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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 446)

AUGUST 25, 1997

51
LIFE SCIENCES (GENERAL)

19970022223 California Univ., Irvine, CA USA
Enhanced Trichloroethylene Degradation Using Genetically-Engineered Microorganisms ***Final Report***
Wood, Thomas K., California Univ., USA; Dec. 28, 1996; 4p; In English
Contract(s)/Grant(s): DAAL03-92-G-0398
Report No.(s): AD-A321121; ARO-30871.7-LS-YIP; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Novel recombinant TCE-degrading bacteria were created using the best known enzyme for TCE degradation, soluble methane monooxygenase(sMMO) of the soil bacterium Methylosinus trichosporium OB3b. sMMO degrades a wide range of halogenated hydrocarbons (HCFCs, chloroform, dichloroethane, etc.), and it degrades TCE 100 times faster than any other microbial enzyme. The mmo genes were cloned and expressed in Pseudomonas putida Fl, Agrobacterium tumefaciens, and Rhizobium meliloti using plasmids pSMMO20 and pSMMO40 created by the Wood laboratory. In addition, a novel fixed-film bioreactor has been constructed and optimized to mineralize TCE in the gas phase.
DTIC
Bacteria; Ethane; Trichloroethylene; Degradation

19970022234 North Carolina Univ., Dept. of Biology, Chapel Hill, NC USA
Effects of Hydrostatic Pressure on Mammalian Tissue Cells-Disruption of Cytoskeletal Function, Organization, and Regulation ***Final Report, 1 Apr. 1992 - 31 May 1996***
Salmon, Edward D., North Carolina Univ., USA; Harris, Albert K., North Carolina Univ., USA; May 1996; 4p; In English
Contract(s)/Grant(s): N00014-92-J-1504
Report No.(s): AD-A321595; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

To investigate the disruption, organization and regulation of the cytoskeleton of mammalian tissue cells by hydrostatic pressure. APPROACH: Novel optical and fixation chambers are being used in combination with immunofluorescence and video microscopy, biochemical and biophysical techniques to examine pressure-induced changes in the structural organization of the cytoskeletal proteins (including tubulin, actin, myosin II, vinculin, talin, vimentin, and cytokeratin) involved in producing changes in cell shape, motility and contractility.
DTIC
Pressure Effects; Cells (Biology); Tissues (Biology); Video Signals; Mammals; Musculoskeletal System

19970022263 Armed Forces Radiobiology Research Inst., Bethesda, MD USA
AFRRI Reports ***Quarterly Report***
Jan. 1996; 57p; In English
Report No.(s): AD-A321315; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Table contents: Effect of chloral hydrate on in vivo KCL-induced striatal dopamine release in the rat. Effect of ionizing radiation on in vivo striatal release of dopamine in the rat. Transient and persistent experimental infection of nonhuman primates with Helicobacter pylori: Implications for human disease. Indomethacin attenuation of radiation-induced hyperthermia does not modify radiation-induced motor hypoactivity. Behavioral toxicity and radioprotective efficacy of WR-15l327 in combination with adenosine receptor antagonists. Chromatographic and mass spectral analysis of the radioprotector and chemoprotector S-3-(3

-methylaminopropylamino)propanethiol (WR- 15t326) and its symmetrical disulfide (WR-25595501). Mechlorethamine-induced enhancement of radiation sensitivity of guanine.
DTIC
Ionizing Radiation; Radiation Effects; Rats; Toxicity

19970022424 Washington State Univ., Lab. of Plant Molecular Biology, Pullman, WA USA
Calmodulin Gene Family in Potato: Developmental and Touch-Induced Expression of the mRNA Encoding a Novel Isoform
Takezawa, D., Washington State Univ., USA; Liu, Z. H., Washington State Univ., USA; An, G., Washington State Univ., USA; Poovaiah, B. W., Washington State Univ., USA; Plant Molecular Biology; 1995; Volume 27, pp. 693-703; In English; Original contains color illustrations; Sponsored in part by the Agricultural Experiment Station.
Contract(s)/Grant(s): NAG10-0061; NSF DCB-91-04586; AES-Proj. 0321
Report No.(s): NASA-CR-204650; NAS 1.26:204650; Copyright Waived (NASA); Avail: CASI; A03, Hardcopy; A01, Microfiche

Eight genomic clones of potato calmodulin (PCM1 to 8) were isolated and characterized. Sequence comparisons of different genes revealed that the deduced amino acid sequence of PCM1 had several unique substitutions, especially in the fourth Ca(2+)-binding area. The expression patterns of different genes were studied by northern analysis using the 3'-untranslated regions as probes. The expression of PCM1, 5, and 8 was highest in the stolon tip and it decreased during tuber development. The expression of PCM6 did not vary much in the tissues tested, except in the leaves, where the expression was lower; whereas, the expression of PCM4 was very low in all the tissues. The expression of PCM2 and PCM3 was not detected in any of the tissues tested. Among these genes, only PCM1 showed increased expression following touch stimulation. to study the regulation of PCM1, transgenic potato plants carrying the PCM1 promoter fused to the beta-glucuronidase (GUS) reporter gene were produced. GUS expression was found to be developmentally regulated and touch-responsive, indicating a positive correlation between the expression of PCM1 and GUS mRNAs. These results suggest that the 5'-flanking region of PCM1 controls developmental and touch-induced expression. X-Gluc staining patterns revealed that GUS localization is high in meristematic tissues such as the stem apex, stolon tip, and vascular regions.
Author
Calmodulin; Potatoes; Gene Expression; Regulatory Mechanisms (Biology); Genes

19970022498 Maryland Univ., Dept. of Zoology, College Park, MD USA
Novel Afferent Terminal Structure in the Crista Ampullaris of the Goldfish, Carassius auratus
Lanford, Pamela J., Maryland Univ., USA; Popper, Arthur N., Maryland Univ., USA; The Journal of Comparative Neurology; 1996; Volume 366, pp. 572-579; In English; Supported in part by the National Institute on Deafness and Other Communication Disorders
Contract(s)/Grant(s): NAG2-787; T32-DC-00046-02
Report No.(s): NASA-CR-204578; NAS 1.26:204578; UM-Contrib-74; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

Using transmission electron microscopy, we have identified a new type of afferent terminal structure in the crista ampullaris of the goldfish Carassius auratus. In addition to the bouton-type afferent terminals previously described in the ear of this species, the crista also contained enlarged afferent terminals that enveloped a portion of the basolateral hair cell membrane. The hair cell membrane was evaginated and protruded into the afferent terminal in a glove-and-finger configuration. The membranes of the two cells were regularly aligned in the protruded region of the contact and had a distinct symmetrical electron density. The electron-dense profiles of these contacts were easily identified and were present in every crista sampled. In some cases, efferent terminals synapsed onto the afferents at a point where the hair cell protruded into the terminal. The ultrastructural similarities of the goldfish crista afferents to calyx afferents found in amniotes (birds, reptiles, and mammals) are discussed. The results of the study support the hypothesis that structural variation in the vertebrate inner ear may have evolved much earlier in evolution than previously supposed.
Author
Ear; Morphology; Transmission Electron Microscopy; Vertebrates; Membranes; Synapses; Fishes

19970022562 Colorado Univ., Center for Neuroscience, Boulder, CO USA

The Octavolateralis System and Mauthner Cell: Interactions and Questions

Eaton, Robert C., Colorado Univ., USA; Popper, Arthur N., Maryland Univ., USA; Brain Behav. Evol.; 1995; Volume 46, pp. 124-130; In English

Contract(s)/Grant(s): N00014-92-J-0111; NSF IBN-92-08725; NIH-RO1-NS-22621; NIH-DC-00140; NAG2-787

Report No.(s): NASA-CR-204741; NAS 1.26:204741; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

This paper is an overview of some of the major points to arise in the accompanying contributions of this special symposium issue. The symposium papers arose out of discussions among investigators interested in the inner ear and Mauthner cell, with the focus on hydrodynamic components that activate the Mauthner cell through the octavolateralis system. The intention of the symposium was to investigate the possibility of using our knowledge of the Mauthner system to help understand acoustic processing by the ear, and of using, our knowledge of fish hearing to better understand Mauthner cell function. This is the first attempt to take a broad look at both systems to see how they might function together. As such, these proceedings can serve as a mini-tutorial for investiaators interested in one system or the other. In this summary paper we also identify some of the major uncertainties in our understanding of the ear-Mauthner connection. These include questions about: (1) the identity of the acoustic stimuli that are neuroethologically relevant to the Mauthner system; (2) the relative importance of the various octavolateralis inputs (acoustic, vestibular, or lateral line); (3) the contribution of the different various acoustic endorgans to the Mauthner system; (4) whether the Mauthner system can distinguish sound source location; and (5) whether Mauthner neurobiology is compatible with the prevailing model (the phase model) for determining sound source location by fishes. We believe these issues provide potentially useful avenues of future investigation that should give important insights into both acoustic processing by fish and the function of the Mauthner system.

Author

Hydrodynamics; Ear; Hearing; Fishes; Neurophysiology; Acoustic Delay Lines

19970022712 Instituto Nacional de Pesaciais Espaciais, Sao Jose dos Campos, Brazil

Spectral Characterization of Deficiency Symptoms of Nitrogen(N), Phosphorus(P) and Potassium(K) in Eucalyptus Saligna Seedlings ***Caracterizacao Espectral de Sintomas Relacionados as Deficiencias de Nitrogenio(N), Fosforo (P) e de Potassio (K) em Mudasde Eucalyptus saligna***

Ponzoni, Flavio Jorge, Instituto Nacional de Pesaciais Espaciais, Brazil; deMoraes Goncalves, Jose Leonardo, Escola Superior de Agricultura Luiz de Queiroz, Brazil; 1997; 62p; In Portuguese

Report No.(s): INPE-6136-PRP/199; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This work was carried out considering two steps. In the first one, deficiency simptoms of Nitrogen (N), Phosphorus (P) and Potassium (K) were induced in Eucalyptus saligna seedlings in order to characterize, in spectral terms, these symptoms in the spectral range of 0.4 to 0.9 microns. The results showed that characterization was evident in the visible spectral region, mainly with the symptoms related to P and K. The seedling age has shown an important factor to be considered in that kind of characterization. In the second step, TM/LANDSAT images were used in order to evaluate the potential of that kind of remote sensing product in the spectral characterization of deficiency symptoms of K, that were identified in Eucalyptus spp. stands in field conditions. The images were selected considering when the symptoms were evident in the field and when they were not. The results did not show the same tendency of those reached in the first step. It could be indicative that this kind of product can not be used in that characterization.

Author

Nitrogen; Phosphorus; Potassium; Signs and Symptoms; Seeds; Spectrum Analysis

19970022817 Marquette Univ., Biology Dept., Milwaukee, WI USA

Effect of Hindlimb Unloading on Rat Soleus Fiber Force, Stiffness, and Calcium Sensitivity

McDonald Kerry S., Marquette Univ., USA; Fitts, Robert H., Marquette Univ., USA; 1995; ISSN 0161-7567, pp. 1796-1802; In English

Contract(s)/Grant(s): NAG2-212; NAGw-4376

Report No.(s): NASA-CR-204850; NAS 1.26:204850; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

The purpose of this study was to examine the time course of change in soleus muscle fiber peak force (N), tension (P(sub 0), kN/sq m), elastic modulus (E(sub 0)), and force-pCa and stiffness - pCa relationships. After 1, 2, or 3 wk of Hindlimb Unloading (HU), single fibers were isolated and placed between a motor arm and a transducer, and fiber diameter, peak absolute force, P(sub 0), E(sub 0), and force-pCa and stiffness-pca relationships were characterized. One week of HU resulted in a significant reduction

in fiber diameter (68 +/- 2 vs. 57 +/- 1 micrometer), force (3.59 +/- 0.15 vs. 2.19 +/- 0.12 x 10(exp -4) N), P(sub 0) (102 +/- 4 vs. 85 +/- 2 kN/sq m), and E(sub 0) (1.96 +/- 0.12 vs. 1.37 +/- 0.13 X 10(exp 7) N/sq m) and 2 wk of HU caused a further decline in fiber diameter (45 +/- 1 micrometer), force (1.31 +/- 0.06 x 10(exp -4) N), and E(sub 0)(0.96 +/- 0.09 x 10(exp 7) N/sq m). Although the mean fiber diameter and absolute force continued to decline through 3 wk of HU, P(sub 0) recovered to values not significantly different from control. The P(sub 0)/E(sub 0) ratio was significantly increased after 1 (5.5 +/- 0.3 to 7.1 +/- 0.6), 2, and 3 wk of HU, and the 2-wk (9.5 +/- 0.4) and 3-wk (9.4 +/- 0.8) values were significantly greater than the 1-wk values. The force-pCa and stiffness-pCa curves were shifted right- ward after 1, 2, and 3 wk of HU. At 1 wk of HU, the Ca(2+) sensitivity of isometric force, assessed by Ca(2+) concentration required for half-maximal force, was increased from the control value of 1.83 +/- 0.12 to 2.30 +/- 0.10 micrometers. In conclusion, after HU, the decrease in soleus fiber P(sub 0) can be explained by a reduction in the number of myofibrillar cross bridges per cross-sectional area. Our working hypothesis is that the loss of contractile protein reduces the number of cross bridges per cross-sectional area and increases the filament lattice spacing. The increased spacing reduces cross-bridge force and stiffness, but P(sub 0)/E(sub 0) increases because of a quantitatively greater effect on stiffness. Author

Rats; Weightlessness; Muscles; Modulus of Elasticity

19970022876 Florida State Univ., Dept. of Chemistry, Tallahassee, FL USA

Improved Chromotographic Bioavailability Estimations ***Final Report, 1 Sep. 1993 - 31 Aug. 1996***

Dorsey, John G., Florida State Univ., USA; Aug. 1996; 4p; In English

Contract(s)/Grant(s): F49620-93-I-0514; AF Proj. 3484

Report No.(s): AD-A321846; AFOSR-TR-97-0116; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The question of how to assess bioavailability has received much attention. Bioavailability is most often approximated by the distribution of the solute in question between two phases, most often bulk phases, of water and an immiscible organic solvent. Since the inception of reversed phase liquid chromatography there have been many attempts to correlate chromatographic retention with bioavailability and the most often used bulk measure, the octanol-water partition coefficient. An entire field has developed around this research, referred to as Quantitative Structure Activity Relationships (QSAR), or where chromatographic retention is the measured parameter, Quantitative Structure Retention Relationships (QSRR). Yet with present technology, these attempts are inevitably doomed to failure. On the one hand, bulk phases are not appropriate for modeling a partitioning process in an interphase such as biological membranes, and while chromatographic stationary phases can be argued as having similar structure to a membrane because of chain organization, the density of the grafted chains is much too low to provide a suitable model. It is these problems which we have come to understand and propose to address.

DTIC

Liquid Chromatography; Biology

19970022880 Iowa Univ., Dept. of Microbiology, Iowa City, IA USA

Molecular Biology of Anaerobic Aromatic Biodegradation ***Final Report, 15 Jul. 1992 - 15 Jul. 1996***

Harwood, Caroline S., Iowa Univ., USA; Apr. 06, 1996; 16p; In English

Contract(s)/Grant(s): DAAL-03-92-G-0313

Patent Info.: Filed 14 Aug. 1995; US-Patent-Appl-SN-514576

Report No.(s): AD-A308975; ARO-29659.4-LS; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The molecular basis for the anaerobic degradation of benzoate and 4-hydroxybenzoate was investigated using the bacterium Rhodopseudomonas palustris as a model. These aromatic acids are intermediates in the degradation of structurally diverse aromatic compounds, including environmental pollutants, by many metabolic types of anaerobic bacteria. Benzoate is the starting compound for a major central pathway of anaerobic benzene ring reduction and cleavage. This appears to be, the major route required for complete degradation of toxic aromatic compounds under anaerobic conditions. There is still uncertainty, however, about the sequence of intermediates formed in the benzoate pathway and very little is known about the enzymology and genetics of the pathway. A major thrust of the work involved cloning benzoate degradation and regulatory genes and assigning functions to these genes based on nucleotide sequencing and physiological analyses of strains carrying defined mutations. Other studies included purification and characterization of the benzoate pathway ring cleavage enzyme (2-ketocyclohexanecarboxyl-CoA hydrolase).

DTIC

Anaerobes; Bacteria; Enzymes; Biodegradation; Molecular Biology

19970022909 Maryland Univ., Dept. of Zoology, College Park, MD USA

Structural Diversity in the Inner Ear of Teleost Fishes: Implications for Connections to the Mauthner Cell

Popper, Arthur N., Maryland Univ., USA; Edds-Walton, Peggy L., Maryland Univ., USA; Brain, Behavior and Evolution; (1995); Volume 46, pp. 131-140; In English

Contract(s)/Grant(s): N00014-92-J-1114; NAG2-787; NIH-DC-00140; MH-10256

Report No.(s): NASA-CR-204576; NAS 1.26:204576; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

A body of literature suggests that the Mauthner cell startle response can be elicited by stimulation of the ear. While we know that there are projections to the M-cell from the ear, the specific endorgan(s) of the ear projecting to the M-cell are not known. Moreover, there are many reasons to question whether there is one pattern of inner ear to M-cell connection or whether the endorgan(s) projection to the M-cell varies in species that have different hearing capabilities of hearing structures. In this paper, we briefly review the structure of fish ears, with an emphasis on structural regionalization within the ear. We also review the central projections of the ear, along with a discussion of the limited data on projections to the M-cell.

Author

Structural Engineering; Ear; Fishes; Cells (Biology)

19970023044 Maryland Univ., College Park, MD USA

Sensory Cells of the Fish Ear: A Hairy Enigma

Popper, A. N., Maryland Univ., USA; Saidel, W. M., Rutgers Univ., USA; Sensory Systems; 1995; ISSN 0894-4520; Volume 8, Nos. 3-4, pp. 142-149; In English

Contract(s)/Grant(s): N00014-92-J-1114; NAG2-787; NIH-DC-00140; NIH-DC-01729

Report No.(s): NASA-CR-204577; NAS 1.26:204577; UD-612.85; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

Analysis of the structure of the ears in teleost fishes has led to the tentative suggestion that otolithic endorgans may function differently, in different species. Recently, evidence has demonstrated different 'types' of sensory hair cells can be found in the ears of teleost fishes, and individual hair cell types are found in discrete regions of individual sensory, epithelia. The presence of multiple hair cell types in fishes provides strong support to the hypothesis of regional differences in the responses of individual otolithic sensory epithelia. The finding of hair cell types in fishes that closely resemble those found in amniote vestibular endorgans also suggests that hair cell heterogeneity arose earlier in the evolution of the vertebrate ear than previously thought.

Author

Sensory Stimulation; Sensory Perception; Fishes; Ear; Cells (Biology)

19970023124 Georgia Univ., Dept. of Microbiology, Athens, GA USA

Characterization of Selected Bacteria and Enzymes Involved in the Sequential Anaerobic Degradation of 2,4-Dichlorophenol ***Final Report, 1 Jun. 1991 - 31 May 1996***

Wiegel, Juergen, Georgia Univ., USA; May 1996; 8p; In English

Contract(s)/Grant(s): N00014-91-J-1874

Report No.(s): AD-A322559; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We elucidated the pathway for the anaerobic degradation of chlorophenols under methanogenic conditions and studied the microbial interactions of the community being directly or indirectly involved in this process. At least 6 different bacteria, -constituting a sequential pathway-, are required. We studied the influence of various environmental factors on the degradation rates in sediment samples and directly in the environment. During the grant period, we isolated two of the main members of this pathway: (1) Desulfitobacterium dehalogenans gen. nov., sp. nov., which catalyzes specifically the removal of ortho substituted phenolic chlorines. An extensive substrate specificity and structure-function analysis, revealed that especially the para position of the halophenols can be substituted with a great variety of groups including carboxylic-, nitro-, amino-, methyl-, hydroxyl-, halogen-, and aryl-substituents leading to a wide variety of different compound classes. We started on the purification of the dehalogenase. (2) Clostridium hydroxybenzoicum sp. nov., which catalyzes the important step of forming hydroxybenzoate and thus linking in the degradation chain the and the mineralization of the phenolic compounds. The organism harbors two specifically induced reversible which we purified and characterized. Most of the work has been published in various international journals.

DTIC

Anaerobes; Bacteria; Enzymes; Degradation

19970023401 NASA Washington, Washington, DC USA
Life Sciences Program Tasks and Bibliography for FY 1996
Nelson, John C., Editor, NASA Washington, USA; May 1997; 940p; In English
Contract(s)/Grant(s): NASw-5000
Report No.(s): NASA-TM-4801; NAS 1.15:4801; No Copyright; Avail: CASI; A99, Hardcopy; A10, Microfiche

This document includes information on all peer reviewed projects funded by the Office of Life and Microgravity Sciences and Applications, Life Sciences Division during fiscal year 1996. This document will be published annually and made available to scientists in the space life sciences field both as a hard copy and as an interactive Internet web page.
Author
Life Sciences; Bibliographies; Microgravity; Aerospace Medicine; Bioastronautics

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AEROSPACE MEDICINE

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

19970022261 Institute for Human Factors TNO, Soesterberg, Netherlands
The Physiological Basis for Thermal Comfort in Different Climates; a Preliminary Study ***Final Report De fysiologische basis voor thermisch comfort onder diverse klimatologische omstandigheden; een voorstudie***
Heus, R., Institute for Human Factors TNO, Netherlands; Havenith, G., Institute for Human Factors TNO, Netherlands; Aug. 07, 1996; 50p; In Dutch
Contract(s)/Grant(s): A93/KL/317
Report No.(s): AD-A321140; TNO-TM-96-A030; TDCK-RP-96-0167; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Thermal comfort is very important for optimal functioning of humans. It gives information about the thermal state of the body, by which the human body can take physiological measures or the human can take behavioural measures to maintain thermal control. This will be the base of this study. Thermal comfort is sensed by warm and cold receptors in the skin, but also in deeper structures of the body . Pain receptors play a role in the detection of extreme cold and heat. The hypothalamus is the regulation and detection centre of temperature in the body, receiving afferent information of the receptors and sending efferent information to the effectors by which the body controls its temperature. Thermal comfort is determined by the temperature, pain and comfort sensations of the body. Also the experience of humidity can influence the comfort feelings. A problem in the study of comfort is the large diversity of the subjective scales used, which makes it difficult to compare the developed models. The goal of this study however is to make an inventory of most commonly used models and to judge them on useability for the existing thermoregulatory models. Local sensations are described as power functions based on psycho-physical functions and global sensations are described as linear functions. The most important dependent variables in global thermal comfort are core temperature, temperature of the extremities and temperature of the environment. In local thermal comfort and pain, temperature of the skin is most important. Humidity sensation of the skin is determined by temperature of the core, sweat production and local relative humidity of the skin. DTIC
Thermal Comfort; Temperature Control; Control Equipment; Climate; Thermoregulation

19970022328 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA
Domestic Use of Telemedicine Technology: Lessons Learned From Initial Consultations ***Final Report, 1 Feb. 1995 - 30 Sep. 1995***
Jacoby, Itzhak, Uniformed Services Univ. of the Health Sciences, USA; Oct. 30, 1995; 11p; In English
Report No.(s): AD-A321033; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Twenty-one patients presenting to the Dunham U.S. Army Health Clinic (DUSAHC) were evaluated by specialists at Walter Reed Army Medical Center (WRAMC) between June 1-30, 1995, using videoconferencing technology (Telemedicine). The project involved DUSAHC physicians and physicians' assistants, consulting physicians at WRAMC, Mystech computer system developers, WRAMC support staff, DUSAHC support staff, and a data gatherer from the Uniformed Services University of the Health Sciences (USUHS). Following a May 19 meeting with the medical staff of DUSAHC (during Grand Rounds), telemedicine consultations began to be scheduled almost daily, often twice a day. Three major points were agreed upon at that meeting: consultations would be scheduled at the clinic's convenience, with WRAMC staff making themselves available on a flexible basis; a Mystech programmer would be assigned to work at the clinic to debug and operate the equipment during consultations; and those

telemedicine patients requiring follow-up appointments would have them scheduled either during the consultation or on an expedited basis. The DUSAHC trial indicated that a designated telemedicine coordinator with specific skills is an absolute requirement.
DTIC
Teleconferencing; Telemedicine; Consulting; Video Communication; Computer Programs

19970022452 Battelle Human Affairs Research Centers, Seattle, WA USA
Fatigue and Alertness In Merchant Marine Personnel: A Field Study of Work and Sleep Patterns ***Final Report***
Sanquist, Thomas F., Battelle Human Affairs Research Centers, USA; Raby, Mireille, Battelle Human Affairs Research Centers, USA; Maloney, Alice L., Battelle Human Affairs Research Centers, USA; Carvalhais, Antonio B., Coast Guard Research and Development Center, USA; Jun. 1996; 104p; In English
Report No.(s): AD-A322126; USCG-D-06-97; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

As part of its mission to improve the safety of maritime operations, the U.S. Coast Guard (USCG) has undertaken a multi-year research program to establish a technical basis for maritime operational practice and regulatory guidance in work-rest scheduling and work hour limitations. Numerous studies across various modes of transportation show fatigue to be an underlying factor in a significant percentage of accidents; further, many of the accidents appear to be a result of sleep disruption based on work schedule requirements. The current phase of the program is concerned with the following: (1) identify the nature and extent of sleep disruption-induced fatigue in the commercial maritime industry, and (2) identify the impact of watch duration on personnel fatigue. One hundred forty-one mariners from eight commercial ships (6 tankers and 2 freighters) provided data regarding their work and sleep patterns, as well as a variety of other data pertinent to fatigue. The results show that there is a fatigue problem in the U.S. maritime industry, and by implication, internationally. The incidence of critical fatigue indicators such as severely restricted sleep durations per 24-hour period, very rapid sleep onset times, and critically low alertness levels suggest that fatigue regularly occurs. The results point to sleep disruption, reduced time between watches, fragmented sleep, and long workdays as principal contributors to the problem. Several courses of action for fatigue reduction are discussed: (1) work and rest period guidelines and policy, (2) government-industry educational programs, and (3) design and evaluation of alternative work-rest schedules.
DTIC
Fatigue (Biology); Alertness; Stress (Physiology); Workloads (Psychophysiology); Work-Rest Cycle; Personnel

19970022723 California Univ., San Diego, School of Medicine, La Jolla, CA USA
Current Issues in Blood Substitute Research and Development - 1995 ***Final Report, 30 Mar. - 30 Sep. 1995***
Winslow, Robert M., California Univ., San Diego, USA; Feb. 1997; 215p; In English
Contract(s)/Grant(s): DAMD17-95-I-5032
Report No.(s): AD-A321910; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The development of a substitute for transfused red blood cells is a highly sought-after goal. Such products potentially would be safer than human (allogeneic) blood because they would eliminate the possibility of transmission of infectious agents such as those causing hepatitis or the deadly AIDS-producing virus, HIV. In addition, red cell substitutes will revolutionize the practice of transfusion medicine, eliminating the need for cross-matching, and their storage capabilities could lead to an overhaul of current blood bank operations. This collection of essays by prominent authorities in different fields will provide a comprehensive perspective of the theoretical, physiological and medical basis underlying the present status of the development of red blood cell substitutes. Topics include: (1) Mechanisms of oxygen transport by red cell substitutes and their implications for efficacy and toxicity of products. (2) The current state development of blood substitutes such as perfluorocarbon and hemoglobin-based products, and encapsulated hemoglobin products. (3) Mechanisms of autoregulation, vasoactivity and microhemodynamics which affect oxygen delivery and consumption in the microcirculation. (4) The treatment of cancers by enhancing sensitivity to irradiation by increasing tissue PO2. (5) A discussion of the world-wide and military impact of red cell substitute products.
DTIC
Infectious Diseases; Blood; Blood Cells; Human Immunodeficiency Virus

19970022738 Louisiana State Univ., Medical Center, New Orleans, LA USA
Neural Responses to Injury: Prevention, Protection, and Repair ***Annual Report, 20 Sep. 1994 - 19 Sep. 1995***
Mize, R., Louisiana State Univ., USA; Beuerman, Roger, Louisiana State Univ., USA; Bobbin, Richard, Louisiana State Univ., USA; Bazan, Nicolas G., Louisiana State Univ., USA; Kline, David, Louisiana State Univ., USA; Sumner, Austin, Louisiana State Univ., USA; Gebhardt, Bryan, Louisiana State Univ., USA; Carr, Daniel J. J., Louisiana State Univ., USA; Moerschbaecher, Joseph, Louisiana State Univ., USA; Kaufman, Herbert, Louisiana State Univ., USA; Deininger, Prescott, Louisiana State Univ., USA; Bobbin, Richard, Louisiana State Univ., USA; Berlin, Charles, Louisiana State Univ., USA; Oct. 1995; 23p; In English
Contract(s)/Grant(s): DAMD17-93-V-3013

Report No.(s): AD-A321582; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The LSU Neuroscience Center is a comprehensive, multidisciplinary, and trans-departmental entity that unites fundamental neurobiology and the clinical neurosciences in the common goal of elucidating the workings of the brain and contributing to the treatment of currently incurable diseases of the nervous system. The objective of this program is to find solutions to neuroscience-related problems of interest to the US Army Medical Research and Development Command. The program is focused on exploiting novel neuroprotective strategies that lead to prevention of and repair after neural injury. Converging approaches using state-of-the-art tools of cell biology, neurochemistry, neuroimmunology, neurophysiology, neuroppharmacology, molecular biology and virology are ongoing. Over the four years covered in this proposal, this program aims to: (1) carry out seven research projects in the basic and clinical neurosciences; (2) expand central, shared facilities with the addition of highly specialized instrumentation not currently available to our scientists; (3) develop laboratory space to permit the physical consolidation and coordination of this research effort; and (4) institute a coordination unit to monitor, facilitate, and administrate the cooperative research programs, as well as to meet the associated budgetary, human resources, facilities, and communications needs for the attainment of the program goals.

DTIC

Clinical Medicine; Nervous System; Molecular Biology; Neurophysiology

19970022753 Tufts Univ., New England Eye Center, Boston, MA USA

Retinal Injuries from Single and Multiple Picosecond Laser Pulses ***Final Report, 1 May 1993 - 30 Apr. 1995***

Puliafito, Carmen A., Tufts Univ., USA; Feb. 12, 1997; 9p; In English

Contract(s)/Grant(s): F49620-93-I-0337; AF Proj. 2312

Report No.(s): AD-A321867; AFOSR-TR-97-0101; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The research results, supported by Air Force Grant #F49620-93-1-0337 (1), have been successful in obtaining the above objectives. Research supported by this grant has lead to significant advancement in the area of Optical Coherence Tomography (OCT). In brief, OCT represents a new and valuable diagnostic technique for high-resolution; noncontact imaging of the human eye including the retina and cross-sectional imaging of structures in the anterior segment. Optical coherence tomography is analogous to ultrasound, except that optical rather than acoustic reflectivity is measured. This new optical imaging modality has spatial resolution superior to that of conventional clinical ultrasonography (less than 20un) and high sensitivity (dynamic range, greater than 90db). OCT is proving to be a powerful tool for detecting and monitoring a variety of diseases of the eye including a variety of macular diseases, such as macular edema, macular holes, and detachments of the neurosensory retina and pigment epithelium.

DTIC

Injuries; Laser Beams; Laser Damage; Picosecond Pulses; Optical Properties; Pulsed Lasers; Images

19970022809 California Univ., San Diego, Dept. of Bioengineering, La Jolla, CA USA

Pulsatile Fluid Shear in Bone Remodeling ***Final Report***

Frangos, John A., California Univ., San Diego, USA; [1997]; 14p; In English

Contract(s)/Grant(s): NAGw-4256

Report No.(s): NASA-CR-204942; NAS 1.26:204942; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of this investigation was to elucidate the sensitivity to transients in fluid shear stress in bone remodeling. Bone remodeling is clearly a function of the local mechanical environment which includes interstitial fluid flow. Traditionally, load-induced remodeling has been associated with low frequency (1-2 Hz) signals attributed to normal locomotion. McLeod and Rubin, however, demonstrated in vivo remodeling events associated with high frequency (15-30 Hz) loading. Likewise, other in vivo studies demonstrated that slowly applied strains did not trigger remodeling events. We therefore hypothesized that the mechanosensitive pathways which control bone maintenance and remodeling are differentially sensitive to varying rates of applied fluid shear stress.

Author

Bones; Fluid Flow; Low Frequencies; Shear Stress; High Frequencies; Actuators

19970022887 Conductus, Inc., Sunnyvale, CA USA

MR Microscope for Use in Histology ***Final Report, 21 Aug. 1995 - 20 Aug. 1996***

Withers, R. S., Conductus, Inc., USA; Johnson, G. A., Conductus, Inc., USA; Hurlston, S. E., Conductus, Inc., USA; Yap, M., Conductus, Inc., USA; Brey, W. W., Conductus, Inc., USA; Sep. 1996; 28p; In English

Contract(s)/Grant(s): DAMD17-95-C-5080

Report No.(s): AD-A321911; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The long-term goal of this project is to develop a magnetic resonance microscope (MRM) suitable for providing sufficiently rapid assessment of tissue pathology to guide surgery. In this first phase of the project, a feasibility study has been performed. Sensitivity is the key technical issue to developing a practical MRM for clinical applications, so two issues that are crucial to sensitivity have been evaluated: the strength of the polarizing field and the design of the RF coil. The optimal strength of the polarizing field was evaluated based on the contrast to noise ratio (CNR) of a T1 weighted image. For a wide range of relaxation parameters there was a pronounced peak in the CNR at fairly low field. The choice of such a magnetic field would dramatically reduce the cost and size of the final instrument. The performance of HTS and copper RF coils was compared in a 2.0 T MRI system. Even under conditions that were far from ideal, a factor of two improvement in sensitivity was obtained with HTS coils. The results point to a new strategy for providing high contrast and resolution in a relatively inexpensive, compact instrument.

DTIC

Histology; Magnetic Resonance; Microscopes; Imaging Techniques; Feasibility

19970022906 Civil Aeromedical Inst., Oklahoma City, OK USA

Index to FAA Office of Aviation Medicine Reports: 1961 through 1996 ***Final Report***

Collins, William E., Civil Aeromedical Inst., USA; Wayda, Michael E., Civil Aeromedical Inst., USA; Jan. 1997; 81p; In English

Report No.(s): AD-A322331; DOT/FAA/AM-97/1; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

An index to Federal Aviation Administration Office of Aviation Medicine Reports (1964-1996) and Civil Aeromedical Institute Reports is presented for those engaged in aviation medicine and related activities. The index lists all FAA aviation medicine reports published from 1961 through 1996: chronologically (pages 1-42), alphabetically by author (pages 43-51), and alphabetically by subject (pages 53-74). A foreword illustrates historical aspects of the Civil Aeromedical Institute's 35 years of service, describes the index's sections, and explains how to obtain copies of published Office of Aviation Medicine technical reports.

DTIC

Aerospace Medicine; Civil Aviation; Indexes (Documentation)

19970023019 Federal Aviation Administration, Oklahoma City, OK USA

Inflight Medical Care: An Update ***Final Report***

DeJohn, Charles A., Federal Aviation Administration, USA; Veronneau, Stephen J., Federal Aviation Administration, USA; Hordinsky, Jerry R., Federal Aviation Administration, USA; Feb. 1997; 13p; In English

Report No.(s): AD-A322708; DOT/FAA/AM-97/2; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A major concern in aviation medicine is the cabin inflight emergency that may result in the diversion of a flight. At the present time there is no convenient way to monitor the incidence of inflight medical emergencies because airline companies are not regularly required to report medical emergencies or resulting diversions. A survey of one major US airline revealed that one out of every one million passengers may be deplaned by an unscheduled landing because of a life-threatening medical emergency. During a two-year FAA survey of US domestic flights there were 2,322 inflight medical emergencies, averaging approximately three per day, which resulted in an annual diversion rate of approximately 9%. In a 1989 study, inflight emergencies among arriving passengers at the Los Angeles International airport were analyzed. During the six-month period of the investigation 0.003% of 8.5 million passengers developed symptoms in flight that required follow-up assistance on the ground, and 10% of these passengers required hospitalization. A survey of the status of inflight medical care aboard domestic US air carriers was undertaken to determine the impact of current changes in the airline industry. Information for the years 1990 to 1993 was obtained from two airlines and two inflight medical care delivery companies, representing a total of nine major US Part 121 air carriers. This sample accounted for approximately 65% of US domestic air carrier activity for the period 1990 to 1993. The information was reviewed to determine which category of inflight medical emergency occurred most frequently and which category accounted for the greatest number of diversions. The trend in the frequency of diversions for medical reasons was also assessed.

DTIC

Civil Aviation; Emergencies; Medical Services

19970023121 Army Aeromedical Research Lab., Fort Rucker, AL USA

Effects of Heat Stress and an Encumbered Aviator Uniform on Flight Performance in a UH-60 Helicopter Simulator

Reardon, Matthew J., Army Aeromedical Research Lab., USA; Smythe, Nicholas, III, Army Aeromedical Research Lab., USA; Omer, Julia, Army Aeromedical Research Lab., USA; Helms, Beth, Army Aeromedical Research Lab., USA; Estrada, Art, Army Aeromedical Research Lab., USA; Feb. 1997; 134p; In English

Contract(s)/Grant(s): DA Proj. 3M1-62787-A-879

Report No.(s): AD-A322522; USAARL-97-12; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

The effects on flight performance of the four combinations of an unencumbered level-zero MOPP0 aviator battle dress uniform and encumbered MOPP4 over ABDU flight ensemble in cool and hot UH-60 simulator cockpit conditions were evaluated. This report describes the flight performance results. Every 30 minutes, the right seat pilot encountered instrument meteorological conditions and ascended to 2000 feet to perform a 10-minute set of standard maneuvers. After each iteration of the set of standard maneuvers, the pilot returned to Nap-Of-the-Earth (NOE) and contour flight between control points. The right seat pilot also performed four 1-minute hovers (HOVs) and hover turns (HOVTs). The simulator's data acquisition system captured relevant combinations of airspeed, altitude, turn and climb rates, trim, and roll for each type of flight maneuver, as well as cyclic and collective inputs during HOV and HOVT. The encumbered MOPP4 uniform was associated with reduced Averaged Composite Scores (ACS) for five of eight maneuvers. ACS values were significantly lower for 5 of 29 separately scored flight systems parameters. The hot temperature condition reduced the ACS for only one (RSRT) of eight maneuvers. For the iterations of the maneuvers flown with AFOS on, the encumbered MOPP4 ensemble was associated with significantly lower ACS for 3 of 8 maneuvers and 5 of the 29 separately scored flight parameters. With AFCS off, the encumbered MOPP4 uniform significantly degraded the composite ACS for 2 of 4 maneuvers comprising the set of standard maneuvers that were alternately flown with AFCS off and 5 of 17 separately scored flight parameters. The hot temperature was associated with reduced composite ACS values for two of the four flight maneuvers.

DTIC

Attack Aircraft; Flight Clothing; Heat Tolerance

19970023135 Defence Science and Technology Organisation, Canberra, Australia

Environmental Stressors Affecting Human Physiology and Performance in Northern Australia

Lau, Wai-Man, Defence Science and Technology Organisation, Australia; Oct. 1996; 28p; In English

Report No.(s): AD-A322109; DSTO-TR-0431; DODA-AR-009-907; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Deployment of military staff to the north exposes them to the debilitating effects of high heat and humidity. This paper summarises the findings of a series of visit to several military establishments in northern Australia and a training battalion in NSW. Areas of research priority were identified and recommendations were given to address ADF's requirements in human physiological performance and survivability in adverse environments.

DTIC

Human Performance; Physiological Effects; Temperature Effects; Stress (Physiology)

19970023159 Naval Submarine Medical Research Lab., Groton, CT USA

Development of a General Hearing Conservation Standard for Diving Operations: Experiment 1: Comparison of Temporary Auditory Threshold Shifts Induced by Intense Tone in Air and Water ***Interim Report***

Smith, Paul F., Naval Submarine Medical Research Lab., USA; Sylvester, Robert, Naval Submarine Medical Research Lab., USA; Baran, Frances, Naval Submarine Medical Research Lab., USA; Steevens, Christopher, Naval Submarine Medical Research Lab., USA; Sep. 30, 1996; 27p; In English

Contract(s)/Grant(s): M0099-01-C-5050

Report No.(s): AD-A322670; NSMRL-1203; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Preliminary hearing-conservation guidance for occupational exposure to intense waterborne sound has been developed but little supporting experimental evidence has been offered. This paper describes two attempts to experimentally determine the auditory hazard to SCUBA divers exposed to intense noise in water. This paper attempts to develop a data base upon which to establish hearing-conservation standards for Navy divers exposed to waterborne noise.

DTIC

Auditory Perception; Diving (Underwater); Human Tolerances; Hearing; Noise (Sound); Noise Intensity

19970023163 North Carolina Univ., Chapel Hill, NC USA

Improvement of Cultured Keratinocyte Grafts for Burn Wounds ***Annual Report, 31 Dec. 1995 - 30 Dec. 1996***

Meyer, Anthony A., North Carolina Univ., USA; Jan. 1997; 65p; In English

Contract(s)/Grant(s): DAMD17-96-I-6003

Report No.(s): AD-A321915; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

During the first year of grant support all components in the Statement of Work scheduled for year one have been completed, with one still in progress. The results have demonstrated that cultured keratinocyte allografts are less immunogenic in burned animals as measured by priming for second-set rejection and cytotoxic lymphocytes. Burn injury impairs expression of alloantigen on keratinocyte allograft as one mechanism of this effect. A second mechanism that effects the response is an increase in cytokine in the burn wound and distant normal tissue after burn injury. Notably, cultured keratinocyte allografts deficient in Class 2 histocompatability antigen are significantly less immunogenic, especially after burn injury, and may provide a means to produce universal donor keratinocytes.

DTIC

Lymphocytes; Burns (Injuries); Epidermis

19970023391 San Jose State Univ., CA USA

Effect of Artificial Gravity: Central Nervous System Neurochemical Studies ***Final Report, 1 May 1994 - 31 Mar. 1997***

Fox, Robert A., San Jose State Univ., USA; D'Amelio, Fernando, San Jose State Univ., USA; Eng, Lawrence F., Veterans Administration Hospital, USA; 1997; 43p; In English

Contract(s)/Grant(s): NAGw-4480; SJSU-21-1614-7083

Report No.(s): NASA-CR-205046; NAS 1.26:205046; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The major objective of this project was to assess chemical and morphological modifications occurring in muscle receptors and the central nervous system of animals subjected to altered gravity (2 x Earth gravity produced by centrifugation and simulated micro gravity produced by hindlimb suspension). The underlying hypothesis for the studies was that afferent (sensory) information sent to the central nervous system by muscle receptors would be changed in conditions of altered gravity and that these changes, in turn, would instigate a process of adaptation involving altered chemical activity of neurons and glial cells of the projection areas of the cerebral cortex that are related to inputs from those muscle receptors (e.g., cells in the limb projection areas). The central objective of this research was to expand understanding of how chronic exposure to altered gravity, through effects on the vestibular system, influences neuromuscular systems that control posture and gait. The project used an approach in which molecular changes in the neuromuscular system were related to the development of effective motor control by characterizing neurochemical changes in sensory and motor systems and relating those changes to motor behavior as animals adapted to altered gravity. Thus, the objective was to identify changes in central and peripheral neuromuscular mechanisms that are associated with the re-establishment of motor control which is disrupted by chronic exposure to altered gravity.

Author

Central Nervous System; Artificial Gravity; Neuromuscular Transmission; Muscles; Microgravity; Gravitational Effects; Chemical Reactions; Animals; Gravitational Physiology; Immune Systems

53
BEHAVIORAL SCIENCES

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

19970022287 Georgia State Univ., Atlanta, GA USA

Respondents, Operants, and Emergents: Toward an Integrated Perspective on Behavior

Rumbaugh, Daune M., Georgia State Univ., USA; Washburn, David A., Georgia State Univ., USA; Hillix, William A., San Diego State Univ., USA; In Learning as a Self-Organizing Process; 1996, pp. 57-73; In English

Contract(s)/Grant(s): NAG2-438; NIH-HD-06016

Report No.(s): NASA-CR-204798; NAS 1.26:204798; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

A triarchic organization of behavior, building on Skinner's description of respondents and operants, is proposed by introducing a third class of behavior called 'emergents.' Emergents are new responses, never specifically reinforced, that require operations more complex than association. Some of these operations occur naturally only in animals above a minimum level of brain complexity, and are developed in an interaction between treatment and organismic variables. (Here complexity is defined in terms of relative levels of hierarchical integration made possible both by the amount of brain, afforded both by brain-body allometric relationships and by encephalization, and, also, the elaboration of dendritic and synaptic connections within the cortex and con-

nections between various parts/regions of the brain.) Examples of emergents are discussed to advance this triarchic view, of behavior. The prime example is language. This triarchic view reflects both the common goals and the cumulative nature of psychological science.
Author
Behavior; Psychology; Animals; Brain; Languages

19970022327 Institute for Human Factors TNO, Soesterberg, Netherlands
Psychosocial Risks at Work, Measured with Personnel from the Royal Military Academy ***Interim Report Welzijnsrisico's bij KMA-personee***
vanOrden, C. Y., Institute for Human Factors TNO, Netherlands; Langefeld, J. J., Institute for Human Factors TNO, Netherlands; Oct. 11, 1996; 58p; In Dutch
Report No.(s): AD-A321036; TNO-TM-96-A041; TDCK-RP-96-0181; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

All Dutch employers are obliged to maintain an inventory of psychosocial risks in the work environment, according to work legislation. In the Dutch Army, the Checklist Man & Organization (TOMO), developed by the TNO Human Factors Research Institute, is used for this inventory. After a first evaluation in 1995, the TOMO inventory was slightly adjusted, and two response categories were added. This renewed inventory was evaluated again, with personnel of the Royal Military Academy. Ten function groups were involved in the study, all represented by approximately ten employees. Respondents filled in the TOMO, as well as a short questionnaire on rank, experience, and contract. In this report, only the psychosocial risks that were found in the different function groups are described. Technical aspects of the inventory (reliability and validity) are reported elsewhere. In general, most psychosocial risks occur in the area of Task Demands (chapter 1 of TOMO) en Skill Discretion (chapter 4 of TOMO). It is striking that employees with a civil contract report more risks than the military personnel, and that sergeants report more risks than officers. It also seems to matter how long people have been working on their job: freshmen, or very experienced employees report more risks than those who have been carrying out their jobs for a 'mediocre' period of time. All this causes some interpretation problems. Risks do not automatically have to do with functions, but one should bear in mind rank, contract, and experience. In the appendix, the total TOMO inventory is included, as well as summaries of the 'risks' per function group.
DTIC
Human Factors Engineering; Personnel Management; Netherlands

19970022439 Institute for Human Factors TNO, Soesterberg, Netherlands
Mission and Task Analysis Methods with Respect to Instructional Development ***Final Report Missie- en taakanalyse: Methoden in het kader van opleidingsontwikkeling***
vanRooij, C. J., Institute for Human Factors TNO, Netherlands; vanBerlo, M. P., Institute for Human Factors TNO, Netherlands; Aug. 02, 1996; 59p; In Dutch
Report No.(s): AD-A321061; TNO-TM-96-A029; TDCK-RP-96-0166; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A major problem in instructional development is the lack of a valid, unambiguous, and sufficiently specific description of the tasks for which instruction is intended. In this report methods are described which provide such a description. The concepts that have been used to develop these methods are derived from the psychological research literature and from ideas adopted from system theory. The methods comprise a method of mission analysis and a method of task analysis that are applied successively. On the basis of mission analysis the behaviour of the system within which the tasks are executed is described. This behaviour is analysed and described in terms of behaviour elements that are called 'missions'. The result is a structured set of mission descriptions that is called the mission repertoire. On the basis of the mission repertoire, the behaviour of the functionaries that belong to the system is analysed and described by means of a method of task analysis. The result is a behavioral description in terms of (relations between) tasks: the task repertoire. In turn, the task repertoire constitutes the starting point for subsequent steps that are distinguished within the analysis phase of instructional development, viz. target group and training analysis. Ultimately, these steps result in a specification of the learning objectives that are to be achieved by the to-be-developed instruction. Although the methods that are described have been developed within the domain of mobile weapon systems, the principles employed are also considered to be applicable within other domains; be they military or non-military.
DTIC
Systems Analysis; Education; Experiment Design

19970022447 Institute for Human Factors TNO, Soesterberg, Netherlands

The Effect of Shared Knowledge on Team Decision Making in a Command and Control Task ***Interim Report Het effect van gemeenschappelijke kennis op teambesluitvorming in een Command and Control taak***

Schraagen, J. M., Institute for Human Factors TNO, Netherlands; Koster, E. R., Institute for Human Factors TNO, Netherlands; Oct. 17, 1996; 42p; In Dutch

Report No.(s): AD-A321028; TNO-TM-96-8015; TDCK-RP-96-0183; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The effect of shared knowledge on team decision making in Command and Control tasks was investigated in the present research. In a simulated C2-task 22 teams of 2 subjects each played 16 scenarios. The scenarios varied in th e disturbance of communication between team members and in whether these were routine or non-routine, that is whether knowledge acquired during training could be applied or not. In half of the teams both team members possessed knowledge for detecting threat patterns, in the other half of the teams only one team member possessed that knowledge and he or she had to explicitly instruct the other team member to detect threats. The results showed that teams in which knowledge was shared between team members performed better than teams in which knowledge was not shared. This 'shared knowledge effect' was strongest in those situations in which communication was disturbed. The effect was absent in non-routine scenarios. There was, however, a positive effect of shared knowledge on the quick dissemination of threat reports in routine scenarios. We conclude that sharing specialist knowledge, such as required for threat assessment, can have positive effects on team decision making, particularly in situations in which the communication between team members is degraded.

DTIC

Command and Control; Decision Making; Information Transfer

19970022460 North Dakota Univ., Dept. of Psychology, Grand Forks, ND USA

Effects of Misinformation on the Concealed Knowledge Test ***Final Report, Mar. 1995 - Aug. 1996***

Amato-Henderson, SUSAn L., North Dakota Univ., USA; Aug. 1996; 55p; In English

Report No.(s): AD-A321267; DODPI-97-R-0001; DODPI-95-P-0017; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Misinformation effects occur in laboratory settings despite disagreement over the mechanism(s) responsible for such effects. Both memory impairment and non-impairment hypotheses explain the phenomenon. The effects of misinformation were examined using the Concealed Knowledge Test (CKT), a psychophysiological detection of deception technique. Ninety-six subjects watched a videotaped crime used to induce guilt. One week later, subjects were given misinformation about three crime details, took a CKT inquiring about the three misled details and three non-misled crime details, and took a 20-item memory test concerning the crime. The six questions asked during the CKT were included in the memory test. Subjects who chose the misinformation on a misled detail were labeled as successfully misinformed. Significant differences were found between the misled and non-misled CKT series, with misinformation leading to a lower score (i.e., higher probability of being categorized as truthful). An interaction was found between CKT detail type and information manipulation with univariate procedures identifying skin resistance amplitude, skin resistance half-recovery time, and abdominal respiration as significant dependent measures. These findings support the memory impairment hypotheses.

DTIC

Psychophysiology; Stress (Psychology); Retention (Psychology); Perception

19970022503 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA

Perceptual Fidelity for Digital Color Imagery

Martin, Curtis E., Air Force Inst. of Tech., USA; Dec. 1996; 114p; In English

Report No.(s): AD-A321063; AFIT/DS/ENG/96-14; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The problem of measuring the fidelity of digital color images in a manner that corresponds to human perceptual assessments is addressed. Experiments are performed to validate Human Visual System (HVS) models, which provide access to a 'perceptual space' in which visual distortions may be measured, and then a model is proposed for assessing the perceptual fidelity of digital color image. Color Mach bands are produced in the first experiment, demonstrating that, as in the brightness channel, low spatial frequency attenuation occurs in the chromatic channels of the HVS. In the second experiment, a correlation between the chromatic channels of the HVS model and color discrimination axes of color blind observers is demonstrated. Removing variation from one of the chromatic channels of a natural image produces a color-distorted image which the color blind subjects cannot distinguish from the original. Removing variation from the other chromatic channel produces an image that appears colorful to normally-sighted observers, but monochrome to the color blind observers. The third experiment shows that a Gabor filter-based HVS model produces illusory contours in several illusory contour stimuli. These results provide a unique validation of multiple-channel HVS

models which process the image in multiple spatial frequency bands that are tuned to match measured sensitivities of neurons in the primary visual cortex of cats and monkeys. Finally, the multiple-channel processing used in the illusory contour experiment is combined with the color vision model from the first two experiments to produce a multiple-channel, color HVS model for measuring perceptual fidelity of color images. A demonstration of the model shows that the structure of the new model is correct. However, inaccurate parameter values for the multiple-channel processing of the chromatic channels cause over-predict
DTIC
Imagery; Color Vision; Image Processing; Digital Command Systems; Visual Perception

19970022572 Institute for Human Factors TNO, Soesterberg, Netherlands
Evidence for a Multi-Stage Model of Practice in Sequential Movement Tasks ***Final Report Evidentie voor een multi-stadium model voor oefening in een sequentiele bewegingstaak***
Verwey, W. B., Institute for Human Factors TNO, Netherlands; Aug. 01, 1996; 46p; In English
Report No.(s): AD-A321008; TNO-TM-96-B011; TDCK-RP-96-0165; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of the present study was to explore the effects of practice in a task in which fixed movement patterns are produced. Earlier studies indicated that an encapsulated representation, a motor chunk, develops when a certain movement pattern is repeatedly executed. The motor chunk would be used to control the production of the movement sequence at a processing stage called sequence construction. This would free processing capacity at earlier processing stages and allow for concurrent processing. The present study sought evidence for the sequence construction stage and the notion that the effect of practice at this stage (i.e. motor chunks development) is independent from that at the response selection stage. The reported experiment included a 2500 trial practice phase and four transfer phases including serial response production, stimulus/response reversal, and production of familiar sequences in rapid succession. In the practice phase, independence of response selection and sequence construction was indicated by effects of mapping consistency, foreperiod duration, and sequence length. The transfer phases showed further evidence for independent effects of practice at response selection and sequence construction as well as for concurrent proc essing.
DTIC
Concurrent Processing; Frequency Response; Reaction Time

19970022578 California Univ., Irvine, CA USA
Experimental and Theoretical Studies of Selective Attention in Visual Search ***Final Report, 1 Sep. 1995 - 31 Aug. 1996***
Sperling, George S., California Univ., USA; Sep. 30, 1996; 25p; In English
Contract(s)/Grant(s): F49620-93-I-0520; AF Proj. 3484
Report No.(s): AD-A321193; AFOSR-TR-97-0095; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This thesis project is a method of measuring the modulation transfer function of spatial visual attention. When the assumptions of this method of measuring attention are satisfied, the method enables one to calculate, for any attentional demand whatsoever, the extent to which an observer could mould his or her distribution of spatial attention to meet the demand. This research is being reported at ARVO, 1997, and a preliminary report is attached herewith.
DTIC
Modulation Transfer Function; Visual Perception; Computer Graphics; Human-Computer Interface

19970022720 Army Aeromedical Research Lab., Fort Rucker, AL USA
The Efficacy of Hypnotic-Induced Prophylactic Naps for the Maintenance of Alertness and Performance in Sustained Operations ***Final Report***
Caldwell, John A., Jr., Army Aeromedical Research Lab., USA; Jones, Roger W., Army Aeromedical Research Lab., USA; Caldwell, J. L., Army Aeromedical Research Lab., USA; Colon, Jose A., Army Aeromedical Research Lab., USA; Pegues, Andre, Army Aeromedical Research Lab., USA; Iverson, Lucinda, Army Aeromedical Research Lab., USA; Roberts, Kristi A., Army Aeromedical Research Lab., USA; Ramsport, Stephanie, Army Aeromedical Research Lab., USA; Sprenger, William D., Army Aeromedical Research Lab., USA; Gardner, SUSAn J., Army Aeromedical Research Lab., USA; Feb. 1997; 68p; In English
Contract(s)/Grant(s): DA Proj. 3M1-62787-A-879
Report No.(s): AD-A321691; USAARL-97-10; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Army aviation units must be capable of sustained operations to achieve a tactical advantage over enemy forces. However, when adequate numbers of personnel are unavailable to staff all shifts 24 hours per day, cognitive efficiency, mood, and motivation rapidly deteriorate because of insufficient sleep. A solution for this problem may be the implementation of a prophylactic napping strategy which allows personnel to store a limited amount of sleep prior to deprivation. Two hour naps have been shown to offer significant alertness benefits in sustained work periods. Unfortunately, although naps have been proven effective in the laboratory,

there may be problems in operational situations. For instance, it may not be possible to place naps at times when sleep will be optimal. In these situations, it may be useful to facilitate napping with a short-acting sleep medication such as zolpidem tartrate. This should allow personnel to gain more restful sleep during limited time periods. However, there may be hangover effects since the half life of zolpidem is 2.5 hours.
DTIC
Sleep Deprivation; Alertness; Mental Performance; Physiological Responses; Work-Rest Cycle; Workloads (Psychophysiology)

19970022721 Uniformed Services Univ. of the Health Sciences, Dept. of Psychiatry, Bethesda, MD USA
Sex Differences, Stress, and Military Readiness ***Final Report***
Gabbay, Frances H., Uniformed Services Univ. of the Health Sciences, USA; Ursano, Robert J., Uniformed Services Univ. of the Health Sciences, USA; Norwood, A. E., Uniformed Services Univ. of the Health Sciences, USA; Fullerton, C. S., Uniformed Services Univ. of the Health Sciences, USA; Sutton, L. K., Uniformed Services Univ. of the Health Sciences, USA; Mar. 1996; 408p; In English
Report No.(s): AD-A321693; No Copyright; Avail: CASI; A18, Hardcopy; A04, Microfiche

The goal of this report is to consider the effects of stress associated with combat, deployment, contingency operations, and trauma on military women's health and performance. This volume reviews empirical and theoretical work bearing on issues of sex differences in the effects of stress on mental health and performance, and to consider ways in which knowledge of this work might assist commanders in the integration of women into an effective military force. It is the hope of the authors that this material will prove useful in the development of a structure within which active duty women and men can function effectively. The success of this effort in the military, for which readiness is the singular operating principle, may also provide a model for change in civilian society.
DTIC
Human Performance; Sex Factor; Stress (Psychology)

19970022803 York Univ., Dept. of Psychology, Ontario Canada
Visual and Auditory Sensitivities and Discriminations ***Final Report, 15 Dec. 1993 - 14 Dec. 1996***
Regan, David, York Univ., Canada; Dec. 14, 1996; 163p; In English
Contract(s)/Grant(s): F49620-94-I-0083; AF Proj. 2313
Report No.(s): AD-A321301; AFOSR-TR-97-0084; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This paper discusses the following topics: (1) The ability to judge time to collision with an approaching object is high in central vision but considerably poorer in peripheral vision. (2) A pilot's time to collision with a simulated approaching helicopter depends on the relative contributions of ownship speed and target speed. (3) Binocular judgements of the direction of motion in depth are similar for motion in the vertical and horizontal meridians. (4) Spatial frequency, temporal frequency, orientation and contrast are processed independently and in parallel. (5) Orientation discrimination for cyclopean form and texture-defined form can be as acute as for luminance-defined form. (6) A letter test for measuring the ability to see and recognize texture-defined form has been made freely available. (7) A physiologically-plausible model of the recognition of texture-defined letters has been developed. (8) The ability to recognize texture-defined, motion-defined and luminance-defined letters can be independently lost in patients with multiple sclerosis. (9) Magnetic brain recording has been used to identify and locate an audio-visual convergence area in human brairand centres for color-defined, texture-defined, and luminance-defined form. (10) Mathematical methods for obtaining the response of auditory hair cells to complex amplitude modulated tones and the harmonic distortion of a pure tone caused by the hair cell transducer function have been developed.
DTIC
Visual Acuity; Helicopters; Auditory Perception; Aircraft Pilots

19970022871 NTI, Inc., Dayton, OH USA
Assessing the Performance Impact of G-Forces: Design of the Acceleration Performance Assessment Simulation System(A-PASS) ***Final Report, May - Nov. 1995***
ODonnell, Robert D., NTI, Inc., USA; Cardenas, Rebecca, NTI, Inc., USA; Eddy, Douglas, NTI, Inc., USA; Shaw, Robert, FCI Associates, Inc., USA; Dec. 1995; 72p; In English
Contract(s)/Grant(s): F41624-95-C-6005; AF Proj. 3005
Report No.(s): AD-A320232; AL/CF-TR-1996-0093; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A performance assessment system for use on a man-rated centrifuge is discussed. The problem of measuring human performance during high G flight simulation is addressed. This research addressed the fundamental problem of using laboratory data to assess the operational military impact (OMI) of physiological stresses. First, a battery of flight task simulations was conceptual-

ized, based on current performance assessment theory. Second, a procedure was demonstrated for converting laboratory measures from this battery into measures of OMI. Specifically, performance data were entered into high-fidelity computer models of aircraft missions, yielding estimates of the military impact of stressors on human performance (e.g., kill probability, circular error - CEP, survivability, etc.). In the pilot demonstration, the effect of a hypothetical stressor on a pop-up air-to-ground maneuver in the F4E aircraft was evaluated. In the undegraded state, the CEP was 25.0 feet (S.D. 10.8 feet). In the degraded state, the CEP was 50.1 feet (S.D. 21.9 feet). This demonstration proved the feasibility of providing operationally meaningful metrics based on laboratory performance data.
DTIC
Performance Prediction; Centrifuges; High Gravity Environments; Human Performance; Flight Simulation; Flight Crews

19970022877 Yale Univ., Dept. of Psychiatry, New Haven, CT USA
Stress-Induced Enhancement of the Startle Reflex ***Final Report, 30 Sep. 1993 - 29 Sep. 1996***
Davis, Michael, Yale Univ., USA; Sep. 29, 1996; 15p; In English
Contract(s)/Grant(s): F49620-93-I-0293; AF Proj. 2312
Report No.(s): AD-A322289; AFOSR-TR-97-0132; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A major goal of the work funded by the Air Force over the previous grant periods was to evaluate the role of the amygdala in both conditioned and unconditioned fear and anxiety. During the last funding period, covered in the current Final Technical Report, we have investigated the role of a brain area closely associated with the amygdala, namely the bed nucleus of the stria terminals (BNST), in fear and anxiety, as well as in the anxiety producing effects of the peptide, corticotropin releasing hormone. In addition, we have obtained further evidence concerning the neural pathway that mediates the primary acoustic startle reflex, changes in which we use as our marker of conditioned fear.
DTIC
Fear; Reflexes; Anxiety; Evoked Response (Psychophysiology)

19970022908 Brigham and Women's Hospital, Boston, MA USA
Developing Guided Search 3.0: The Next Generation of a Model of Visual Search ***Final Report, May 1993 - May 1996***
Wolfe, Jeremy M., Brigham and Women's Hospital, USA; Feb. 18, 1997; 88p; In English
Contract(s)/Grant(s): F49620-93-I-0407; AF Proj. 2313
Report No.(s): AD-A322288; AFOSR-TR-97-0137; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This report describes achievement in four areas: (1) Guided Search 3.0 (GS3) is the third generation of the Guided Search model of visual search behavior. It models new visual search data and proposes a relationship between covert deployment of attention and overt eye movements;(2) Research documents the effect of eccentricity in visual search, shows the interaction of those effects with other visual and non-visual loads, and incorporates eccentricity effects into GS3;(3) A retrospective analysis of 2500 search sessions provides an unprecedented statistical picture of human search behavior; and (4) Research shows that published inferences based on individual differences in search performance must be evaluated with great caution. These differences prove to be statistically unreliable. Nevertheless, with proper methods, it is possible to find reliable individual differences in visual search.
DTIC
Eye Movements; Image Processing; Visual Perception; Searching; Computer Programs

19970022921 Armstrong Lab., Brooks AFB, TX USA
Instructional Interventions for Reduction of Gender Differences in Learning ***Final Report, 9 Jan. 1995 - 30 Sep. 1995***
Regian, J. W., Armstrong Lab., USA; Apr. 1996; 70p; In English
Contract(s)/Grant(s): MIPR-95MM5576
Report No.(s): AD-A321788; No Copyright; Avail: CASI; A04, Hardcopy; A01, MicroficheThe objectives of the studies reported herein sought to refine and extend earlier research on gender-based spatial differences, focusing on the application of instructional interventions that can possibly reduce any gender differences. First, we attempted to replicate a study where one simple instructional intervention (i.e., heterogeneous discussion groups between training sessions) had been shown to improve females' spatial skills. Second, we tried to account for the remaining performance differences between males and females after the instructional intervention by measuring testosterone levels in saliva using a radioimmunoassay procedure. Third, we measured gender-based differences in performance on a complex spatial task under stress, and related these differences to testosterone level.
DTIC
Sex Factor; Radioimmunoassay; Learning; Psychomotor Performance; Mental Performance; Physiological Tests; Perception; Retention (Psychology)

19970023133 Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA USA

Effects of Display Type on Performance in Virtual Environments ***Interim Report, Sep. 1994 - May 1996***

Lampton, Donald R., Army Research Inst. for the Behavioral and Social Sciences, USA; Gildea, Joh n P., Army Research Inst. for the Behavioral and Social Sciences, USA; McDonald, Daniel P., Army Research Inst. for the Behavioral and Social Sciences, USA; Kolasinski, Eugenia M., Army Research Inst. for the Behavioral and Social Sciences, USA; Oct. 1996; 53p; In English

Contract(s)/Grant(s): DA Proj. 2O2-62785-A-790

Report No.(s): AD-A322046; ARI-TR-1049; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This research was conducted as part of a program to determine interface requirements for enabling dismounted soldiers to train in Virtual Environments (VEs). We compared different VE display devices in terms of their effects on task performance, skill acquisition, and side effects. Forty-eight college students completed a series of visual and psychomotor tasks, a subset of the Virtual Environment Performance Assessment Battery (VEPAB), using either a Head-mounted Display (HMD), a head-tracked boom-mounted display, or a standard computer monitor. Performance on vision tasks was sensitive to differences in display devices and to individual differences. Visual acuity scores were ordered according to estimates of the resolution of the displays, but were worse than what would he predicted from the resolution estimates. In comparison to real-world performance, distance and height estimation in the VEs varied greatly across participants, especially with the HMD. Motor tasks had high reliability, demonstrated small but significant practice effects, and were correlated with participants' use of computers and video games. Unexpectedly, even the standard monitor group showed a significant increase in simulator sickness scores. The VEPAB tasks should prove useful in the future when design tradeoffs must be made in the process of develop ing training system prototypes.

DTIC

Psychomotor Performance; Virtual Reality; Visual Acuity; Display Devices

19970023144 Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA USA

The 1995 Gender Integration of Basic Combat Training Study ***Final Report, Aug. 1993 - Sep. 1995***

Mottern, Jacqueline A., Army Research Inst. for the Behavioral and Social Sciences, USA; Foster, David A., Army Research Inst. for the Behavioral and Social Sciences, USA; Brady, Elizabeth J., Army Research Inst. for the Behavioral and Social Sciences, USA; Marshall-Mies, Joanne, Army Research Inst. for the Behavioral and Social Sciences, USA; Feb. 1997; 126p; In English

Contract(s)/Grant(s): MDA903-93-D-0032

Report No.(s): AD-A322335; ARI-SR-97-01; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This report summarizes a series of studies from 1993 through 1995 of the attitudes of soldiers-in-training and their training cadre during squad-level, gender-integrated Basic Combat Training (BCT) for soldiers in Combat Support and Combat Service Support military occupational specialties. During each of the three phases, soldiers completed a pre-training and post-training questionnaire, and the training cadre completed a post-training questionnaire. A total of 3,963 soldiers and 277 training cadre were surveyed. Focus groups were conducted with all-male and/or all-female groups from each of the participating companies and with male and female training drill sergeants. Training performance and soldierization in a gender-integrated environment were more positive for female soldiers and as positive as single-gender training for male soldiers. Preparation of drill sergeants-especially training to work with and train female soldiers-is key to the success of gender-integrated BCT. Chain of command support is necessary for continued success of gender-integrated training.

DTIC

Combat; Males; Females; Training Devices

19970023146 California Univ., Marine Technology and Management Group, Berkeley, CA USA

Human Factors in Diving

Blumenberg, Michael A., California Univ., USA; Dec. 1996; 84p; In English

Report No.(s): AD-A322423; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Dive safety is primarily a function of four factors: the environment, equipment, individual diver performance and dive team performance. The water is a harsh and alien environment which can impose severe physical and psychological stress on a diver. The remaining factors must be controlled and coordinated so the diver can overcome the stresses imposed by the underwater environment and work safely. Diving equipment is crucial because it provides life support to the diver, but the majority of dive accidents are caused by individual diver panic and an associated degradation of the individual diverts performance. This paper investigates the factors which influence human performance and behavior, and focuses on divers working underwater. Recommendations are offered on how to improve dive safety through knowledge and awareness of human factors.

DTIC

Human Factors Engineering; Diving (Underwater); Safety Factors; Human Performance

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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.

19970022309 North Carolina Agricultural and Technical State Univ., Dept. of Industrial Engineering, Greensboro, NC USA
Effects of Induced Motion Changes During Task Performance on Pilot Workload
Watson, Alexandria R., North Carolina Agricultural and Technical State Univ., USA; Jan. 1997; 131p; In English
Report No.(s): AD-A321212; AFIT-96-124; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

The purpose of this thesis study is to investigate through laboratory experiments, whether motion has any effect on workload during compensatory and pursuit tracking tasks. A workload metric is derived as a function of system complexity. We define system complexity as the ratio of RMS(path) to RMS(velocity or control rate error). Thus, the complexity index allows to quantify workload as a function of error attenuation generated by the operator (path control error) and the task (velocity error). Experiments were conducted at four levels of control dynamics (0th, 1st, 2nd, and 3rd order), three levels of orientation (stationary (no motion), motion with damping coefficient 0.85 and 2.0). Two tasks, compensatory and pursuit tracking tasks, were performed. The results obtained show that: (a) Motion does affect error attenuation or the complexity factor and also the workload index. (b) Pursuit tracking generates more error attenuation and workload than compensatory tracking, especially when they are performed in an unstable (motion-induced) orientation. (c) The task dynamics or difficulties defined by the control order (position (zero order), velocity (1st order), acceleration (2nd order), and jerk (3rd order)) do have effects on workload. In statics, load is defined as the pressure placed upon the surface area of a body. This pressure can be caused by wind, fluids, or the weight of an object. In humans, load refers to the amount pressure placed on the worker (Petersen, 1982). Here, pressure is the work and stress that can stem from both the job and home environment. Therefore, load is the physical, physiological, and psychological effects that result from performing a task.
DTIC
Human Performance; Physiological Effects; Workloads (Psychophysiology); Psychological Effects

19970022473 Technische Physische Dienst TNO-TH, Delft, Netherlands
Box-Like Seating Structures: Interface Shape Dependence
Petersson, Bjoern A., Technische Physische Dienst TNO-TH, Netherlands; Oct. 1996; 30p; In English
Report No.(s): AD-A321556; TPD-HAG-RPT-960094; TDCK-RP-96-0208; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The influence of the shape of the interface between a superstructure and a recipient on the vibrational energy transmission is analyzed. The real parts of the zero and first order interface mobilities are derived for a basic rectangular shape. Numerical results are presented for various aspect ratios but comparisons are also made with the corresponding results for an annular shape. It is concluded that the primary parameter is the perimeter of the interface and the condition that the wavelength is larger than the perimeter constitutes the transition from point to distributed contact. Also it is demonstrated that for closed-contour, strip-like interfaces, the real parts are independent of the strip width in a large and practically relevant range. With respect to the zero order interface mobility, the aspect ratio is of subordinate importance for the overall trend whereas the details of the signature are influenced. In contrast, the first order interface mobility includes two orthogonal cases, which are affected differently by the aspect ratio. Straightforward estimation procedures are developed for both interface mobilities.
DTIC
Electromagnetic Radiation; Wave Propagation; Acoustics; Vibration; Energy Transfer; Ships; Rectangular Plates

19970022641 Weston (Roy F.), Inc., West Chester, PA USA
Guidance Document for Control of Microbiological Growth in An Air Force Base Water Distribution Systems ***Final Report, Apr. 1995 - Jun. 1996***
Deb, Arun K., Weston (Roy F.), Inc., USA; Jan. 1997; 75p; In English
Contract(s)/Grant(s): F49650-91-D-0008
Report No.(s): AD-A321323; Rept-11035-001-001-0100; AL/OE-TR-1996-0067; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In recent years, a lack of proper control, maintenance, and management of base water systems has resulted in an increased period of bacteriological noncompliance in the distribution system. Armstrong Laboratory (AL) has conducted some limited case studies of such violations of Safe Drinking Water Act (SDWA) Regulations. The objective of this guidance document is to assist Air Force Civil and BioEnvironmental Engineers (CE/BEE) in operating and maintaining water distribution systems to avoid dis-

tribution system water quality violations of SDWA Regulations and to develop corrective actions. The report provides a summary of requirements of various existing SDWA Regulations that have impacts on distribution water quality, such as Surface Water Treatment Rule (SWTR) and Total Coliform Rule, as well as potential future rules, such as Information Collection Rule (ICR) and Disinfectant/Disinfection By-Products Rule (D/DBP). An action plan has been developed describing bacteriological sampling requirements of TCR and possible corrective actions to avoid noncompliance. A systematic methodology has been described to develop a comprehensive maintenance program to improve general water quality in distribution systems, and a case study has been conducted to illustrate the methodology.
DTIC
Microbiology; Water Quality; Water Management; Drinking; Surface Water; Environmental Quality

19970022799 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
Artificial Cochlea Design Using Micro-Electro-Mechanical Systems
Dalton, George C., II, Air Force Inst. of Tech., USA; Dec. 17, 1996; 211p; In English
Report No.(s): AD-A321310; AFIT/GCS/ENG/96D-06; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The use of Micro-Electro-Mechanical Systems (MEMS) in the design of an artificial cochlea is investigated in depth. Interdigitated finger (comb), cantilever, bridge, and mirror resonators are presented as possible devices used to implement the artificial cochlea. These resonators are demonstrated to be extremely high Q devices, capable of being tuned with a simple DC bias. This suggests a possible change to existing cochlea models that claim highly complex AC feedback as being responsible for changes in the damping of the basilar membrane. The new cochlea model presented here, using MEMS to approximate the tuning of the basilar membrane, may be closer to the workings of the actual cochlea, as we understand it today.
DTIC
Electromechanical Devices; Hearing; Cochlea; Design Analysis; Tuning; Q Factors; Auditory Perception; Human Factors Engineering

19970023131 Naval Postgraduate School, Dept. of Computer Sciences, Monterey, CA USA
Application of Inertial Sensors and Flux-Gate Magnetometer to Real-Time Human Body Motion Capture
Frey, William, III, Naval Postgraduate School, USA; Sep. 1996; 170p; In English
Report No.(s): AD-A322420; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Human body tracking for synthetic environment interface has become a significant human-computer interface challenge. There are several different types of motion capture systems currently available. Inherent problems, most resulting from the use of artificially-generated source signals, plague these systems. A proposed motion capture system is being developed at the Naval Postgraduate School which utilizes a combination of inertial sensors to overcome these difficulties. However, the current design exhibits azimuth drift errors resulting from the use of inertial sensors. This thesis proposes a new method of compensating for azimuth drift using a three-axis fluxgate magnetometer. The magnetometer capable of azimuth drift compensation since its sensitive axis is not collinear with the local vertical. This thesis includes a program for simulating the operation of a fluxgate magnetometer in C++. The included C++ code simulates a fluxgate magnetometer and provides an estimate of azimuth based on the magnetometer's output which is typically within five degrees of the actual azimuth. Real magnetometer data for testing and verification was accomplished by bench testing a real fluxgate magnetometer.
DTIC
Human-Computer Interface; Human Body; Magnetometers; Real Time Operation; Computer Programs; Computerized Simulation

19970023171 Honeywell Technology Center, Phoenix, AZ USA
Display Simulation and Analysis: Two-Primary Color and Alternative Gray Scale Distribution ***Final Report, Jun. 1994 - Aug. 1995***
Franklin, Henry, Honeywell Technology Center, USA; Reinhart, William, Honeywell Technology Center, USA; Feb. 1997; 473p; In English
Contract(s)/Grant(s): DAAK6O-94-C-0042
Report No.(s): AD-A322894; NATICK-TR-97/009; No Copyright; Avail: CASI; A20, Hardcopy; A04, Microfiche

Two areas of display innovation have been identified which will promote the development of helmet or head mounted displays (HMDs) that are both small and inexpensive, while delivering high performance and reliability at the same time. These innovations involve the use of two-primary color displays and alternative gray scale control. Two-primary color displays offer the advantage of significant reductions in cost and complexity for applications such as aircraft helmet mounted sights and field process control monitors where the display requirements call for greater than monochrome, yet less than full, color, especially for subtrac-

tive color displays. Alternative gray scale control offers the potential for reduction of perceptual artifacts such as luminance and color handing, especially in displays with relatively limited numbers of gray scale levels. This report describes five principal tasks completed by Honeywell in the simulation and analysis of two-primary color display and alternative gray scale concepts: Display Requirement Analysis; System Configuration Concepts; Test Cell Fabrication and Evaluation; Display Analysis; and Simulation Development and Evaluation. The report also includes suggestions for additional future research.
DTIC
Helmet Mounted Displays; Gray Scale; Simulation; Color

19970023368 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Nutrition and Food Research Inst., Zeist, Netherlands
Renewed Fitness and Health Survey, Part 1 ***Interim Report Hernieuwide peiling fitheid en gezondheid, Deel-1***
Brussard, J. H., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Meuling, W. J. A., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; denBreeijen, J. H., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Feb. 1997; 33p; In Dutch
Contract(s)/Grant(s): A95/KL/120
Report No.(s): TNO Voeding V96.727; TD97-0206; Copyright; Avail: Issuing Activity (TNO, P.O. Box 360, NL-3700 AJ Zeist, The Netherlands), Hardcopy, Microfiche

The study described here was set up to give an update of the data on fitness and health among military personnel in the Netherlands. The study population comprised 277 male participants (21 -54 years old) of a medical screening as part of a job rotation procedure. Compared to a survey among military personnel carried out in 1987, mean serum total cholesterol values were 0.39 mmol/l lower and mean HDL-cholesterol values were 0.06 mmol/l higher in 1996. No favorable change was observed in average values of body weight, Quetelet Index (Ql), body fat percentage, or blood pressure. Comparison with a limited number of other studies among men in the Netherlands showed that mean HDL-cholesterol values and percentage smokers among military personnel were lower than among other men, mean Ql and serum total cholesterol values were comparable, while mean blood pressure was higher among military personnel than among other men. The prevalence of serum total cholesterol values 6.5 mmol had decreased since 1987: 22% in 1996 vs 33% in 1987; diastolic blood pressure 90 mm Hg was prevalent in 23% in 1996 vs 27% in 1987. It is concluded that health policy should be directed at lowering of over-weight, serum total cholesterol, blood pressure and smoking by measures directed at physical activity and nutrition.
Author
Surveys; Health; Nutrition; Blood Pressure; Body Weight; Cholesterol; Diastolic Pressure; Adipose Tissues

Subject Term Index

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Report Documentation Page

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