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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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

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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. 447)

SEPTEMBER 8, 1997

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LIFE SCIENCES (GENERAL)

19970023588 Duke Univ., Medical Center, Durham, NC USA
Efficient Scavenging of Superoxide Radical (02-) in Vitro and In Vivo ***Annual Report, 8 May 1995 - 7 May 1996***
Fridovich, Irwin, Duke Univ., USA; Jun. 1996; 18p; In English
Contract(s)/Grant(s): DAMD17-95-C-5065
Report No.(s): AD-A323481; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We have prepared manganic porphyrins, as mimics of SOD activity. Several generalizations follow: (a) In vivo action may involve cycles of reduction by NAD(P)H, or GSH, and reoxidation by O2; whereas the in vitro cycle involves O2 in both reduction and oxidation steps. (b) Action of mimics on bacterial cells is only a rough indicator of their action on mammalian cells; because of differences in uptake of the compounds. (c) Redox potential is more important than net charge, for activity in the in vitro assay. The most active compound we have prepared to date is the Mn(III) 2,3,7,8,12,13,17, 18-octabromo-5, 10, 15,20-tetrakis (N-methyl pyridinium-4-yl)porphyrin. Since the electron withdrawing effect of Br, Cl, F, we will also explore the synthesis and properties of the octachloro and octafluoro analogues. Bromination increased the rate constant by -50-fold. Chlorination or fluorination might provide even greater improvements.
DTIC
Oxidation-Reduction Reactions; Reaction Kinetics; Methyl Compounds; Inorganic Peroxides

19970023607 Cold Spring Harbor Lab., New York, NY USA
General Methods for Identifying G1-Phase Substrates of Cdk Protein Kinases ***Annual Report, 1 Jun. 1995 - 31 May 1996***
Futcher, A. B., Cold Spring Harbor Lab., USA; Marshak, Daniel R., Cold Spring Harbor Lab., USA; Jun. 1996; 12p; In English
Contract(s)/Grant(s): DAMD17-94-J-4050
Report No.(s): AD-A323678; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We are using two-dimensional gels in combination with genetic and biochemical techniques to identify G1-phase substrates of cyclin-Cdk complexes. We have optimized protocols for labeling proteins with 32P prior to two-dimensional gel electrophoresis. So far, we have successfully identified one important in vivo substrate, Sic1. We have characterized Sic1, and have shown that phosphorylation of Sic1 by cyclin-Cdk complexes promotes DNA synthesis in yeast. We have made peptide antigens for the purpose of making antibodies against phosphorylated Cdk substrates. Mice have been immunized; their sera are positive; and fusions for monoclonal antibodies are about to be done.
DTIC
Proteins; Serums; Mice; Genetics; Electrophoresis; Deoxyribonucleic Acid; Biochemistry

19970023623 Connecticut Univ., Dept. of Biochemistry, Farmington, CT USA
Studies on Bacterial Spore Resistance and Regulation of Activation ***Final Report***
Setlow, Peter, Connecticut Univ., USA; Feb. 1997; 4p; In English
Contract(s)/Grant(s): DAAH04-93-G-0263
Report No.(s): AD-A322933; ARO-31522.13-LS; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Highlights of work on spores of Bacillus subtilis in the past performance period have included demonstration that: (1) the zymogen of the spore protease GPR autoactivates, and that autoactivation is stimulated by low pH, dipicolinic acid and dehydration; (2) most of the propeptide of GPR is not needed for zymogen stability or autoprocessing; (3) the decrease in forespore pH in B. subtilis sporulation is responsible for 3-phosphoglycerate accumulation; (4) alpha/ beta-type small, acid-soluble proteins in spores protect DNA against killing by freeze-drying, dry heat and several organic hydroperoxides, by preventing DNA damage; (5) DNA repair during spore germination is an important component of resistance of spores to agents that kill spores through DNA

damage; and (6) spore resistance to peroxides is not due to the presence of protective enzymes such as catalases or alkylhydroperoxide reductases in spores.
DTIC
Bacillus; Dehydration; Germination; Spores; Deoxyribonucleic Acid

19970023640 Armed Forces Radiobiology Research Inst., Bethesda, MD USA
Sensitivity of Guinea Pigs to Gamma Radiation
McBride, Sharon A., Armed Forces Radiobiology Research Inst., USA; Kneisier, Tracy B., Armed Forces Radiobiology Research Inst., USA; Strocko, Steven M., Armed Forces Radiobiology Research Inst., USA; Pena, Roderick D., Armed Forces Radiobiology Research Inst., USA; Pellmar, Terry C., Armed Forces Radiobiology Research Inst., USA; Apr. 1997; 15p; In English
Report No.(s): AD-A323652; AFRRI-SP97-1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Given the wide variability in the LD50/30 doses for gamma radiation in guinea pigs presented in older reports and the improvements in animal husbandry techniques over the past 25 years, this study was conducted to determine a physiologically relevant dose of gamma radiation for use in our planned gamma-radiation/nerve agent seizure threshold studies. Guinea pigs received bilateral, whole-body, midline tissue doses of 1-5 Gy of gamma rays from a Co(60) source. Probit analysis of the number of survivors from each dose group at the 30-day endpoint revealed the LD50/30 for gamma irradiation in our test animals was 2.2 Gy (1.5 to 2.7 Gy, 95% CI). In each of the radiation dose groups, no animal deaths were seen prior to 6 day s after irradiation, and no animal died after 11 days postirradiation, suggesting that the window of 6-11 days after irradiation is the most critical. by day 4, significant differences in weight gain were found among sham and radiation groups (pless then 0.001), but there were no significant weight gain differences among the five radiation dose groups (p = 0.1). The observed difference in weight gain in irradiated versus sham irradiated animals may be explained by the presence of gastrointestinal lesions in animals exposed to 2-5 Gy of gamma radiation. Based on the present findings that identify 2.2 Gy as the LD50/30 radiation dose and days 6-11 as the most critical time period following gamma irradiation, our future studies on the combined effects of radiation and nerve agents on seizure threshold can be planned.
DTIC
Guinea Pigs; Sensitivity; Radiation Effects; Irradiation; Gastrointestinal System; Gamma Rays

19970023723 NASA Johnson Space Center, Houston, TX USA
Recombinant Protein Production and Insect Cell Culture and Process
Spaulding, Glenn F., Inventor, NASA Johnson Space Center, USA; Goodwin, Thomas J., Inventor, NASA Johnson Space Center, USA; OConnor, Kim C., Inventor, NASA Johnson Space Center, USA; Francis, Karen M., Inventor, NASA Johnson Space Center, USA; Andrews, Angela D., Inventor, NASA Johnson Space Center, USA; Prewett, Tracey L., Inventor, NASA Johnson Space Center, USA; Jun. 10, 1997; 17p; In English; Continuation-in-part of US-Patent-Appl-SN-062856, filed 14 May 1993
Patent Info.: Filed 16 Aug. 1994; NASA-Case-MSC-22336-2; US-Patent-5,637,477; US-Patent-Appl-SN-291791; US-Patent-Appl-SN-062856; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A process has been developed for recombinant production of selected polypeptides using transformed insect cells cultured in a horizontally rotating culture vessel modulated to create low shear conditions. A metabolically transformed insect cell line is produced using the culture procedure regardless of genetic transformation. The recombinant polypeptide can be produced by an alternative process using virtually infected or stably transformed insect cells containing a gene encoding the described polypeptide. The insect cells can also be a host for viral production.
Official Gazzette of the U.S. Patent and Trademark
Proteins; Cells (Biology); Polypeptides; Culture Techniques; Insects

19970023836 Tennessee Univ., Center for Environmental Biotechnology, Knoxville, TN USA
Bioluminescent Genetically Engineered Micro-Organisms for the Study of Biofilms ***Final Report, 6 Jun. 1993 - 31 May 1996***
White, David C., Tennessee Univ., USA; Sayler, Gary S., Tennessee Univ., USA; Apr. 08, 1997; 14p; In English
Contract(s)/Grant(s): N00014-93-I-1387
Report No.(s): AD-A323700; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

These studies illustrate the versatility and potential usefulness of this bioluminescent reporter plasmid for studying the roles of EPS in biofilm process and the effects of other environmental insults on these microbial biofilms. Future experiments should

allow the cellular processes involved in microbially induced corrosion to be successfully Lo studied from a molecular point of view.
DTIC
Microorganisms; Bioluminescence

19970023921 Washington State Univ., Pullman, WA USA
Plant Roots: The Hidden Half, Chapter 16, Calcium and Gravitropism
Poovaiah, B. W., Washington State Univ., USA; Reedy, A. S. N., Colorado State Univ., USA; 1995; 15p; In English; Supported in part by Agricultural Experiment Station, Plant Biotechnology Lab.
Contract(s)/Grant(s): NAG10-0061; NSF DCB-91-04586
Report No.(s): NASA-CR-204523; NAS 1.26:204523; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Environmental signals such as light and gravity control many aspects of plant growth and development. In higher plants, the directional growth of an organ in response to stimuli such as gravity and light is considered a tropic movement. Such movement could be either positive or negative with respect to a specific stimulus. In general, stems show a positive response to light and negative response to gravity. In contrast, most roots show a positive response to gravity and a negative response to light. Investigations on plant tropism date back a century when Darwin studied the phototropic responses of maize seedlings (Darwin). Although the precise mechanism of signal perception and transduction in roots is not understood, Darwin recognized over 100 years ago that the root cap is the probable site of signal perception. He discovered that the removal of the root cap eliminates the ability of roots to respond to gravity. Other investigators have since confirmed Darwin's observation (Konings; Evans et al.). In recent years, especially with the advent of the U.S. Space Program, there has been a renewed interest in understanding how plants respond to extracellular signals such as gravity (Halstead and Dutcher). Studies on the mechanisms involved in perception and transduction of gravity signal by roots would ultimately help us to better understand gravitropism and also to grow plants under microgravity conditions as in space. In this chapter, we restrict ourselves to the role of calcium in transduction of the gravity signal. In doing so, emphasis is given to the role of calcium-modulated proteins and their role in signal transduction in gravitropism. Detailed reviews on various other aspects of gravitropism (Scott, Torrey, Wilkins, Fim and Digby, Feldman, Pickard, Moore and Evans, Halstead and Dutcher, Poovaiah et al.) and on the role of calcium as a messenger in signal transduction in general have been published (Helper and Wayne, Poovaiah and Reddy, Roberts and Hartnon, Bowler and Chua, Gilroy and Trewavas). Plant roots have been widely used to study the transduction of gravity and light signals (Poovaiah et al., Roux and Serlin). Most roots show positive gravitropic response in either dark or light. However, roots of some varieties of plants (e.g., Zea mays L., cv Merit, and Zea rwvs L., cv Golden Cross Bantam 70) show positive gravitropic response only in light (Feldman, Miyazaki et al.). Investigations from various laboratories indicate that calcium acts as a messenger in transducing gravity and light signals in plant roots(Pickard, Evans et al., Pooviah et al.).
Author
Calcium; Gravitropism; Microgravity; Vegetation Growth; Proteins; Plant Roots; Genetics

19970024025 Marquette Univ., Dept. of Biology, Milwaukee, WI USA
Soleus Fiber Force and Maximal Shortening Velocity After Non-Weight Bearing with Intermittent Activity
Widrick, Jeffrey J., Marquette Univ., USA; Bangart, Jill J., Marquette Univ., USA; Karhanek, Miloslav, Marquette Univ., USA; Fitts, Robert H., Marquette Univ., USA; 1996; ISSN 0161-7567; 8p; In English; Sponsored in part by a Wisconsin Space Grant Consortium undergraduate scholarship
Contract(s)/Grant(s): NAG2-212; NAGw-4376
Report No.(s): NASA-CR-204851; NAS 1.26:204851; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

This study examined the effectiveness of intermittent weight bearing (IWB) as a countermeasure to non-weight-bearing (NWB)-induced alterations in soleus type 1 fiber force (in mN), tension (P(sub o); force per fiber cross-sectional area in kN/sq m), and maximal unloaded shortening velocity (V(sub o), in fiber lengths/s). Adult rats were assigned to one of the following groups: normal weight bearing (WB), 14 days of hindlimb NWB (NWB group), and 14 days of hindlimb NWB with IWB treatments (IWB group). The IWB treatment consisted of four 10-min periods of standing WB each day. Single, chemically permeabilized soleus fiber segments were mounted between a force transducer and position motor and were studied at maximal Ca(2+) activation, after which type 1 fiber myosin heavy-chain composition was confirmed by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. NWB resulted in a loss in relative soleus mass (-45%), with type 1 fibers displaying reductions in diameter (-28%) and peak isometric force (-55%) and an increase in V(sub o) (+33%). In addition, NWB induced a 16% reduction in type 1 fiber P., a 41% reduction in type 1 fiber peak elastic modulus [E(sub o), defined as ((delta)force/(delta)length x (fiber length/fiber cross-sectional area] and a significant increase in the P(sub o)/E(sub o) ratio. In contrast to NWB, IWB reduced the loss of relative

soleus mass (by 22%) and attenuated alterations in type 1 fiber diameter (by 36%), peak force (by 29%), and V(sub o)(by 48%) but had no significant effect on P(sub o), E(sub o) or P(sub o)/E(sub o). These results indicate that a modest restoration of WB activity during 14 days of NWB is sufficient to attenuate type 1 fiber atrophy and to partially restore type 1 peak isometric force and V(sub o) to WB levels. However, the NWB-induced reductions in P(sub o) and E(sub o) which we hypothesize to be due to a decline in the number and stiffness of cross bridges, respectively, are considerably less responsive to this countermeasure treatment.
Author
Electrophoresis; Gels; Fibers; Transducers; Modulus of Elasticity; Weightlessness; Countermeasures; Atrophy

19970024831 Indiana Univ., Bloomington, IN USA
Symposium: The Exploration of Sequence Space Selecting Functions Molecules from Combinatorial Libraries ***Final Report***
Ellington, Andrew D., Indiana Univ., USA; Feb. 1997; 6p; In English, 12-15 Oct. 1995, Bloomington, IN, USA
Contract(s)/Grant(s): N00014-95-I-1334
Report No.(s): AD-A323849; Rept-43-429-69; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
The ONR provided funding for a conference that was designed to explore interactions between combinatorial methodologies in Biology and Chemistry. Breakthrough discoveries with replicating biopolymer libraries and chemical combinatorial libraries made the conference timely and allowed synergistic interactions to occur between the participants. For example, this conference was where David Bartel first reported on using a 'reflection selection' technique to identify nucleic acid aptamers that were stable to sera. Dr. Bartel's announcement was quickly picked up on by both academic and corporate scientists, and novel extensions of the work were informally discussed. Another goal of the conference was to begin to chart directions for the future, and to try to anticipate where these broad-ranging fields might be headed. Several of the talks, including the keynote address by Jack Szostak, made apparent how the science of combinatorial chemistry both provides insights into researches into the origins of life and molecular evolution, and ultimately supports more practical applications in industry.
DTIC
Molecular Biology; Combinatorial Analysis; Biological Evolution; Biopolymers; Conferences

19970024853 Civil Aeromedical Inst., Oklahoma City, OK USA
Stereochemical Determination of Selegiline Metabolites in Postmortem Biological Specimens
Kupiec, T. C., Civil Aeromedical Inst., USA; Chaturvedi, A. K., Civil Aeromedical Inst., USA; Jul. 1997; 14p; In English
Contract(s)/Grant(s): DTAM-B-96-TOX-202
Report No.(s): DOT/FAA/AM-97/14; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The Federal Aviation Administration's Toxicology and Accident Research Laboratory determines the presence of drugs, volatiles, and primary combustion gases in biological samples from aircraft accident victims and also establishes any medical condition for which the drugs might have been taken. In this study, findings related to an aircraft accident are reported. Along with biological specimens from the pilot of this fatal accident, two types of tablets found at the accident scene were submitted for analysis. These tablets were identified as levodopa and selegiline, commonly prescribed for the treatment of Parkinson's disease. Selegiline, a stereospecific compound, is biotransformed into (-)-N-desmethylselegiline, (-)-methamphetamine, and (-)-amphetamine. During this process, the chiral center of the parent molecule is not affected. The latter two levorotatory metabolites cannot be easily distinguished by routine analysis from their dextrorotary isomers, which are controlled substances. Therefore, it was prudent to differentiate these isomers to prove or disprove the controlled substance categorization. Initial immunoassay drug screenings revealed the presence of amphetamine class drugs (867 ng/ml) and amphetamine/methamphetamine (261 ng/ml) in urine and methamphetamine (46 ng/ml) in blood. The gas chromatography-mass spectrometry (GC/MS) results revealed the presence of methamphetamine in the concentrations of 76 ng/ml of blood and 685 ng/ml of urine. The level of amphetamine was 52 ng/ml in blood and 320 ng/ml in urine. To determine the stereospecificity of these amines, the isolated amines from the biosamples were derivatized by a stereospecific agent, (S)-(-)-N- (trifluoroacetyl)prolyl chloride, and characterized by a GC/MS method to be levorotatory. The 2.14 ratio of (-)-methamphetamine to (-)-amphetamine concentrations in the urine was consistent with a selegiline study in the recent literature. The stereospecific analysis, in conjuction with the history of the pilot being on Parkinson's medications, suggests that the source of these amines was selegiline. This conclusion substantiates the importance of the identification of enantiomers in evaluating and interpreting related analytical results for accident investigations.
Author
Aircraft Accidents; Metabolites; Methamphetamine; Accident Investigation; General Aviation Aircraft

19970025064 Washington State Univ., Lab. of Plant Molecular Biology and Physiology, Pullman, WA USA

Dual Regulation of a Chimeric Plant Serine/Threonine Kinase by Calcium and Calcium/Calmodulin

Takezawa, D., Washington State Univ., USA; Ramachandiran, S., Washington State Univ., USA; Paranjape, V., Washington State Univ., USA; Poovaiah, B. W., Washington State Univ., USA; The Journal of Biological Chemistry; 1996; Volume 271, No. 14, pp. 8126-8132; In English

Contract(s)/Grant(s): NAG10-0061; NSF DCB-91-4586

Report No.(s): NASA-CR-204648; NAS 1.26:204648; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

A chimeric Ca(2+)/calmodulin-dependent protein kinase (CCaMK) gene characterized by a catalytic domain, a calmodulin-binding domain, and a neural visinin-like Ca(2+)-binding domain was recently cloned from plants. The Escherichia coli-expressed CCaMK phosphorylates various protein and peptide substrates in a Ca(2+)/calmodulin-dependent manner. The calmodulin-binding region of CCAMK has similarity to the calmodulin-binding region of the alpha-subunit of multifunctional Ca(2+)/calmodulin-dependent protein kinase (CaMKII). CCaMK exhibits basal autophosphorylation at the threonine residue(s) (0.098 mol of P-32/mol) that is stimulated 3.4-fold by Ca(2+) (0.339 mol of P-32/mol), while calmodulin inhibits Ca(2+)-stimulated autophosphorylation to the basal level. A deletion mutant lacking the visinin-like domain did not show Ca(2+)-simulated autophosphorylation activity but retained Ca(2+)/calmodulin-dependent protein kinase activity at a reduced level. Ca(2+)-dependent mobility shift assays using E.coli-expressed protein from residues 358-520 revealed that Ca(2+) binds to the visinin-like domain. Studies with site-directed mutants of the visinin-like domain indicated that EF-hands II and III are crucial for Ca(2+)-induced conformational changes in the visinin-like domain. Autophosphorylation of CCaMK increases Ca(2+)/calmodulin-dependent protein kinase activity by about 5-fold, whereas it did not affect its C(2+)-independent activity. This report provides evidence for the existence of a protein kinase in plants that is modulated by Ca(2+) and Ca(2+)/calmodulin. The presence of a visinin-like Ca(2+)-binding domain in CCaMK adds an additional Ca(2+)-sensing mechanism not previously known to exist in the Ca(2+)/calmodulin-mediated signaling cascade in plants.

Author

Calmodulin; Calcium; Biochemistry; Genes

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AEROSPACE MEDICINE

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

19970023530 NASA Langley Research Center, Hampton, VA USA

Calculation of Heavy Ion Inactivation and Mutation Rates in Radial Dose Model of Track Structure

Cucinotta, Francis A., NASA Langley Research Center, USA; Wilson, John W., NASA Langley Research Center, USA; Shavers, Mark R., Texas A&M Univ., USA; Katz, Robert, Nebraska Univ., USA; Jul. 1997; 16p; In English

Contract(s)/Grant(s): RTOP 199-45-16-11

Report No.(s): NASA-TP-3630; L-17579; NAS 1.60:3630; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In the track structure model, the inactivation cross section is found by summing an inactivation probability over all impact parameters from the ion to the sensitive sites within the cell nucleus. The inactivation probability is evaluated by using the dose response of the system to gamma rays and the radial dose of the ions and may be equal to unity at small impact parameters. We apply the track structure model to recent data with heavy ion beams irradiating biological samples of E. Coli, B. Subtilis spores, and Chinese hamster (V79) cells. Heavy ions have observed cross sections for inactivation that approach and sometimes exceed the geometric size of the cell nucleus. We show how the effects of inactivation may be taken into account in the evaluation of the mutation cross sections in the track structure model through correlation of sites for gene mutation and cell inactivation. The model is fit to available data for HPRT (hypoxanthine guanine phosphoribosyl transferase) mutations in V79 cells, and good agreement is found. Calculations show the high probability for mutation by relativistic ions due to the radial extension of ions track from delta rays. The effects of inactivation on mutation rates make it very unlikely that a single parameter such as LET (linear energy transfer) can be used to specify radiation quality for heavy ion bombardment.

Author

Biophysics; Heavy Ions; Mutations; Ion Irradiation; Linear Energy Transfer (LET); Radiation Protection

19970023598 Institute for Human Factors TNO, Soesterberg, Netherlands

Thermal Modelling of Individual Characteristics ***Interim Report***

Havenith, G., Institute for Human Factors TNO, Netherlands; Jun. 25, 1997; 47p; In English

Contract(s)/Grant(s): B97-044

Report No.(s): TD97-0219; TM-97-B007; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 DE Soesterberg, The Netherlands), Hardcopy, Microfiche

One of the major gaps in the prediction of heat stress response is the limited implementation of individual characteristics in prediction models. Without this individualization, the evaluation of the resultant average group response prediction necessitates the use of very conservative limit values for body temperature increase. This is caused by the wide range of responses observed within a group. The present study aimed at the implementation of individual characteristics in a heat stress prediction model (THDYN), in order to investigate whether this would indeed result in a more precise prediction with less variance between predicted and observed responses. For this purpose, the relevant parameters related to anthropometric characteristics (body surface area (A(sub D)), body tissue conductance, body heat capacity), sweating and skin blood flow control (training and acclimation) were introduced in the model. The parameters were derived from literature. Next, data sets which were not used for the parameter estimation were used for a validation of the model changes. It was found that the individualized model indeed provided an improved prediction. The size of the improvement varied with the climate and the work type however. The best predictions for body heat storage were observed for fixed work loads in a warm humid and in a hot dry climate and for work loads relative to the individual maximum in a warm humid climate (explained variance 27-53%). For relative work loads in a cool and in a hot dry climate the models predictive capacity for individuals was not significantly improved (less than 10%). When this predictive power was compared to that of a multiple regression model derived from the data sets (the 'maximal achievable' predictive power), using individual characteristics as independent parameters and body temperature as dependent variable, showed that the independent computer model had between 54 and 89% of the predictive power of the empirical model, except for the cool climate where this was zero. It can be concluded that the additions to the model provide a good tool for study of effects of individual characteristics, but also that still a substantial part of individual variation is still not understood. In order to demonstrate the model's possibilities and reactions, several example simulations are presented.

Author

Stress Analysis; Specific Heat; Predictions; Body Temperature; Heat Tolerance; Conductive Heat Transfer; Workloads (Psychophysiology); Computerized Simulation; Acclimatization

19970023619 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA

Measurement of Energy Expenditure on the Uniport Mobility Platform ***Final Report***

Krausman, Andrea S., Army Research Lab., USA; Savick, Douglas S., Army Research Lab., USA; Leiter, Kathy L., Army Research Lab., USA; Faughn, Jim A., Army Research Lab., USA; Knapik, Joseph J., Army Research Lab., USA; Feb. 1997; 33p; In English

Contract(s)/Grant(s): DA Proj. 1L1-62716-AH-70

Report No.(s): AD-A322888; ARL-TR-1263; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of this study was to measure energy expenditure on the Uniport mobility platform, a virtual reality device for dismounted infantry soldiers. Eight subjects performed at five grades (-5.0 deg, -2.5 deg, 0 deg, 2.5 deg, and 5.0 deg) at four speeds (2.5, 3.0, 3.5, and 4.0 mph). An Oxylog device was used to measure oxygen uptake (VO2). An empirical equation derived by Pandolf et al. (1977) was also used to estimate VO2 for comparison purposes. Analysis of variance indicated that the actual VO2 values recorded by the Oxylog were lower than the estimated VO2 values from the Pandolf equation at 2.5 and 5.0 deg grades. This illustrates that the Uniport does not provide a sufficient amount of energy extraction as the grade increases and suggests that error increases as the grade increases. There were no differences between speeds for the estimated and actual VO2, which indicates that the Uniport provides sufficient energy extraction at the speeds tested. Appropriate software or hardware adjustments must be developed on the Uniport device to increase energy output when subjects move uphill.

DTIC

Virtual Reality; Oxygen Consumption; Mobility

19970023667 Army Research Inst. of Environmental Medicine, Natick, MA USA

Total Army Injury and Health Outcomes Database: Description and Capabilities

Amoroso, Paul J., Army Research Inst. of Environmental Medicine, USA; Swartz, William G., Army Research Inst. of Environmental Medicine, USA; Hoin, Francis A., Army Research Inst. of Environmental Medicine, USA; Yore, Michell M., Army Research Inst. of Environmental Medicine, USA; Feb. 21, 1997; 105p; In English

Report No.(s): AD-A322980; USARIEM-TN97-2; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The impact of injuries on the mission of the Armed Forces is unacceptably high. to determine the complete spectrum of injury and disease outcomes among Army service members, USARIEM developed the Total Army Injury and Health Outcomes Database (TAIHOD). The TAIHOD is a relational database encompassing multiple components of six master databases linked by scrambled SSN. The TAIHOD links three types of data: demographics (the parameters for the denominator); outcomes (hospitalizations, lost-time injuries, permanent disabilities, and fatalities); and health habits from surveys (health risk assessments). Each component represents an extraordinary source of data for study. The process of linking this data at the level of the individual soldier will give researchers the ability to: (1) Analyze and determine incidence, prevalence, and trends of injury among female and male soldiers by diagnosis and location/body part; (2) Identify important causes of injuries; (3) Determine sub-populations at greatest risk of injury, including high-risk military occupational specialties; (4) Determine incidence of training-related and sports injuries; (5) Determine relative morbidity and mortality from injuries vs. illness/disease; and (6) Estimate direct and indirect costs associated with injuries and illnesses.

DTIC

Relational Data Bases; Armed Forces; Injuries; Medical Services

19970023771 Johns Hopkins Univ., Laurel, MD USA

Corneal Damage from Infrared Radiation ***Annual Report, 1 Nov. 1995 - 31 Oct. 1996***

McCally, Russell L., Johns Hopkins Univ., USA; Dec. 1996; 21p; In English

Contract(s)/Grant(s): DAMD17-96-C-6005

Report No.(s): AD-A323653; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report summarizes our research during the past year on the interaction of short pulses of infrared radiation produced by a CO2-TEA laser with the cornea. The report discusses the re-establishment of our laboratory, revision and testing of our computer program for computing temperature histories, confirmation of earlier results for single-pulse damage thresholds, the determination of the damage threshold for a sequence of two 80 ns pulses at 5 Hz, and correcting problems with the laser in order to achieve uniform pulse amplitudes at higher pulse repetition frequencies.

DTIC

Computer Programs; Cornea; Infrared Radiation

19970023799 Naval Health Research Center, San Diego, CA USA

The 1995 Perceptions of Wellness and Readiness Assessment (POWR 1995) Methodology Report ***Final Report, Oct. 1994 - Oct. 1996***

Hourani, Laurel L., Naval Health Research Center, USA; Graham, Wendy F., Naval Health Research Center, USA; Sorenson, Diane, Naval Health Research Center, USA; Yuan, Hui-Xing, Naval Health Research Center, USA; Bray, Robert M., Research Triangle Inst., USA; Wheeless, Sara C., Research Triangle Inst., USA; Keesling, Randall S., Research Triangle Inst., USA; Rueckert, Matthew W., Research Triangle Inst., USA; Oct. 1996; 125p; In English

Report No.(s): AD-A323198; NHRC-TD-96-9I; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This report describes the methodology for the assessment of Perceptions Of Wellness and Readiness (POWR) among active-duty Navy and Marine Corps personnel. Supported by the Defense Women's Health Research Program, the purpose of this study was to obtain baseline prevalence and risk factor information on a representative sample of active-duty Navy and Marine Corps women and men worldwide and to provide relevant comparative data with civilian populations. The POWR Assessment consisted of three separate, but complementary components. The first and most comprehensive component was a large-scale survey in which respondents completed an in-depth self-report questionnaire that assessed six key issues including reproductive health, medical history and nutritional status, mental health, lifestyle issues, occupational/environmental risks, and health services issues. This questionnaire study was based on a probability sample of approximately 10,000 active-duty Navy and Marine Corps personnel. The second component consisted of physical measurements taken on a subsample of approximately 1,200 respondents to the main survey. The third component was a telephone interview drawn from volunteers responding to the main survey. This report

includes background about the study and discussions of the sampling design, the data collection instruments, data collection methods, and sample weighting and estimation procedures.
DTIC
Personnel; Armed Forces; Health

19970023830 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
Validity and Reliability of the TEEM 100 Portable Metabolic Measurement System ***Final Report***
Pope, Jan I., Defence and Civil Inst. of Environmental Medicine, Canada; Jan. 1997; 14p; In English
Report No.(s): AD-A323302; DCIEM-97-TM-02; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study examined the validity and reliability or consistency of a portable gas analysis system (TEEM 100) used for the measurement of oxygen consumption. Eight males were evaluated at rest and during several work intensities while expired air was collected and analysed in series with the TEEM 100 and a reference collection system (Tissot gasometer and Ametek gas analysers). Subjects were tested on 2 separate days for comparison of 2 TEEM 100 systems. The data revealed th at either collection and analysis method was reliable or consistent from day to day. However, significant and unexplained differences were found between methods for expired ventilation, expired gas fractions and the calculated oxygen consumption. These differences became greater at higher flow rates or work intensities. It was concluded that the TEEM 100 is a consistent gas exchange measurement system. Its validity, however, should be viewed with caution.
DTIC
Oxygen Consumption; Flow Velocity; Gas Analysis; Gas Exchange

19970023832 Naval Health Research Center, San Diego, CA USA
The Effect of Hypoxia, Cold, and Exercise on Human Thermoregulation ***Interim Report***
Reading, J., Naval Health Research Center, USA; Roberts, D., Naval Health Research Center, USA; Hodgdon, J., Naval Health Research Center, USA; Pozos, R., San Diego State Univ., USA; Dec. 23, 1996; 20p; In English
Report No.(s): AD-A323293; NHRC-96-37; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

U.S. Marine and Navy personnel may be at an increased risk for developing hypothermia when training at 2700 m. The objective of this study was to determine if exposure to moderate cold and decreased oxygen (O2) tension (15% O2 simulating 2700 m) reduces the ability of the human body to shiver and to maintain core and skin temperatures during moderate exercise. Eight male and two female U.S. Navy and Marine Corps personnel participated as subjects. Subjects were exposed to 4.4 deg C air breathing either 20.9% O2 (N) or 15% O2 (H) for 120 min, 40 min sitting, then 40 min walking on a treadmill at 3.0 mph, then sitting for 40 min. All subjects shivered vigorously during N and H cold as observed by investigators, reported in thermal sensation, and measured by electromyograms. The exposure of H does not decrease the ability of the human body to shiver. The respiratory exchange ratio did increase with H, indicating an increased need for glucose, and H decreased the O2 blood saturation, indicating less O2 is being carried in the blood, resulting in a possible limitation in maximal aerobic capacity. Therefore, thermoregulation during military missions conducted at altitudes up to 2700 m should not be affected adversely by the reduction in inspired O2.
DTIC
Skin Temperature (Biology); Respiratory Physiology; Oxygen Tension; Hypothermia; Electromyography

19970023906 Prins Maurits Lab. TNO, Rijswijk, Netherlands
Acoustic Microsensors 2. Detection of Staphylococcal Enterotoxin B Employing a Piezoelectric Crystal Immunosensor ***Final Report***
Harteveld, J. L., Prins Maurits Lab. TNO, Netherlands; Wils, E. R., Prins Maurits Lab. TNO, Netherlands; Feb. 1997; 19p; In English
Contract(s)/Grant(s): A93KL488
Report No.(s): AD-A323386; PML-1996-A86; TDCK-TD96-0413; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper reports on a study concerning the development of a biochemical sensor for Staphylococcal Enterotoxin B (SEB), a substance which falls within the bracket of biological warfare agents. A 20 MHz piezoelectric quartz crystal sensor device was employed in a flow injection system. The assay for SEB is based on a competition scheme using polyclonal antibodies (anti-SEB). Three parameters, i.e. the flow rate in the flow cell, the incubation time and the anti-SEB concentration, were optimised. A

detection limit of 0.1 micrograms/ml is obtained, whereas at concentrations of SEB of 10 micrograms/mi or higher the sensor response is completely inhibited. The results were compared with a competition Enzyme Linked Immunosorbent Assay (ELISA).
DTIC
Piezoelectric Crystals; Flow Velocity; Warfare

19970023953 Naval Health Research Center, San Diego, CA USA
A Comparison of Two Navy Watch Schedules *Final Report*
Kelly, Tamsin L., Naval Health Research Center, USA; Ryman, David, Naval Health Research Center, USA; Pattison, Stewart, Naval Health Research Center, USA; Dec. 1996; 30p; In English
Report No.(s): AD-A323196; NHRC-96-41; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Many types of shift-work schedules have been devised to achieve the around-the-clock coverage that frequently is required in both military and civilian work environments. Ideal shift lengths and types of rotation remain controversial. Worker job satisfaction has been reported to relate to how many sequential days off their work schedule allows. A natural experiment occurred when the watch schedule in a Navy installation was altered from 2 shifts per day, 7 days a week being covered by 4 individuals per watch location, to 3 shifts per day on weekdays and 2 on weekends, divided amo ng 5 watchstanders. The first schedule provided 3-day weekends on alternate weeks. The second schedule provided a 2-week period with only 2 days of work, every 5 weeks. Data from seven subjects were available for the first schedule and data from 8 subjects (different subjects) from the second schedule. Questionnaire and sleep/work log data collected before and after the schedule change showed that the increase in the number of watchstanders and/or the new schedule resulted in fewer subjects feeling that fatigue sometimes impaired their ability to do their job or made them unsafe when driving home after work. However, amounts of sleep and other measures of fatigue remained basically unchanged, and satisfaction with the schedule was only slightly improved. Thus, increasing the amount of time watchstanders have off work, may not lead to increased sleep. Individuals may choose to devote the extra hours to outside work or recreational activities.
DTIC
Navy; Sensory Feedback; Sleep; Daytime

19970024026 Norwegian Defence Research Establishment, Forsvarets Forskningsinstitutt, Kjeller, Norway
Vesicular Uptake of Amino Acid Transmitters: An Investigation of Evolution and the Effect of Exogenous and Endogenous Inhibitors, *1994 - 1996*
Roseth, Svein, Norwegian Defence Research Establishment, Norway; May 21, 1997; 156p; In English; Supported in part by the NFR.
Report No.(s): FFI/PUB-97/02409; ISBN-82-464-0158-0; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

The mechanisms of uptake and storage of amino acid neurotransmitters in synaptic vesicles is characterized by searching for new inhibitors. Vesicular targets and the possible implications associated with these inhibitors are discussed.
Derived from text
Amino Acids; Inhibitors; Neurotransmitters; Glutamates

19970024829 Civil Aeromedical Inst., Human Factors Research Lab., Oklahoma City, OK USA
Effects of Simulated General Aviation Altitude Hypoxia on Smokers and Nonsmokers *Final Report*
Nesthus, Thomas E., Civil Aeromedical Inst., USA; Garner, Robert P., Civil Aeromedical Inst., USA; Mills, Scott H., Civil Aeromedical Inst., USA; Wise, Robert A., OMNI Corp., USA; Mar. 1997; 63p; In English
Report No.(s): AD-A323899; DOT/FAA/AM-97/7; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

General aviation pilots are permitted to fly without the use of supplemental oxygen up to an altitude of 12,500 ft. However, hypoxia occurs at altitudes under 12,500 ft. Personal lifestyle, physical conditioning, and illness can interact with hypoxia to affect performance. This study evaluated physiological and cognitive performance of smokers and nonsmokers during sessions of mild hypoxia. Nine male smokers and 9 nonsmokers performed the Multi-Attribute Task Battery (MATB) while breathing oxygen mixtures that simulated sea level, 5,000 ft., 8,000 ft., and 12,500 ft. altitude conditions. Four physiological measures: transcutaneous partial pressures of oxygen and carbon dioxide (P(tc)O2 and P(tc)CO2), heart rate (HR), and oxyhemoglobin saturation (SaO2), demonstrated significant trends across the simulated altitude conditions and for some measures, between groups. Results of the physiological measures obtained, confirmed the study's targeted levels of hypoxia. Smokers exhibited elevated HR and lower P(tc)CO2 values, compared with nonsmokers. Elevated HR is consistent with nicotine effects. Reduced P(tc)CO2 values may

indicate greater hyperventilation among the smokers. Smokers may have experienced a reduction of peripheral vision and their ability to visually monitor several tasks simultaneously.
DTIC
Hypoxia; General Aviation Aircraft; Oxygen; Physiology; Tobacco; Human Factors Engineering; High Altitude; Flight Simulation; Pilots (Personnel)

19970024884 General Accounting Office, National Security and International Affairs Div., Washington, DC USA
Telemedicine: Federal Strategy is Needed to Guide Investments. Report to Congressional Requesters
Feb. 1997; 104p; In English
Report No.(s): AD-A323976; GAO/NSIAD/HEHS-97-67; B-272523; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

During a deployment in the Western Pacific region, a sailor aboard the U.S.S. Abraham Lincoln became seriously injured and was seen and treated by a specialist in San Diego-6,000 miles away. Doctor and patient were linked by telemedicine, which, in its broadest sense, refers to the use of communications technology to help deliver medical care without regard to the distance that separates the participants. In addition to the Department of Defense (DOD), other federal agencies, state governments, and private organizations support telemedicine initiatives. Congress has raised questions about the federal government's role in advancing telemedicine. In this regard, the Chairman and Ranking Minority Member, Subcommittee on Research and Development, House Committee on National Security, asked GAO to help determine the steps that DOD and the federal government need to take to realize the full potential of telemedicine and achieve cooperation with the private sector. Specifically, this report addresses the (1) scope of public and private telemedicine investments; (2) telemedicine strategies among DOD, other federal agencies, and the private sector; (3) potential benefits that the public and private sectors may gain from telemedicine initiatives; and (4) barriers facing telemedicine implementation.
DTIC
Telemedicine; Medical Services; Congressional Reports; Medical Equipment

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BEHAVIORAL SCIENCES

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

19970023471 Northeastern Univ., Boston, MA USA
Spatial Frameworks for Perceived Environments ***Final Report, 1 May 1994 - 28 Feb. 1997***
Bryant, David J., Northeastern Univ., USA; Feb. 17, 1997; 45p; In English
Contract(s)/Grant(s): AFOSR-0220-94; AF Proj. 3484
Report No.(s): AD-A322270; BRY-3; AFOSR-97-0122TR; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Research examined mental representation of spatial information. Spatial frameworks are based on an egocentric reference frame, and intrinsic computation on a object centered frame. Research documented the use of spatial frameworks in memory for observed and modeled scenes, but intrinsic computation for memory of diagrams. Intrinsic computation was also used in perception of models and diagrams. Reference frame is under strategic control - instructions can alter the representation of diagrams and models. Spontaneous use of spatial frameworks is determined by the directness with which information about all three spatial dimensions is conveyed. Related experiments revealed that differences in accessibility result from the relative salience of body axes. Laterality and handedness do not affect the accessibility of spatial locations. Additional research documented the use of a Euclidean metric for representing haptically explored space and the effortful rather than automatic rehearsal of visual spatial location. The rehearsal process depends critically on eye movements between locations. New projects have begun to explore pattern perception and the metric structure under lying spatial concepts.
DTIC
Eye Movements; Space Perception.

19970023515 Federal Aviation Administration, Dept. of Transportation, Washington, DC USA

Distribution of Attention, Situation Awareness, and Workload in a Passive Air Traffic Control Task: Implications for Operational Errors and Automation ***Final Report***

Endsley, Mica R., Texas Technological Univ., USA; Rodgers, Mark D., Federal Aviation Administration, USA; Jul. 1997; 28p; In English

Contract(s)/Grant(s): DTFA02-95-P-35476

Report No.(s): DOT/FAA/AM-97/13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A study was conducted to investigate factors underlying Operational Errors (OE's) in en route air traffic control. Twenty active duty controllers watched re-creations of OE's and were asked to report on their situation awareness and workload on two occasions during the re-creations. A total of 14 OE's were examined. Responses were analyzed to determine how subjects allocated their attention while viewing the scenarios. While observed patterns probably reflect necessary prioritization schemes, attention strategies identified In this study can be linked to data on factors underlying OE's. Both objective taskload, as indicated by the number of aircraft being controlled, and subjective workload were found to be related to controllers' ability to report situation awareness information. Workload was found to be higher at the time of the OE than at the other stop during the re-creation. During high workload, controllers appeared to reduce attention paid to certain aircraft and variables to maintain awareness of more important information. Implications of this research are drawn for potential problems in situation awareness under passive monitoring conditions that may be present if certain forms of automation are introduced in the future air traffic control system.

Author

Air Traffic Control; Workloads (Psychophysiology); Controllers; Errors

19970023536 Institute for Human Factors TNO, Soesterberg, Netherlands

The Effect of Various Methods for Crosstraining on Team Performance ***Final Report Het effect van drie verschillende methoden voor crosstraining op het presteren van teams***

Schaafstal, A. M., Institute for Human Factors TNO, Netherlands; Bots, M. J., Institute for Human Factors TNO, Netherlands; Feb. 05, 1997; 53p; In Dutch

Report No.(s): AD-A323496; TNO-TM-97-B001; TDCK-TD97-01169; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

An experiment is described in which the effects of three different methods for crosstraining on team performance and communication within teams are examined. The methods for crosstraining differ in information contents about the tasks, activities and informational needs of the other team members. They were developed with the aim of answering the following questions: (1) will practice in the tasks of other team members lead to better communication strategies and to an enhanced team performance? (2) Will an explicit training of the shared aspects of the task between different team members result in better performance than crosstraining in which the various team members are trained in each others' total task? Apart from this, the effect of time pressure on the various cross training methods was examined. The results show that the communication between team members is of utmost importance for a good performance of the team. Analysis of the differences between the various methods for crosstraining shows that explicit attention for the shared aspects of the tasks of various team members will lead to better team performance and to the use of more efficient communication strategies. The manipulation of time pressure unfortunately did not result in interpretable results, and has possibly been overshadowed by a general practice effect. The effect of practice in the tasks of other team members is less clear and seems to result in performance improvement only after a short acquaintance period. Suggestions are made for future research.

DTIC

Human Performance; Education

19970023584 Vanderbilt Univ., Dept. of Psychology, Nashville, TN USA

Characteristics of Long-Lasting Repetition Priming ***Final Report, 1 May 1993 - 31 Oct. 1996***

Cave, Carolyn B., Vanderbilt Univ., USA; Nov. 01, 1996; 38p; In English

Contract(s)/Grant(s): N00014-93-0578

Report No.(s): AD-A323270; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Facilitated performance in the identification of stimuli has been demonstrated due to prior exposure to the stimuli. Repetition priming can occur in the absence of explicit memory for the stimuli. Experiments explored the degree to which facilitation in visual object identification is due to perceptual or conceptual processing changes. Our results suggest that facilitation in picture naming is due to perceptual changes, that these changes are not in low-level sensory processing. Additional experiments explored the generality of priming within and across modalities. We found priming in auditory and tactile modalities and that priming transferred between vision and touch. We have also explored the limiting conditions for the occurrence of repetition priming. Are there

situations in which exposure to stimuli does not induce priming? Our results suggest that priming only occurs when stimuli are processed in the context of performing a task. Finally, we have tested the duration of repetition priming. We have found that a single exposure to pictures at study can lead to facilitated test performance nearly a year later. The combined results provide a repetition priming that is sensitive to the study task demands and that can influence performance long after the original exposure.
DTIC
Exposure; Images

19970023645 Oklahoma Univ., Norman, OK USA
A Laboratory Model of Readiness-to-Perform Testing, 1, Learning Rates and Reliability Analyses for Candidate Testing Measures *Final Report*
Gilliland, Kirby, Oklahoma Univ., USA; Schlegel, Robert E., Oklahoma Univ., USA; Feb. 1997; 70p; In English
Contract(s)/Grant(s): DTFA02-93-D-93088
Report No.(s): AD-A323620; DOT/FAA/AM-97/5; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The concept of Readiness to Perform (RTP) refers to that stare in which a person is prepared and capable of performing a job for which that person is willingly disposed and is free of any transient risk factors, such as drugs, alcohol, fatigue, or illness. A large study involving thirty-two subjects, five RTP tests, two work sample tasks, and three self-report measures was conducted at the University of Oklahoma to provide the FAA with a basic laboratory investigation of the 'Readiness-to-Perform' (RTP) testing concept. This report (volume 1) presents the objectives and methodology for the overall study, along with the analysis of data from the initial training phase of the study. Learning rate information for more than seventy task measures used in the study, as well as information on the reliability of those measures, is presented. Based on the learning curve analysis, it was determined that the customary initial high rate of learning was complete for most of the candidate RTP tasks by the tenth training session. A few tasks required additional sessions, but major learning effects for nearly all of these task measures did not exist beyond the middle of the second week of training. Even following five full weeks of experience, most ta sk measures showed some continued improvement, with the rate of improvement determined by the complexity of the task. Test-retest correlation coefficients computed for various intervals throughout the study confirmed that the RTP tasks provided multiple, highly repeatable measures that were both reliable and stable over the latter four weeks of the study. Interpretations of several interesting findings with respect to performance assessment are provided within the framework of job performance and RTP testing.
DTIC
Correlation Coefficients; Learning Curves; Human Performance; Education; Risk

19970023689 Defence Science and Technology Organisation, Melbourne, Australia
Simulating Human Characteristics for Operational Studies
Loyd, Ian V., Defence Science and Technology Organisation, Australia; Apr. 1997; 35p; In English
Report No.(s): DSTO-RR-0098; AR-010-179; Copyright; Avail: Issuing Activity (DSTO Aeronautical and MaritimeResearch Lab., PO Box 4331 Melbourne, Victoria 3001 Australia), Hardcopy, Microfiche

The effect of errors in models of human response on the outcome of a simulated sequence of events can be significantly. The effects of such errors can accumulate when events are propagated up and down a command and control chain. For a simulation of a system to be realistic, the products of simulated human decisions should be available in accordance with human cognitive limitations and at human rates of response. An approach of structuring simulations of human tactical response is proposed. This approach requires pre-processing of the simulation procedures to establish their cognitive resource loading for different levels of simulated expertise. Run-time processes are also required to regulate access to behavior algorithms to simulated cognitive resources, and to dynamically adjust those resources as a function of stress.
Author
Human Reactions; Psychomotor Performance; Errors

19970023717 Institute for Human Factors TNO, Soesterberg, Netherlands
Computing Visual Target Distinctness *Interim Report Berekening van de visuele onderscheildbaarheid van doelen*
Toet, A., Institute for Human Factors TNO, Netherlands; May 08, 1997; 74p; In English; Original contains color illustrations
Contract(s)/Grant(s): A95/KL/328
Report No.(s): TD97-0202; TM-97-A039; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 DE Soesterberg, The Netherlands), Hardcopy, Microfiche

The present pilot study investigates the capability of (a) several digital image metrics that have been reported in the literature; (b) the digital edge distance metric defined in this report; and (c) the psychophysically determined target visual lobe (i.e. the minimal distance between target and eye-fixation at which the target is no longer distinguishable from its surroundings), to predict

human visual search performance for a small number of realistic and military relevant complex scenes. A visual search and detection experiment is performed on a set of complex naturalistic images with military vehicles as targets. The area under the resulting cumulative detection probability curve of each target is adopted as a characteristic measure for its visual distinctness. The visual distinctness rank order induced by this measure is adopted as the reference rank order. The targets are also rank-ordered with respect to their visual distinctness as determined by the visual lobe and the different computational metrics. The rank orders produced by the psychophysical and computational target distinctness measures are compared with the reference rank order. The following conclusions can be drawn from the results of this exercise. The visual lobe indeed appears a useful predictor of human performance in a visual search and detection task. Models of the early human visual system (Cortex, TARDEC, Perceptual Distortion), a normalized root-mean square metric, and the edge distance metric introduced in this report, all seem to induce a visual distinctness rank ordering that agrees with human visual perception. Metrics based (a) on first order statistics of the graylevel histogram (Doyle); (b) on the intersection of (oriented) graylevel histograms of target and background; and (c) on a combination of area and edge contrast, all correlate poorly with human observer performance. The CAMAELEON model (based on histogram intersection) is also highly sensitive to variations in the definition (size and shape) of the target and background masks. The Perceptual Distortion model induces a visual target distinctness rank ordering identical to the one resulting from human observer performance, and therefore shows the best overall performance of all models and metrics tested in this study.
Author
Targets; Visual Perception; Statistical Analysis; Eye (Anatomy); Human Performance; Mean Square Values; Histograms

19970023774 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
Redundant Coding in Visual Search Displays: Effects of Shape and Color
Bauer, Ben, Defence and Civil Inst. of Environmental Medicine, Canada; McFadden, Sharon, Defence and Civil Inst. of Environmental Medicine, Canada; Feb. 1997; 30p; In English
Report No.(s): AD-A323155; DCIEM-97-R-04; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Subjects sought a unique target shape in a display of distractor shapes under three color coding conditions. In the no color coding condition (NC C) all shapes shared the same color. In the two color-coded conditions, the target was uniquely and redundantly color coded with a color whose CIE xy chromaticity coordinates were linearly separable (LS) or were not linearly separable (NLS) from the set of distractor chromaticity coordinates. Performance was optimal under LS coding, was reduced under NLS coding and was least efficient in the NCC condition. We discuss the implications of these results for refining color selection algorithms and for color coding in situations where the gamut of available colors is limited. In a secondary set of analyses, we note large performance differences as a function of target shape.
DTIC
Visual Perception; Color Coding; Display Devices; Redundancy Encoding; Human Performance; Color Vision; Visual Acuity

19970023780 Utah Univ., Salt Lake City, UT USA
Individual Differences in Skilled Performance Errors ***Final Report, 1 Jul. 1993 - 30 Nov. 1996***
Woltz, Dan J., Utah Univ., USA; Gardner, Michael K., Utah Univ., USA; Bell, Brian G., Utah Univ., USA; Feb. 28, 1997; 40p; In English
Contract(s)/Grant(s): F49620-93-I-0378; AF Proj. 3484
Report No.(s): AD-A323420; AFOSR-TR-97-0155; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Three studies were conducted to investigate questions concerning which type of individual is most susceptible to errors in skilled (highly practiced) cognitive task performance. The first study was a small pilot project conducted with university students. The remaining two studies were larger scale projects conducted with Air Force enlisted personnel. The research findings suggested that self-reported error-proneness is not related to performance in at least one class of cognitive skill tasks or to working memory task performance. Instead, measures of error-proneness appear to reflect how a person perceives themselves or how they wish to present themselves. The research findings also suggested that measures of working memory capacity (i.e., measures of general mental resource availability or mental workspace) were predictive of undetected errors in skilled performance after extensive skill practice. This finding suggests the need for further research as it has potential implications for selection of individuals to critical jobs. This finding also has implications for current theories of individual differences in learning. Finally, the research produced inconsistent findings regarding the relationship of anxiety to
DTIC
Work Capacity; Mental Performance; Memory; Human Performance; Anxiety

19970023796 California Univ., Los Angeles, CA USA
Psychometric Developments Related to Tests and Selection ***Final Report, 1 May 1993 - 31 Dec. 1996***
Muthen, Bengt O., California Univ., USA; Mar. 24, 1997; 3p; In English
Contract(s)/Grant(s): N00014-93-I-0619; N00014-95-I-0448
Report No.(s): AD-A323149; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Recent theoretical developments in the areas of latent variable modeling and missing data theory provide the basis for new psychometric analyses of the relationship between job performance and test performance. New approaches to the assessment of predictive validity of tests as well as to problems of selection and assignment are proposed. These methods have the potential for better understanding of predictive validity of tests such as the ASVAB and improving the selection and assignment of recruits for military jobs.
DTIC
Human Performance; Psychometrics; Aptitude; Personnel Selection

19970023849 Army Safety Center, Fort Rucker, AL USA
Flightfax; Spatial Disorientation, Volume 25
Apr. 1997; 12p; In English
Report No.(s): AD-A323538; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Basic to any discussion of spatial-disorientation controls is recognizing that there are two types of SD. The challenge of Type 1 SD is to find a way to apply controls (the appropriate course of action) when you are unaware that you are in an SD situation. The challenge of Type 2 SD is to apply the right controls to the specific SD situation. Identifying appropriate controls for both types of SD was an issue at last fall's Tri-Service Spatial Disorientation in Rotary Wing Operations Conference held at Fort Rucker. This conference produced control proposals in four major categories: (1) education, (2) training, (3) research, and (4) equipment. What follows is a discussion of these proposals, modified slightly to include input from the Aviation Leaders' Training Conference and the Aviation Brigade Safety Officer Conference held in January 1997 and input from standardization pilots and human factors experts at Fort Rucker.
DTIC
Human Factors Engineering; Flight Safety; Aircraft Safety

19970023893 National Aerospace Lab., Tokyo, Japan
In-Flight Measurement of Eye Scanning Characteristics of Helicopter Pilots
Kawahara, H., National Aerospace Lab., Japan; Funahiki, K., National Aerospace Lab., Japan; Wakairo, K., National Aerospace Lab., Japan; Tanaka, K., National Aerospace Lab., Japan; Watanabe, A., National Aerospace Lab., Japan; Oct. 1996; 14p; In Japanese; Portions of this document are not fully legible
Report No.(s): PB97-151138; NAL/TR-1310; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Attempts to study the control behavior of helicopter pilots have been conducted with the aim of providing fundamental information for future cockpit design, establishing procedures and training. A series of in-flight measurements of human visual scanning behavior during various flight phases were carried out: (1) hovering, (2) level light, (3) coordinated turning, and (4) approach and landing. A total of 12 pilots participated in the experiment, each of whom performed 15 repetitions.
NTIS
Human Behavior; In-Flight Monitoring; Pilot Performance; Eye Movements; Helicopters

19970023995 Wright Lab., Wright-Patterson AFB, OH USA
Reinforcement Learning: A Tutorial ***Final Report, 14 Jan. 1997***
Harmon, Mance E., Wright Lab., USA; Harmon, Stephanie S., Wright State Univ., USA; Jan. 1997; 21p; In English
Contract(s)/Grant(s): AF Proj. 2312
Report No.(s): AD-A323194; WL-TR-97-1028; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this tutorial is to provide an introduction to reinforcement learning (RL) at a level easily understood by students and researchers in a wide range of disciplines. The intent is not to present a rigorous mathematical discussion that requires a great deal of effort on the part of the reader, but rather to present a conceptual framework that might serve as an introduction to a more rigorous study of RL. The fundamental principles and techniques used to solve RL problems are presented. The most popular RL algorithms are presented. Section (1) presents an overview of RL and provides a simple example to develop intuition of the underlying dynamic programming mechanism. In Section (2) the parts of a reinforcement learning problem are discussed. These include the environment, reinforcement function, and value function. Section (3) gives a description of the most widely

used reinforcement learning algorithms. These include TD(lambda) and both the residual and direct forms of value iteration, Q-learning, and advantage learning. In Section (4) some of the ancillary issues of RL are briefly discussed, such as choosing an exploration strategy and a discount factor. The conclusion is given in Section (5). Finally, Section (6) is a glossary of commonly used terms followed by references and bibliography.
DTIC
Dynamic Programming; Iteration

19970023996 Goeteborg Univ., Sweden
The Nature of the General Factor in Hierarchical Models of the Structure of Cognitive Abilities: Alternative Models Tested on Data from Regular and Experimental Military Enlistment Tests
Gustafsson, Jan-Eric, Goeteborg Univ., Sweden; Mutheon, Bengt O., Goeteborg Univ., Sweden; Aug. 13, 1996; 26p; In English; Sponsored in part by Bank of Sweden
Contract(s)/Grant(s): N00014-93-I-0619
Report No.(s): AD-A323238; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Hierarchical models of the structure of cognitive abilities offer theoretical as well as practical advantages (Gustafsson, 1988, 1994a, in press-a; Loliman, 1991). Such models may resolve the conflict between theorists who emphasize one general ability (e. g., Spearman, 1927; Jensen, 1987; Humphreys, 1985), and theorists who emphasize several specialized abilities (e. g., Thurstone, 1938; Guilford, 1967; Gardner, 1985), by allowing for both categories of abilities in the model. The hierarchical approach also offers possibilities for solving prediction problems efficiently and parsimoniously (Gustafsson, 1988, 1989; Muthen, 1994). There are several alternative hierarchical models, however (Gustafsson, 1994a, in press-b).
DTIC
Mental Performance; Psychomotor Performance; Abilities

19970024933 Army Aeromedical Research Lab., Aircrew Health and Performance Div., Fort Rucker, AL USA
Spatial Disorientation in US Army Helicopter Accidents: An Update of the 1987-1992 Survey to Include 1993-1995 ***Final Report***
Braithwaite, Malcolm, Army Aeromedical Research Lab., USA; Groh, Shannon, Army Aeromedical Research Lab., USA; Alvarez, Eduardo, Army Aeromedical Research Lab., USA; Mar. 1997; 29p; In English
Contract(s)/Grant(s): DA Proj. 3M1-62787-A-879
Report No.(s): AD-A323898; USAARL-97-13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report updates the survey of U.S. Army helicopter accidents (1987-92) to include fiscal years 1993 through 1995. Those accidents in which spatial disorientation (SD) was considered to have played a major role were identified and compared to those in which SD played no part. In addition, an attempt was made to identify the factors behind each SD accident together with potential solutions. of the 970 accidents now on the database, 30% were considered to have had SD as a major or contributory factor. of particular note is the increased incidence of SD during helicopter operations during night aided flight. SD remains a n important source of attrition of Army helicopter operations, costing an average of $58 million and 14 lives each year. The contribution of SD accidents to the overall accident rate is not getting smaller. The increase in risk associated with the use of night vision devices when compared to day flying is of particular concern. Recommendations are made in the following four areas: (1) education, (2) training, (3) research, and (4) equipment. In addition, control factors are discussed both on an individual, U.S. Army, and triservice basis.
DTIC
Aircraft Accidents; Helicopters; Disorientation; Physiological Effects; Aircraft Maneuvers

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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.

19970023540 Naval Health Research Center, San Diego, CA USA
Evaluation of Whole-Body Anti-Exposure Suits During Exercise in Cold Water ***Interim Report***
Hagan, R. D., Geo-Centers, Inc., USA; Bernhard, R. D., Geo-Centers, Inc., USA; Jacobs, K. A., Geo-Centers, Inc., USA; Cohen, B. S., Naval Health Research Center, USA; Hodgdon, J. A., Naval Health Research Center, USA; Nov. 1996; 29p; In English
Report No.(s): AD-A323495; NHRC-96-31; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study evaluated the effectiveness of three whole-body anti-exposure suits (AESs) in maintaining body temperatures during immersion in cold water (7.5 deg C). Male subjects (n = 15) were monitored for rectal (Tre), chest (Tch), arm (Tar), thigh (Tth), calf (Tca) finger (Tfi) and big toe (Tto) temperatures during random trials of coveralls (CON), Marine Corps (MARCOR), Naval Clothing and Textile (NAVCLO), and MultiFabs Survival (MULFAB) sui ts. Coveralls was the undergarment for AES. Immersion was 20 min to knees, 20 min to waist, and up to 40 min to midchest. Consecutively, subjects did 2 min of rest, 6 min of a pipe-patching task, and 2 min of holding 25 lb over head. Maximum immersion time was 80 min. Subjects were able to stay longer (p is less then 0.05) in cold water wearing MULFAB (76 min), NAVCLO (80 min), and MARCOR (74 min) compared with CON (47 min). No differences in final Tre (X = 36.8 deg C) and Tfi (X = 20.8 deg C) occurred among AES and CON. AES Tch (Xs=35.4 deg C) and Tar (X = 34.7 deg C) were higher (p is less then 0.05) compared with CON (29.9 deg C, 27.5 deg C, respectively). Final Tth for MULFAB (19.4 deg C) was higher (p is less then 0.05) than NAVCLO (16.0 deg C) and MARCOR (15.2 deg C), which were higher than CON (11.5 deg C). Final Tca for MULFAB (14.7 deg C) and NAVCLO (13.6 deg C) were higher than MARCOR (11.2 deg C) and CON (10.4 deg C). Final Tca for MARCOR (17.3 deg C) was higher than NAVCLO (13.2 deg C), MULFAB (11.6 deg C), and CON (12.1 deg C). Thus, MULFAB, NAVCLO, and MARCOR provided the best maintenance of body temperatures.
DTIC
Water Immersion; Survival; Submerging; Physical Exercise; Coveralls; Cold Water; Clothing; Body Temperature

19970023628 Texas Technological Univ., Dept. of Industrial Engineering, Lubbock, TX USA
Augmentation Award for Training in Aviation Human Factors and Ergonomics ***Final Report***
Endsley, Mica R., Texas Technological Univ., USA; Dec. 1996; 10p; In English
Contract(s)/Grant(s): F49620-94-I-0279; AF Proj. 3484
Report No.(s): AD-A323269; AFOSR-TR-97-0153; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The objective of this project is to train graduate students in conducting research in human factors and ergonomics issues related to aviation. Numerous research projects have been completed within this project. They have focused on: (1) an investigation of causal factors related to problems with situation awareness among pilots and air traffic controllers, (2) investigations of automated compensation for enhancing performance in teleoperations task under operator/system control axis misalignment with both static and dynamic misalignments, (3) an investigation of level of automation effects on human performance, situation awareness and workload, (4) an investigation of adaptive automation and level of control on human performance, situation awareness and workload under dual task conditions, and (5) an investigation of cue characteristics related to errors in situation awareness comprehension. Each of these projects provided the AASERT fellows with extensive experience in studying critical issues related to human performance in aviation, and each has resulted in new research that significantly advances scientific knowledge in each of these areas.
DTIC
Air Traffic Controllers (Personnel); Workloads (Psychophysiology); Task Complexity; Human Performance; Human Factors Engineering; Aviation Psychology

19970023705 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA

Female Load-Carrying Performance ***Final Report***

Harper, Wiliam H., Army Research Lab., USA; Knapik, Joseph J., Army Research Lab., USA; DePontbriand, Rene, Army Research Lab., USA; Mar. 1997; 124p; In English

Contract(s)/Grant(s): DA Proj. 1L1-62716-AH-70

Report No.(s): AD-A323483; ARL-TR-1176; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This study examined the relative load-carrying ability of men and women. Nineteen male and fifteen female soldiers (medical specialists who had just completed advanced individual training) carried loads of 18, 27, and 36 kg during an individual maximal effort 10-km road march. March times, heart rates, and subjective exertion ratings were collected every 2.5 km along the road march course and at the finish. Before and after the march, maximum vertical jump, grenade throw distance, and pain, soreness and discomfort of various body locations were assessed and a post-march questionnaire about equipment was completed. The major findings were that the average march rates for both male and female soldiers in all load conditions were faster than the rates published in Field Manual 21-18 (U.S. Army, 1990). This suggests that the test subjects were within the published zone of acceptable foot march performance. Men completed the marches an average of 21% faster than the women. Women reported more problems with the shoulder straps, fit of the pistol belts, and the fit and stability of the rucksack. Women also reported greater pain, soreness, and discomfort in the back regions than men did after carrying the heaviest load. This suggests that at least a portion of the gender differences in march rate may be explained by the equipment problems reported by the women, and equipment redesigned specifically for the female population may reduce the magnitude of the difference. Increasing load masses resulted in slower march times, more perceived exertion, and reports of greater pain, soreness, and discomfort regardless of gender. The maximal effort march itself (regardless of gender or load) results in slight decrements in grenade throw distance.

DTIC

Females; Heart Rate; Loads (Forces); Pain; Physical Work; Shoulders; Straps

19970023806 Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada

Defence and Civil Institute of Environmental Medicine and Air Transport Group Human Study of CC-l30 Operations ***Final Report***

Banks, R. D., Defence and Civil Inst. of Environmental Medicine, Canada; Hendy, K. C., Defence and Civil Inst. of Environmental Medicine, Canada; Fraser, W. D., Defence and Civil Inst. of Environmental Medicine, Canada; Thompson, M. M., Defence and Civil Inst. of Environmental Medicine, Canada; Jamieson, D., Defence and Civil Inst. of Environmental Medicine, Canada; Wright, H., Defence and Civil Inst. of Environmental Medicine, Canada; Gee, T., Defence and Civil Inst. of Environmental Medicine, Canada; Meek, I. M., Defence and Civil Inst. of Environmental Medicine, Canada; Latullppe, J., Defence and Civil Inst. of Environmental Medicine, Canada; Davis, B., Defence and Civil Inst. of Environmental Medicine, Canada; Cole, M., Defence and Civil Inst. of Environmental Medicine, Canada; Nov. 1996; 91p; In English

Report No.(s): AD-A323536; DCIEM-96-R-66; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The Defence and Civil Institute of Environmental Medicine (DCIEM) and Air Transport Group (ATG) were tasked to conduct a joint study of human factors concerning the CC-130 Hercules aircraft. The aim of the study was to establish human factors issues relevant to air accidents, and to recommend preventative measures. The study was organized around two working groups: the Crew Behaviour Assessment Group (CBAG) and the Flight Performance Assessment Group (FPAG). The CBAG developed a method of measuring the ability of the crew to coordinate their activities efficiently and manage their workload. The FPAG developed a method of measuring the accuracy and consistency of simulator flight along an aircraft flight path. Data to support the development of both methods were obtained from a simulator study of 23 ATG crews. The results defined the characteristics of high proficiency Aircraft Commanders (ACs) and those of less proficient ACs. Less proficient ACs seemed to focus primarily upon systems-related, procedural cross-checking and rechecking of information, and had more open-loop communication which supports the contention that these individuals were becoming task overloaded. The results suggest that a proportion of ATG crews are adversely overloaded by the occurrence of unexpected flight events and certain system failures. Since behaviour can be influenced by training, this study recommends a review and modification of the current CC-130 training program, including Aircrew Coordination Training (ACT).

DTIC

C-130 Aircraft; Human Factors Engineering; Flight Paths; Flight Crews; Flight Characteristics

19970023841 Institute for Human Factors TNO, Soesterberg, Netherlands

Troop Trial of the Parka Bilaminate (Goretex(trademark)) by the Scouts, Airmobile Brigade and Marines of the Royal Netherlands Army ***Final Report Operationele beproving van de parka bilaminaat (Gortex(trademark)) bij het Korps Commando Troepen, Luchtmobiele Brigade en het Korps Mariniers***

Heus, R., Institute for Human Factors TNO, Netherlands; Kistemaker, J. A., Institute for Human Factors TNO, Netherlands; Jun. 24, 1997; 30p; In Dutch

Contract(s)/Grant(s): A96/KL/369

Report No.(s): TD97-0222; TM-97-A046; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Hardcopy, Microfiche

Due to complaints about the protection against weather of the in service parka, a new parka is tested during a troop trial of operational units of the Army. The fit and size, comfort, functioning and quality of the clothing are especially looked at. The wearers were questioned about their experiences with the parka. Most people were more satisfied with the new parka than with the in service parka. An exception were the Marines, but they had a different reference compared to the other units. Some aspects of the parka can be improved, like better cold protection by introducing a liner, elastic band in the hood for better putting on the hood and larger flaps on the sacks to protect against rain. Finally it is recommended to try cheaper materials like breathing poly-urethane and Sympatex. Some troops are reluctant to use the expensive Goretex parka under all operational circumstances. The scouts were of opinion that the parka was too expensive to use on the obstacle course.

Author

Clothing; Protection; Comfort; Linings; Flapping

19970023880 NASA Ames Research Center, Moffett Field, CA USA

Human Powered Centrifuge

Mulenburg, Gerald M., Inventor, NASA Ames Research Center, USA; Vernikos, Joan, Inventor, NASA Ames Research Center, USA; Apr. 01, 1997; 8p; In English

Patent Info.: Filed 10 Aug. 1995; NASA-Case-ARC-12058-1; US-Patent-5,616,104; US-Patent-Appl-SN-513263; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A human powered centrifuge has independently established turntable angular velocity and human power input. A control system allows excess input power to be stored as electric energy in a battery or dissipated as heat through a resistors. In a mechanical embodiment, the excess power is dissipated in a friction brake.

Official Gazzette of the U.S. Patent and Trademark

Human Centrifuges; Physical Exercise; Gravitational Effects; Rotating Bodies

19970023900 General Accounting Office, Resources, Community, and Economic Development Div., Washington, DC USA

Report to the Chair, Subcommittee on Technology, Committee on Science, House of Representatives. Human Factors: Status of Efforts to Integrate Research on Human Factors Into FAA's Activities

Jun. 1996; 28p; In English

Report No.(s): GAO/RCED-96-151; B-270246; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

FAA's structure for incorporating the consideration of human factors in the agency's programs includes a human factors policy order, a Chief Scientific and Technical Advisor for Human Factors (Chief Scientist), and guidance for acquisitions. The order, issued in 1993, assigns responsibility for ensuring that human factors are considered in the agency but does not establish minimal standards for meeting this requirement. The Chief Scientist chairs the Human Factors Coordinating Committee and manages the Human Factors Division within FAA's Office of Aviation Research. Recent legislative and organizational changes may affect the application of human factors in acquisitions and in operations, such as safety. The Human Factors Division consults with other members of the aviation community and participates in industry task forces and conferences in order to identify issues associated with human factors in aviation. In addition, it solicits ideas for research from FAA's acquisition and operating units. The Human Factors Division is primarily responsible for the internal and external coordination of FAA's research on human factors. Internally, this division allocates most of the agency's funding for core research on human factors. Externally, the division has entered into interagency agreements with NASA and Defense to coordinate the agencies' research on human factors. However, FAA's other units are not required to coordinate their research on human factors with the Human Factors Division when the research is performed internally, by the units themselves, or externally, through interagency agreements or by contractors. As a result, the possibility of duplication exists, and the opportunity to leverage resources for research could be lost.

Derived from text

Human Factors Engineering; Policies; Conferences; Coordination

19970023991 National Academy of Sciences - National Research Council, Committee on Toxicology, Washington, DC USA
Spacecraft Maximum Allowable Concentrations for Selected Airborne Contaminants, Volume 2
1996; 408p; In English
Contract(s)/Grant(s): NAGw-2239
Report No.(s): NASA-CR-204303; LC-95-73151; NAS 1.26:204303; ISBN 0-309-05478-8; Copyright Waived (NASA); Avail: CASI; A18, Hardcopy; A04, Microfiche

The National Aeronautics and Space Administration (NASA) is aware of the potential toxicological hazards to humans that might be associated with prolonged spacecraft missions. Despite major engineering advances in controlling the atmosphere within spacecraft, some contamination of the air appears inevitable. NASA has measured numerous airborne contaminants during space missions. As the missions increase in duration and complexity, ensuring the health and well-being of astronauts traveling and working in this unique environment becomes increasingly difficult. As part of its efforts to promote safe conditions aboard spacecraft, NASA requested the National Research Council (NRC) to develop guidelines for establishing spacecraft maximum allowable concentrations (SMACs) for contaminants, and to review SMACs for various space-craft contaminants to determine whether NASA's recommended exposure limits are consistent with the guidelines recommended by the subcommittee. In response to NASA's request, the NRC organized the Subcommittee on Guidelines for Developing Spacecraft Maximum Allowable Concentrations for Space Station Contaminants within the Committee On Toxicology (COT). In the first phase of its work, the subcommittee developed the criteria and methods for preparing SMACs for spacecraft contaminants. The subcommittee's report, entitled Guidelines for Developing Spacecraft Maximum Allowable Concentrations for Space Station Contaminants, was published in 1992. The executive summary of that report is reprinted as Appendix A of this volume. In the second phase of the study, the Subcommittee on Spacecraft Maximum Allowable Concentrations reviewed reports prepared by NASA scientists and contractors recommending SMACs for approximately 35 spacecraft contaminants. The subcommittee sought to determine whether the SMAC reports were consistent with the 1992 guidelines. Appendix B of this volume contains the SMAC reports for 12 chemical contaminants that have been reviewed for their application of the guidelines developed in the first phase of this activity and approved by the subcommittee. This report is the second volume in the series Spacecraft Maximum Allowable Concentrations for Space Station Contaminants. The first volume was published in 1994.
Derived from text
NASA Programs; Hazards; Exposure; Toxicology; Contaminants

19970024003 Prins Maurits Lab. TNO, Rijswijk, Netherlands
Characteristics of Means for Respiratory Protection, Part 1, Simplified Correlation for Estimation of the Life Time *Final Report Kenmerken van adembeschermingsmiddelen, Deel 1, Eenvoudgie correlatie voor schatting van de gebruiksduur*
Mallens, E. P. J., Prins Maurits Lab. TNO, Netherlands; Duisterwinkel, A. E., Prins Maurits Lab. TNO, Netherlands; Dankers, H., Prins Maurits Lab. TNO, Netherlands; Jun. 1997; 44p; In Dutch
Contract(s)/Grant(s): A95/KL/430
Report No.(s): TD97-0005-Pt-1; PML-1997-A5-Pt-1; Copyright; Avail: Issuing Activity (TNO Prins Maurits Lab., PO Box 45, 2280 AA Rijswijk, The Netherlands), Hardcopy, Microfiche

The aim of this project is to develop a method to determine whether a filter bed of activated carbon can be of use in the protection against components of high volatility under known conditions. In this report the usefulness of a relatively simple method to estimate the life time of a filter bed is discussed. Comparison between the calculated and measured so-called 1% breakthrough time showed that this time interval can be calculated with an accuracy of 15%. This correlation is valid under conditions typical for filter beds used in practice. In case of very volatile components, however, the error in the calculated value of the breakthrough time can increase strongly. Moreover, the correlation is only valid in case both the activated carbon and the air flowing through the filter bed are dry. However, the number of situations in which the breakthrough time can be calculated accurately is too restricted by these boundary conditions. A modification of the correlation presented in this report is possible, but does not show much perspective. Therefore in the continuation of the project a different approach will be applied, based on an advanced adsorption process simulation model, which is currently being developed at TNO-PML.
Author
Activated Carbon; Life (Durability); Filters; Adsorption; Boundary Conditions; Errors

19970024011 NERAC, Inc., Tolland, CT USA

Anthropometry. (Latest Citations from the Aerospace Database)

Mar. 1997; 50p; In English

Report No.(s): PB97-857692; Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)) (US Sales Only), Microfiche

The bibliography contains citations concerning methods used to calculate important anthropometric and biomechanical parameters pertaining to human performance. Topics include recent advantages in analysis, methods, devices and techniques for measurement of human biomechanical activity and theoretical research into the applicability of analytical mechanics to human motion problems. Optimal performance of human motion and optimal modeling for specific human motion are discussed.

NTIS

Bibliographies; Anthropometry; Human Factors Engineering; Data Bases; Aerospace Engineering; Computation

19970024927 Army Research Inst. of Environmental Medicine, Biophysics and Biomedical Modeling Div., Natick, MA USA

Characterization of a Three-Phase Response in Cold-Stressed Fingers

Shitzer, Avraham, Technion - Israel Inst. of Tech., Israel; Endrusick, Thomas L., Army Research Inst. of Environmental Medicine, USA; Stroschein, Leander A., Army Research Inst. of Environmental Medicine, USA; Wallace, Robert F., Army Research Inst. of Environmental Medicine, USA; Gonzalez, Richard R., Army Research Inst. of Environmental Medicine, USA;

; Mar. 1997; 104p; In English

Report No.(s): AD-A323977; USARIEM-TR-T97-5; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Seven gloves were tested in 8 subjects (6 males and 2 females) in cold-dry, C-D, (db= -17.2 C; dp= -25.1 C), and cold-wet, C-W, (dp=0 C; dp= -8.4 C) conditions. Endurance times were 75 min (C-D) and 162 min (C-W). Females endurance times were significantly (p less than 0.05) shorter at 47 and 127 min, respectively. A three-phase response pattern of the fingers was characterized. In Phase 1 finger-tip temperature remains close to the initial level, due to delayed vasoconstriction DURATIONS:15 MIN (C-D), 43 min (C-W). In Phase 2 vasoconstriction causes an exponential-like decrease of finger temperature-tip DURATIONS: 36 MIN (C-D), 62 min (C-W). Phase 3 manifests periodic finger temperature changes due to cold induced vasodilatation CIVD; durations: 20 min (C-D), 58 min (C-W)). Average wave patterns for Phase 3 showed 31/2 waves/hr (C-D) and only about 2 waves/hr (C-W). Extension of endurance times due to CIVD, were 13 min in the C-D and 31 min in the C-W conditions. Three overall response patterns of fingers in the cold were characterized: (1) Type A exhibiting all 3 phases; (2) Type B1 or B2 exhibiting either Phases 1 + 2 or Phases 2 + 3; and (3) Type C showing only Phase 2.

DTIC

Gloves; Cold Tolerance; Low Temperature Tests; Vasoconstriction; Fingers

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