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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Introduction

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53 Behavioral Sciences 5

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 Man/System Technology and Life Support 6

Includes human engineering; biotechnology; and space suits and protective clothing.

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Includes exobiology; planetary biology; and extraterrestrial life.

Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also view the indexes provided, for searching on *NASA Thesaurus* subject terms and author names.

Subject Term Index ST-1

Author Index PA-1

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Appendix

Select **Appendix** for important information about NASA Scientific and Technical Information (STI) Program Office products and services, including registration with the NASA Center for Aero-Space Information (CASI) for access to the NASA CASI TRS (Technical Report Server), and availability and pricing information for cited documents.

Typical Report Citation and Abstract

DOCUMENT ID NUMBER → **19960021053** NASA Langley Research Center, Hampton, VA USA. ← **CORPORATE SOURCE**

TITLE → **An Extended Compact Tension Specimen for Fatigue Crack Propagation and Fracture**

AUTHORS → Piascik, R. S., NASA Langley Research Center, USA; Newman, J. C., Jr., NASA Langley Research Center, USA; ← **AUTHORS' AFFILIATION**

PUBLICATION DATE → Mar. 1996, pp. 16; In English

CONTRACTS/GRANTS → Contract(s)/Grant(s): RTOP 538–02–10–01

REPORT NO.(S) → Report No.(s): NASA–TM–110243; NAS 1.15:110243; No Copyright; Avail: CASI A03, Hardcopy; A01, Microfiche ← **AVAILABILITY AND PRICE CODE**

ABSTRACT → An extended compact tension specimen, EC(T) has been developed for fatigue and fracture testing. Documented herein are stress-intensity factor and compliance expressions for the EC(T) specimen.

ABSTRACT AUTHOR → Author

SUBJECT TERMS → *Crack Propagation; Stress Intensity Factors; Fatigue (Materials)*

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 428)

DECEMBER 9, 1996

51
LIFE SCIENCES (GENERAL)

19960051378 NASA Ames Research Center, Moffett Field, CA USA
Minutes of the 12th Joint NASA/DARA-DLR Life Sciences Program Working Group Meeting
Oct. 27, 1994; 254p; In English; 12th; Joint NASA/DARA-DLR Life Sciences Program Working Group Meeting, 26-27 Oct. 1994, Moffett Field, CA, USA; Sponsored by Deutsche Agentur fuer Raumfahrtangelegenheiten G.m.b.H., Germany
Report No.(s): NASA-TM-110655; NAS 1.15:110655; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

Status reports on German and NASA life sciences are presented. Overview of research and facilities at Ames Research Center, and overview of integrated physiology are given. Flight activities associated with Neurolab, Shuttle/Mir Program, Mir 1996 Mission, 'New' Spacelab Mission and small payloads hardware status are discussed. CO2 study at DLR, human factors, International Plant Space Research Plan, and Data Archive Status and Plans are also discussed.
CASI
Life Sciences; Conferences; Research; Research Facilities; Human Factors Engineering; Space Missions

19960052255 Army Natick Research and Development Command, MA USA
Uptake of Carboxyfluorenscein-Containing Liposomes by Peyer's Patch and Non-Peyer's Patch Tissue of the Rat Intestine ***Final Report, 9 Jun. - 3 Aug. 1995***
Porter, William L., Army Natick Research and Development Command, USA; Matthew, Candace B., Army Natick Research and Development Command, USA; Lau, Olivia, Army Natick Research and Development Command, USA; Feb. 1996; 27p; In English
Report No.(s): AD-A305911; NATICK/TR-96/022; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Studies have shown that stress in soldiers caused by caloric and sleep deprivation coupled with performance anxiety can markedly suppress immune function. This study was designed to test the possibility of oral targeting of liposomes containing immune-enhancing cargos to the Peyer's patch follicles of the small intestine.
DTIC
Rats; Intestines; Lipids

19960052383 Massachusetts Inst. of Tech., Cambridge, MA USA
Physical Processes and Zooplankton Distribution in the Great South Channel: Observational and Numerical Studies
Epstein, Ari Wenkart, Massachusetts Inst. of Tech., USA; Jun. 1995; 204p; In English
Contract(s)/Grant(s): N00014-93-1-0602; NSF OCE-93-13671; NOAA-NA36GP0374; NOAA-NA26GP0431
Report No.(s): AD-A305896; Copyright Waived; Avail: CASI; A10, Hardcopy; A03, Microfiche

This thesis addresses the question, 'How do small-scale physics and biology combine to produce dense aggregations of certain species of zooplankton in the Great South Channel (GSC) of the Gulf of Maine?' The thesis consists of three relatively independent parts: an observational study made while following two right whales as they fed on dense patches of the copepod Calanus firmarchicus in the northern GSC; a detailed description of a tightly integrated set of biological and physical observations made in the GSC by means of a new instrument, the Video Plankton Recorder (VPR); and a two-dimensional Eulerian numerical model that simulates one way in which a physical flow field, combined with a biological behavior pattern, may produce dense plankton patches at a convergent front.
DTIC
Zooplankton; Marine Biology; Maine; Gulfs; Mathematical Models

19960052595 Armstrong Lab., Veterinary Sciences Div., Brooks AFB, TX USA
Influence of Large Volume Phlebotomy on Compensatory Tracking Performance in Rhesus Monkeys ***Final Report, Jan. - Dec. 1995***
Fanton, John W., Armstrong Lab., USA; Blick, Dennis W., Systems Research Labs., Inc., USA; Weathersby, Frank R., Systems Research Labs., Inc., USA; Cook, Michael, Systems Research Labs., Inc., USA; Brown, G. C., Systems Research

Labs., Inc., USA; Feb. 1996; 24p; In English
Contract(s)/Grant(s): AF Proj 7757
Report No.(s): AD-A305828; AL/OE-TR-1995-0196; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In the biomedical research community, veterinarians charged with the clinical care of nonhuman primates occasionally are called upon to make judgments on the issue of blood volumes, blood sampling criteria, and the effects of phlebotomy on research results. The clinician must balance on a fine line when allowing investigators to perform either frequent small volume phlebotomies, or single large volume phlebotomies. Some large primate colonies allow 10 m1/kg of whole blood to be removed as single withdrawals no more often than once per month, while other institutional policies dictate smaller volumes and less frequent sampling intervals. Since it has already been proven that rhesus monkeys survive single, large volume phlebotomies without adverse effects, a study was designed to determine the effects of such large volume phlebotomy on the performance of a demanding sensorimotor task. This task, the Primate Equilibrium Platform (PEP), is sensitive to changes in central nervous system sensorimotor integration, but does not necessarily involve complex cognitive functions. It was found that PEP was unaffected after single, large volume (10 m1/kg) phlebotomy in rhesus monkeys.
DTIC
Clinical Medicine; Medical Science; Blood Volume; Monkeys

19960052809 Istituto Superiore di Sanita, Rome, Italy
Workshop on chromosome instability and cell cycle control
Sep. 03, 1996; ISSN 0393-5620; 260p; In English; 26th; European Environment Mutagen Society, 3-7 Sep. 1996, Rome, Italy; Sponsored by Consiglio Nazionale delle Ricerche, Italy
Report No.(s): ISTISAN Congressi 45; Copyright; Avail: Issuing Activity(Istituto Superiore di Sanita, Viale Regina Elena, 299-00161 Roma, Italy), Hardcopy, Microfiche

The objective of the 1996 workshop of the European Environmental Mutagen Society (EEMS) is to offer the opportunity for a productive interaction between cell biologists, geneticists and toxicologists working in the field of DNA damage, chromosome aberrations, chromosome segregation and genome instability. Mechanisms and targets for endogenous and induced damage, new detection methods (with special emphasis on molecular cytogenetics),and consequences to human health are specifically addressed in four sections, including invited lectures, oral communications, and poster disscussion. A collection of abstracts addressing the following topics is presented: genomic instability, DNA damage, cell cycle control, molecular cytogenetics, biological dosimetry, chromosome segregation, and chromosome aneuploidy.
CASI
Genetics; Chromosomes; Cells (Biology); Cell Division; Conferences; Mutations; Mutagens

19960054817
High gradient magnetic separation of motile and non-motile magnetotactic bacteria
Bahaj, A. S., Univ of Southampton, UK; James, P. A. B.; Moeschler, F. D.; IEEE Transactions on Magnetics; September 1996; ISSN 0018-9464; vol. 32, no. 5, pt. 2, pp. 5106-5108; In English; Copyright; Avail: Issuing Activity

Motile magnetotactic bacteria are normally separated from a solution by applying a low intensity (mT) orientating magnetic field. This constrains the bacteria to swim in the required direction. High gradient magnetic separation (HGMS) is a well established method for the extraction of magnetic particles from solutions. This paper reports on the separation properties of both motile and non-motile magnetotactic bacteria using both techniques. A comparison of HGMS separation with low field orientational magnetic separation is made and the conditions under which HGMS becomes beneficial are considered.
Author (EI)
Bacteria; Magnetic Fields; Magnetic Materials; Particulates; Separators

19960054819
Nerve excitation model for localized magnetic stimulation of finite neuronal structures
Hyodo, A., Kyushu Univ, Japan; Ueno, S.; IEEE Transactions on Magnetics; September 1996; ISSN 0018-9464; vol. 32, no. 5, pt. 2, pp. 5112-5114; In English; Copyright; Avail: Issuing Activity

In this paper we focuses on a membrane excitation model of finite and bent nerves elicited by magnetically induced electric fields. We simulated nerve excitation by changing the length of an axon and the distance between the coil and the nerve. The computer simulation suggests that the termination points of nerves or the bending part of an axon are low threshold stimulation sites when magnetically stimulated with a figure-eight coil. We also suggest that a short axon is more easily excited than an infinitely long axon of the same thickness. These results give useful information in understanding neuronal responses to magnetic stimulation of both central and peripheral nervous systems.
Author (EI)
Bioengineering; Mathematical Models; Neurophysiology; Stimulation

19960054820
Effects of low frequency magnetic fields on DNA synthesis
Yamada, S., Kanazawa Univ, Japan; Kawasaki, M.; Gunji, Y.; Ronan, P.; Harada, S.; Yamamoto, H.; IEEE Transactions on Magnetics; September 1996; ISSN 0018-9464; vol. 32, no. 5, pt. 2, pp. 5115-5117; In English; Copyright; Avail: Issuing Activity

50/60Hz magnetic fields are of special concern in biomagnetics because living organisms are constantly exposed to

these fields. We report the influences of a very low frequency alternating-current magnetic stimulus as high as 1.0T on the DNA synthesis processes in vitro. In this study, we examined both the activity of enzyme and the DNA synthesis error rate. Enzyme activity and synthesis error rate are measured by the speed of DNA synthesis and the number of mistaken DNA pairs respectively. In these experiments we used artificially synthesized DNA and a radioisotope technology. by comparing the exposed and control cases, we cannot recognize any differences for either the enzyme activity or error rate.
Author (EI)
Alternating Current; Biotechnology; Deoxyribonucleic Acid; Enzyme Activity; Enzymes; Kinetics; Magnetic Effects; Synthesis (Chemistry)

19960054826
Alternative method for the estimation of the magnetic moment of non-spherical magnetostatic bacteria
Bahaj, A. S., Univ of Southampton, UK; James, P. A. B.; Moeschler, F. D.; IEEE Transactions on Magnetics; September 1996; ISSN 0018-9464; vol. 32, no. 5, pt. 2, pp. 5133-5135; In English; Copyright; Avail: Issuing Activity

A new approach to the determination of the magnetic moment of non-spherical magnetotactic bacteria is described. This is achieved by studying the reaction of non-motile bacteria to applied homogeneous magnetic fields. The magnetic moment is calculated from the 'flip time' of a magnetostatic bacterium as it's dipole realigns itself when the polarity of the applied magnetic field is reversed. The results are compared with measurements obtained from three other techniques.
Author (EI)
Bacteria; Magnetic Fields; Magnetic Measurement; Magnetic Moments; Viscosity

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19960052202 Department of the Navy, Washington, DC USA
Method and Apparatus for Non-Invasive Detection and Analysis of Turbulent Flow in a Patient's Blood Vessels
Owsley, Norman L., Inventor, Department of the Navy, USA; Apr. 23, 1996; 31p; In English
Patent Info.: US-Patent-Appl-SN-641049
Report No.(s): AD-D018058; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

A method and apparatus for the diagnosis of pathological turbulent arterial blood flow in a patient includes energy wave detectors for sensing at a plurality of spaced positions on the patient forces generated by turbulent arterial blood flow. The detectors generate a plurality of space time signals that are arranged in a vectorized data structure. A processor converts the vectorized data structures into an output that indicates the form of the waves propagated from the site of the turbulent arterial blood flow, the location and spatial configuration of that site.
DTIC
Data Structures; Diagnosis; Blood Flow; Arteries; Detection; Blood Vessels

19960052287 Houston Univ., Dept. of Biochemical and Biophysical Sciences., TX USA
Gene Regulation in Memory Formation and Circadian Rhythm *Final Report, 1 Sep. 92 - 31 Oct. 1995*
Eskin, Arnold, Houston Univ., USA; Mar. 18, 1996; 21p; In English
Contract(s)/Grant(s): F49620-92-J-0494; AF Proj. 2312
Report No.(s): AD-A306218; AFOSR-TR-96-0139; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Although it has been clear for some time that regulation of gene expression is a key process in the development of organisms, the degree to which regulation of gene expression plays a role in the life of adults has been less clear. The general objectives of this research were to investigate the role of gene expression in circadian rhythms and in memory formation. The first stage of this research required obtaining clones of genes for proteins thought to be involved in learning and memory and circadian rhythms. We cloned the Aplysia genes for porin, protein 3, phosphoglycerate kinase, calmodulin, BiP, and HSP70. Using riboprobes made from these gene sequences, we developed sensitive techniques to measure levels of mRNA in eyes and in a cluster of a few hundred sensory neurons. Using these techniques, we discovered that the expression of most of these genes was regulated by light and/or 5-llT, treatments known to perturb the clock and to induce the formation of memory. We have now begun to study regulation of this expression in greater detail. Overall, these studies on gene regulation have further implicated some of these genes/proteins in mechanisms of the circadian system and the system by which memories are induced and maintained. A particular outstanding result was our discovery that a developmental gene, known in Drosophila as Tolloid, appeared to be involved in memory.
DTIC
Circadian Rhythms; Memory; Gene Expression; Genes; Proteins; Organisms

19960052382 Army Research Inst. of Environmental Medicine, Natick, MA USA
Thermoregulation in Women: Effect of the Menstrual Cycle
Kolka, Margaret A., Army Research Inst. of Environmental Medicine, USA; Stephenson, Lou A., Army Research Inst. of

Environmental Medicine, USA; Oct. 1995; 38p; In English
Report No.(s): AD-A305834; T96-1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Twelve women participated in seven different experimental protocols which characterized the effect of the mid-luteal phase elevation in core temperature during exercise and heat exposure. Experiments were conducted at ambient temperatures between 30 C and 50 C at both low and high ambient water vapor pressures when test subjects were not naturally acclimatized or artificially acclimated to the heat. In all experiments, the separation of temperatures between the early follicular and mid-luteal phases was apparent, with temperature in the mid-luteal phase averaging 0.3 to 0.5 C higher than in the early follicular phase. This significant difference observed in resting core (esophageal) temperature between the two menstrual cycle phases studied in these experiments was maintained during exercise during both cycling and walking exercise, in both hot and very hot ambient temperatures, in both humid and dry conditions, and when heavy or light clothing was worn. Heart rate, skin temperatures and sweating rates were variable between test protocols. In summary, the change in resting and exercise core temperature between the mid-luteal and early follicular phases of the menstrual cycle was significant and of the same magnitude as observed as a result of changes in circadian timing, heat acclimation, exercise training or during dehydration.
DTIC
Medical Science; Temperature Effects; Temperature Control; Menstruation

19960052565 Kings Coll., Dept. of physics, London, UK
Compilation of the Dielectric Properties of Body Tissues at RF and Microwave Frequencies ***Final Report, 15 Sep. 1993 - 14 Dec. 1995***
Gabriel, Camelia, Kings Coll., UK; Feb. 1996; 273p; In English
Contract(s)/Grant(s): F49620-93-1-0561; AF Proj 6277
Report No.(s): AD-A305826; AFOSR-TR-96-0135; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

Knowledge of the dielectric properties of biological materials is of importance in solving electromagnetic interaction problems. There is, as yet, no consensus on such data among scientists dealing with these issues. This project is geared towards producing a database of dielectric data based on measurements using recently developed techniques. This has been achieved through measurement over a wide frequency range. The new data were evaluated by comparison with corresponding data from the literature where available. to facilitate the incorporation of the dielectric data in numerical solutions, their frequency dependence was modelled to a spectrum characterized by 4 dispersion regions. The conductivity of tissues below 100 Hz was estimated from the recent measurements mitigated by data from the literature and used to estimate the body and of various body parts.
DTIC
Dielectric Properties; Electromagnetic Radiation; Microwave Frequencies; Data Bases; Numerical Analysis

19960054824
Comparison of the performance of distributed source estimation in the human brain using normal and vector magnetic field measurements
Iwaki, Sunao, Univ of Tokyo, Japan; Ueno, Shoogo; IEEE Transactions on Magnetics; September 1996; ISSN 0018-9464; vol. 32, no. 5, pt. 2, pp. 5127-5129; In English; Copyright; Avail: Issuing Activity

In neuromagnetism research, it is important to accurately estimate internal electrical sources in the human brain from the spatial and temporal distributions of magnetoencephalogram (MEG) activities over the head. In this study, we compared the performance of distributed internal source estimation in the human brain under two different MEG measurement conditions: (a) measurements of only the normal components of the external magnetic fields and (b) three-dimensional vector measurements of the external magnetic fields. We applied the sub-optimal least-squares subspace scanning source estimation technique to both measurement conditions. The results showed that with the measurements of only the normal components, distributed source tends to be estimated deeper in the brain than they should be, while the three-dimensional vector measurements had the possibility to provide a better estimation for the depth of the internal source distribution.
Author (EI)
Brain; Estimating; Magnetic Fields; Magnetic Measurement

19960054825
Dissolution of thrombus under high gradient magnetic fields
Iwasaka, Masakazu, Univ of Tokyo, Japan; Ueno, Shoogo; Tsuda, Hiroko; IEEE Transactions on Magnetics; September 1996; ISSN 0018-9464; vol. 32, no. 5, pt. 2, pp. 5130-5132; In English; Copyright; Avail: Issuing Activity

This study focused on the mechanism of effects of strong magnetic fields on a process of dissolution of fibrin clots. We measured the rate of fibrinolysis using a fibrin column as a model of a thrombus, and investigated the effects of gradient magnetic fields. Fibrin clots in glass tubes were digested by plasmin under magnetic fields of up to 8 T which were produced by a horizontal type of superconducting magnet at 37 C. When a fibrin gel and a plasmin solution were exposed to magnetic fields where a product of magnetic fields and field gradients, B center-dot dB/dz, was 370 T(sup 2)/m, dissolution of fibrin was enhanced by 34%. However, we obtained no distinct effects when B center-dot dB/dz was less than 150 T(sup 2)/m. As a mechanism, we proposed a model in which

fibrin polymers in water magneto-phoresically drifted in the direction of increasing magnetic fields, and digestions of fibrin polymers by plasmin were accelerated.
Author (EI)
Dissolving; Magnetic Effects; Magnetic Fields; Mathematical Models; Superconducting Magnets

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19960051444 Civil Aeromedical Inst., Oklahoma City, OK USA
Shift Work, Age and Performance: Investigation of the 2-2-1 Shift Schedule Used in Air Traffic Control Facilities 2. Laboratory Performance Measures
Della Rocco. Pam, Civil Aeromedical Inst., USA; Cruz, Crystal E., Civil Aeromedical Inst., USA; Sep. 1996; 66p; In English
Report No.(s): DOT/FAA/AM-96/23; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Many Air Traffic Control Specialists (ATCSS) work a counter-clockwise rotating shift schedule, called the '2-2-1,' or some variation of the schedule. The 2-2-1 involves rotating from two afternoon shifts to two mornings, and finally, to a midnight shift over the course of one work week. The purpose of the present study was to investigate the effects in two different age groups of working the 2-2-1 schedule, as compared to a straight day schedule on measures of complex task performance in a laboratory- based synthetic work environment. It was hypothesized that the counterclockwise rotations would result in performance decrements over the course of the 2-2-1 week. Four groups of five male subjects between the ages of 30 to 35 (n=10) and 50 to 55 (n=10) participated in the four-week study. Subjects were screened on medical and cognitive criteria. The Multiple Task Performance Battery (MTPB) was utilized to provide a motivating synthetic work environment. Subjects worked three 2-hour sessions on the MTPB per eight-hour day for three weeks of a four-week protocol. During the second and fourth weeks, subjects worked day shifts (0800-1630). During the third week, subjects worked the 2-2-1 schedule. Performance measures were analyzed for each of the five tasks in the MTPB. Composite scores were also computed. Significant performance decrements were observed primarily on the night shift for both age groups. The older group demonstrated decrements in accuracy of recall on the code lock task following both rapid rotations during the 2-2-1 schedule. This study was part of a research program designed to develop fatigue countermeasures for Air Traffic Control Specialists. The hypothesis that the rapid, counter-clockwise rotations would result in performance decrements was partially supported. Data suggest that initial interventions should be directed toward maintaining alertness and performance on the night shift.
Author
Air Traffic Control; Air Traffic Controllers (Personnel); Schedules; Rotation; Tasks; Human Performance; Alertness

19960052053 Institute for Human Factors TNO, Soesterberg, Netherlands
Systematic development of team training: A review of the literature *Interim Report*
van Berlo, M.P.W., Institute for Human Factors TNO, Netherlands; Jun. 13, 1996; 38p; In English
Contract(s)/Grant(s): B96-036
Report No.(s): TM-96-B010; RP 96-0159; 788.3; Copyright; Avail: Issuing Activity(TNO Human Factors Research Inst., KampWeg 5, 3769 DE Soesterberg, The Netherlands), Hardcopy, Microfiche

In both military and civilian organizations, many tasks are performed by teams rather than by individuals. Despite the acknowledgment of the importance of team performance and team training, relatively few attempts have been made to train teams in a systematic way. Teams training is rarely conducted as separate training, with the argument that functioning as a team can be learned best in the operational environment, after each team member is trained for their individual tasks. In this literature review, the concept of team performance (team tasks) is defined and the required skills are examined. A generalized model of team evolution and maturation is depicted and a team work characteristics checklist is appended.
Author
Teams; Education; Bibliographies; Management Methods; Training Evaluation; Human Performance

19960052186 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Temporal Influence on Awareness
Hill, Don E., Air Force Inst. of Tech., USA; Dec. 1995; 203p
Report No.(s): AD-A305393; AFIT/GE/ENG/95D-07; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

Grossberg's Motion Oriented Contrast Filter(MOC) was extensively analyzed(7). The output from the filter's 'global motion' neuronal layer was compared to a noncausal post-processing filter developed by AFIT. Both filters were shown to incorporate a weighted, noncausal temporal range of input data in processed output. The global motion framework was then implemented using a physiologically motivated pulsed neural model - the Pulse Coupled Neural Network(PCNN). by incorporating both spatial and temporal data, the PCNN was shown to exhibit a common visual illusion, apparent motion. The existence of a phys iological temporal processing range was further investigated through implementation of two multi-modal experiments which integrated visual and auditory stimulus input channels. Results from the first experiment reinforce earlier findings from literature of a temporal win-

dow for perception of simultaneous activity. (Events occurring within this window are considered simultaneous; events which span more than one window are considered temporally separate.) Data collected from the second experiment suggests future inputs from an accessory auditory stimulus impact current perception of a visual stimulus. The influence of the auditory accessory stimulus decreases as the temporal delay between visual and auditory stimulus presentation is increased up to a maximum value of approximately 40 milliseconds. These tests results suggest the existence of perceptual noncausality in the mind - awareness as a function of past, current, and future perceptual inputs.
DTIC
Neural Nets; Neurophysiology; Visual Stimuli

19960052248 Human Resources Research Organization, Alexandria, VA USA
Contract for Manpower and Personnel Research and Studies for the US Army Research Institute for the Behavioral and Social Sciences. ***Annual Report, Year 2***
Dec. 1995; 51p; In English
Contract(s)/Grant(s): MDA903-93-D-0032; Army Proj. D730
Report No.(s): AD-A305385; ARI-96-02; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report documents the second year of a 5-year project to provide the U.S. Army Research institute for the Behavioral and Social Sciences short- and medium-term scientific and technical support in solving problems related to manpower and personnel. The three COMPRS programs are (1) quick reaction; (2) attitude and opinion surveys; and (3) medium term. During the second year of the contract, 10 delivery orders were initiated, 8 in the quick response program and 2 in the medium-term program. This report includes examples of problem and objective statements and summaries for each delivery order (including problem, objectives, status, results, bibliography, products, and planned documents and products). The intent is to give a very brief overview of each effort.
DTIC
Psychology; Human Behavior

19960052841 Rutgers - The State Univ., Dept. of Psychology, New Brunswick, NJ USA
Eye Movements and Visual Information Processing ***Final Report, 30 Sep. 1991 - 30 Sep. 1995***
Kowler, Eileen, Rutgers - The State Univ., USA; Sep. 30, 1995; 17p; In English
Contract(s)/Grant(s): AFOSR-91-0342; AF Proj. 2313
Report No.(s): AD-A305753; AFOSR-TR-96-0081; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective is to find out how saccadic eye movements (voluntary jumps of the eye) can be directed accurately to chosen targets within natural, patterned visual environments. An effective saccadic scanning mechanism must consist of (1) a selective filter that determines which object serves as the saccadic target, and (2) a spatial-pooling mechanism that computes a single, precise saccadic landing position. Major findings were (1) a single attentional filter serves both saccadic eye movements and perception; (2) attentional requirements of saccades are modest; (3) it is easier to divide attention between two widely-spaced targets than two closely-spaced targets; (4) the spatial-pooling process guides saccades to a central landing position within spatially-extended targets with a high degree of precision; (5) the central landing position is near the center of gravity; (6) the central landing position and the precision of the saccade depends on target size but not on spatial frequency content, contrast, or shape.
DTIC
Saccadic Eye Movements; Visual Perception; Information Processing (Biology)

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19960052026 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA
The Effects of a Computer-Aided Teleoperation Technology on Operator Workload and Performance of Concurrent Tasks ***Final Report***
Glumm, Monica M., Army Research Lab., USA; Breitenbach, Francis W., Army Research Lab., USA; Grynovicki, Jock O., Army Research Lab., USA; Feb. 1996; 54p; In English
Contract(s)/Grant(s): 1L162716AH70
Report No.(s): AD-A307051; ARL-TR-779; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The Feedback Limited Control System (FELICS) is a Computer-Aided Teleoperation (CAT) technology that enables the remote operator to designate an extended path that the vehicle will automatically follow. This report describes the methodology and results of a study designed to quantify the effects of this technology on remote driving performance and operator workload in both single and dual task conditions. In the dual task condition, the operator's ability to detect and identify targets while driving was also measured. These data were compared with those obtained when the same vehicle was operated in the standard mode of remote driving. The study was conducted on an indoor test course consisting of five segments: straight-aways, turns, serpentine, figure 8, and obstacle avoidance. Generally, for most segments of the course, greater speeds and fewer errors (p less than .001) were achieved by subjects who drove the vehicle in the standard

mode. In this mode, subjects rated the effort they expended as being less (p less than .05) than did those subjects who operated the vehicle in the CAT mode. A significant relationship was found across driving modes between the distance traveled off the road and the subjects' assessment of their performance (p less than .05). An association was also found between the subjects' level of frustration and the number of obstacles hit in the obstacle avoidance segment of the course (p less than .05). When subjects were required to detect and identify targets while driving, driving speed in both modes decreased significantly (p less than .001). In the CAT mode, the distance traveled off the road in turns and in the serpentine segments increased (p less than .05), but driving error in the standard mode on these and other segments of the course was unaffected. Fewer targets were also correctly identified in the CAT mode than in the standard mode of remote operation.
DTIC
Velocity; Image Processing; Feedback Control; Computer Techniques; Operator Performance; Human-Computer Interface

19960052063 Institute for Human Factors TNO, Soesterberg, Netherlands
Physiological workload reactions to increasing levels of task difficulty ***Final Report***
Gaillard, A.W.K., Institute for Human Factors TNO, Netherlands; Veltman, J. A., Institute for Human Factors TNO, Netherlands; Jun. 21, 1996; 28p; In English
Contract(s)/Grant(s): A91/KLu/314
Report No.(s): TM-96-A026; RP 96-0162; 789.4; Copyright; Avail: Issuing Activity(TNO Human Factors Research Inst., KampWeg 5, 3769 ZG Soesterberg, The Netherlands), Hardcopy, Microfiche

In complex systems, such as modern fighter jets and helicopters, operators have to manage several tasks at the same time; this has consequences for their mental workload. Before new systems are introduced, it is important to know what factors influence the mental workload and how this workload can be measured. This study is part of a project to gain insight into the concept of mental workload and develop measurement techniques for mental workload. The experiment described in this report, the fourth in the workload project, is designed to evaluate the sensitivity of physiological measures and their mutual relations. For the present experiment, pilots flew the simulator in two tasks: pursuit and tunnel task. In the pursuit task, subjects had to follow a target at at great distance. In the tunnel task,they had to fly thorough a tunnel and perform simultaneously an auditory memory task with four levels of difficulty.
Derived from text
Auditory Tasks; Complex Systems; Mental Performance; Physiological Responses; Flight Simulators; Task Complexity; Workloads (Psychophysiology); Pilot Performance

19960052100 Institute for Human Factors TNO, Soesterberg, Netherlands
Evaluation of the Usability of the PG1MS Night-Vision Goggle ***Interim Report Evaluate Inzetbaarheid van de PG1MS nachtzichtkijker***
Kooi, F. L., Institute for Human Factors TNO, Netherlands; Jun. 17, 1996; 20p; In Dutch
Contract(s)/Grant(s): A93/KL/363
Report No.(s): TM-96-A025; RP96-0161; Copyright; Avail: Issuing Activity (Institute for Human Factors TNO, Soesterberg, Netherlands), Hardcopy, Microfiche

The PGLMS night-vision goggle (NVG) was compared to more modern NVGs on visual acuity and vehicle detection. Visual acuity was measured over a Large range, covering all relevant Light levels. When possible, the percentage of nights a NVG yields sufficient resolution to perform a task was calculated, using the statistical distribution of nighttime light levels in The Netherlands. The more modern NVGs can be used in up to 50% more of the nights for target detection. Suggestions are made for possible further use of the PGLMS NVGS.
Author
Goggles; Night Vision; Visual Acuity; Image Intensifiers

19960052445 Army Aeromedical Research Lab., Fort Rucker, AL USA
Figures of Merit and Performance Specifications for the IHADSS and ANVIS ***Final Report***
Harding, Thomas H., UES, Inc., USA; Martin, John S., UES, Inc., USA; Beasley, Howard H., UES, Inc., USA; Rash, Clarence E., Army Aeromedical Research Lab., USA; Feb. 1996; 26p; In English
Report No.(s): AD-A305936; USAARL-96-13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The U.S. Army currently fields two helmet mounted display systems. These are the Integrated Helmet and Display Sighting System (IHADSS), which is employed on the AH-64 Apache, and the Aviator's Night Vision Imaging System (ANVIS), which is employed on all U.S. Army rotary wing aircraft. The performance and figures of merit specifications provide the basis for judging performance of future aviation electrooptical devices. This paper specifies in summary form performance parameters for different figures-of-merit which can be used to define the overall performance of the IHADSS and ANVIS.
DTIC
Helmet Mounted Displays; Figure of Merit; Functional Design Specifications; Aircraft Instruments; Indicating Instruments; Rotary Wing Aircraft

19960052821 Institute for Human Factors TNO, Soesterberg, Netherlands
Predictive information in the cockpit as a target acquisition aid ***Final Report Helpt pedictie-informatie in de***

cockpit bij het opsporen van doelviegtuigen?
vanBreda, L., Institute for Human Factors TNO, Netherlands; Veltman, J. A., Institute for Human Factors TNO, Netherlands; May 1996; 30p; In Dutch
Contract(s)/Grant(s): A89/KLu/335
Report No.(s): TM-96-A021; RP 96-0155; Copyright; Avail: Issuing Activity(TNO Human Factors Research Inst., Kampweg 5, 3769 DE Soesterberg), Hardcopy, Microfiche

A flight simulator test was conducted to investigate the presence of any predictive information for tracking targets. This served as research of the effect of advanced interface principles in the cockpit on flight performance, pilot orientation, and pilot workload. The simulation required the fighter pilots to trace as quickly as possible a target aircraft, initially from an arbitrary position at a fixed distance. The pilots are able do see an exocentric radar display with inside-out motion reference. In two instances, additional graphics were presented based on the extrapolation of translations of the pilot's own aircraft and the target aircraft, and based on translation and pitch. The difficulty of the scenarios was varied by directing the target towards and away from the observer. Results show the pilots were not able to find the target any faster with the additional predictive information was presented in the radar image. The display offered so many possibilities that no increase of target search time was possible; and ironically, there was a tendency to decrease the search performance time. This can be attributed to 'display clutter', or too much information deteriorating the interpretation. A follow-on study is proposed to investigate the possibility of increasing the pilot's situational awareness. Ongoing experiments suggest that inside-out referenced displays cause more frequently controlled flight into ground.
CASI
Radar Imagery; Flight Simulators; Display Devices; Workloads (Psychophysiology); Target Acquisition; Pilot Performance; Radar Data; Human Factors Engineering

19960052836 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
Advanced Environmental Monitoring and Control Program: Technology Development Requirements *Interim Report*
Jan, Darrell, Editor, Jet Propulsion Lab., California Inst. of Tech., USA; Seshan, Panchalam, Editor, Jet Propulsion Lab., California Inst. of Tech., USA; Ganapathi, Gani, Editor, Jet Propulsion Lab., California Inst. of Tech., USA; Schmidt, Gregory, Editor, Jet Propulsion Lab., California Inst. of Tech., USA; Doarn, Charles, Editor, Jet Propulsion Lab., California Inst. of Tech., USA; May 1996; 64p; In English; Environmental Monitoring and Controls, May 1996, Pasadena, CA, USA
Report No.(s): NASA-TM-4755; JPLD-13832; NAS 1.15:4755; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Human missions in space, from the International Space Station on towards potential human exploration of the moon, Mars and beyond into the solar system, will require advanced systems to maintain an environment that supports human life. These systems will have to recycle air and water for many months or years at a time, and avoid harmful chemical or microbial contamination. NASA's Advanced Environmental Monitoring and Control program has the mission of providing future spacecraft with advanced, integrated networks of microminiaturized sensors to accurately determine and control the physical, chemical and biological environment of the crew living areas. This document sets out the current state of knowledge for requirements for monitoring the crew environment, based on (1) crew health, and (2) life support monitoring systems. Both areas are updated continuously through research and space mission experience. The technologies developed must meet the needs of future life support systems and of crew health monitoring. These technologies must be inexpensive and lightweight, and use few resources. Using these requirements to continue to push the state of the art in miniaturized sensor and control systems will produce revolutionary technologies to enable detailed knowledge of the crew environment.
Author
Environmental Monitoring; Life Support Systems; Environmental Control; Spacecraft Environments

19960052897 Defence Science and Technology Organisation, Air Operations Div., Aeronautical and Maritime Research Lab., Melbourne, Australia
Annotated Bibliography of Helmet Mounted Sight Systems
Saliba, Anthony J., Defence Science and Technology Organisation, Australia; Meehan, James W., Defence Science and Technology Organisation, Australia; Jan. 1996; 34p; In English
Report No.(s): DSTO-GD-0097; AR-009-740; Copyright; Avail: Issuing Activity (DSTO Aeronautical and Maritime Research Lab., PO Box 4331, Melbourne, Victoria 3001 Australia), Hardcopy, Microfiche

A search of literature was conducted on helmet mounted sights (HMSs) and related helmet mounted displays (HMDs). The result was 42 entries that are grouped under broad subject headings of human factors, design and evaluation, and other related areas. Human factors deals with issues relating to human performance with HMSs and HMDS. Design and evaluation covers work that is focused more on the helmet systems. Work in related areas includes material that fits neither of the other categories, but which is relevant. Entries are accompanied by an abstract, annotation, or both. This bibliography represents the present understanding of issues involved with the current state of technology. Rapid growth in computer technology suggests that developments in this area will accelerate rapidly, indicating a need for maintaining commen-

surate research effort in human performance in the virtual environments that this technology is providing.
Author
Helmet Mounted Displays; Human Factors Engineering; Bibliographies; Head-Up Displays

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SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

19960051154 Lunar and Planetary Inst., Houston, TX USA
Carbon-Based Compounds and Exobiology
Kerridge, John, Lunar and Planetary Inst., USA; DesMarais, David, Lunar and Planetary Inst., USA; Khanna, R. K., Lunar and Planetary Inst., USA; Mancinelli, Rocco, Lunar and Planetary Inst., USA; McDonald, Gene, Lunar and Planetary Inst., USA; diBrozollo, Fillipo Radicati, Lunar and Planetary Inst., USA; Wdowiak, Tom, Lunar and Planetary Inst., USA; Planetary Surface Instruments Workshop; 1996, pp. 85-96; In English; Also announced as 19960051148; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

The Committee for Planetary and Lunar Explorations (COMPLEX) posed questions related to exobiological exploration of Mars and the possibility of a population of carbonaceous materials in cometary nuclei to be addressed by future space missions. The scientific objectives for such missions are translated into a series of measurements and/or observations to be performed by Martian landers. These are: (1) A detailed mineralogical, chemical, and textural assessment of rock diversity at a landing site; (2) Chemical characterization of the materials at a local site; (3) Abundance of Hydrogen at any accessible sites; (4) Identification of specific minerals that would be diagnostic of aqueous processes; (5) Textual examination of lithologies thought to be formed by aqueous activity; (6) Search for minerals that might have been produced as a result of biological processes; (7) Mapping the distribution, in three dimensions, of the oxidant(s) identified on the Martian surface by the Viking mission; (8) Definition of the local chemical environment; (9) Determination of stable-isotopic ratios for the biogenic elements in surface mineral deposits; (10) Quantitative analysis of organic (non-carbonate) carbon; (11) Elemental and isotopic composition of bulk organic material; (12) Search for specific organic compounds that would yield information about synthetic mechanisms, in the case of prebiotic evolution, and about possible bio-markers, in the case of extinct or extant life; (13) and Coring, sampling, and detection of entrained gases and cosmic-ray induced reaction products at the polar ice cap. A discussion of measurements and/or observations required for cometary landers is included as well.
Derived from text
Exobiology; Mars Surface; Activity (Biology); Chemical Composition; Chemical Evolution; Carbon Compounds; Comet Nuclei; Ice

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