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FOREWORD

Documents published at the Naval Aerospace Medical Institute (NAMI) since 1 July 1968 are included in this first annual supplement to a previously published annotated bibliography of reports dated 30 June 1968 (AD 674 914).

Distribution of all NAMI-numbered reports is unlimited; they have been approved for public release and sale. All requests for copies should be directed to the Clearing House for Scientific and Technical Information, Springfield, Virginia 22151. Requests for reprints of open literature documents should be addressed to the author.

Catherine F. Kasparek
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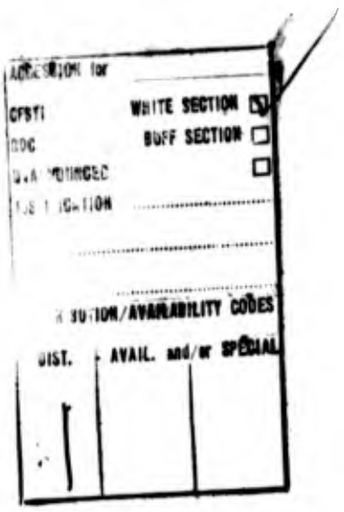

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Bureau of Medicine and Surgery
Navy Department

FOOTNOTES

* Denotes those studies supported by the National Aeronautics and Space Administration.

+ Denotes studies performed jointly with and supported by the United States Army Aeromedical Research Laboratory, Fort Rucker, Alabama.

Study supported by the Naval Air Systems Command.

Work Unit

MR005.04-0114.1
NAMI-1059
(AD 688 117)

A Venting Alarm System for Cryogenic Liquids.

E. A. Molina and V. R. Reno

2/10/69

Abstract:

An alarm system was designed which continuously monitors the gas output from vessels in which cryogens are either stored or used. The system is fail safe in nature. It provides a visual and an auditory alarm in the event that venting is eliminated, thus allowing the experimenter to concentrate upon the investigation without risk that high pressures may be developing within Dewars containing the cryogenics.

Work Unit

MR005.04-0021.139
NAMI-983
(AD 675 265)

Evaluation of Sixteen Antimotion Sickness Drugs Under Controlled Laboratory Conditions. 8/7/68

C. D. Wood and A. Graybiel

Also published in Aerospace Med., 39:1341-1344, 1968

Abstract: The effectiveness of a drug in reducing susceptibility to acute motion sickness is readily determined in a slow rotation room (SRR) where the stressful Coriolis accelerations are under quantitative control and the experimenter and subject can collaborate under laboratory conditions. Fifty subjects were used, each serving as his own control, in evaluating 16 representative antimotion sickness drugs. Only the drugs with a sympathomimetic or parasympatholytic action and some of the antihistamines were notably effective. The summation effect of dextroamphetamine sulfate and l-scopolamine hydrobromide provided far better protection than any single drug. Other classes of drugs had either a slightly favorable or slightly unfavorable action.

MR005.04-0021.159
NAMI-1053
(AD 681 014)

Rapid Vestibular Adaptation in a Rotating Environment by Means of Controlled Head Movements. 12/9/68

A. Graybiel and C. D. Wood

Also published in Aerospace Med., 40:638-643, 1969

Abstract: Two attempts to telescope, in time, vestibular adaptation in a slow rotation room (SRR) were made to determine the easiest and quickest means of preventing the appearance of SRR sickness at a terminal velocity of 10 rpm. Three subjects in each experiment were exposed to unit increases in rotational velocity at which time they made several hundred experimenter-directed head movements. Prior to cessation of rotation standardized tasks were performed to determine the degree of transfer of adaptation acquired from the "directed" movements. The results demonstrate that the process of homeostatic adaptation can be greatly speeded up through experimental control of head movements although a large number of "limited" head motions must be made to ensure transfer of adaptation to general activities. Some idea was gained regarding the number and excursion of head movements required at each unit increase in rpm for adaptation and overadaptation at terminal velocity.

MR005.04-0021.160
NAMI-1055
(AD 681 740)

Structural Elements in the Concept of Motion Sickness. 12/16/68

A. Graybiel

Also published in Aerospace Med., 40:351-367, 1969

Abstract:

A slow rotation room in a laboratory environment provides an excellent instrument for the study of motion sickness because the experimenter can control not only the stressful Coriolis accelerations, but also other important procedural and environmental variables. By exploiting this control, combined with the judicious selection of experimental subjects, it was possible to confirm many previous findings and demonstrate that manifestations of disturbances in the vestibular system fall into two distinct categories. In the first category are reflex phenomena evoked by Coriolis accelerations when the head is rotated out of the plane of the room's rotation, and revealed through systems which, under natural stimulus conditions, have functional articulations with vestibular receiving areas. The symptomatology in the second category comprises an epiphenomenon superimposed on any manifestation of the first, when the unusual vestibular activity, presumably through facilitory-inhibitory processes, irradiates to cells or cell assemblies not normally stimulated.

Selected experimental findings are used in defining the characteristics of manifestations in the two categories and in demonstrating the nature of the facultative linkage between the otherwise independent systems underlying manifestations in the two categories. It will be shown that the experimenter, by manipulating mainly vestibular homeostatic mechanisms, can prevent the appearance of manifestations in the second category, control their severity when evoked, and lose control only when these symptoms are relatively severe or perseverate long after the stressful accelerations have ceased. Practical and theoretical implications are discussed, including the concept of "functional vestibular reserve."

MR005.04-0021.161
NAMI-1061

Motion Sickness Precipitated in the Weightless Phase of Parabolic Flight by Coriolis Accelerations.

2/18/69

A. Graybiel, R. S. Kennedy, and R. S. Kellogg

Abstract:

Nineteen normal persons and three deaf subjects with bilateral loss of labyrinthine function (L-D subjects) were exposed to Coriolis accelerations during the brief periods of weightlessness in parabolic flight by having them move their heads while rotating in a Bárány chair at 30 rpm. None of the L-D but all of the normal subjects except three experienced motion sickness: Only one of eight subjects selected on the basis of insusceptibility to symptoms in standard parabolic flights was free of symptoms; the other seven were motion sick and completed on the average only six parabolas. Two of three subjects selected primarily on the basis of low susceptibility to Coriolis acceleration in a slow rotation room were symptom free, and one was motion sick but his level of symptoms did not reach the end point of severe malaise during ten parabolas. In addition to demonstrating susceptibility to motion sickness when exposed to Coriolis acceleration in the weightless phase of parabolic flight, the findings are important in emphasizing the difficulty in predicting susceptibility to motion sickness in novel force environments.

Work Unit

MR005.04-0031.1
NAMI-1046
(AD 675 956)

Effect of Drugs on Ocular Counterrolling.

E. F. Miller II, and A. Graybiel 8/5/68

Also published in Clin. Pharm. Therap., 10:92-99, 1969

Abstract:

To determine the temporal effect of each of several selected drugs and a placebo upon ocular counterrolling, a specific indicator of otolith activity, measurements under controlled conditions were made before and at various times after the oral administration of the drug or placebo. A pool of nine normal subjects participated, and from four to six were used in each experimental trial. Alcohol, 1 cc/lb body weight, had a marked and progressive depressant effect on the amount of eye roll during the intoxication period; complete recovery was recorded six hours after its ingestion. Scopolamine, meclizine, acetylsalicylic acid, meprobamate, chlordiazepoxide hydrochloride, d-amphetamine, and diphenidol, given in twice the usually recommended doses, had little or not effect.

MR005.04-0031.2
NAMI-1057
(AD 684 782)

Motion Sickness Susceptibility Under Weightless and Hypergravity Conditions Generated by Parabolic Flight.

E. F. Miller II, A. Graybiel, R. S. Kellogg, and R. D. O'Donnell 1/13/69

Abstract:

Motion sickness susceptibility of five labyrinthine-defective (L-D) and 25 normal subjects was tested under the force environments encountered in parabolic flight (0 g and hyper-g). The L-D subjects were uniformly symptomless, while the normal subjects revealed great inter- and intra-individual differences in susceptibility to motion sickness provoked by standardized head movements during: 1) the hypergravic and 2) the weightless phases of the parabolic maneuver while restrained; and 3) the weightless phase while being rotated in a chair. Four of six subjects tested under condition 1 were completely unaffected by the condition while two reacted with symptoms. Condition 2 provoked severe symptoms in five of the twelve subjects tested and moderate symptoms in one. Fifteen subjects tested under condition 3 revealed either a marked increase or decrease in susceptibility to Coriolis acceleration in weightlessness compared to terrestrial baseline measurements.

MR005.04-0031.3
NAMI-1058

A Standardized Laboratory Means of Determining Susceptibility to Coriolis (Motion) Sickness. 2/7/69

E. F. Miller II and A. Graybiel

Abstract:

A standard method developed for quantifying Coriolis (motion) sickness susceptibility was evaluated in tests of 250 normal and three labyrinthine-defective subjects. The procedure required the subject to execute standard head movements ($\sim \pm 90^{\circ}$ in the frontal and sagittal planes) while seated in a chair device which was rotated at one of several constant velocities.

The proper test velocity was predicted in the majority of cases with the Motion Experience Questionnaire. Three of the normal and all of the labyrinthine-defective subjects were found to be unsusceptible to these test conditions. Coriolis Sickness Susceptibility Index, CSSI, was determined for each subject by multiplying the appropriate E factor, the average stress effect of each head movement, for the rpm used in the test by the number of head movements required to provoke Malaise III. The resultant CSSI values for the 250 subjects ranged from 0.4 to 100 but the distribution was markedly right skewed. The procedure yielded a high test-retest reliability ($\rho = .89$) in terms of CSSI scores and symptomatological patterning. In reaching the Malaise II level the nausea syndrome was manifested in most cases, but a significant percentage (14%) of the subjects remained free of any epigastric disturbance or nausea.

MR005.04-0031.4
NAMI-1063
(AD 687 714)

Evaluation of Otolith Organ Function by Means of Ocular Counterrolling Measurements. 3/20/69

E. F. Miller II

Abstract:

Measurements of ocular counterrolling by the photographic method provide specific and valid otolith function information. The precision of the test method has extended the usefulness of ocular counterrolling as an indicator of otolith function of individuals with severe macular destruction as well as normals subjected to conditions which act physiologically to deafferent these organs, such as near weightlessness of aerospace flight.

Work Unit

MR005.04-0032.4
NAMI-1056
(AD 683 315)

The Somatic Chromosomes of the Mongolian Gerbil (Meriones unguiculatus).

S. P. Pakes 1/3/69

Abstract:

This study was initiated to characterize the somatic chromosomes of the Mongolian gerbil (Meriones unguiculatus) prior to conducting experiments concerned with the effects of various environmental factors encountered in space flight on mammalian chromosomes.

From the study of bone marrow cells after intraperitoneal injection of colchicine it was determined that the diploid number of chromosomes for the Mongolian gerbil is 44.

The karyotype was constructed by arranging the chromosomes into four distinct groups and includes 32 meta- or submetacentric and 10 acrocentric autosomal chromosomes. The X element was identified as a large submetacentric chromosome and the Y element as a medium-sized submetacentric chromosome.

Work Unit

MR005.04-0084.4
NAMI-1066
(AD 689 118)

Autonomic Responses to Vestibular Stimulation. 4/11/69

P. C. Tang and B. E. Gernandt

Abstract:

Decerebrate, paralyzed cats were used to determine some autonomic effects of vestibular stimulation and to establish through which peripheral links this vestibulofugal activity was transmitted. Vestibular stimulation increased both rate and depth of respiration, as demonstrated by phrenic and recurrent laryngeal nerve recording, and a marked elevation in blood pressure accompanied this effect. When the strength of stimulation was reduced and the evoked respiratory effect weak or questionable, the systemic blood pressure declined. Vestibular stimulation elicited strong responses from the neck vagus nerve, but this vestibulo-vagal activity was found to be conducted exclusively in the recurrent laryngeal nerve and not in the vagus nerve proper. Only the sympathetic portion of the autonomic system responded to vestibular stimulation, thus providing vestibular impulses a channel for reaching different effector organs. The responses obtained from the neck sympathetic nerve were analyzed and their characteristics described.

Work Unit

MR005.04-0085.1
NAMI-1064

Dynamic Response of the Head and Neck of the Living Human to $-G_x$ Impact Acceleration.

3/26/69

C. L. Ewing, D. J. Thomas, G. W. Beeler, Jr., L. M. Patrick, and D. B. Gillis

Also published In: Proceedings, 12th Stapp Car Crash Conference, 1968. New York: Society of Automotive Engineers, Inc., 1968. Pp 424-439.

Abstract:

A joint Army-Navy research study, in cooperation with Wayne State University, is underway to determine the dynamic response of the head and neck of living human subjects to $-G_x$ impact acceleration, using transducers to measure differential displacements and differential angular and linear accelerations of the head with reference to the base of the neck in response to the input acceleration measured at that point. A redundant photographic data system is being used for validation. Preliminary results are presented.

Work Unit

MR005.04-0088.3
NAMI-1071

Rod and Cone Contributions to S-Potentials From Cat Retina. 6/2/69

R. H. Steinberg

Abstract: The problem of whether the rods contribute to S-potentials was studied in the intact eye of the cat. S-potentials from luminosity units (L-units) were evoked by small spots of relatively monochromatic light in dark- and light-adapted retinae. The spectral sensitivity curve for dark-adapted S-potentials had its maximum at 500 nm, and the form of dark-adapted responses also suggested that rods were excited. The spectral sensitivity curve for light-adapted S-potentials had its maximum at 560 nm, and response latencies even at threshold were much faster than in dark adaptation. Individual S-potentials exhibited Purkinje shifts. It is concluded that rhodopsin rods contribute to S-potentials (L-type) in the cat and that cones contribute to the same responses.

MR005.04-0088.4
NAMI-1072

Rod-Cone Interaction in S-Potentials From Cat Retina. 6/5/69

R. H. Steinberg

Abstract: Rod-cone interaction in cat S-potentials was studied by analyzing the effect of wavelength and intensity upon the form of dark-adapted responses. Flashes of white light and relatively monochromatic flashes produced responses that seemed to originate from the excitation of both receptor types. The rod response changed as a function of intensity, peaking at ~2.5 log above threshold and increasing in duration at ~3.0 log above threshold. The cone response seemed in some way to add to the changing rod response. V-Log I curves showed that the rod responses reached a ceiling (initial peak voltage) at ~3.5 log above threshold while the maintained voltage leveled off at a lower intensity. Both ceilings were obscured by the apparent addition of the cone contribution. Cone and rod responses to brief orange and blue lights of moderate intensity, separated in time, added together across a complete range of intervals.

MR005.04-0088.5
NAMI-1075

The Rod After-Effect in S-Potentials From Cat Retina.

6/18/69

R. H. Steinberg

Abstract:

The relation of the rod after-effect to percentage rhodopsin bleached was studied in S-potentials from cat retina. At threshold, flashes which produced the rod after-effect bleached only very small quantities of rhodopsin; and at a fixed flash duration, the duration of the after-effect increased as a function of log intensity. The after-effect's threshold occurred at about the intensity which saturated the maintained voltage. With flash intensity fixed (6.5 log td. scotopic) and flash duration increased (0.5 to 64.0 sec) the duration of the after-effect was a linear function of exposure time. The duration continued to increase after an exposure of 16 sec, even though at least 99 per cent of the rhodopsin had been bleached. It is concluded that the after-effect originates from something which accumulates after the maintained voltage in rod pathways reaches a ceiling. The accumulation can continue at a fixed rate irrespective of the bleaching rate.

Work Unit

MR005.04-0097.1
NAMI-1067

Isothermal Method for Volume Determination. 4/15/69

E. Molina and J. Knepton

Abstract: An initial feasibility probe of an isothermal volume measurement method for application to weight measuring was found to be promising. Rhesus monkeys (Macaca mulatta) were used as test animals.

Work Unit

MR005.20-0049.19
NAMI-1062
(AD 688 118)

Acquired Bundle Branch Block in the Naval Aviator Population. 2/28/69

R. F. Smith, D. H. Jackson, J. W. Harthorne and C. A. Sanders

Abstract:

Twenty-eight naval aviators (median age 40 years) whose electrocardiograms changed from a normal pattern to bundle branch block were studied in order to assess the attendant risk. Twenty-two of the men had right bundle branch block (RBBB) and six had left bundle branch block (LBBB). In 25 men the abnormality was noted on a routine ECG at the time of annual physical examination. Follow-up information was available for all members of the group and represented 100 patient-years of observation. Selective coronary angiography was done in seven men and coronary artery disease was noted in one patient with LBBB. Six men had normal coronary arteries. One patient, age 44, died eight months after his ECG changed to RBBB. Extensive coronary artery disease was present at autopsy. A total of three men in the bundle branch block group had definite evidence of coronary heart disease. In two men RBBB appeared after chest trauma. The prevalence of coronary heart disease was higher in the bundle branch block group than in a cohort of 649 naval aviators of similar age. In 23 of the men the etiology of the bundle branch block was not determined. It is concluded that acquired bundle branch block is frequently, but not invariably, associated with a good prognosis in the young male patient.

Work Unit

MR005.20-0052.14
NAMI-1069
(AD 688 435)

A Study of the Ballistocardiographic Test-Retest Reliability. 5/5/69

D. H. Jackson, N. Lane, and R. J. Wherry, Jr.

Abstract:

Qualitative evaluation of large numbers of ballistocardiograms (BCG's) has indicated that considerable variation exists within a single BCG record and between records obtained on the same individual on different days. Because the extent to which BCG records can be reliably reproduced appears to be essentially unknown, it seems of interest to investigate quantitatively the reliability of measures obtained from these records. Further, since respiration condition has been thought to influence BCG results, and because of the availability of two differing designs of BCG apparatus (Air Bed and Suspended Bed), the study was extended to examine measurements obtained on both beds under five respiratory conditions.

All ballistocardiographic waveform measurements examined demonstrated statistically significant reliabilities, although the overall level of reliability obtained was somewhat lower than that previously reported in the literature. Precise interpretation of single measurements or of a single change measure may not be possible, and examinations repeated over a period of time may be necessary to obtain data with sufficient precision for predictive or diagnostic purposes. Respiratory conditions were found to have an effect on some waveform measurements, with the air bed more sensitive to the condition effects. The suspended bed was more susceptible to individual changes in behavior from day to day.

Work Unit

MR011.01.6
NAMI-1048
(AD 676 884)

A Refined Thermodilution Cardiac Output Catheter. 8/19/68

H. H. Khalil

Abstract:

A quantitative method for rapid repeated measurements of the right ventricular minute and stroke volumes is described. Based on thermodilution principles, a special cardiac catheter with an upstream heating coil and a downstream resistance thermometer is utilized to measure these parameters.

Several new refined features were introduced into the present model of the catheter. These included: a) the use of a plastic coating which provides optimal durability, flexibility, and resistance to heat; b) bifilar winding the heating coil; c) a refined pattern of winding the sensing element wire.

These new features rendered considerable baseline stability and therefore more accurate measurements.

MR011.01.7
NAMI-1041
(AD 684 781)

A Study of Blood pH, Serum Potassium Concentration, and Stress in the Squirrel Monkey (Saimiri sciureus).

T. E. Wheeler and A. E. New 12/1/68

Abstract:

Serum potassium concentration in the squirrel monkey is elevated as compared to that of other commonly used laboratory animals. This study was designed to determine if the levels observed for the potassium ion are related to a change in pH. Related parameters of serum CO_2 and pCO_2 are reported. Data accumulated from the study of biochemical parameters in the squirrel monkey cannot be rationalized in terms of in vivo buffer systems. Serum potassium and CO_2 appear to be related to altered pH, since low pH values were found in conjunction with low CO_2 and high potassium. Stress brought about by restraint during blood collection was found to significantly alter the pH and potassium when these values were compared with those from tranquilized and anesthetized squirrel monkeys which were used as controls. The squirrel monkey appears to present an extreme stress response and thus may be a highly desirable biological system in which to elucidate those in vivo changes associated with stress.

Work Unit

MF12.524.002.5001.56
SP-68-2
(AD 675 044)

Comparison of Career and Noncareer Naval Aviators. 7/24/68

G. M. Rickus, Jr., R. F. Booth, and R. K. Ambler

Abstract: The decision to change from a three-source procurement policy to a two-source policy for selecting naval aviators was evaluated from the standpoints of career retention and quality of performance. Career retention rates were established which reflected the fact that the effects of the two policies on retention of career aviators were not drastically different. Analysis of training performance of career and noncareer aviators indicated significant differences, with procurement source having a moderating effect.

MF12.524.002.5001.57
NAMI-1070

Predicting the Career Naval Flight Officer 5/26/69

R. F. Booth, G. M. Rickus, Jr., and R. K. Ambler

Abstract: This study established actual retention rates at which Naval Flight Officers are voluntarily extending beyond their initial obligated tour of duty. Analysis of aptitude and training performance showed that significant differences exist with regard to quality of performance between the extendees or career personnel and the noncareer men, with procurement source having a moderating effect. A multiple regression analysis revealed that the men entering the aviation training program as commissioned officers had a significantly greater multiple correlation with the career/noncareer criterion than those men entering as Aviation Officer Candidates or the Naval Flight Officer group as a whole.

Work Unit

MF12.524.002-5002.11
NAMI-1045
(AD 675 213)

A Sixty-Minute Vigilance Task With 100 Scoreable Responses. 7/16/68

R. S. Kennedy

Abstract:

Four forms of a vigilance task were administered over four sessions in counterbalanced order to 16 subjects. Three of the tasks required auditory (1, 2, or 3 tones) and one required visual (3 lights) monitoring. Visual performance was superior to auditory performance which was a function of the number of channels monitored, and performance for the four sessions was asymptotic. Among the different scoring methods used, "percent correct" had the most common variance. Decrements in performance appeared within 10 minutes in the one- and two-channel auditory tasks. An overall downward trend appeared in the three-channel visual task but was less regular. No systematic change in performance was apparent in the three-channel auditory task. Intratask correlations were high (>.75), while intertest correlations showed only a 20 per cent common variance.

MF12.524.002-5002.12
NAMI-1051

Magnitude Estimation of Visual Velocity 11/14/68

R. S. Kennedy, M. D. Yessenow, and G. R. Wendt

Abstract

Two subjects were able to reliably and validly estimate real movements in degrees per second over a broad range of velocities (0.76° to 11.1° per second). Forty-eight velocity levels (about 0.2°/sec apart) were the finest discriminations these subjects made and standard errors were approximately 1°/sec.

Pearson product moment correlation coefficients between real and perceived movement were high (generally more than .95), and since the range of real and perceived was the same, it is concluded that if a power function is considered for perceived velocity, under the conditions of this experiment the exponent is 1.0. This latter finding is similar to what others have found when less demanding responses (i.e., ratings) were required.

In general, no systematic practice effects between sessions were obtained. Fine grain analysis of each subject's first session indicates that practice effects occur early in a session but asymptotic performance appears quickly and remains thereafter.

Work Unit

MF12.524.002-5010.1
NAMI-1076

The Relationship of the Objectively Scoreable Apperception Test (OAT)

6/25/69

R. M. Bale and L. E. Waldeisen

Abstract:

The Objectively Scoreable Apperception Test (OAT) was administered to 725 naval aviation officer candidates (AOC's) during their first week of training to examine the potential of the OAT as a supplement to the primary selection system. Multiple correlations were determined first by using only the scores from existing primary selection variables; the criterion was completion versus separation from flight training. With a second set of multiple correlations the dimension scores of the OAT combined with those of the primary selection variables were used. Results of the experimental analysis revealed that inclusion of the OAT scores significantly augmented the multiple correlation; however, under crossvalidation the inclusion of those scores did not result in a significant increase in predictive validity.

It was concluded that, although the OAT as it presently exists is not suitable for inclusion in the Pensacola student prediction system, the evidence obtained with the experimental sample indicates the feasibility of developing a similar device geared specifically toward a naval aviation population.

MF12.524.004-5001.3
NAMI-1073

Assessment of Semicircular Canal Function: I. Measurements of Subjective Effects Produced by Triangular Waveforms of Angular Velocity. 6/17/69

F. E. Guedry, Jr., G. G. Owens, and J. W. Norman

Abstract: Two methods were compared for measuring subjective angular displacement produced by triangular waveforms of angular velocity while subjects (N = 11) were enclosed in a vertical-axis rotation device which excluded visual and auditory cues of angular motion. Accuracy of subjective estimates was influenced by the methods and by the magnitudes of the acceleration comprising the stimulus waveforms. Results suggest that one of the methods, with slight modification, will provide reliable indication of the subjective effects of controlled semicircular canal stimulation. A follow-up experiment, reported separately as Part II, deals with this modification.

MF12.525.004-5001.4
NAMI-1074

Assessment of Semicircular Canal Function: II. Individual Differences in Subjective Angular Displacement Produced by Triangular Waveforms of Angular Velocity. 6/17/69

G. G. Owens and F. E. Guedry, Jr.

Abstract: Mean estimates (N = 26) of short arcs of passive whole-body rotation about an Earth-vertical axis were accurate when subjects used a psychophysical procedure that involved counterdisplacement of a pointer on a dial. The required retrospective displacement judgments yielded more accurate mean estimates of angular displacement than were obtained in an earlier experiment which probably involved concurrent velocity matching. The differences in response curves in the various conditions of the two experiments clearly illustrate the importance of attention to psychophysical procedures prior to attempting to develop models of the vestibular endorgans to explain results. The method used in this experiment is sufficient to detect prominent individual differences within a sample of aviation training candidates, and the results obtained thus far indicate high test-retest reliability (r_{12} = .94).

Work Unit

MF12.524.004-5002.1
NAMI-1077

The Effect of Prior Exposure to a Harmful Event Upon Subsequent Performance Under Threat.

6/25/69

X. Coulter and M. A. Overman

Abstract:

Earlier research stressed the need for controlling magnitude of threat when measuring susceptibility to fear of harm (electric shock). Level of threat was manipulated before testing by varying the intensity of demonstrated shock and the stated probability of receiving shock at a specified point during a given experimental performance task. Results in subsequent studies have questioned the efficacy and practicality of the pretest demonstration. This study investigated effect of 1) pretest shock demonstration vs. no demonstration with the stated probability held constant at 65%, and 2) the stated probability at 25% vs. 85% with no pretest shock demonstration. Subjects were 70 entering aviation trainees. The task was a subject-paced, four-choice discrimination task. Ten subjects were used as controls, with the remainder divided among the experimental conditions. A five-minute practice period without threat preceded a five-minute experimental period for all conditions. It was concluded that 1) shock demonstration is not necessary, and its elimination would provide a more useful range for individual difference measurement; 2) 65% probability is better for producing measurable performance decrement than either the lower or higher extremes of 25% and 85%; 3) threat perception as measured by mean performance level across time may be as useful a parameter as performance decrement immediately preceding the anticipated harmful stimulus.

Work Unit

MF12.524.005-5001.41
NAMI-1054
(AD 682 917)

Comparative Evaluation of the Radiation Environment in the Biosphere and in Space. 12/13/68

H. J. Schaefer

Abstract: Natural radiation levels in the biosphere on Earth vary from 6 microrem/hr over the ocean to values 300 times larger in certain geologic territories. The upper end of this scale overlaps the lowest galactic radiation levels in space. Except for acute radiation exposure in the radiation belt or from solar protons, the radiation environment in space would not seem to constitute a basic obstacle to man's survival in space. Since proton storm shelters on the Moon or planets could be built with indigenous rock, only galactic exposure has to be dealt with in long-term missions. This exposure can be expected to result in inconspicuous chronic damage, such as life shortening which can be estimated to amount to 25 per cent of the time spent in space. As far as acute effects from trapped or solar particles are concerned, these comparatively soft radiations will mainly affect the skin, possibly producing erythema or more severe skin damage, with bone marrow and intestines remaining essentially intact. Operationally, this problem would require the main attention to be focused on in-flight medical care.

MF12.524.005-5001.42
NAMI-1060
(AD 685 241)

Nuclear Emulsion Measurements of the Astronauts' Radiation Exposure on Apollo VII. 2/13/69

H. J. Schaefer and J. J. Sullivan

Abstract: On the 10.8-day Apollo VII misssion, the radiation exposure of the three astronauts was measured with small nuclear emulsion packs on chest, thigh, and ankle. Track and grain count analysis of the G.5 emulsion on the CSM pilot's chest furnished a dose of 122 millirads. The LET distribution was found to be almost similar to the one recorded on the 14-day Gemini VII mission in line with the fact that the orbital parameters of the two missions were also closely similar. The counts of proton enders in all packs showed a markedly greater uniformity in directional distribution than those on Gemini VII. Presumably, this is caused by the heavier shielding of the Apollo vehicle in connection with the greater freedom of movement of the crew in the larger ship which greatly reduce

the influence of self-shielding of the body in the overall shield distribution.

MF12.524.005-5001.43
NAMI-1068
(AD 689 119)

Radiation Measurements at Supersonic Transport Altitude With Balloon-Borne Nuclear Emulsions. 5/2/69

H. J. Schaefer

Abstract: A radiation pack containing single Ilford K.2 emulsion sheets sandwiched between tissue equivalent material was flown on 22 August 1968 out of Fort Churchill, Canada with a ballon which floated at a level altitude of 65,000 feet for 19 hours. Conditions were those of solar maximum on a day of a Quiet Sun. Track and grain count analysis furnished an absorbed dose rate of 0.17 millirad/hour and a dose equivalent rate of 0.49 millirem/hour. According to the limited sensitivity of the K.2 emulsion, these values represent only the flux component of protons from zero to about 20 Mev. The bulk of the protons at the lower end of this energy interval appears to be made up of neutron recoils. The results indicate that dosimetric instrumentation for measuring the dose equivalent at SST altitude must possess exceptionally good LET resolution closely up to the Bragg peak of protons.

Work Unit

MF12.524.005-5019.1
NAMI-1065

Vestibular Responses to Sinusoidal Angular Acceleration Stimuli With Superimposed Offset Velocities. 4/2/69

J. I. Niven and W. C. Hixson

Abstract: Thirty subjects were exposed to a sinusoidal rotation stimulus of 0.025 cps and a peak velocity of 63 deg/sec, which was superimposed on a constant rotational velocity of 153 deg/sec clockwise (CW), 153 deg/sec counterclockwise (CCW), or 0 deg/sec. The phase lag of nystagmus and sensation directional transitions was determined and used to derive a functional index, $2\zeta/\omega_n$, equivalent to the Π/Δ index obtained by conventional cupulometry. Nystagmus-based values were found to be independent of the base velocity and its direction. The phase lag of the CCW-to-CW transition in sensation of turning increased with a CCW offset velocity and decreased with a CW offset. The opposite effect was observed for a CW-to-CCW transition.

Work Unit

MF12.524.005-5021.1
NAMI-1049
(AD 676 885)

Manikin Measurements of the Noise Attenuation Provided by Flight Helmets. 8/23/68

J. R. Forstall

Abstract:

Measurements of the noise attentuation provided by five flight helmets were obtained on a manikin head and compared with attenuation measurements obtained on human subjects according to the USASI Standard for Evaluating Real-Ear Attenuation at Threshold. The two sets of measurements were similar. The manikin method has certain advantages which should be considered in terms of the particular requirements of an evaluation program: 1) a helmet can be optimally fitted with little expenditure of time; 2) variability introduced by human factors is kept at a minimum; 3) high levels of noise can be used as the test stimulus; 4) visual and auditory monitoring of the attenuated noise provides the experimenter with a precise appraisal of the fit as adjustments are made; 5) manikin measurements are particularly useful in revealing improvements in attenuation resulting from minor modifications.

Work Unit

M4305.09-3002.1
NAMI-1047
(AD 675 214)

Development of an Aviation Combat Criterion: Preliminary Report. 8/6/68

G. M. Rickus, Jr., and J. R. Berkshire

Abstract: This is a preliminary report on the development of a combat criterion for naval aviators and flight officers. Interviews with veteran combat aviators, flight officers, and flight surgeons indicated that the flight surgeon was the single best individual capable of identifying unsatisfactory combat personnel. The criteria for identifying a man as unsatisfactory were: "turned in wings," "had wings taken away," "transferred due to poor performance," "given nonflying duties," or "nominated as person others refuse to fly with." Questionnaires were sent to all combat deployed flight surgeons, and 57% were completed and returned at the time of this analysis. Results indicate that the flight surgeon identified as combat unsatisfactory that group of officers whose aviation training performance had been below average. Frequency distributions of 17 selection and training variables indicated that only Peer Rating has possible value as a screening device to prevent potentially inadequate performers from reaching the fleet.

M4305.09-3002.2
NAMI-1050
(AD 681 794)

Factor Analysis of Aviation Training Measures and Post-Training Performance Evaluations. 10/4/68

R. F. Booth and J. R. Berkshire

Abstract: Factor structures of Marine jet and helicopter pilot training measures and post-training performance criteria are compared and discussed. Academic ability, flying ability, and systems comprehension factors were common to both samples. Additional factors unique to each sample were also identified. Significant relationships were found between some performance criteria and some factors, although the criteria factor loadings were low.

The results of this investigation are compared with previous factor analytic studies of aviation training measures that did not include post-training criterion data.

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