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February 24, 1997

# **AEROSPACE MEDICINE AND BIOLOGY**

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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# Typical Report Citation and Abstract

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

## Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
7. Abstract
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# AEROSPACE MEDICINE AND BIOLOGY

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*A Continuing Bibliography (Suppl. 433)*

FEBRUARY 24, 1997

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## LIFE SCIENCES (GENERAL)

**19970004917** Lamar Univ., Chemical Engineering Dept., Beaumont, TX USA

**Study of Resource Recovery and Epidemiology in an Anaerobic Digester**

Li, K. Y., Lamar Univ., USA; Cao, Song, Lamar Univ., USA; Hunt, M. D., Lamar Univ., USA; Fu, Xuping, Lamar Univ., USA; 1995; 10p; In English; Life Sciences and Space Medicine, 3-5 Apr. 1995, Houston, TX, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): NAG9-696

Report No.(s): NASA-CR-202585; NAS 1.26:202585; AIAA Paper 95-1056; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

Three 4-liter packed bed anaerobic digesters were fabricated and operated at 35 degrees C, pH around 7, and hydraulic retention time (HRT) of 20, 10 and 5 days to study the resource recovery and epidemiology in a controlled ecological life support system (CELSS). A simulated wastewater, consisted of shower water, clothwash water, dishwasher water, handwash water, and urine flush water was used as the feeding solution. Under steady-state operation, chemical oxygen demand (COD), total organic carbon (TOC), pH, nitrogen, phosphorus, and potassium were monitored in the digester input and output solutions. The volume and the CH<sub>4</sub>/CO<sub>2</sub> ratios in the biogas produced from the anaerobic digesters were measured. The results indicate about 90 percent of TOC is converted while only 5-8 percent of N-P-K are consumed in the digester. A multi-drug resistant strain of *Salmonella choleraesuis* was used as the indicator bacterium in the epidemiology study. The levels of *Salmonella choleraesuis* in the influent and the effluent were determined and decimal decay rate constants,  $k(d)$ , were estimated. The  $k(d)$  values were greater at higher initial doses than lower doses for the same HR, and greater for batch digestion (7.89/d) than for continuous digestion (4.28, 3.82, and 3.82/d for 20, 10, and 5 d HRT, respectively).

Author

*Closed Ecological Systems; Life Support Systems; Reaction Kinetics; Effluents; Epidemiology; Waste Water; Anaerobes; Sewage Treatment*

**19970004941** Wisconsin Univ., Dept. of Zoology, Madison, WI USA

**Modification of Experimental Protocols for a Space Shuttle Flight and Applications for the Analysis of Cytoskeletal Structures During Fertilization, Cell Division, and Development in Sea Urchin Embryos**

Chakrabarti, Amitabha, Wisconsin Univ., USA; Stoecker, Andrew, Wisconsin Univ., USA; Schatten, Heide, Wisconsin Univ., USA; 1995; 12p; In English; Life Sciences and Space Medicine, 3-5 Apr. 1995, Houston, TX, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): NAG10-64

Report No.(s): NASA-CR-202584; NAS 1.26:202584; AIAA Paper 95-1059; Copyright Waived (NASA); Avail: CASI; A03, Hardcopy; A01, Microfiche

To explore the role of microgravity on cytoskeletal organization and skeletal calcium deposition during fertilization, cell division, and early development, the sea urchin was chosen as a model developmental system. Methods were developed to employ light, immunofluorescence, and electron microscopy on cultures being prepared for flight on the Space Shuttle. For analysis of microfilaments, microtubules, centrosomes, and calcium-requiring events, our standard laboratory protocols had to be modified substantially for experimentation on the Space Shuttle. All manipulations were carried out in a closed culture chamber containing 35 ml artificial sea water as a culture fluid. Unfertilized eggs stored for 24 hours in these chambers were fertilized with sperm diluted in sea water and fixed with concentrated fixatives for final fixation in formaldehyde, taxol, EGTA, and MgCl<sub>2</sub>(exp -6)H<sub>2</sub>O for 1 cell to 16 cell stages to preserve cytoskeletal structures for simultaneous analysis with light, immunofluorescence, and elec-

tron microscopy, and 1.5 percent glutaraldehyde and 0.4 percent formaldehyde for blastula and plueus stages. The fixed samples wre maintained in chambers without degradation for up to two weeks after which the specimens were processed and analyzed with routine methods. Since complex manipulations are not possible in the closed chambers, the fertilization coat was removed from fixation using 0.5 percent freshly prepared sodium thioglycolate solution at pH 10.0 which provided reliable immunofluorescence staining for microtubules. Sperm/egg fusion, mitosis, cytokinesis, and calcium deposition during spicule formatin in early embryogenesis were found to be without artificial alterations when compared to cells fixed fresh and processed with conventional methods.

Author

*Cell Division; Embryology; Microgravity Applications; Mitosis; Reproduction (Biology); Sea Urchins; Sea Water; Spicules; Fertilization*

**19970005108** Veterans Administration Hospital, Philadelphia, PA USA

**X-Ray Crystallography of Botulinum Neurotoxins *Final Report, 1 May 1993 - 30 Apr. 1996***

Sax, Martin, Veterans Administration Hospital, USA; May 1996; 8p; In English

Report No.(s): AD-A313747; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Botulinum neurotoxin E is understudy crystallographically. Preliminary crystal data have been collected and a heavy atom derivative search is in progress. The structural information is relevant for applications in the development of vaccines and in the improvement of therapeutic uses of the neurotoxin.

DTIC

*X Rays; Clostridium Botulinum; Crystallography*

**19970005128** South Carolina Univ., Dept. of Microbiology and Immunology, Columbia, SC USA

**Identification of Nucleic Acid Sequences and Chemical Markers for Taxonomic Characterization of Bacteria *Final Report, Jun. 1992 - Jun 1996***

Fox, Alvin, South Carolina Univ., USA; Aug. 14, 1996; 7p; In English

Contract(s)/Grant(s): DAAL03-92-G-0255

Report No.(s): AD-A313737; ARO-29583.13-LS; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Our biodetection research is primarily concerned with two inter-related issues (1) development of novel schemes for improving chemotaxonomic characterization of microbial pathogens and (2) mass spectrometry-based methods for trace detection of chemical markers for key agents in complex environmental matrices. \$180,000 in direct + indirect costs were provided over the period June 1992-1995. This contract was extended with additional funds of \$49,020 from ERDEC through June 1995-June 1996. Development of chemotaxonomic schemes for correct identification of species of bacteria relevant to the biodetection program is essential. The research employed a systematic search for new chemical markers employing state-of-the-art chemical and molecular approaches. The feasibility of detecting markers for bacteria in environmental samples was demonstrated by developing a working method for detection of muramic acid (universally found in bacteria) in airborne dust. A prototype approach for the rapid (less than 10 minutes) detection/identification of microorganisms (B. anthracis) based upon the combination of polymerase chain reaction (PCR) and electrospray mass spectrometry is also described. Extrapolation of this approach to environmental monitoring would represent a major improvement over existing technologies for biodetection.

DTIC

*Bacteria; Taxonomy; Nucleic Acids; Environmental Monitoring; Microorganisms; Matrices (Mathematics)*

**19970005158** Albert Einstein Coll. of Medicine, Yeshiva University, New York, NY USA

**Ricin- Inhibitor Design *Final Report, 15 Apr. 1993 - 14 Apr 1996***

Schramm, Vern L., Albert Einstein Coll. of Medicine, USA; May 1996; 29p; In English

Contract(s)/Grant(s): DAMD17-93-C-3051

Report No.(s): AD-A313750; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this proposal was to provide information which will permit the design of transition state inhibitors for ricin A-chain. The original goals were to solve the transition state structure based on kinetic isotope effects. Substrates were synthesized and the conditions for assays optimized to provide catalytic rates at least 1000 fold greater than those published prior to this work. Reliable assay methods have been established to permit routine assays for ricin A-chain. Substrate analogues for N-ribohydrolase reactions have been designed to establish whether the reaction involves leaving-group activation or oxycarbonium ion formation. Based on these results, leaving group activation is a major contributor and oxycarbonium-ion formation is a secondary contribution in the mechanism of catalysis by ricin A-chain. Using this information, the first submicromolar inhibitor of ricin A-chain has

been synthesized, tested and kinetically characterized. The development of powerful inhibitors will be a direct extrapolation of these results.

DTIC

*Ribonucleic Acids; Isotope Effect; Substrates*

**19970005178** Florida Univ., Dept. of Chemistry, Gainesville, FL USA

**'Designer Yeast': A New Reagent for Enantioselective Baeyer-Villiger Oxidations**

Reed, Kieth W., Florida Univ., USA; 1996; 98p; In English

Report No.(s): AD-A308051; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

The catalytic repertoire of baker's yeast has been expanded to include enantioselective Baeyer-Villiger oxidations. To create this catalyst, the *Acinetobacter* sp. (NCIB 98%1) cyclohexanone monooxygenase gene was cloned into a yeast expression plasmid and this vector was used to transform baker's yeast (*Saccharomyces cerevisiae*). Whole cell-mediated Baeyer-Villiger reactions were carried out on a 1.0 mmole scale and several cyclic ketones were converted in 20-30 hours into the corresponding lactones in isolated yields of 54-83%. Under our reaction conditions, ketone reduction caused by the host yeast reductases constituted only a minor side-reaction. In the first phase of this work, reaction conditions for the Baeyer-Villiger yeast-mediated oxidation of cyclohexanone were optimized. The second phase involved the oxidation of prochiral 4-substituted cyclohexanones by our engineered yeast. The enzyme-mediated oxidation of these substrates afforded lactones with very high enantioselectivities. While we did encounter some problems with substrate solubilities, these were easily solved by the addition of stoichiometric amounts of beta cyclodextrin. In the third and final phase, we studied the oxidation of racemic 2-substituted cyclohexanones. As the size of the substituent increased, we found that the kinetic resolutions improved dramatically. In all cases, the (S)- ketone was more reactive than the antipode. This kinetic resolution allowed us to isolate both enantiomerically enriched ketones and lactones, generally with ee values of greater than 98%. Recovered yields of the lactone products varied from 54 to 79%. In conclusion, we have created a simple reagent capable of performing a chiral Baeyer-Villiger oxidation.

DTIC

*Oxidation; Cyclic Compounds; Saccharomyces; Yeast; Cells (Biology); Plasmas (Physics)*

**19970005392** State Univ. Coll. of New York, Buffalo, NY USA

**The Binding of Oligopeptides to Cyclodextrins: The Role of the Tyrosine Group**

Bekos, E. J., State Univ. Coll. of New York, USA; Gardella, J. A., Jr., State Univ. Coll. of New York, USA; Bright, F. V., State Univ. Coll. of New York, USA; Aug. 1996; 34p; In English

Report No.(s): AD-A313397; TR-96-05; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The formation of alpha-cyclodextrin (alpha-CD) and beta-cyclodextrin (beta-CD) inclusion complexes with free tyrosine and the tyrosine residues in two oligopeptides were investigated using steady-state fluorescence spectroscopy. The oligopeptides consist of five amino acids (pentapeptide) and the tyrosine residues are at the n-terminus of both peptides. The two peptides used in this study have specific biological applications and are known to bind selectively to specific receptors. Cyclodextrins were used to model this receptor-peptide (protein-ligand) interaction. Equilibrium binding constants and the enthalpy and entropy of binding were recovered. Molecular size of the tyrosine-containing species and pH (7.0 vs 10.0) were found to have little effect on alpha-CD binding. However, tyrosine binding to beta-CD was dependent on the size (free tyrosine vs. peptide), structure, and pentapeptide conformation.

DTIC

*Amino Acids; Fluorescence; pH; Steady State; Entropy; Enthalpy*

**19970005451** Louisville Univ., Dept. of Pathology, KY USA

**Immunological and Hematopoietic Biotechnology Studies Final Report**

Fernandez-Botran, Rafael, Louisville Univ., USA; Sonnenfeld, Gerald, Carolinas Medical Center, USA; Aug. 1996; 5p; In English

Contract(s)/Grant(s): NCA2-687

Report No.(s): NASA-CR-202566; NAS 1.26:202566; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The purpose of the work carried under this interchange was to support the development of space flight biotechnology experiments in the areas of immunology and hematopoiesis to facilitate the commercial development of space. The studies involved the interaction and development of experiments with biotechnology companies for necessary ground-based studies to allow the development of flight studies. The thrust of the work was to develop experiments with the Chiron Corporation and Bioserve involving the use of interleukin-2 to modulate the effects of spaceflight on immune responses. Spaceflight has been shown to have multiple effects on immune responses (1). Interleukin-2 is an immuno-regulator that could have potential to counter some of the

alterations induced in immune responses by spaceflight (1). to test this possibility before flight, rats were suspended antiorthostatically (2) and treated with interleukin-2. Antiorthostatic suspension is a model for some of the effects of spaceflight on immune responses (2). The interleukin-2 was given to see if it could alter some of the effects of suspension. This was achieved. As a result of these studies, two flight experiments were developed and flown with the Chiron Corp. and Bioserve to determine if use of interleukin-2 could prevent or attenuate the effects of space flight on immune responses.

Author

*Biotechnology; Hematopoietic System; Rats; Spaceborne Experiments; Hypokinesia; Immune Systems; Hematopoiesis; Orthostatic Tolerance*

**19970006841** NASA Kennedy Space Center, Cocoa Beach, FL USA

**Microinvertebrates in CELSS Hydroponic Rhizosphere: Experimental Invasion as a Test of Community Stability and a Test of a Method to Measure Bacterivory**

Sager, John, NASA Kennedy Space Center, USA; Garland, Jay, NASA Kennedy Space Center, USA; Jenkins, David G., Illinois Univ., USA; NASA/ASEE Summer Faculty Fellowship Program; Aug. 09, 1996, pp. 89-110; In English; Also announced as 19970006834; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

This report consists of two separate draft manuscripts, each prepared for submittal to a peer-reviewed journal after Kennedy Space Center (KSC) colleague editorial review and final revision. References for the two papers have been combined in this report. The two manuscripts are: (1) Experimental invasion of aquatic rhizosphere habitat and invertebrate communities, and (2) Lysozyme analysis is neither protistan- or bacteriophage-specific.

Author

*Closed Ecological Systems; Habitats; Hydroponics; Lysozyme; Stability*

**19970007048** Utah Univ., Radiobiology Div., Salt Lake City, UT USA

**Prostaglandin E2 Adds Bone to a Cancellous Bone Site with a Closed Growth Plate and Low Bone Turnover in Ovariectomized Rats**

Ma, Y. F., Utah Univ., USA; Ke, H. Z., Utah Univ., USA; Jee, W. S. S., Utah Univ., USA; Bone; 1994; ISSN 8756-3282; Volume 15, No. 2, pp. 137-146; In English

Contract(s)/Grant(s): DE-AC02-76EV-0019; NAG2-435; NIH-AR-38346

Report No.(s): NASA-CR-202745; NAS 1.26:202745; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

The objects of this study were to determine the responses of a cancellous bone site with a closed growth plate, (the distal tibial metaphysis (DTM), to ovariectomy (OVX) and OVX plus a prostaglandin E(2) treatment, and compare the site's response to previous findings reported for another site, the proximal tibial metaphysis (PTM). Thirty five 3-month old female Sprague-Dawley rats were divided into five groups; basal, sham OVX, and OVX+0, +1, or +6 mg PGE(2)/kg/d injected subcutaneously for 3 months and given double fluorescent labels before sacrifice. Cancellous bone histomorphometric analyses were performed on 20 micrometer thick undecalcified DTM sections. Similar to the PTM, the DTM showed age-related decreases in bone formation and increases in bone resorption, but it differed in that at 3 months POST OVX there was neither bone loss nor changes in formation endpoints. Giving 1 mg PGE(2)/kg/d to OVX rats prevented most age-related changes and maintained the bone formation histomorphometry near basal levels. Treating OVX rats with 6 mg PGE(2)/kg/d prevented age-related bone changes, added extra bone, and improved microanatomical structure by stimulating bone formation, without altering bone resorption. Furthermore, After PGE(2) administration, the DTM, a cancellous bone site with a closed growth plate, increased bone formation more than did the cancellous bone in the PTM.

Author

*Age Factor; Bone Mineral Content; Rats; Prostaglandins*

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**AEROSPACE MEDICINE**

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

**19970004677** Naval Medical Research Inst., Bethesda, MD USA

**Statistically Based Decompression Tables X: Real-Time Decompression Algorithm Using a Probabilistic Model, Jan. 1991 - Dec. 1993**

Survanshi, S. S., Naval Medical Research Inst., USA; Weathersby, P. K., Naval Medical Research Inst., USA; Thalmann, E. D.,

Naval Medical Research Inst., USA; Mar. 1996; 44p; In English

Contract(s)/Grant(s): M0099

Report No.(s): AD-A308010; NMRI-96-06; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Underwater decompression meters or computers sense a diver's changes of depth in real-time and calculate a decompression schedule for the individual diver's exposure. Currently available devices compare calculated nitrogen tissue tensions to a set of stored 'safe' constants. No explicit quantitative connection between these rules and the risk of decompression sickness has been established. Well calibrated probabilistic models, even though computationally more intense, can be used to specify decompression procedures tailored to control the risk of decompression sickness. Probabilistic models allow conscious choice of the degree of 'safety' or acceptable risk. Previously, the choice required searching up to tens of thousands of possibilities for any given dive. That method cannot be employed in real time without a very fast computer. We describe a quicker search method that depends upon a 'recent optimal' solution so that it can be implemented in real time. The real time algorithm compared favorably with decompression schedules obtained by extensive searches. Timing requirements for updating calculations (important for hardware specification) depends on how fast the 'recent optimal' answer changes. Risk management for repetitive diving is described in terms of conditional probability. The algorithm can be used to permit the acceptable risk level to vary during real time as the dive severity increases, and to include multiple breathing gases.

DTIC

*Diving (Underwater); Breathing Apparatus; Probability Theory; Pressure Reduction; Real Time Operation; Risk; Decompression Sickness*

**19970004697** Naval Postgraduate School, Monterey, CA USA

**A New Kinematic Model for the Study of the Role of the Anterior Cruciate Ligament (ACL) in Human Knee Motion**

Romero, Nestor E., Naval Postgraduate School, USA; Dec. 1995; 73p; In English

Report No.(s): AD-A307196; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A six degree of freedom model was utilized to continuously measure the motions of loaded cadaveric human knees with unconstrained motion at the tibiofemoral joint through a range of motion from zero to 110 degrees of flexion. Several conditions were studied. Loading conditions were varied to simulate the natural body forces (i.e. the normal condition) and quadriceps-deficient condition. The range of motion in which the Anterior Cruciate Ligament (ACL) is the primary restraint to anterior tibial translation was determined. The effect of ACL insufficiency on the kinematics of the human knee was investigated by comparing the kinematics of the knee specimens in the intact state with the kinematics obtained after the ACL was surgically severed. To simplify the complex kinematics of a six degree of freedom model, the motion of the instant center of the tibiofemoral joint for each specimen was estimated using the femoral transepicondylar pin reference point. The estimated motion of the instant center of the knees in the intact state and ACL deficient state was compared to empirical observations. The importance of the motion of the instant center was then determined in pathologic knee motion. Finally, the effect of total knee replacement on kinematics was investigated.

DTIC

*Degrees of Freedom; Knee (Anatomy); Dynamic Models*

**19970004828** Wisconsin Univ., Madison, WI USA

**Ability of Blood with Altered Affinity and Hemoglobin Solutions to Deliver Oxygen Final Report, 15 Nov. 1988 - 31 Mar. 1995**

Woodson, Robert D., Wisconsin Univ., USA; Berlin, Gosta, Wisconsin Univ., USA; Challoner, Keith E., Wisconsin Univ., USA; Apr. 1995; 54p; In English

Contract(s)/Grant(s): DAMD17-89-Z-9004

Report No.(s): AD-A308057; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

We compared O<sub>2</sub> delivery in isolated hearts (1) by red blood cells (RBC) as a function of oxygen dissociation curve position P(dc) and (2) by purified hemoglobin in direct comparison to RBC. Hearts were retrograde perfused and performed isometric work by compressing a left ventricular fluid-filled balloon. A right shift of the oxygen dissociation curve (due to incorporation of inositol hexaphosphate into red cells) improved function and myocardial oxygen consumption. Hemoglobin, at equivalent hemoglobin concentration and P(dc), was indistinguishable from RBC in this model. These findings have important relevance to the Army's blood program. We also studied the effect of a new allosteric modifier of hemoglobin function (termed RSR-13), which powerfully shifts the oxygen dissociation curve to the right, on cardiac output and its distribution in lightly anesthetized rats. We found no effect on either cardiac output or on absolute or relative blood flow to any organ. This finding is quite surprising and runs counter

to standard physiologic dogma and most previous work. As such it has potentially important implications for basic physiologic concepts but requires further study.

DTIC

*Blood; Oxygen Consumption; Erythrocytes; Hemoglobin*

**19970004836** Centro de Isotopos, Havana, Cuba

**Evaluation of the human prolactin of National Production for use in radioimmunoassay (RIA) *Evaluacion de la prolactina humana de produccion nacional para su empleo en radioimmunoanálisis (RIA)***

Caso, R., Centro de Isotopos, Cuba; Arranz, C., Instituto Nacional de Edogrinologia, Cuba; 1996; 7p; In Spanish

Report No.(s): CIEN-R-23-96; DE96-626778; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

In this work the possibility of using the Prolactin hormone as raw material to produce Kits-RIA of Prolactin was studied. The prolactin, which is obtained in Cuba by the Pharmaceutical Institute Mario Munoz, was used. The labeling of Prolactin was made with I-125, the hormone was used as standard and the probes were done of quality control. The Prolactin Hormone had the necessary quality to produce Kits-RIA-Prolactin.

DOE

*Quality Control; Radioimmunoassay; Iodine 125; Pituitary Hormones; Hormones*

**19970004934** NASA Ames Research Center, Moffett Field, CA USA

**The Effects of Promethazine on Human Performance, Mood States, and Motion Sickness Tolerance**

Cowings, Patricia S., NASA Ames Research Center, USA; Stout, Cynthia, NASA Ames Research Center, USA; Toscano, William B., NASA Ames Research Center, USA; Reynoso, Samuel, NASA Ames Research Center, USA; DeRoshia, Charles, NASA Ames Research Center, USA; Nov. 1996; 24p; In English

Contract(s)/Grant(s): RTOP 199-14-12-14

Report No.(s): NASA-TM-110420; NAS 1.15:110420; A-965113; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Intramuscular (IM) injections of promethazine in 25 mg or 50 mg dosages are commonly used to treat space motion sickness in astronauts. The present study examined the effects of IM injections of promethazine on neuropsychological performance, mood states, and motion sickness tolerance in humans. Twelve men, mean age 36 plus or minus 3.1 participated in one training (no injections) and three treatment conditions: a 25 mg injection of promethazine, a 50 mg injection of promethazine, and a placebo injection of sterile saline. Each condition, spaced at 7 day intervals, required an 8-10 hr session in which subjects were given four repetitions of 12 performance tasks, and one rotating chair motion sickness test. On the training day subjects were trained on each task to establish stability and proficiency. On treatment days, the order in which the drug or placebo was assigned to subjects was counter-balanced and a double-blind technique was used. Statistically significant decrements in performance were observed on 10 of 12 tasks when subjects were given 25 mg or 50 mg of promethazine as compared to the placebo. Performance decrements were associated with mean blood alcohol dose equivalency levels of 0.085% for 25 mg and 0.137% for 50 mg dosages. The mood scale results showed significant changes in individual subjective experiences with maximum deterioration in the arousal state and fatigue level. When compared to placebo significant increases in motion sickness tolerance were found for both dosages of promethazine. These data suggest that effective dosages of promethazine currently used to counteract motion sickness in astronauts may significantly impair task components of their operational performance.

Author

*Arousal; Human Performance; Motion Sickness; Promethazine; Dosage; Moods*

**19970005130** Prime Technology, Inc., Dayton, OH USA

**Aviation Epidemiology Data Register *Final Report, 1 Mar. 1992 - 7 Jun. 1996***

Saini, Surinder K., Prime Technology, Inc., USA; Aug. 1996; 21p; In English

Contract(s)/Grant(s): DAMD17-92-C-2062

Report No.(s): AD-A313749; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The two fundamental objectives of this contract were Data entry of all Flying Duty Medical Examination (FDME) and analytical support and research data retrieval for clinical assessment purposes. Each FDME was entered into the backlog file and a print out of all prior medical history was generated. All medical history was given a ICD9CM code After all medical history has been coded and an AEDR file established other medical information is transcribed into the AEDR from the FDME. There are approximately 172 fields in the AEDR for administrative and medical testing results. Utilizing the 40-501, various APLs, and the Flight Surgeons guide, each FDME is then pre-reviewed, or screened for medical conditions which are out of standards and any medical conditions which may require special action by the Aeromedical Activity Screeners A recommendation is then written on the

accompanying computer generated cover sheet The entire packet is then forwarded to the Aeromedical Activity flight surgeon for Review and Disposition. As an ongoing process, contract personnel sought ways to promote the quick turnaround of FDMES without losing quality assurance. Also searched for was a quick and accurate way to track an FDME and eliminate repetitive time use for the flight surgeon in the field, while at the same time making available to him information concerning the air crewmember he would be examining. Each year aviators and aviation related personnel are required to take a Flight Duty Medical Examination. One requirement of the annual FDME was to complete a Standard Form 93 medical history form. Due to the tremendous number of FDMES processed annually through the Aeromedical Activity, it became necessary to develop a process by which a EDME could be located quickly.

DTIC

*Data Retrieval; Data Bases; Data Processing; Aerospace Medicine; Aircraft Pilots; Epidemiology*

**19970005148** Texas Univ., Medical School; Dept. of Anesthesiology, Houston, TX USA

**Transesophageal Echocardiographic Study of Decompression-Induced Venous Gas Emboli**

Butler, B. D., Texas Univ., USA; Morris, W. P., Texas Univ., USA; Undersea & Hyperbaric Medicine; 1995; Volume 22, No. 2, pp. 117-128; In English

Contract(s)/Grant(s): NAG9-215

Report No.(s): NASA-CR-202627; NAS 1.26:202627; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Transesophageal echo-cardiography was used to evaluate venous bubbles produced in nine anesthetized dogs following decompression from 2.84 bar after 120 min at pressure. In five dogs a pulsed Doppler cuff probe was placed around the inferior vena cava for bubble grade determination. The transesophageal echo images demonstrated several novel or less defined events. In each case where the pulmonary artery was clearly visualized, the venous bubbles were seen to oscillate back and forth several times, bringing into question the effect of coincidental counting in routine bubble grade analysis using precordial Doppler. A second finding was that in all cases, extensive bubbling occurred in the portal veins with complete extraction by the liver sinusoids, with one exception where a portal-to-hepatic venous anastomosis was observed. Compression of the bowel released copious numbers of bubbles into the portal veins, sometimes more than were released into the inferior vena cava. Finally, large masses of foam were routinely observed in the non-dependent regions of the inferior vena cava that not only delayed the appearance of bubbles in the pulmonary artery but also allowed additional opportunity for further reaction with blood products and for coalescence to occur before reaching the pulmonary microcirculation. These novel observations are discussed in relation to the decompression process.

Author

*Aeroembolism; Bubbles; Decompression Sickness; Dogs; Echocardiography; Foams; Blood Pressure*

**19970005306** Denver Univ., Dept. of Psychology, Denver, CO USA

**[The Strategic Organization of Skill] Final Report**

Roberts, Ralph, Denver Univ., USA; Oct. 10, 1996; 60p; In English

Contract(s)/Grant(s): NAG2-737

Report No.(s): NASA-CR-202532; NAS 1.26:202532; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Eye-movement software was developed in addition to several studies that focused on expert-novice differences in the acquisition and organization of skill. These studies focused on how increasingly complex strategies utilize and incorporate visual look-ahead to calibrate action. Software for collecting, calibrating, and scoring eye-movements was refined and updated. Some new algorithms were developed for analyzing corneal-reflection eye movement data that detect the location of saccadic eye movements in space and time. Two full-scale studies were carried out which examined how experts use foveal and peripheral vision to acquire information about upcoming environmental circumstances in order to plan future action(s) accordingly.

Derived from text

*Algorithms; Eye Movements; Fovea; Peripheral Vision; Saccadic Eye Movements; Abilities; Air Traffic Controllers (Personnel); Psychomotor Performance; Workloads (Psychophysiology); Visual Perception*

**19970005333** Analytic Sciences Corp., San Antonio, TX USA

**Review of the Elemental Capability of Vision: Primary Visual Taxons Final Report, Oct.1995 - Dec.1995**

Miller, Robert E., II, Analytic Sciences Corp., USA; Barsalou, Norm, Analytic Sciences Corp., USA; Cartledge, Robert M., Air Force Materiel Command, USA; Aug. 1996; 48p; In English

Contract(s)/Grant(s): F33615-92-C-0017; AF Proj. 7757

Report No.(s): AD-A313430; AL/OE-TR-1996-0103; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Joint Technical Coordinating Group/Munitions Effectiveness and Aircraft Survivability Crew Casualty Working Group (CCWG) was formed to review and standardize casualty assessments for the Tri-services. The goal of the CCWG is to design an accurate model which is sufficiently general to predict the probability of incapacitation from a wide range of weapon effects or insults (e.g., blast, penetration, blunt injury, acceleration, bumps, toxic gases, biological agents, electromagnetic energy, etc.) for any military specialty and role. A crew casualty assessment flow diagram was developed as the architecture to model the insult-to-injury-to-operational-casualty determination. The intent of this report is to review the contentious issues of the model as they apply to visual function, define the elemental capabilities of vision, identify the primary visual taxons, design appropriate injury metrics, and endorse a plan to bridge the gaps in mission performance data. This initial effort is only the beginning in the much larger task of building an accurate model for the assessment of crew casualties from eye injuries produced by multiple types of insults.

DTIC

*Visual Acuity; Injuries; Eye (Anatomy)*

**19970005474** Carolinas Medical Center, Dept. of General Surgery Research, Charlotte, NC USA

**Spaceflight and Development of Immune Responses *Final Report***

Sonnenfeld, Gerald, Carolinas Medical Center, USA; Nov. 1996; 7p; In English

Contract(s)/Grant(s): NCC2-859

Report No.(s): NASA-CR-202602; NAS 1.26:202602; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Evidence from both human and rodent studies has indicated that alterations in immunological parameters occur after space flight. The number of flight experiments has been small, and the full breadth of immunological alterations occurring after space flight remains to be established. Among the major effects on immune responses after space flight that have been reported are: alterations in lymphocyte blastogenesis and natural killer cell activity, alterations in production of cytokines, changes in leukocyte sub-population distribution, and decreases in the ability of bone marrow cells to respond to colony stimulating factors. Changes have been reported in immunological parameters of both humans and rodents. The significance of these alterations in relation to resistance to infection remains to be established. The objective of the studies contained in this project was to determine the effects of space flight on immune responses of pregnant rats and their offspring. The hypothesis was that space flight and the attendant period of microgravity will result in alteration of immunological parameters of both the pregnant rats as well as their offspring carried in utero during the flight. The parameters tested included: production of cytokines, composition of leukocyte sub-populations, response of bone marrow/liver cells to granulocyte/monocyte colony stimulating factor, and leukocyte blastogenesis. Changes in immune responses that could yield alterations in resistance to infection were determined. This yielded useful information for planning studies that could contribute to crew health. Additional information that could eventually prove useful to determine the potential for establishment of a permanent colony in space was obtained.

Author

*Bone Marrow; Infectious Diseases; Physiological Responses; Rats; Leukocytes; Immunology; Liver*

**19970006963** NASA Washington, Washington, DC USA

**Aerospace Medicine and Biology: 1995 Cumulative Index (supplement 409)**

Dec. 1995; 322p; In English

Report No.(s): NASA-SP-7011(409); NAS 1.21:7011(409); No Copyright; Avail: Issuing Activity (NASA Washington, Washington, DC), Hardcopy, Microfiche

This publication is a cumulative index to the abstracts contained in Supplements 397 through 408 of 'Aerospace Medicine and Biology: A Continuing Bibliography'. It includes seven indexes: subject, personal author, corporate source, foreign technology, contract number, report number, and accession number. Subject coverage includes aerospace medicine and physiology, life support systems and human/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance.

Author (revised)

*Indexes (Documentation); Bibliographies; Aerospace Medicine; Bioastronautics; Exobiology; Life Sciences*

## BEHAVIORAL SCIENCES

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

**19970004670** Army Research Inst. of Environmental Medicine, Natick, MA USA

**Body Fluid Balance During Exercise-Heat Stress**

Sawka, Michael N., Army Research Inst. of Environmental Medicine, USA; Montain, Scott J., Army Research Inst. of Environmental Medicine, USA; Latzka, William A., Army Research Inst. of Environmental Medicine, USA; Mar. 1996; 43p; In English  
Contract(s)/Grant(s): USARIEM-TN96-2

Report No.(s): AD-A307206; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

During exercise, sweat output often exceeds water intake; producing a body water deficit or hypohydration. The water deficit affects both intracellular and extracellular volume. It also results in plasma hypertonicity and hypovolemia. Muscular strength and endurance can be reduced by hypohydration, but the effects are not clear-cut. Aerobic exercise tasks are likely to be adversely affected by hypohydration; with the potential being greater in warm environments. Hypohydration increases heat storage and reduces one's ability to tolerate heat strain. The increased heat storage is mediated by reduced sweating rate and reduced skin blood flow for a given core temperature. Hyperhydration has been suggested to reduce thermal strain during exercise in the heat, however, data supporting that notion are not robust.

DTIC

*Body Fluids; Sweat; Water Loss; Heat Tolerance; Temperature Effects; Dehydration; Blood Circulation*

**19970004837** Navy Personnel Research and Development Center, San Diego, CA USA

**Distributed Training Technology Project Final Report**

Wetzel, C. Douglas, Navy Personnel Research and Development Center, USA; Apr. 1996; 53p; In English

Report No.(s): AD-A308012; NPRDC-TR-96-7; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The objective of the Distributed Training Technology project was to extend the use of videoteletraining (VTT) beyond lecture-based courses traditionally given by VTT to courses with interactive or hands-on laboratory environments. Lessons learned and guidelines resulting from the effort were derived for this final project report. The project formally evaluated the feasibility of using VTT to deliver training in four course content areas representing different challenges for VTT: Celestial Navigation, Navy Leadership, Fiber Optic Cable Repair, and a computer laboratory in a Quality Assurance course. A combination of three approaches has the greatest generality for implementing VTT laboratory courses: (1) students can be better prepared prior to performing laboratory work, (2) support at the remote site can be increased by providing a surrogate for the instructor in order to supervise students and conduct laboratory activities, and (3) video technology can be used to increase the visibility of activities between sites. An increased level of effort is required to convert and deliver VTT laboratory courses. Training equipment adapted for portability allows classrooms to be used by other VTT courses. Courses must be selected for student throughput sufficient to provide savings in travel costs.

DTIC

*Instructors; Education; Research and Development; Students; Visibility; Lectures; Leadership; Celestial Navigation; Fiber Optics*

**19970005041** CAE-Link Corp., Training Services Div., Alexandria, VA USA

**Executive Leadership in a Changing World Order: Requisite Cognitive Skills. The First Literature Review Final Report, Apr. - Nov. 1990**

Markessini, Joan, CAE-Link Corp., USA; Jun. 1996; 92p

Contract(s)/Grant(s): MDA903-87-C-0625

Report No.(s): AD-A313666; ARI-CR-96-05; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This document reviews the psychological literature for models and taxonomies of human cognition and examines 20 such models and taxonomies by 18 theorists over a period of 67 years, from 1923 through 1989. Researchers concluded that, while a number of the models were of great interest, the scientific community does not have a widely accepted, comprehensive theory of cognition or a general theory of learning that allows generalizations of learning principles to specified complex tasks, nor does it appear to have a consensus on the concept of intelligence. Above and beyond those circumstances, one gets little sense of common purpose guiding the development of the more recently derived models of cognition; the field is more paradigm-than theory-driven. No taxonomy of requisite cognitive skills for executive leadership performance was found.

DTIC

*Leadership; Cognition; Learning; Abilities*

**19970005127** Department of Defense Polygraph Inst., Fort McClellan, AL USA

**POLYSCORE: A Comparison of Accuracy Final Report, May 1995 - Jun. 1996**

Blackwell, N. Joan, Department of Defense Polygraph Inst., USA; Jun. 1996; 26p; In English

Report No.(s): AD-A313620; DODPI95-R-0001; DODPI94-P-0006; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Using data collected under a mock crime scenario paradigm, four versions of the John Hopkins University Applied Physics Laboratory (APL) algorithm-based scoring system were evaluated for consistency in scoring accuracy. The four versions were: (a) PASS 2.0, (b) POLYSCORE 2.3, (c) POLYSCORE 2.9, and (d) POLYSCORE 3.0. The algorithm's rates of agreement/disagreement with ground truth were examined, and the same evaluations were made for the psychophysiological detection of deception (PDD) examiners who collected the data. The PDD examiners in this evaluation had an overall accuracy rate of 72.27% when compared to ground truth. The overall rate of accuracy generated by the algorithm (edited dataset) was: (a) PASS 2.0, 63.03%; (b) POLYSCORE 2.3, 67.72%; (c) POLYSCORE 2.9, 72.27%; and (d) POLYSCORE 3.0, 68.91%. With the inconclusive decisions eliminated, the recomputed accuracy rate for the PDD examiners was 79.63%, while each version of the algorithm was comparable (PASS 2.0, 78.95%; POLYSCORE 2.3, 79.21%; POLYSCORE 2.9 83.50%); POLYSCORE 3.0, 82.83%, with both POLYSCORE 2.9 and POLYSCORE 3.0 exceeding the examiners' level of accuracy. In addition to overall accuracy and accuracy based on the test format used, the effects of subjective manipulation of the data were discussed, and information was provided on the occurrence of decision reversals and statistical outliers.

DTIC

*Algorithms; Ground Truth; Scoring; Psychophysiology; Accuracy*

**19970005132** Rice Univ., Houston, TX USA

**Comparing Performance on Implicit Memory Tests Final Report, 1 Aug. 1992 - 31 Dec. 1995**

Roediger, Henry L., III, Rice Univ., USA; Oct. 15, 1995; 17p; In English

Contract(s)/Grant(s): F49620-92-J-0437; AF Proj. 2313

Report No.(s): AD-A308305; AFOSR-TR-96-0228; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

AFOSR Grant F49620-92-J-0437 has provided support for the past three years on nine different lines of research. The first six of these are concerned with priming on implicit memory tests, which was the focus of the grant. The last three topics described below (the experimental basis of serial position effects and two laboratory paradigms for studying the development of false memories) were new research directions generated during the course of the grant. With regard to the main thrust of the grant, we believe we have made progress in understanding (1) the role of imagery in affecting priming on perceptual implicit memory tests; (2) the effect of distinctive or high priority events on implicit memory tests; (3) the specificity of priming on implicit memory tests; (4) the role of repetition in affecting implicit memory tests; and (5) work directed at the issue of whether implicit memory tests are 'contaminated' by conscious recollection.

DTIC

*Memory; Learning; Cognitive Psychology; Psychological Tests*

**19970005182** South Carolina Univ., Dept. of Psychology, Columbia, SC USA

**Retrieval and Storage Consequences of Working Memory Limitations Final Report, 1 Jul. 1994 - 30 Jun. 1996**

Engle, Randall W., South Carolina Univ., USA; Jul. 31, 1996; 15p; In English

Contract(s)/Grant(s): F49620-94-1-0257; AF Proj. 3484

Report No.(s): AD-A312967; AFOSR-TR-96-0431; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Over the two years of the ASSERT grant and the 3 years of the parent grant, the students supported by the grants performed studies that greatly extended our knowledge about the importance of working memory capacity in the performance of cognitive tasks and clarified the nature of the causes of individual differences in working memory capacity. One set of studies showed that working memory capacity was important in the suppression of distracting information. Individuals with greater working memory resources are better able to block and inhibit both distracting events from the environment and thoughts that interfere with ongoing processing. This places even greater importance on the evaluation of individual differences in working memory for jobs in which distractions could impede performance. The final project on the grants was a large factor analysis of working memory tasks, short-term memory tasks, general fluid intelligence tests and Verbal and Quantitative Scholastic Aptitude Tests. The analysis clearly demonstrated that a wide variety of so-called working memory tasks reflect a common latent trait and that the trait is very closely related to both general fluid intelligence and to aptitude as measured by the SAT's. If the renewal of these grants is funded, my lab will pursue the role of attention switching and task switching in working memory capacity and the relationship between many findings from my lab over the years and findings with patients with damage to the prefrontal cortex of the brain. This would suggest

that individual differences in working memory capacity reflects differences in functioning of the central attentional system in general and the prefrontal cortex in particular.

DTIC

*Memory; Verbal Communication; Psychological Tests; Mental Performance; Intelligence Tests; Factor Analysis*

**19970005314** SAG Corp., Falls Church, VA USA

**Estimation of Retention Parameters for the Prototype Officer Personnel Inventory, Cost and Compensation Model *Final Report, Aug. 1993 - Jan. 1995***

Mackin, Patrick G., SAG Corp., USA; Mairs, Lee S., SAG Corp., USA; Hogan, Paul F., SAG Corp., USA; Oct. 1995; 66p; In English

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

Report No.(s): AD-A313541; ARI-SR-96-01; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This research estimated a multiperiod Annualized Cost of Leaving (ACOL-2) model that predicts officer career decisions as a function of economic, demographic, and Army personnel policy (e.g., military compensation) influences. The panel probit estimation yielded statistically significant pay but not unemployment effects. The research also found that fixed, unobserved preferences for military service significantly influence retention behavior. The estimation encompassed up to 13 consecutive annual decision points, with data taken from ARI's Officer Longitudinal Research Database, covering year groups 1979-1992. The retention parameter estimates were embedded in an Officer Personnel Inventory, Cost and Compensation (OPICC) Model. This PC-based prototype model was designed and developed to improve the Army's ability to effectively manage its officer force by providing policy makers with accurate information about the impact of policy changes, including promotion policy, compensation, and separation incentives. The OPICC model provides estimates of the impacts of policy and economic changes to the Officer Personnel Management Directorate inventory for a 6-year projection horizon. The prototype version does not contain a cost estimation capability. The model was validated by using it to predict actual historical behavior.

DTIC

*Personnel Management; Cost Estimates; Incentives; Inventories; Military Operations; Economics*

**19970005332** Manhattanville Coll., Dept. of Psychology, Purchase, NY USA

**Situation, Domain, and Coherence: Toward a Pragmatic Psychology of Understanding *Final Report***

Warner, John, Manhattanville Coll., USA; Burnstein, David D., Manhattanville Coll., USA; Jul. 1996; 46p; In English

Contract(s)/Grant(s): DAAL03-91-C-0034

Report No.(s): AD-A313483; ARL-CR-306; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report reviews theoretical perspectives about how people use and understand information. This is particularly relevant to an information production domain such as military intelligence. We focused on approaches in cognitive psychology and on problem solving in particular. These approaches proved limited in several important ways but specifically because the emphasis in cognitive psychology is information processing rather than information content and on 'toy' problems rather than the pragmatic use of information to meet a domain-relative objective. Drawing upon social cognition and semiotics, we propose a conceptual framework that emphasizes coherence, or how people make sense of information concerning a domain objective, and pragmatics or how people actually use information to meet that objective. Finally, we suggest that while understanding mental processing that underlies the use of information may be valuable, our pragmatic coherence framework is better suited to address questions about how people use information. It will provide a more direct link between theory and application.

DTIC

*Cognitive Psychology; Knowledge Representation; Problem Solving; Information Theory; Thresholds (Perception)*

**19970005480** Armstrong Lab., Brooks AFB, TX USA

**Description of the Neuropsychiatry Branch with an Annotated Bibliography *Interim Report, Jan. 1995 - Jun. 1996***

Marsh, Royden W., Armstrong Lab., USA; Oct. 1996; 14p; In English

Contract(s)/Grant(s): AF-7755

Report No.(s): AD-A317128; AL/AO-TR-1996-0125; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This monograph contains a directory of the Neuropsychiatry Branch of the Clinical Sciences Division of the Armstrong Laboratory along with an introduction, listing of current or recent projects, educational training activities, operational support, and an annotated bibliography of research products from January 1995 through June 1996.

DTIC

*Neuropsychiatry; Aviation Psychology; Aerospace Medicine; Bibliographies*

**19970006668** Armstrong Lab., Brooks AFB, TX USA

**A Climate for Transfer Model *Interim Report, Aug. 1992 - Jun. 1995***

Thayer, Paul W., Armstrong Lab., USA; Teachout, Mark S., Armstrong Lab., USA; Dec. 1995; 44p; In English

Contract(s)/Grant(s): AF Proj. 1121

Report No.(s): AD-A317057; AL/HR-TP-1995-0035; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Although transfer of training to the job has been an important issue for over 30 years, research on variables influencing transfer has been limited. Researchers have more recently called for the systematic study of factors influencing transfer of training. Two aspects of the training process that facilitate positive transfer are: (1) transfer-enhancing activities that occur during the training program itself; and (2) a favorable climate for transfer in the post-training setting. The purpose of this paper is to describe the development of constructs in these two areas and questionnaires intended to measure the constructs. Previous models of the training process are described, followed by a more detailed discussion of in-training transfer-enhancing activities and climate for transfer. A new, simplified model is proposed, followed by a description of questionnaires that measure these two aspects of the training process, and a proposed research plan.

DTIC

*Climate Models; Transfer of Training*

**19970006688** Army Command and General Staff Coll., Fort Leavenworth, KS USA

**US Air Force and US Navy Joint Pilot Training: An Analysis of the Fighter Training Tracks**

Floyd, Charles C., Army Command and General Staff Coll., USA; Jun. 07, 1996; 108p; In English

Report No.(s): AD-A313176; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This study investigates the feasibility of consolidating the Air Force Fighter-Bomber and the Navy Fighter-Attack pilot training tracks. Excluding Navy Carrier Qualification training, the core training in these two undergraduate fighter training tracks is similar. The instruction in fighter-related training areas is also similar in nature, but different training philosophies have reduced the compatibility for consolidating the two fighter training tracks. The two fighter-related training tracks were compared to highlight the similarities and the differences. Staff interviews were conducted to provide service-related perceptions and to clarify research questions. This study concludes that near-term consolidation is unlikely. However, long-term consolidation is feasible but requires immediate studying if it is to occur. The study promotes further research to consolidate the training conducted in the two fighter training tracks into a Joint Advanced Phase Fighter track.

DTIC

*Pilot Training; Armed Forces (USA); Education*

**19970006722** Systems Engineering Associates, San Diego, CA USA

**Implementation of Instructional Strategies for Decision-Making Training *Interim Report, Jan. - Dec 1994***

Brecke, Fritz H., Systems Engineering Associates, USA; Garcia, Sharon K., Systems Engineering Associates, USA; Jan. 1996; 33p; In English

Contract(s)/Grant(s): F33615-91-C-0007; AF Proj. 1123

Report No.(s): AD-A317054; AL/HR-TP-1995-0042; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper documents work performed to develop a computer-based training prototype to teach decision-making skills to personnel in Logistics Command and Control domain. In particular, this paper discusses how the instructional strategies developed for training decision-making skills were implemented within the prototype. Focus is also given to problems encountered when trying to simulate 'real' world problems in an artificial environment and how these were addressed.

DTIC

*Computer Techniques; Decision Making; Training Devices*

**19970004667** Naval Health Research Center, San Diego, CA USA

**Comparison of Anti-Exposure Suits During Rest and Arm Exercise in Cold Water**

Shannon, M. P., Geo-Centers, Inc., USA; Jacobs, K. A., Geo-Centers, Inc., USA; Ramirez, L. R., Naval Health Research Center, USA; Arnall, D. A., University of Northern Arizona, USA; Woolf, A. M., Naval Health Research Center, USA; Hagan, R. D.,

Geo-Centers, Inc., USA; Hodgdon, J. A., Naval Health Research Center, USA; Bennett, B. L., Naval Health Research Center, USA; Jul. 1995; 32p; In English

Report No.(s): AD-A308271; NHRC-95-41; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this study was to evaluate the effectiveness of three anti-exposure suits in preventing decreases in body temperatures during intermittent arm exercise in cold water. Ten male subjects were evaluated during waist-high cold-water (7.50C/45.50F) exposure tests consisting of alternating periods of 5 min rest and 15 min arm cycle ergometry. The maximum exposure time was 80 min. Each subject completed tests wearing the (1) Navy fire resistant coverall (CON), (2) CwU-62/P anti-exposure coverall (CWU), (3) Navy cold weather anti-exposure suit (NCW), and (4) Mustang Survival TF4 anti-exposure suit (MUS). Physiological measures included rectal temperature T(re) and skin temperatures from the chest T(ch), arm T(ar), finger T(fi) thigh T(th), calf T(ca) and toe T(to). CWU and MUS had significantly (p less than 0.05) longer cold-water stay times than CON. There were no significant differences in T(re) among suits. The end stay time T(th) for CWU was significantly higher than CON, NCW, and MUS. Absolute low T(ca) values for CWU and NCW were significantly higher than both CON and MUS. No significant differences were found for T(to) among suits. CWU, with its impermeable design, provided the best protection from decreases in body temperatures during intermittent arm exercise in waist-high cold-water.

DTIC

*Body Temperature; Cold Water; Exposure; Coveralls; Protective Clothing; Physical Exercise; Water Immersion*

**19970004817** Lockheed Martin Engineering and Science Services, Houston, TX USA

**The Evolution of the Posture Video Analysis Tool (trademark) (PVAT)**

Whitmore, Mihriban, Lockheed Martin Engineering and Science Services, USA; Berman, Andrea H., Lockheed Martin Engineering and Science Services, USA; Oct. 1996; 22p; In English

Report No.(s): NASA-TP-3657; NAS 1.60:3657; S-818; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Posture Video Analysis Tool(tm) (PVAT) has been developed by the Human Factors and Ergonomics Laboratory (HFEL) engineers at the NASA Johnson Space Center in response to the need for a low cost, reliable method of collecting postural data from non-scientific mission video footage. The PVAT is an interactive Macintosh menu and button driven SuperCard prototype consisting of a setup and an analysis screen. Since its creation, PVAT has undergone a series of usability evaluations. The testing accomplished thus far has assisted the PVAT designers in improving the interface with both subtle and sweeping changes. The results of these iterative evaluations demonstrated that the PVAT is a promising initial step in identifying and quantifying 'limiting microgravity postures' and related workstation design concerns. Furthermore, it is also anticipated that the PVAT will be applicable in a host of non-aerospace industries with little or no modification. If funding is available, further evaluations will be conducted to refine its graphical user interface and demonstrate its industrial applications.

Author

*Data Acquisition; Graphical User Interface; Human Factors Engineering; Microgravity Applications; Cost Effectiveness; Posture; Workstations*

**19970004930** Space Hardware Optimization Technology, Inc., Floyd's Knobs, IN USA

**Engineering Support of Microgravity Life Science Research: Development of an Avian Development Facility**

Vellinger, J., Space Hardware Optimization Technology, Inc., USA; Deuser, M., Space Hardware Optimization Technology, Inc., USA; Hullinger, R., Purdue Univ., USA; 1995; 8p; In English; Life Sciences and Space Medicine, 3-5 Apr. 1995, Houston, TX, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): NAS2-16066

Report No.(s): NASA-CR-202583; NAS 1.26:202583; AIAA Paper 95-1060; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

The Avian Development Facility (ADF) is designed to provide a 'window' for the study of embryogenesis in space. It allows researchers to determine and then to mitigate or nullify the forces of altered gravity upon embryos when leaving and re-entering the Earth's gravity. The ADF design will allow investigations to begin their incubation after their experiments have achieved orbit, and shut down the experiment and fix specimens before leaving orbit. In effect, the ADF makes every attempt to minimize launch and re-entry effects in order to isolate and preserve the effects of the experimental variable(s) of the space environment.

Author

*Aerospace Environments; Microgravity Applications; Embryology; Reentry Effects; Chickens; Bones*

**19970004931** South Carolina Univ., Sociology Dept., Columbia, SC USA

**Modeling Social Interaction for the Nauvik Project, A Closed Ecological Life Support System, Fairbanks, Alaska**

Dudley-Rowley, Marilyn, South Carolina Univ., USA; 1995; 8p; In English; Life Sciences and Space Medicine, 3-5 Apr. 1995, Houston, TX, USA

Report No.(s): AIAA Paper 95-1061; Copyright; Avail: Issuing Activity (AIAA, 370 L'Enfant Promenade S. W., Washington, DC 20024), Hardcopy, Microfiche

This paper discusses the modeling of social interaction for an underground multi-level closed ecological life support system (CELSS) being constructed in discontinuous permafrost overburden in Fairbanks, Alaska. The CELSS is to be completely sealed, regenerative, and host to a maximum crew of three persons. This report synthesizes information from sociological disaster and social network theories, and results from human dynamics research and expedition histories to produce a model of social interaction which would best protect the inviolability of the environmental seals and regenerative operations of the CELSS.

Author

*Closed Ecological Systems; Life Support Systems; Biosphere; Permafrost; Social Isolation; Models; Regeneration (Physiology)*

**19970005012** NASA Ames Research Center, Moffett Field, CA USA

**The Suitport's Progress**

Cohen, Marc M., NASA Ames Research Center, USA; 1995; 12p; In English; Life Sciences and Space Medicine, 3-5 Apr. 1995, Houston, TX, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Report No.(s): NASA-TM-111836; NAS 1.15:111836; AIAA Paper 95-1062; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

NASA-Ames Research Center developed the Suitport as an advanced space suit airlock to support a Space Station suit based on the AX-5 hard suit. Several third parties proposed their own variations of the Suitport on the moon and Mars. The Suitport recently found its first practical use as a terrestrial application in the NASA-Ames Hazmat vehicle for the clean-up of hazardous and toxic materials. In the Hazmat application, the Suitport offers substantial improvements over conventional hazard suits by eliminating the necessity to decontaminate before doffing the suit.

Author

*Air Locks; Space Stations; Space Suits; Extravehicular Activity; Extravehicular Mobility Units*

**19970005088** Armstrong Lab., Crew Systems Directorate, Wright-Patterson AFB, OH USA

**Biodynamic and Spasticity Reduction in Joystick Control Via Force Reflection Final Report, Mar. 1992 - Sep. 1995**

Repperger, Daniel W., Armstrong Lab., USA; Sep. 1995; 31p; In English

Contract(s)/Grant(s): AF Proj. 7231

Report No.(s): AD-A313739; AL/CF-TR-1995-0152; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

When pilots are subjected to exogenous environmental influences such as complex acceleration fields during unusual aircraft maneuvers, these effects disturb the normal motion of the human body producing undesired biodynamic effects. These disturbances, in turn, affect how the pilot controls his aircraft. Thus, it becomes a problem of interest to investigate joystick controllers that show some resistance to these untoward effects. Force reflection algorithms, when applied to a joystick controller are shown to mitigate these unwanted motions induced by the environment. These same results also extrapolate to the problem involving the neuromotor disabled patients who suffer from spasticity. The disturbance in this case is internal, not external, but force reflecting stick controllers are shown to reduce these undesired responses. Data are given from pilots involving the external disturbances such as complex acceleration fields as well as for neuromotor disabled patients where disturbances are internally generated. Some general rules for applying these force reflection scenarios are given.

DTIC

*Aircraft Maneuvers; Controllers; Biodynamics; Human Factors Engineering*

**19970005109** Villanova Univ., Dept. of Mechanical Engineering, PA USA

**Modeling of a Deformable Manikin Neck for Multibody Dynamic Simulation Final Report, May 1994 - Oct. 1995**

Ashrafiuon, Hashem, Villanova Univ., USA; Colbert, Robert, Villanova Univ., USA; Obergefell, Louise, Armstrong Lab., USA; Kaleps, Ints, Armstrong Lab., USA; Oct. 1995; 32p; In English

Contract(s)/Grant(s): AF Proj. 2304

Report No.(s): AD-A313744; AL/CF-TR-1996-0087; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Articulated Total Body (ATE) is a rigid body dynamics computer model of the human body used at the Armstrong Laboratory (AL). The model is used to predict the kinetic response of the human body in different dynamic environments such as aircraft pilot ejections, sled tests, etc. In order to predict the response accurately, however, a rigid body dynamics model may not be suffi-

cient. This is particularly true for the more flexible segments such as the neck and for cases where local segment vibrations occur. In this study, a deformable body dynamics option of the ATB is developed which incorporates linear deformation of individual segments in the ATB model. The displacements due to deformation are determined using finite element modal analysis. The study concentrates on the modeling of manikin necks which have shown large deformation in certain environments. The Hybrid 3 manikin neck finite element model and modal solution are presented. Modal analysis results are incorporated into the ATB model. Selected parameters for quasi-static Hybrid 3 neck and several head-neck dynamic simulations are compared with the experimental results where available. It is shown that the new model simulation results have excellent agreement with the experimental results particularly when compared with the rigid model.

DTIC

*Computerized Simulation; Finite Element Method; Aircraft Pilots; Human Body*

**19970005366** Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Working Group 21, Neuilly-Sur-Seine, France

**Anthropomorphic Dummies for Crash and Escape System Testing**

Jul. 1996; 118p; In English; In French

Report No.(s): AD-A313660; AGARD-AR-330; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Anthropomorphic dummies are mechanical surrogates of the human body. Dummies are also called Anthropomorphic Test Devices (ATDs) and manikins. They are used as test devices by the automotive and aircraft industries and regulatory bodies, and the military to evaluate vehicle safety in crash and escape system environments. Dummies are designed to perform two basic functions. Earlier versions were used strictly for loading the vehicle dynamically, and required only weight and size in their design. The second type of dummy, used to assess type and severity of injury, is designed to mimic human dynamic impact response. These dummies require a sensor suite of instrumentation to measure impact loading of different body parts to assess injury risk.

DTIC

*Human Factors Engineering; Ejection Seats; Injuries; Escape Systems*

**19970005476** Santa Clara Univ., Dept. of Mechanical Engineering, ,CA USA

**Machine-Vision Aids for Improved Flight Operations Final Report, Jan. 1994 - Oct. 1996**

Menon, P. K., Santa Clara Univ., USA; Chatterji, Gano B., Santa Clara Univ., USA; Nov. 1996; 235p; In English

Contract(s)/Grant(s): NCC2-841

Report No.(s): NASA-CR-202564; NAS 1.26:202564; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

The development of machine vision based pilot aids to help reduce night approach and landing accidents is explored. The techniques developed are motivated by the desire to use the available information sources for navigation such as the airport lighting layout, attitude sensors and Global Positioning System to derive more precise aircraft position and orientation information. The fact that airport lighting geometry is known and that images of airport lighting can be acquired by the camera, has lead to the synthesis of machine vision based algorithms for runway relative aircraft position and orientation estimation. The main contribution of this research is the synthesis of seven navigation algorithms based on two broad families of solutions. The first family of solution methods consists of techniques that reconstruct the airport lighting layout from the camera image and then estimate the aircraft position components by comparing the reconstructed lighting layout geometry with the known model of the airport lighting layout geometry. The second family of methods comprises techniques that synthesize the image of the airport lighting layout using a camera model and estimate the aircraft position and orientation by comparing this image with the actual image of the airport lighting acquired by the camera. Algorithms 1 through 4 belong to the first family of solutions while Algorithms 5 through 7 belong to the second family of solutions. Algorithms 1 and 2 are parameter optimization methods, Algorithms 3 and 4 are feature correspondence methods and Algorithms 5 through 7 are Kalman filter centered algorithms. Results of computer simulation are presented to demonstrate the performance of all the seven algorithms developed.

Author

*Computer Vision; Airport Lights; Navigation Aids; Landing Aids; Aircraft Landing; Air Navigation*

**19970006850** NASA Kennedy Space Center, Cocoa Beach, FL USA

**Modeling Advance Life Support Systems**

Pitts, Marvin, Washington State Univ., USA; Sager, John, NASA Kennedy Space Center, USA; Loader, Coleen, NASA Kennedy Space Center, USA; Drysdale, Alan, NASA Kennedy Space Center, USA; NASA/ASEE Summer Faculty Fellowship Program; Aug. 01, 1996, pp. 203-212; In English; Also announced as 19970006834

Contract(s)/Grant(s): NGT10-52605; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Activities this summer consisted of two projects that involved computer simulation of bioregenerative life support systems for space habitats. Students in the Space Life Science Training Program (SLSTP) used the simulation, space station, to learn about relationships between humans, fish, plants, and microorganisms in a closed environment. One student complete a six week project to modify the simulation by converting the microbes from anaerobic to aerobic, and then balancing the simulation's life support system. A detailed computer simulation of a closed lunar station using bioregenerative life support was attempted, but there was not enough known about system restraints and constants in plant growth, bioreactor design for space habitats and food preparation to develop an integrated model with any confidence. Instead of a completed detailed model with broad assumptions concerning the unknown system parameters, a framework for an integrated model was outlined and work begun on plant and bioreactor simulations. The NASA sponsors and the summer Fell were satisfied with the progress made during the 10 weeks, and we have planned future cooperative work.

Author

*Aerobes; Closed Ecological Systems; Computerized Simulation; Education; Life Sciences; Life Support Systems; Regeneration (Physiology); Space Habitats*

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