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Supplement No. 9

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Naval Aerospace Medical Research Laboratory
Pensacola, Florida

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FOREWORD

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Development Command**

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Work Unit

MF51.524.002-5012.1
NAMRL-1237

Naval Aviation Attrition: 1950-1976.
Implications for the Development of
Future Research and Evaluation

8/30/77

Glenn R. Griffin and James D. Mosko

Abstract:

Drop on request, or voluntary withdrawal, is a continuing major source of attrition in the Navy Aviation Training Program. A major reason for student voluntary withdrawal is expressed as anxiety in the naval aviation training environment. Numerous research efforts have been conducted to analyze the relationship of stress and anxiety to attrition. Generally, these efforts have been unsuccessful, or partially successful at best, as an objective and reliable measure of anxiety has been unavailable for use in research evaluations. A review of research literature suggests that:

a. High levels of anxiety may be casually related to performance decrement and subsequent attrition.

b. Anxiety is a behavior expression or symptom of poor or inefficient student performance in the Navy aviation training program.

Both hypotheses appear to warrant further research and evaluation.

It is recommended that new research efforts be developed and funded that would deal with anxiety as a causative factor, resulting in poor human performance in the aviator training environment. Previous research indicates that certain anxiety producing environments occurring as an integral part of the present naval aviation training program may be utilized to identify anxiety oriented individuals of which substantial portions later attrite. It is appropriate to evaluate this aspect of behavior utilizing new experimental concepts and new measurement

technology (voice analysis), to objectively measure anxiety in a non-intrusive manner and determine its relation to attrition.

It is recommended that additional research and evaluation efforts be conducted to determine the relationship of symptomatic anxiety to attrition. The high rates of voluntary withdrawal and flight failure attrition in conjunction with the students' first introduction to the training aircraft (T-34B) and his transition to higher performance training aircraft (T-2, T-28) suggest that perceptual psychomotor, selective and divided attention criteria will be useful in the identification of those individuals deficient in multilimb coordination and those unable to synthesize multiple cognitive and sensory stimuli.

This recommended research emphasizes the evaluation of performance measures (rather than pencil-and-paper measures) which promise to be useful in the selection of future aviation training populations.

The conduct of research to identify individuals who exhibit high levels of stress or anxiety in early training situations has potential in the development of selection techniques to enhance the prediction of attrition prior to or very early in training. Such techniques would result in a considerable reduction in the number of individuals who fail to complete training, resulting in a considerable cost savings to Navy aviation training.

MF51.524.004-2011.2
NAMRL-1235
(AD A043298)

The Effect of Caffeine on Human Dark
Adaptation

4/30/77

Tommy R. Morrison and Gerald M. Long

Abstract:

The consumption of caffeine by naval personnel in the operational environment is extensive and frequent. In particular, pilots, aircrewmembers, watchstanders, and drivers often consume coffee prior to their performance

of missions or tasks at night. The present two experiments were designed to investigate the effects of caffeine upon the absolute detection thresholds during dark adaptation. Within certain subjects caffeine consumption resulted in lower detection thresholds. The caffeine enhancement effect was significant only during the portion of dark adaptation following the rod-cone break. No evidence was found for a detrimental effect of caffeine on dark adaptation.

MF51.524.004-5001.18
NAMRL-1231
(AD A036899)

Coriolis Cross-Coupling Effects:
Disorienting and Nauseogenic or
Not?

12/20/76

Fred E. Guedry, Jr., and Alan J. Benson

Abstract:

Nausea, vomiting, and disorientation are sometimes produced by head movements during turning maneuvers in aircraft. These responses are usually attributed to Coriolis cross-coupling stimulation of the vestibular system, although it has been indicated recently that many turning maneuvers of aircraft have insufficient angular velocity to generate such effects. The purpose of the study was to further distinguish conditions in which Coriolis cross-coupling effects are disorienting and nauseogenic from conditions in which they are neither disorienting nor nauseogenic.

When head tilts are executed during an angular acceleration which commences a turn, vestibular stimulation is neither disorienting nor nauseogenic. During constant speed turns and during deceleration which stops such turns, Coriolis cross-coupling effects can be disorienting and nauseogenic if the angular velocity of the turning vehicle is of sufficient magnitude at the time the head movement is made.

MF51.524.004-5001.19
NAMRL-1232
(AD A038767)

Visual Counteraction of Nauseogenic
and Disorienting Effects of Some
Whole-Body-Motions--A Proposed
Mechanism

2/16/77

Fred E. Guedry, Jr.

Abstract:

It has been indicated that the nauseogenic and disorienting effects of several kinds of provocative motion stimuli can be ameliorated by visual reference to the Earth. The purpose of the present experiment is to investigate a hypothesis concerning the mechanism of this beneficial effect.

The results demonstrate that the aftereffects of large-field optokinetic stimulation can nullify the nauseogenic and disorienting effects of Coriolis cross-coupled vestibular stimuli. It is hypothesized that large-field optokinetic stimulation in a particular head plane modifies activity in the vestibular nuclei as though the semicircular canals in that plane had been stimulated. A previous study illustrated that such semicircular canal stimulation would completely nullify the disturbing effects of Coriolis cross-coupled stimulation according to theoretical expectations. The results provide inferential support for the hypothesis and suggest that predictability of disorientation and nauseogenic disturbance are reasonably well handled by current theory when the conditions of motion are fairly well specified.

MF51.524.004-5001.20
NAMRL-1233
(AD A033937)

Conditioned Suppression of Vestibular
Nystagmus with Visual Stimuli 3/30/77

Richard D. Gilson, Charles W. Stockwell,
and Fred E. Guedry, Jr.

Abstract:

During sinusoidal whole-body oscillation, three tasks, two visual and one auditory, were presented, respectively, to three groups of ten subjects each. Oscillation lasted a total of 10 minutes, with a

frequency of 0.04 Hz and a peak velocity of ± 120 deg/sec. Before and after this conditioning period, nystagmus recorded while subjects were engaged in a visual compensatory tracking revealed a diminution in slow phase velocity of nystagmus of 59 percent for one visual group and 33 percent for the other. There was a 23 percent decrease in the group with the auditory task. Pre- and post-nystagmus recorded in the dark before and after conditioning showed an approximately equal reduction among the groups of about 22 percent. A reduction in visual compensatory tracking errors of approximately 21 percent was found, also with no apparent difference between groups. Subjective reports, however, indicated that the visual groups had less blurring after the conditioning even though this difference between groups was not reflected in the performance task.

MF51.524.004-5001.21
NAMRL-1234
(AD A039372)

Nauseogenic Visual-Vestibular Inter- 3/30/77
action in a Visual Search Task

H. Jack Moore, J. Michael Lentz,
and Fred E. Guedry, Jr.

Abstract:

This study describes the development of a Visual-Vestibular Interaction (VVI) test which may be useful in predicting motion sickness susceptibility in working situations aboard ship, aircraft, and other moving vehicles.

The nauseogenic aspect of visual suppression of the vestibulo-ocular nystagmus reflex was evaluated in three experiments. In approximately 5 percent of the subjects tested, motion sickness symptoms, including vomiting, developed. The establishment of individual sensitivities to this form of motion sickness is noteworthy, not only because of the similarity of the visual task to applied

performance, but it also provides a basis for investigating the types of displays and visual leads encountered in moving vehicles.

MF51.524.015-0037.2
NAMRL-1236
(AD A043706)

Operant Behavior and Colonic Temperature of Squirrel Monkeys (Saimiri sciureus) during Microwave Irradiation

6/8/77

John O. de Lorge

Abstract:

Contemporary reports in the scientific and popular press of potentially hazardous effects of exposure to microwaves require substantiation because some Navy personnel contact a variety of microwave devices in communication, warning and weapons systems. Such putative effects preclude the use of man as a subject; hence, a series of experiments with other primates, monkeys, has been initiated. Research in our laboratory has established that microwave irradiation greater than 62 mW/cm^2 disrupts behavior in rhesus monkeys. In an effort to extend the generality of this finding squirrel monkeys were exposed to microwaves. The behavior of squirrel monkeys on a vigilance task was disrupted by 30- or 60-minute exposures to 50 mW/cm^2 and higher power densities. This disruption increased with the increase in power density. Under both durations of exposure, behavior was not consistently perturbed until colonic temperature changes exceeded 1°C . Colonic temperatures regularly increased beginning at 10 mW/cm^2 and were related in a nonlinear fashion to the power density with a marked acceleration between 40 and 50 mW/cm^2 .

XSB09.ED6.6-B1.2
NAMRL-1230
(AD A035228)

Normal Hematological, Biochemical, and Serum Electrolyte Values for a Colony of Rhesus Monkeys (Macaca mulatta).

10/28/76

J. L. Kupper, M.J. Kessler, and L. L. Cook

Abstract:

To establish normal hematological, biochemical, and serum electrolyte values for rhesus monkeys housed at the Naval Aerospace Medical Research Laboratory, venipuncture was performed on 56 male and 57 female rhesus monkeys (Macaca mulatta). Arithmetic means and standard deviations are reported for each parameter for sex. The results are compared with previously reported studies on rhesus monkeys from other laboratories.

Special Report

NAMRL 77-1

Interior Noise Levels in an
Executive Helicopter

9/30/77

J.D. Mosko, W.C. Hixson, and
A.N. Dennis, Jr.

Abstract:

This report presents the results of inflight acoustic noise measurements made in three different VH-3 series executive helicopters at the request of Naval Air Systems Command (PMA-255). Magnetic tape recordings and 1-octave band dBA and dBC analyses were made at four different physical locations within the aircraft under two different flight conditions -- cruise and hover. In addition, for each cruise condition, noise data were collected with the aircraft air conditioning system operated in normal fashion or turned off. A Hewlett-Packard Model 5451B Fast Fourier Transform Analyzer and an associated one-third Octave Band Analysis software package were used to analyze the noise samples recorded on tape. The results of this computer analysis, one-third octave band noise spectra covering the 20 Hz to 10 kHz frequency range, are separately plotted for each of the 16 measurement conditions.

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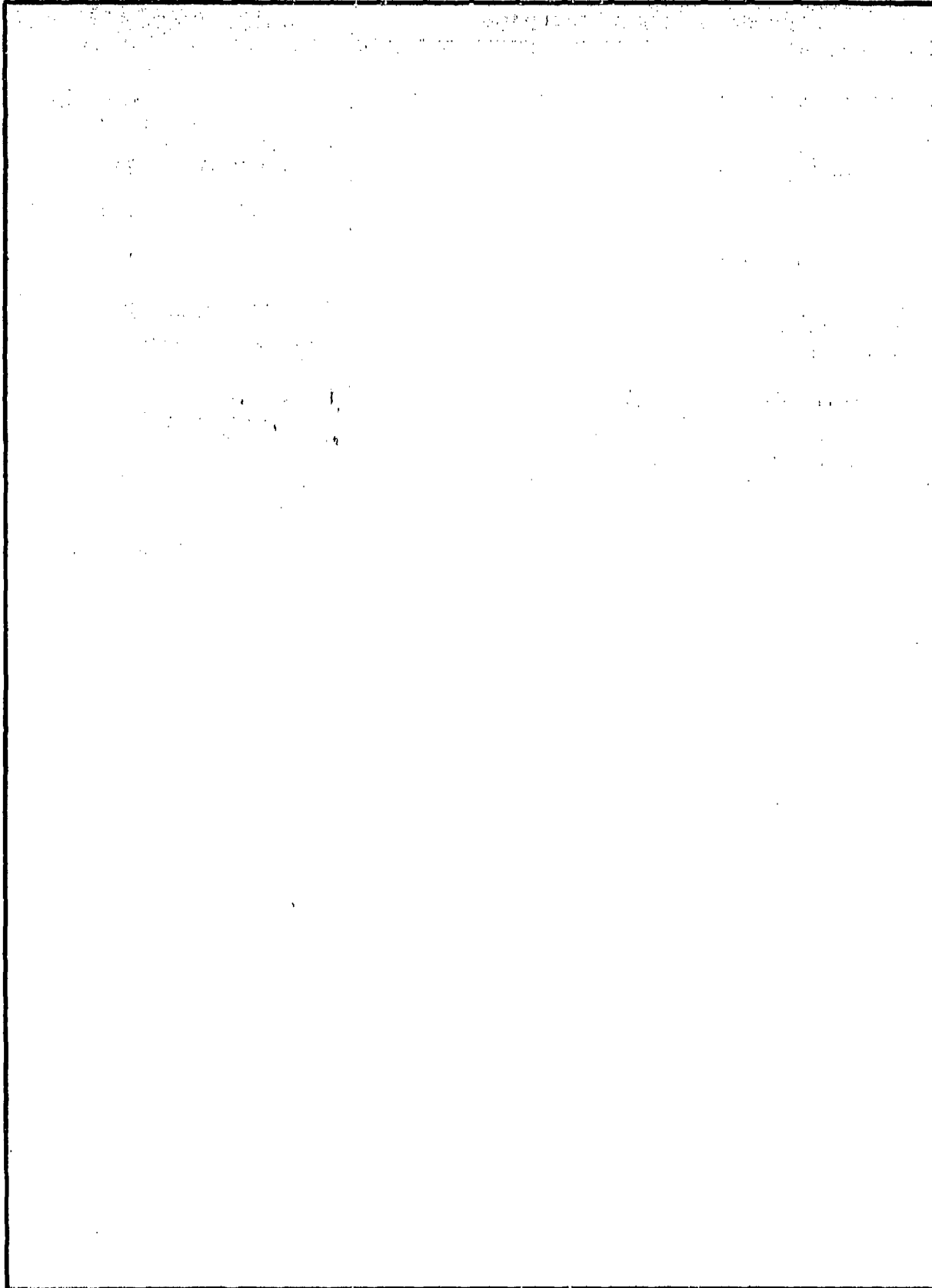
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