evaluation Test (VORPET) as part of the NMPTB test stations along with the UTC PAB test battery.

The VORPET test allows assessment of the type of head/eye motion coordination that is required in a variety of military weapons systems (especially aircraft). It is most relevant to the aviator who must routinely make large shifts in gaze during his scan of cockpit instruments and outside environment such as horizon, targets, and wingman position when doing formation flying.

The test requires the subject to directly face one display which provides visual fixation, and upon presentation of a simultaneous visual and auditory cue, to rapidly rotate his head toward the second display. At the onset of the cue, digits are presented for a brief exposure time on the second display; the subject task is to then called out (presently, the subject response is manually entered into the computer's keyboard by the operator) as many of the digits as he can correctly identify. The exposure time of the second display is appropriately adjusted (increased or decreased) according to the accuracy of response of the previous trial. The procedure is repeated for a number of trials with the role of the first and second displays sequentially interchanged resulting in bidirectional gaze shifts. The end result is a single threshold time for each direction of gaze shift, and a grand mean threshold time based on the simple mean of the left- and right-directed gaze shift thresholds. In a recent JWGD[3] MILPERF sponsored validation study, the VORPET results indicated degradation of performance as a result of antihis-

tamine administrations, indicating the VORPET may be useful as a sensitive NMPTB performance test.

Full automation of the VORPET test will be attempted by means of a voice recognition system that will accept the subject's audible response (calling out of the digits) and convert it to an appropriate numerical format needed to properly administer the test.

STATUS: Active.

BUDGET:	FY90	FY91	(IN THOUSANDS)
	50	40	

ACCOMPLISHMENTS:

FY 1990 (Second, Third, and Fourth Quarters)

Procurement of voice recognition system interfaces, and display interfaces for two NMPTB test stations.

VORPET test programs were transferred to operate in a Zenith Z-248 computer and tested. Test programs were implemented in Turbo Basic, and interfaced with the automatic voice recognition system using a Basic callable subroutine.

Initial test evaluation of the voice recognition showed 80 % to 90 % accuracy in voice recognition of spoken numbers.

The VORPET software, available in BASIC Language (Turbo Basic), was converted to the C-language to improve on the percent accuracy of the voice recognition system. Software library routines that support the voice recognition hardware were written and optimized with programs implemented in the C-language. The use of Votan software library routines provides for best control of the Voice Automated Interface card.

Experimental test design of a method to measure accuracy of the Automated Voice Data Collection System when collecting numerical responses (two through four numerical digits in rapid succession) from subjects was completed.

FY 1991 (First Quarter)

Execution of the experimental test design was carried out starting in the month of November. The experimental test design is part of the accuracy measure of the Voice Automated System. Accuracy of the Voice Automated subject response feature will then be determined. At least nineteen subjects from the Naval Aviation School Command has been tested.

FY 1991 PROTOCOLS

Data analysis of collected data will be made in order to (a) evaluate the use of the voice recognition system, (b) determine relationship between voice recognition system's percent accuracy and the number of numerical digits used as stimuli, and (c) voice recognition systems's accuracy and percent uncertainty of measured gaze time as compared with the manual method of collecting subject's response. Budget permitting, procurement of two (2) more hardware and software interfaces (voice recognition and display systems) will be made.

Data collection on at least seventeen additional subjects will be continued.

Determination of minimal target size and distance(s) from the subject to the VORPET alpha/numerical stimuli (targets), and minimal accoustical isolation specifications to make use of voice actuated subject response(s) (minimal booth physical requirements) required for implementation of the VORPET test in one of the NAMRL's MFL unit.

Installation of hardware, and software system for two to four automated VORPET test stations in trailer # 5 of NAMRL's Mobile Field Laboratory (MFL).

PUBLICATIONS:

None this year. Publication effort is on the way to publish results of a drug study (Effects of 4 - mg atropine sulfate injections on aviators) carried out in FY88.