NASA SP-7011 (448)
September 22, 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
8. Abstract Author
9. Subject Terms

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 448)

SEPTEMBER 22, 1997

51
LIFE SCIENCES (GENERAL)

19970025318 California Univ., Los Angeles, CA USA

Genetic Transformation Systems for Characterization of Gene Promoters in Marine Algae ***Final Report, 15 Dec. 1992 - 31 Dec. 1995***

Smith, G. Jason, California Univ., USA; Dec. 1995; 5p; In English

Contract(s)/Grant(s): N00014-93-I-0182

Report No.(s): AD-A324528; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

This report summarizes the results of ONR funded research focused on the development of a general method for directed genetic manipulation of marine algae based on DNA transfection. The research established the use of electroporation for DNA transfection and macromolecular loading of walled diatom cells through the development of an osmotically compatible electroporation buffer, Seapore Buffer. This technique was extended to several other diverse groups of marine phytoplankton. Expression of transfected genes was demonstrated and stability of transfection assessed. Kanamycin and formaldehyde were identified as two useful selective agents for enrichment of transformed cell lines and enhancement of expression from plasmids bearing the resistance markers. A variety of protein encoding genes where characterized from the diatom Skeletonema costatum and used to identify potential requirements for efficient translation of heterospecific genes in diatoms. Flanking regulatory sequences of highly expressed genes were targeted for future development of diatom specific transformation vectors. The protocols developed through this research provide a foundation for biotechnological utilization of marine chromophyte algae.

DTIC

Marine Biology; Gene Expression; Antibiotics; Genes; Phytoplankton; Genetics; Algae

19970025374 NASA Ames Research Center, Moffett Field, CA USA

Astrobiology Workshop: Leadership in Astrobiology ***Final Report***

DeVincenzi, D., Editor, NASA Ames Research Center, USA; Briggs, G., NASA Ames Research Center, USA; Cohen, M., NASA Ames Research Center, USA; Cuzzi, J., NASA Ames Research Center, USA; DesMarais, D., NASA Ames Research Center, USA; Harper, L., NASA Ames Research Center, USA; Morrison, D., NASA Ames Research Center, USA; Pohorille, A., NASA Ames Research Center, USA; Dec. 1996; 65p; In English, 9-11 Sep. 1996, Moffet Field, CA, USA; Sponsored by NASA Ames Research Center, USA; Also announced as 19970025375 through 19970025402

Contract(s)/Grant(s): RTOP 154-88-00; RTOP 199-90-07; RTOP 622-65-32

Report No.(s): NASA-CP-10153; NAS 1.55:10153; A-976058; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Astrobiology is defined in the 1996 NASA Strategic Plan as 'The study of the living universe.' At NASA's Ames Research Center, this endeavor encompasses the use of space to understand life's origin, evolution, and destiny in the universe. Life's origin refers to understanding the origin of life in the context of the origin and diversity of planetary systems. Life's evolution refers to understanding how living systems have adapted to Earth's changing environment, to the all-pervasive force of gravity, and how they may adapt to environments beyond Earth. Life's destiny refers to making long-term human presence in space a reality, and laying the foundation for understanding and managing changes in Earth's environment. The first Astrobiology Workshop brought together a diverse group of researchers to discuss the following general questions: Where and how are other habitable worlds formed? How does life originate? How have the Earth and its biosphere influenced each other over time? Can terrestrial life be sustained beyond our planet? How can we expand the human presence to Mars? The objectives of the Workshop included: discussing the scope of astrobiology, strengthening existing efforts for the study of life in the universe, identifying new cross-disciplinary

programs with the greatest potential for scientific return, and suggesting steps needed to bring this program to reality. Ames has been assigned the lead role for astrobiology by NASA in recognition of its strong history of leadership in multidisciplinary

research in the space, Earth, and life sciences and its pioneering work in studies of the living universe. This initial science workshop was established to lay the foundation for what is to become a national effort in astrobiology, with anticipated participation by the university community, other NASA centers, and other agencies. This workshop (the first meeting of its kind ever held) involved life, Earth, and space scientists in a truly interdisciplinary sharing of ideas related to life in the universe, and by all accounts was a resounding success.

Author (revised)

Biological Evolution; Exobiology; Multidisciplinary Research

19970025381 NASA Ames Research Center, Moffett Field, CA USA

Gravity and Biology

Morey-Holton, Emily R., NASA Ames Research Center, USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A14-A15; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

Gravity has been the most constant environmental factor throughout the evolution of biological species on Earth. Organisms are rarely exposed to other gravity levels, either increased or decreased, for prolonged periods. Thus, evolution in a constant 1G field has historically prevented us from appreciating the potential biological consequences of a multi-G universe. to answer the question 'Can terrestrial life be sustained and thrive beyond our planet?' we need to understand the importance of gravity on living systems, and we need to develop a multi-G, rather than a 1G, mentality. The science of gravitational biology took a giant step with the advent of the space program, which provided the first opportunity to examine living organisms in gravity environments lower than could be sustained on Earth. Previously, virtually nothing was known about the effects of extremely low gravity on living organisms, and most of the initial expectations were proven wrong. All species that have flown in space survive in microgravity, although no higher organism has ever completed a life cycle in space. It has been found, however, that many systems change, transiently or permanently, as a result of prolonged exposure to microgravity.

Author

Exobiology; Gravitational Effects; Gravitational Physiology; Life Sciences; Extraterrestrial Life

19970025386 Wisconsin Univ., Center for Great Lakes Studies, Milwaukee, WI USA

Response of Microbial Ecosystems to Global Change

Nealson, Ken, Wisconsin Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A26-A27; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

In order to consider the question of global change as it relates to microbial ecosystems, one must be in the right spatial scale and recognize some fundamental properties of microbial ecosystems and microbes themselves. That is, we must ask what is the environment that a microbe actually sees; when this is done, we can conclude that large size and complexity are decided disadvantages when global change occurs. As size decreases, the ability to escape from bulk phase conditions increases, and except for true ecological calamities, the changes that dramatically affect the larger eukaryotes probably have little effect on the microbes on a global scale. When one also considers the metabolic advantages of a high surface to volume ratio enjoyed by the bacteria, it is easy to understand why the microbes have remained small-if it was an advantage to be large, they would be large (given 3.8 billion years).

Author

Microorganisms; Ecosystems; Environmental Control

19970025387 California Univ., Berkeley, CA USA

Evolution of Light- and Gravity-Sensing Genes in Plants

Feldman, Lewis, California Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A28-A29; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

Organisms perceive and respond to a wide variety of physical stimuli, including gravity and light. Following perception, translation of physical stimuli into a biological response occurs via a number of interlinked steps collectively designated 'signal transduction.' When and from where did the gravity signal transduction pathway evolve? The hypothesis advanced here is that

the signal transduction pathway for gravitaxis (gravitropism) evolved by building on and/or incorporating signal transduction steps which evolved earlier in connection with prokaryotes responding to light.
Author
Genetics; Genes; Biological Effects; Physiological Responses; Prokaryotes; Gravitropism; Gravireceptors; Gravitational Effects; Plants (Botany)

19970025388 Columbia Univ., College of Physicians and Surgeons, New York, NY USA
Vertebrate Development in Space: Clues and Complications
Wolgemuth, Debra J., Columbia Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A30-A31; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

The development of an animal includes embryogenesis, growth, and reproduction. The successful completion of this program requires the capability to survive in and adapt to altered environments. On Earth, the gravitational field represents a constant force in the environment which may have influenced the size, shape, and behavior of animals throughout evolution. The extent to which altered gravitational environments can affect the normal developmental program in higher organisms is poorly understood. Space flight, especially for extended periods of time, represents an altered environment in which animals will be required to undergo these various aspects of the developmental program, not only in the virtual absence of gravity but also in the presence of other unique environmental features such as radiation and alterations in atmospheric pressure.
Author
Vertebrates; Reproduction (Biology); Gravitational Fields; Atmospheric Pressure

19970025391 California Univ., Berkeley. Lawrence Berkeley Lab, CA USA
Biological Responses to Exposure to the Space Radiation Environment
Kronenberg, Amy, California Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A37-A38; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

The environment in space is different from that on Earth in many ways. One of the environmental factors that is unique is the space radiation environment. This environment may play an ongoing role in the evolution of life in the universe in addition to being an important consideration for human exploration in space. The radiation environments encountered in space are different from the natural background radiation on Earth and are complex in nature. Both bacteria and eukaryotes have evolved a series of mechanisms to respond to similar damages on Earth.
Author
Aerospace Environments; Biological Effects; Damage; Eukaryotes; Extraterrestrial Radiation; Physiological Responses; Spacecrews

19970025399 California Univ., Santa Cruz, CA USA
Origin of Protocells
Deamer, David W., California Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A51-A53; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

An important question that must be answered if we are to understand life's origin fully is whether the living state arose a priori from pre-existing cellular structures. The alternative is that living molecular systems were first present as solutions or adsorbed films, with cellular life developing only at a later evolutionary stage. If the self-assembly of amphiphilic molecules into membranes preceded the origin of life, it is plausible that the earliest living systems may have had access to encapsulated environments. The following concepts and experimental results support this conjecture.
Author
Protobiology; Biological Evolution; Protein Synthesis; Life Sciences; Exobiology

19970025400 California Univ., Berkeley, CA USA
Biological Perspective on the Early Earth and the Chemistry that Spawned Life
Pace, Norman R., California Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A54-A56; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Our perspective on the nature of the geochemical processes that gave rise to life on Earth has improved enormously over the past decade. Astronomical and geochemical studies provide an increasingly clear view of the character of the early Earth, at the time of the origin of life. Microfossil work is increasingly sophisticated in its interpretations and has provided solid evidence for

life at 3.5 billion years ago or before. Perhaps most dramatically, we can now infer with increasing confidence the biochemical nature of the earliest life, which also provides information on the environment in which that life came to be. The record that we interpret for the nature of the earliest life is a quantitative one, phylogenetic trees based on molecules that are found in all of modern-day life and so must have been present in the earliest genetic cell. Together, the biological and physical information paint a harsh cradle for life, a violent world of volcanism and hydrothermal interaction with the molten bones of the forming planet. We must couch our speculation on the origin of life in terms of these findings.
Author
Biochemistry; Biological Evolution; Life Sciences; Geochemistry; Exobiology

19970025924 NASA Ames Research Center, Moffett Field, CA USA
Experimental Modification of Rat Pituitary Growth Hormone Cell Function During and After Spaceflight
Hymer, W. C., NASA Ames Research Center, USA; Salada, T., NASA Ames Research Center, USA; Nye, P., NASA Ames Research Center, USA; Grossman, E. J., NASA Ames Research Center, USA; Lane, P. K., NASA Ames Research Center, USA; Grindeland, R. E., NASA Ames Research Center, USA; Journal of Applied Physiology; 1996; ISSN 8750-7587; Volume 80, No. 3, pp. 955-970; In English; American Society of Gravitational and Space Biology, 1993, Washington, DC, USA; Original contains color illustrations
Contract(s)/Grant(s): NCC2-370
Report No.(s): NASA-CR-205104; NAS 1.26:205104; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Space-flown rats show a number of flight-induced changes in the structure and function of pituitary Growth Hormone (GH) cells after in vitro postflight testing. to evaluate the possible effects of microgravity on GH cells themselves, freshly dispersed rat anterior pituitary gland cells were seeded into vials containing serum +/- 1 micron HydroCortisone (HC) before flight. Five different cell preparations were used: the entire mixed-cell population of various hormone-producing cell types, cells of density less than 1.071 g/sq cm (band 1), cells of density greater than 1.071 g/sq cm (band 2), and cells prepared from either the dorsal or ventral part of the gland. Relative to ground control samples, bioactive GH released from dense cells during flight was reduced in HC-free medium but was increased in HC-containing medium. Band I and mixed cells usually showed opposite HC-dependent responses. Release of bioactive GH from ventral flight cells was lower; postflight responses to GH-releasing hormone challenge were reduced, and the cytoplasmic area occupied by GH in the dense cells was greater. Collectively, the data show that the chemistry and cellular makeup of the culture system modifies the response of GH cells to microgravity. As such, these cells offer a system to identify gravisensing mechanisms in secretory cells in future microgravity research.
Author
Rats; Growth; Cells (Biology); Pituitary Hormones

19970026041 Carolinas Medical Center, Dept. of General Surgery Research, Charlotte, NC USA
Spaceflight and Immune Responses of Rhesus Monkeys *Final Report*
Sonnenfeld, Gerald, Carolinas Medical Center, USA; Feb. 1997; 6p; In English
Contract(s)/Grant(s): NAG2-933
Report No.(s): NASA-CR-203558; NAS 1.26:203558; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

In the grant period, we perfected techniques for determination of interleukin production and leukocyte subset analysis of rhesus monkeys. These results are outlined in detail in publication number 2, appended to this report. Additionally, we participated in the ARRT restraint test to determine if restraint conditions for flight in the Space Shuttle could contribute to any effects of space flight on immune responses. All immunological parameters listed in the methods section were tested. Evaluation of the data suggests that the restraint conditions had minimal effects on the results observed, but handling of the monkeys could have had some effect. These results are outlined in detail in manuscript number 3, appended to this report. Additionally, to help us develop our rhesus monkey immunology studies, we carried out preliminary studies in mice to determine the effects of stressors on immunological parameters. We were able to show that there were gender-based differences in the response of immunological parameters to a stressor. These results are outlined in detail in manuscript number 4, appended to this report.
Derived from text
Monkeys; Physiological Responses; Immune Systems; Leukocytes; Constraints

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AEROSPACE MEDICINE

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

19970025133 Harvard Univ., Cambridge, MA USA
Structural Analysis of the Human T-Cell Receptor/HLA-A2/Peptide Complex ***Annual Report, 1 Sep. 1995 - 31 Aug. 1996***
Wiley, Don C., Harvard Univ., USA; Garboczi, David N., Harvard Univ., USA; Oct. 1996; 21p; In English
Contract(s)/Grant(s): DAMD17-94-J-4060
Report No.(s): AD-A323769; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

During the second year of this grant, we obtained better X-ray data from the crystals of the T-cell receptor/HLA-A2/peptide complex, by finding improved conditions for freezing the crystals, by producing heavy atom-containing crystals, and by collecting data at the Cornell High Energy Synchrotron Source (CHESS). by the combination of the techniques of molecular replacement, multiple isomorphous replacement, and iterative real-space averaging, we were able to determine the structure of the TCR/HLA-A2/peptide complex. We are in the process of analyzing the immunological implications of the structure and are determining two closely related structures to allow a fuller interpretation of this central molecular recognition event in the immune system.
DTIC
Structural Analysis; Cells (Biology); Peptides; X Rays; Data Acquisition

19970025389 NASA Ames Research Center, Moffett Field, CA USA
Gravity Sensor Plasticity in the Space Environment
Ross, Muriel D., NASA Ames Research Center, USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A32-A34; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

The ability of the brain to learn from experience and to adapt to new environments is recognized to be profound. This ability, called 'neural plasticity,' depends directly on properties of neurons (nerve cells) that permit them to change in dimension, sprout new parts called spines, change the shape and/or size of existing parts, and to generate, alter, or delete synapses. (Synapses are communication sites between neurons.) These neuronal properties are most evident during development, when evolution guides the laying down of a general plan of the nervous system. However, once a nervous system is established, experience interacts with cellular and genetic mechanisms and the internal milieu to produce unique neuronal substrates that define each individual. The capacity for experience-related neuronal growth in the brain, as measured by the potential for synaptogenesis, is speculated to be in the trillions of synapses, but the range of increment possible for any one part of the nervous system is unknown. The question has been whether more primitive endorgans such as gravity sensors of the inner ear have a capacity for adaptive change, since this is a form of learning from experience.
Author
Aerospace Environments; Gravitation; Nervous System; Gravitational Effects; Neurophysiology

19970025390 Texas Univ., Southwestern Medical Center, Dallas, TX USA
Human Cardiovascular Adaptation to Altered Environments
Levine, Benjamin, Texas Univ., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A35-A36; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

The human cardiovascular system has an extraordinary adaptive range. Even the most unfit person can, within minutes, increase the amount of blood pumped by the heart and distributed to skeletal muscle by an order of magnitude. Endurance athletes, who place regular and sustained demands on the cardiovascular system, may have an additional two-fold capacity above more sedentary individuals. In contrast, bed rest, space flight, or other causes of disuse (i.e., illness or injury) result in a reduction in maximal capacity by 25 - 30%. Thus the cardiovascular system can be viewed in terms of its acute ability to respond to a sudden increase in metabolic demand, and a more chronic adaptation to match the range of the system to the regular requirements that are placed upon it.
Author
Cardiovascular System; Musculoskeletal System; Adaptation; Gravitational Effects; Human Beings

19970025394 NASA Johnson Space Center, Houston, TX USA

Destination Mars: An Astronaut's Perspective

Parazynski, Scott, NASA Johnson Space Center, USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A42-A43; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

The recent discovery of possible fossilized life forms within a Martian meteorite has rekindled interest in human exploration of the planet. While the global scientific community must carefully study this physical evidence as well as await the results of 4 space probes to Mars in the coming years, others are looking ahead to the next logical step of sending humans to the planet. Such a feat, while a tremendous scientific undertaking, is nearly within the grasp of current technology. The travel distance involved and the harsh Martian environment itself impose great challenges to human physiology as well as to spacecraft design. Mission planners face challenges from the long-duration microgravity environment, complex life-support systems, interplanetary radiation, and the psychological stressors involved in such an endeavor.

Author

Mars (Planet); Space Exploration; Mars Exploration; Mars Surface; Extraterrestrial Life

19970025580 Saint Louis Univ., School of Medicine, MO USA

Skeletal Collagen Turnover by the Osteoblast ***Final Report***

Partridge, Nicola C., Saint Louis Univ., USA; 1997; 6p; In English

Contract(s)/Grant(s): NAG2-454

Report No.(s): NASA-CR-205066; NAS 1.26:205066; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Among the most overt negative changes experienced by man and experimental animals under conditions of weightlessness are the loss of skeletal mass and attendant hypercalciuria. These clearly result from some disruption in the balance between bone formation and bone resorption (i.e. remodelling) which appears to be due to a decrease in the functions of the osteoblast. In the studies funded by this project, the clonal osteoblastic cell line, UMR 106-01, has been used to investigate the regulation of collagenase and Tissue Inhibitors of MetalloProteases (TIMPs). This project has shed light on the comprehensive role of the osteoblast in the remodelling process, and, in so doing, provided some insight into how the process might be disrupted under conditions of microgravity.

Author

Collagens; Osteoporosis; Weightlessness; Bone Demineralization; Musculoskeletal System

19970025601 North Carolina Univ., Chapel Hill, NC USA

Simultaneous Palpation of the Craniosacral Rate at the Head and Feet: Rate Comparison, Intrarater and Interrater Reliability, and Assessment of Lag Time

Rogers, Joseph S., North Carolina Univ., USA; May 06, 1997; 89p; In English

Report No.(s): AD-A324580; AFIT-97-028; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The purposes of this study were to test the assumption that craniosacral motion is constant throughout the human body, determine the interrater and intrarater reliability of palpating the craniosacral rate at the head and feet, and determine if a lag time was present between the start of craniosacral events at the head and feet. Subjects. Twenty-eight adult subjects and two craniosacral examiners. Method. With-in subjects repeated measures design. Examiners were blinded to each other. Results. Craniosacral rates simultaneously palpated at the head and feet were significantly different. Interrater ICC's were .08 and .19 at the head and feet respectively. Intrarater ICC's ranged from .18 to .30. Lag time trends indicated random phase relationships and faster head rates. Conclusion. Results did not support craniosacral motion theory.

DTIC

Human Body; Reliability; Trends; Time Lag

19970025698 Psychology Software Tools, Inc., Pittsburgh, PA USA

A Turn-Key System for fMRI ***Quarterly Report, Oct. 1996 - Mar. 1997***

Jensen, Karen, Psychology Software Tools, Inc., USA; Apr. 28, 1997; 4p; In English

Contract(s)/Grant(s): N00014-96-C-0110

Report No.(s): AD-A324976; ONR-2/0397; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The development of the Plexiglas headholder device has continued. We have built our third prototype of the unit and have just begun testing its functionality. The initial uses of the unit in actual functional Magnetic Resonance Imaging (fMRI) subject

runs has demonstrated some minor engineering problems associated with the lock-down mechanism to the MRI gurney table. Software development for the Functional Imaging System (FlS) core routines has been under continual improvement.
DTIC
Magnetic Resonance; Computer Programming; Product Development; Polymethyl Methacrylate

19970025709 Saint George's Hospital, Medical School, London, UK
Noninvasive Monitoring of Tissue Oxygenation and Redox Status in Humans ***Final Report***
Whipp, Brian J., Saint George's Hospital, UK; Jan. 16, 1997; 18p; In English
Contract(s)/Grant(s): F61708-95-W-0334
Report No.(s): AD-A324355; SPC-95-4020; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report results from a contract tasking St. George's Medical School as follows: The contractor will investigate a cluster of reliable noninvasive techniques for the tracking of improvements in oxygen delivery, oxygen availability, and oxygen usage within and in the vicinity of sites of injury. The investigator evaluates a range of state-of-the-art commercially available techniques designed to monitor the status of tissue hemodynamics and energetics in humans, both within and upstream of selected locations, such as the limbs and the brain. Techniques will include near infrared spectroscopy and doppler based ultrasound monitoring of regional blood velocities and flows.
DTIC
Tissues (Biology); Blood Flow; Infrared Spectroscopy; Near Infrared Radiation; Oxidation-Reduction Reactions; Blood Circulation; Oxygenation

19970025914 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
Statistical Process Control in Medical Surveillance: An Application Using Spirometry
McAree, Paul W., Air Force Inst. of Tech., USA; Mar. 1996; 82p; In English
Report No.(s): AD-A324401; AFIT/GOR/ENS/96M-7; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This research effort concentrated on applying statistical process control techniques to the results of seven years worth of spirometry exams of workers at Wright-Patterson AFB in helping the occupational health squadron identify potential work hazard areas. Each spirometry exam was classified as abnormal or normal based on a comparison with established normals or a significant loss of function from the previous year's exam for the individual. Each test was classified into the work area of the individual and the number of abnormalities per population of the work area was examined.
DTIC
Control Systems Design; Statistical Analysis; Health; Occupational Diseases

19970026019 Army Research Inst. of Environmental Medicine, Natick, MA USA
SCENARIO: A Military/Industrial Heat Strain Model Modified to Account for Effects of Aerobic Fitness and Progressive Dehydration
Kraning, Kenneth K., III, Army Research Inst. of Environmental Medicine, USA; Gonzalez, Richard R., Army Research Inst. of Environmental Medicine, USA; Apr. 1997; 33p; In English
Report No.(s): AD-A323872; USARIEM-TN-97-1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report focuses on the development and application of new mathematical algorithms for blood flow, sweating rate, and cardiac stroke volume for use in SCENARIO, a previously documented simulation of physiological responses to work in hot environments. The new algorithms make for the subject's level of aerobic fitness and the extent of dehydration which can progressively deteriorate performance during sustained exposures. Graphic examples of SCENARIO output are given for sustained work in the normal, euhydrated state and compared with examples of progressive dehydration and of deteriorated physical fitness due to 20 days of bed rest. An novel example of its use as a tactical decision aide is given.
DTIC
Aerobes; Physical Fitness; Algorithms; Computer Programs; Dehydration; Physiological Responses; Heat; Computerized Simulation; Blood Flow; Perspiration; Stroke Volume

19970026047 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France
Medical Screening of Subjects for Acceleration and Positive Pressure Breathing ***La Surveillance Medicale des Sujets Relative aux Accelerations et a la Surpression Ventilatoire***
Jul. 1997; 48p; In English
Report No.(s): AGARD-AR-352; ISBN-92-836-0045-2; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The AGARD Aerospace Medical Panel sponsored a Workshop on the Medical Surveillance of Subjects for Acceleration Research. There remain unanswered questions about the possible long-term medical complications of repetitive exposure to G forces. The outcome of the Workshop includes a consensus protocol for medical screening of subjects for acceleration research, and a protocol for a database to track medical occurrences of NATO centrifuges.
Author
Aerospace Medicine; Pressure Breathing; Stress (Physiology); Acceleration Tolerance; Acceleration Stresses (Physiology); Physiological Effects

53
BEHAVIORAL SCIENCES

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

19970025165 Michigan Univ., Ann Arbor, MI USA
A Computational Theory of Executive Cognitive Processes and Human Multiple-Task Performance, Part 1, Basic Mechanisms ***Interim Report, 1 Jan. 1992 - 1 Dec. 1996***
Meyer, David E., Michigan Univ., USA; Kieras, David E., Michigan Univ., USA; Dec. 01, 1996; 125p; In English
Contract(s)/Grant(s): N00014-92-J-1173
Report No.(s): AD-A324264; DRDA-TR-95-ONR-EPIC-6; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Persistent controversies about human multiple task performance suggest that research on it will benefit from increased use of precise computational models. Toward this objective, the present report outlines a comprehensive theoretical framework for understanding and predicting the performance of concurrent perceptual motor and cognitive tasks. The framework involves an Executive Process Interactive Control (EPIC) architecture, which has component modules that process information at perceptual, cognitive, and motor levels. On the basis of EPIC, computational models that use a production system formalism may be constructed to simulate multiple task performance under a variety of conditions. These models account well for reaction time data from representative paradigms such as the psychological refractory period (PRP) procedure. With modest numbers of parameters, good fits between empirical and simulated reaction times support several key conclusions: (1) at a cognitive level, people can apply distinct sets of production rules simultaneously for executing the procedures of multiple tasks; (2) there is no immutable central response selection or decision bottleneck; (3) people's capacity to process information and take action at peripheral perceptual motor levels is limited; (4) to cope with such limits and to satisfy task priorities, flexible scheduling strategies are used; (5) these strategies are mediated by executive cognitive processes that coordinate concurrent tasks adaptively. The initial success of EPIC and models based on it suggest that they may help characterize multiple task performance across many domains, including ones that have substantial practical relevance.
DTIC
Human Performance; Cognition; Psychomotor Performance; Mathematical Models; Mental Performance; Psychology; Performance Prediction; Workloads (Psychophysiology)

19970025442 NASA Johnson Space Center, Houston, TX USA
Studies of the Interactions Between Vestibular Function and Tactual Orientation Display Systems ***Final Report***
Cholewiak, Roger W., Princeton Univ., USA; Reschke, Millard F., NASA Johnson Space Center, USA; National Aeronautics and Space Administration (NASA) /American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program; Jun. 1997; Volume 1, pp. 8.3-8.15; In English; Also announced as 19970025435
Contract(s)/Grant(s): NAG9-867; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

When humans experience conditions in which internal vestibular cues to movement or spatial location are challenged or contradicted by external visual information, the result can be spatial disorientation, often leading to motion sickness. Spatial disorientation can occur in any situation in which the individual is passively moved in the environment, but is most common in automotive, aircraft, or undersea travel. Significantly, the incidence of motion sickness in space travel is great: The majority of individuals in Shuttle operations suffer from the syndrome. Even after the space-sickness-producing influences of spatial disorientation dissipate, usually within several days, there are other situations in which, because of the absence of reliable or familiar

vestibular cues, individuals in space still experience disorientation, resulting in a reliance on the already preoccupied sense of vision. One possible technique to minimize the deleterious effects of spatial disorientation might be to present attitude information (including orientation, direction, and motion) through another less-used sensory modality - the sense of touch. Data from experiences with deaf and blind persons indicate that this channel can provide useful communication and mobility information on a real-time basis. More recently, technologies have developed to present effective attitude information to pilots in situations in which dangerously ambiguous and conflicting visual and vestibular sensations occur. This summers project at NASA-Johnson Space Center will evaluate the influence of motion-based spatial disorientation on the perception of tactual stimuli representing veridical position and orientation information, presented by new dynamic vibrotactile array display technologies. In addition, the possibility will be explored that tactile presentations of motion and direction from this alternative modality might be useful in mitigating or alleviating spatial disorientation produced by multi-axis rotatory systems, monitored by physiological recording techniques developed at JSC.
Author
Display Devices; Visual Perception; Touch; Signs and Symptoms; Physiology; Motion Sickness

19970025554 Michigan Univ., Dept. of Psychology, Ann Arbor, MI USA
A Computational Theory of Executive Cognitive Processes and Human Multiple-Task Performance, Part 2, Accounts of Psychological Refractory-Period Phenomena ***Interim Report, 1 Jan. 1992 - 1 Jan 1997***
Meyer, David E., Michigan Univ., USA; Kieras, David E., Michigan Univ., USA; Jan. 1997; 87p; In English
Contract(s)/Grant(s): N00014-92-J-1173
Report No.(s): AD-A324235; TR-95-ONR-EPIC-7; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
Further simulations of multiple task performance have been conducted with computational models that are based on the Executive Process Interactive Control (EPIC) architecture for human information processing. These models account well for patterns of reaction times and psychological refractory period phenomena (delays of overt responses after short stimulus onset asynchronies) in a variety of laboratory paradigms and realistic situations. This supports the claim of the present theoretical framework that multiple task performance relies on adaptive executive control, which enables substantial amounts of temporal overlap among stimulus identification, response selection, and movement production processes for concurrent tasks. Such overlap is achieved through optimized task scheduling by flexible executive processes that satisfy prevailing instructions about task priorities and allocate limited capacity perceptual motor resources efficiently.
DTIC
Human Performance; Cognition; Mathematical Models; Adaptive Control

19970025638 San Diego State Univ., Dept. of Psychology, San Diego, CA USA
Monitoring Situational Awareness in Tactical Information Displays with Eye-Tracking Instrumentation ***Final Report***
Marshall, Sandra P., San Diego State Univ., USA; Aug. 29, 1996; 5p; In English
Contract(s)/Grant(s): N00014-95-I-1091
Report No.(s): AD-A324592; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
The significant modification we have made to the original proposal was the decision to use a scan converter to transmit the signal from the target computer screen observed by the experimental subject to the eyetracking system. This option was not known to us when we developed the original proposal, but we determined after consultation with ASL personnel that the scan converter option would allow us to collect data and conduct analyses more efficiently without additional cost. Under this configuration, we substituted the scan converter for the stationary scene camera configuration that was originally budgeted.
DTIC
Optical Tracking; Eye Movements; Human-Computer Interface; Data Processing; Decision Making; Conditioning (Learning); Visual Perception; Human Performance

19970026007 New York Univ., Dept. of Psychology, New York, NY USA
Stimulus Similarity versus Process Similarity in Picture Priming ***Final Report, 1 Sep. 1993 - 30 Nov. 1996***
Snodgrass, Joan Gay, New York Univ., USA; Apr. 23, 1997; 36p; In English
Contract(s)/Grant(s): F49620-93-I-0535
Report No.(s): AD-A324781; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This grant has supported the research training of four graduate students and one undergraduate student in the area of human experimental cognition. Its primary purpose has been to broaden the range of the parent grant, Facilitation and Interference in Identification of Pictures and Words, by exploring more intensively an unexpected finding from the parent research---namely, that both explicit memory (recognition) and implicit memory (fragment completion and picture naming) show identical effects of sim-

ilarity between study and test forms of the picture stimuli. We have explored two areas of research connected with this question. In the first, we have explored the question of whether the similarity effects occur because of stimulus similarity or process similarity between two sets of items. We have done this by varying whether the fragments presented at study and test are the same or not, and by whether the level of fragmentation between study and test is the same or not.
DTIC
Images; Analogies; Education

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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.

19970025175 Naval Aerospace Medical Research Lab., Pensacola, FL USA
Muscular Strength and Anthropometric Characteristics of Male and Female Naval Aviation Candidates
Meyer, L. G., Naval Aerospace Medical Research Lab., USA; Pokorski, T. L., Naval Aerospace Medical Research Lab., USA; Ortel, B . E., Naval Aerospace Medical Research Lab., USA; Saxton, J. L., Naval Aerospace Medical Research Lab., USA; Collyer, P. D., Naval Aerospace Medical Research Lab., USA; Dec. 05, 1996; 18p; In English
Report No.(s): AD-A323781; NAMRL-1396; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Secretary of Defense directed the military services to allow women to fly all aircraft engaged in combat missions. The current inventory of naval aircraft was designed to accommodate the general physical characteristics of the male population based on information that is over 20 years old. Anthropometric standards have been used for a number of years to certify that individuals entering naval aviation can fit into assigned aircraft. However, there are no established strength standards to assess whether aviation candidates are capable of operating manual foot and hand controls. This study was done to determine current muscular strength and anthropometric characteristics of male and female aviation candidates. Volunteer subjects included 458 male and 152 female naval aviation students and Naval Academy Midshipmen. Cybex muscle testing equipment was used to measure the strength and endurance of muscles in the arm, shoulder, and leg. Fourteen different anthropometric measurements were made. Compared to males entering naval aviation, female candidates were weaker than their male counterparts when measuring both upper and lower body limb strength. Anthropometry indicated obvious differences in body size with men generally larger than women in most measurements. The data obtained in this study can be used to develop occupational strength standards for modern aviation, modify aircraft cockpits, and redesign aviation life support equ ipment. These results may help the Navy in preparing candidates for aviation and foster confidence in the assignment of aircraft.
DTIC
Muscular Strength; Anthropometry; Males; Females; Armed Forces

19970025221 Sytronics, Inc., Dayton, OH USA
The CG Dataset: Whole Body Surface Scans of 53 Subjects ***Interim Report, Mar. - Oct. 1996***
Brunsman, Matthew A., Sytronics, Inc., USA; Files, Patrick S., Sytronics, Inc., USA; Nov. 1996; 29p; In English
Contract(s)/Grant(s): F41624-93-C-6001; AF Proj. 7184
Report No.(s): AD-A324286; AL/CF-TR-1996-0160; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The prototype data set was created containing 159 scans of 24 male and 29 female subjects. Each subject is represented by three scans: one standing scan and two seated scans. Sixteen scans were collected at the Computer Anthropometric Research and Design (CARD) Laboratory with 16 cyberware WB4 whole body scanner.
DTIC
Computer Design; Computerized Simulation; Data Bases; Scanners; Laser Applications

19970025231 Naval Surface Warfare Center, Panama City, FL USA
Comparison Testing of 0.7-in. Field Emission Display (FED) and 0.7-in. Liquid Crystal Display (LCD) for Use in Head-Mounted Displays
Gorin, Steven E., Naval Surface Warfare Center, USA; Alexander, Jesse, Naval Surface Warfare Center, USA; Fisher, Robert E., Naval Surface Warfare Center, USA; Ma, Goulin, Naval Surface Warfare Center, USA; Dec. 1996; 43p; In English
Report No.(s): AD-A324536; CSS/TR-96/64; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Miniature displays for portable electronic devices have tremendous utility potential both in military and commercial applications. Emerging technologies would benefit from the high resolution graphic and video images that the displays could provide, thus enhancing the operator's access to information without disrupting the whole field of vision or requiring hands-on operation. The displays demonstrated little difference in their power consumption, magnetic signatures, size, and usefulness in temperature extremes. However, one of the most promising advantages of the Field Emission Display (FED) is its self-illuminating feature. This puts the Liquid Crystal Display (LCD) at a disadvantage if a low magnetic signature is required since its backlight would also have to be redesigned. Redesigning the circuit board for low magnetic signature should be approximately the same for both displays. Although benchtop testing indicated some measurable differences in color, brightness, and resolution, the opinions of the users were not as clear cut. Both benchtop and user testing however rated the LCD better than the FED for resolution and color accuracy. Neither display was acceptable in bright sunlight; both would require shading. More extensive testing would be required to completely evaluate the displays. Environmental and field testing should be expanded before introduction into the Fleet.
DTIC
Liquid Crystals; Display Devices; Helmet Mounted Displays; Head-Up Displays

19970025320 Army Natick Research and Development Command, MA USA
Computer Modeling for Individual Thermal Protection ***Final Report, Oct. 1994 - Oct. 1995***
DeCristofano, Barry S., Army Natick Research and Development Command, USA; Hoke, Landa C., Army Natick Research and Development Command, USA; Mar. 1997; 63p; In English
Contract(s)/Grant(s): Proj. AH98
Report No.(s): AD-A324357; NATICK/TR-97/010; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The goal of this work is to use computer modeling to enhance individual thermal protection of clothing materials. This modeling can evaluate current clothing fabrics and also provide guidance for the development of improved materials. Calculations are performed on human skin simulant materials and also on the thermal protective fabric Nomex. Some comparisons are made between calculated and experimental results. In addition, the computer model is used to predict the protective effects of Nomex from heat fluxes of a flash fire, a CO2 laser or a nuclear explosion. The model also is used to evaluate the importance of several material parameters (density, specific heat capacity, thermal conductivity) in the thermal protection by Nomex. Finally, the thermal computer code is used to facilitate experimental work pertaining to protection from thermal effects of nuclear weapons by making correlations between nuclear pulses and trapezoidal pulses (which can be obtained in the laboratory).
DTIC
Computerized Simulation; Clothing; Fabrics; Protective Clothing; Nuclear Weapons; Nuclear Explosions; Thermal Protection

19970025393 Massachusetts Inst. of Tech., Cambridge, MA USA
Artificial Gravity for Human Missions
Young, Laurence R., Massachusetts Inst. of Tech., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A40-A41; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

Artificial gravity will be considered as an alternative to currently inadequate countermeasures for long-duration space flight, of the type required to explore Mars. If we are to commit to a spinning vehicle, the physiological questions get down to two types-one for a full-time rotating habitat and one for intermittent stimulation-a kind of gravity gym. For full-time rotation, the first question is what level of acceleration at foot level is the minimum required to maintain normal function? Various means of achieving the artificial gravity will be considered, but we initially just concentrate on the size and speed needed to give sufficient centripetal acceleration. We can be reasonably certain that 1 G will suffice, but is it needed? Will a half-G do? Or can we avoid deconditioning by spinning continuously at a level of 0.38 Gs to match the Martian gravity?
Derived from text
Artificial Gravity; Rotation; Space Missions; Aerospace Medicine; Environmental Control; Rotating Environments; Gravitational Physiology; Spacecraft Environments

19970025421 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Inst. fuer Flugmechanik, Brunswick, Germany
Rotorcraft-Pilot Coupling: A Critical Issue for Highly Augmented Helicopters?
Hamel, Peter G., Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Germany; Apr. 1997; 10p; In English; Also announced as 19970025403; Copyright Waived; Avail: CASI; A02, Hardcopy; A04, Microfiche

Rotorcraft-pilot coupling (RPC) has became a critical issue for flight safety. Based on experience in the field of aircraft-pilot coupling (APC), definitions and limited prediction opportunities of three RPC categories are discussed. Time delay, rate-limiting

elements and pilot manipulators of full-authority FbW/L flight control systems provide new potentials of unfavorable rotorcraft-pilot coupling phenomena. Some limited RPC flight test experience at AFDD and DLR is presented. Research requirements for soliciting RPV prevention methodologies and technologies are laid down. New flight test techniques prediction tools and advanced technologies are proposed to improve RPC immunity.
Author
Pilot Induced Oscillation; Aircraft Pilots; Flight Tests; Flight Control; Helicopters

19970025439 NASA Johnson Space Center, Houston, TX USA
Measurement of Carbon Dioxide Accumulation and Physiological Function in the Launch and Entry and Advanced Crew Escape Suits ***Final Report***
Bishop, Phillip, Alabama Univ., USA; Greenisen, M. C., NASA Johnson Space Center, USA; National Aeronautics and Space Administration (NASA) /American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program; Jun. 1997; Volume 1, pp. 5.1-5.13; In English; Also announced as 19970025435
Contract(s)/Grant(s): NAG9-867; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Launch and Entry Suit (LES) and Advanced Crew Escape Suit (ACES) are worn by astronauts for launch and entry. Previous work by Waligora, et al., 1992, Waligora and Gilbert, 1992, and Dalrymple 1996, have found that carbon dioxide (CO2) accumulation in the LES/ACES helmet may be problematic. CO2 accumulation is important because high inspired levels of CO2 reduce physical function and pose a safety hazard (e.g. levels of CO2 accumulation of 3.6% in the Extravehicular Mobility Unit are sufficient to terminate Extra Vehicular Activities). My task was to design a suitable test protocol for determining the important physiological aspects of LES/ACES use. Three basic issues arose. First was the determination of the astronaut's CO2 inspiration during visor-down use at rest and during walking at 3.5 mph. A sub-issue was the impact of a pneumotach on CO2 since it has been previously observed that when the Aerosport pneumotach was used, performance seemed improved, which might be attributable to a lowered respiration rate when using the pneumotach. The second issue was the energy costs of waLking in the LES/ACES with various G-suit inflation levels, since G-suit inflation increases metabolic costs and metabolic costs influence the C02 production in the LES/ACES helmet. Since G-suit inflation improves orthostatic tolerance after space flight, but likely increases the energy costs of walking, the balance between G-suit inflation and C02 accumulation is an important safety consideration. The third issue which arose from pilot work was the substantial reduction in physical function after a 10 min visor-down period prior to walk.
Author
Astronauts; Life Support Systems; Carbon Dioxide; Safety; Space Shuttle Missions; Pressure Suits; Helmets; Aerospace Medicine; Physiology; Respiratory Rate

19970025537 Institute for Human Factors TNO, Soesterberg, Netherlands
Interactive Virtual Environments: Adaptation to Virtual Hand Position ***Final Report***
Werkhoven, P. J., Institute for Human Factors TNO, Netherlands; Apr. 16, 1997; 35p; In English
Contract(s)/Grant(s): B96-107
Report No.(s): TM-97-B003; TD97-0192; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, P. O. Box 23, 3769 ZG, Soesterberg, The Netherlands), Hardcopy, Microfiche

Virtual hand control is a direct natural manipulation method in virtual environments enabling advanced applications in the field of interactive design, training, medicine, etc. Researchers have shown that for grasping and positioning tasks virtual hand control is faster and more accurate than traditional mouse/cursor interactions. However, in virtual environments the virtual hand may not always be exactly aligned with the real hand. We carried out pointing tests with a non-visible hand in the real world before and after immersion in the virtual world. A comparison of pre- and post-tests revealed after-effects of the adaptation of eye-hand coordination in the opposite direction of the lateral shift. The magnitude of the after-effect was 20% under stereoscopic viewing conditions. However, decreased manipulation performance in VE (speed/accuracy) during the immersion with misaligned hand conditions was not found. The occurrence of negative after-effects in lateral direction indicates that adaptation is not explained by a strategic change of eye-hand coordination but by a lower-level parameter adjustment. Therefore, acquired visuo-motor skills in VE are likely to transfer to the real world.
Derived from text
Virtual Reality; Motion Simulation; Human-Computer Interface; Environment Simulation; Sensorimotor Performance; Misalignment; Manipulators

19970025594 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA

Requirements, Design, and Development of a Rapidly Reconfigurable, Photo-Realistic, Virtual Cockpit Prototype

Adams, Terry A., Air Force Inst. of Tech., USA; Dec. 1996; 136p; In English

Report No.(s): AD-A323143; AFIT/GCS/ENG/96D-02; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

The USA Air Force uses aircraft flight simulators for pilot training and mission rehearsal. They use a variety of simulators for this task ranging with prices ranging from $400,000 to $30,000,000. These simulators have specialized hardware that restricts reuse of their components and increases maintenance costs. Air Education and Training Command wants to reduce simulators cost and improve availability to the operational commands by supporting research in virtual reality flight simulators. This thesis looks at the development of a reconfigurable virtual cockpit in a distributed virtual environment that can be used for different aircraft as well as training scenarios. The thesis effort builds on a F-15 virtual cockpit previously developed at AFIT by creating a F-16. The Rapidly Reconfigurable Virtual Cockpit (RRVC) allows users to switch between an F-15 and F-16 during live simulation. All software models and aircraft geometry files are updated to reflect the current aircraft. The ability of a distributed virtual environment to support two unique aircraft flight simulators in a single application is encouraging. With the development of more aircraft, a single application can be provided to the operational pilot community that would support many aircraft at a fraction of the cost of today's flight simulators.

DTIC

Design Analysis; Product Development; Cockpits; Flight Simulators; Fighter Aircraft; Virtual Reality; Computerized Simulation

19970025607 Prins Maurits Lab. TNO, Rijswijk, Netherlands

Methods for Determination of Face Seal Leakage ***Final Report Methoden voor de bepaling van gelaatslek***

vanGruijthuijsen, L. M. P., Prins Maurits Lab. TNO, Netherlands; Apr. 1997; 35p; In Danish

Contract(s)/Grant(s): A94KL422

Report No.(s): PML-1997-A6; TD97-0006; Copyright; Avail: Issuing Activity (TNO Prins Maurits Lab., P. O. Box 45, 2280 AA Rijswijk, Netherlands), Hardcopy, Microfiche

This paper discusses the Netherlands Army's use and testing of respirators. They employed two methods for a fit test. The ambient aerosol fit test was useful, but it is not sufficiently accurate to check whether the required level of protection is obtained. Derived from text

Leakage; Respirators; Protection

19970025620 Colorado State Univ., Fort Collins, CO USA

Venoconstrictive Thigh Cuffs Impede Fluid Shifts During Simulated Microgravity

Lindgre n, Kjell N., Colorado State Univ., USA; Apr. 18, 1997; 111p; In English

Report No.(s): AD-A324398; AFIT-97-022; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The microgravity environment associated with spaceflight has a number of significant effects on the human body, one of with is a net shift of fluid into the thoracocephalic compartment. The purpose of this study was to investigate the effects of venoconstrictive cuffs on the body's fluid distribution during simulated microgravity. This study was designed to test the following hypothesis: venoconstrictive thigh cuffs, inflated to 50 mmHg during simulated microgravity as modeled by 12 degree Head Down Tilt (HDT), will impede venous flow resulting in increased leg blood volumes and thereby changing the whole body fluid distribution. DTIC

Body Fluids; Microgravity; Simulation; Blood Volume; Cardiovascular System

19970025650 NASA Johnson Space Center, Houston, TX USA

Lunar-Mars Life Support Test Project, Phase 2, Human Factors and Crew Interactions

Ming, D. W., NASA Johnson Space Center, USA; Hurlbert, K. M., NASA Johnson Space Center, USA; Kirby, G., Lockheed Martin Engineering and Sciences Co., USA; Lewis, J. F., Lockheed Martin Engineering and Sciences Co., USA; ORear, P., Lockheed Martin Engineering and Sciences Co., USA; 1997; 7p; In English

Report No.(s): NASA-TM-113031; NAS 1.15:113031; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Phase 2 of the Lunar-Mars Life Support Test Project was conducted in June and July of 1996 at the NASA Johnson Space Center. The primary objective of Phase 2 was to demonstrate and evaluate an integrated physicochemical air revitalization and regenerative water recovery system capable of sustaining a human crew of four for 30 days inside a closed chamber. The crew (3 males and 1 female) was continuously present inside a chamber throughout the 30-day test. The objective of this paper was to describe crew interactions and human factors for the test. Crew preparations for the test included training and familiarization of chamber systems and accommodations, and medical and psychological evaluations. During the test, crew members provided

metabolic loads for the life support systems, performed maintenance on chamber systems, and evaluated human factors inside the chamber. Overall, the four crew members found the chamber to be comfortable for the 30-day test. The crew performed well together and this was attributed in part to team dynamics, skill mix (one commander, two system experts, and one logistics lead), and a complementary mix of personalities. Communication with and support by family, friends, and colleagues were identified as important contributors to the high morale of the crew during the test. Lessons learned and recommendations for future testing are presented by the crew in this paper.
Author
Life Support Systems; Human Factors Engineering; Air Purification; Logistics; Education; Lunar Spacecraft; Mars (Planet)

19970026028 IIT Research Inst., Orlando, FL USA
Head Mounted Displays: Analyses of Current Technologies and Future Applications
Saulibio, Myle V., IIT Research Inst., USA; Feb. 1997; 24p; In English
Contract(s)/Grant(s): DAAH01-95-C-0310
Report No.(s): AD-A323949; DMSTTIAC-SOAR-97-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This document provides a top level analysis of Head Mounted Display (HMD) systems for new missions or functions. It provides a collection of data and objective assessment on HMD technology and analyzes evolving HMD technologies that may be incorporated into technology demonstrations. This report will aid DoD components in the assessment, evaluation and qualification of HMD technology as it may be applied to meet established or future requirements for force capabilities.
DTIC
Human Factors Engineering; Helmet Mounted Displays; Electro-Optics; Data Acquisition; Optical Communication; Head-Up Displays

19970026046 Oregon State Univ., Dept. of Industrial and Manufacturing Engineering, Corvallis, OR USA
An Agent-Based Cockpit Task Management System *Final Report*
Funk, Ken, Oregon State Univ., USA; Jun. 30, 1997; 78p; In English
Contract(s)/Grant(s): NAG2-875
Report No.(s): NASA-CR-205043; NAS 1.26:205043; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
An agent-based program to facilitate Cockpit Task Management (CTM) in commercial transport aircraft is developed and evaluated. The agent-based program called the AgendaManager (AMgr) is described and evaluated in a part-task simulator study using airline pilots.
Derived from text
Management Systems; Cockpits; Commercial Aircraft; Transport Aircraft; Pilot Performance

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SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

19970025376 NASA Ames Research Center, Moffett Field, CA USA
Key Questions in Astrobiology
Morrison, David, NASA Ames Research Center, USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A7-A8; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only
Astrobiology is a new name for a range of interdisciplinary studies related to life in the universe. The term is defined in the 1996 NASA Strategic Plan as 'The Study of the living universe. This field provides a scientific foundation for a multidisciplinary study of (1) the origin and distribution of life in the universe, (2) an understanding of the role of gravity in living systems, and (3) the study of the Earth's atmosphere and ecosystems.'
Author
Exobiology; Earth Atmosphere; Ecosystems; Gravitational Effects

19970025398 NASA Ames Research Center, Moffett Field, CA USA

Planetary Perspective on Life on Early Mars and the Early Earth

Sleep, Norman H., Stanford Univ., USA; Zahnle, Kevin, NASA Ames Research Center, USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A50; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

Impacts of asteroids and comets posed a major hazard to the continuous existence of early life on Mars as on the Earth. The chief danger was presented by globally distributed ejecta, which for very large impacts takes the form of transient thick rock vapor atmospheres; both planets suffered such impacts repeatedly. The exposed surface on both planets was sterilized when it was quickly heated to the temperature of condensed rock vapor by radiation and rock rain. Shallow water bodies were quickly evaporated and sterilized. Any surviving life must have been either in deep water or well below the surface.

Author

Mars (Planet); Earth (Planet); Mars Exploration; Surface Water; Extraterrestrial Life; Asteroids; Space Exploration; Planetary Environments; Comets; Exobiology

19970025401 Search for Extraterrestrial Intelligence Inst., Mountain View, CA USA

Intelligent Life in the Universe

Drake, Frank, Search for Extraterrestrial Intelligence Inst., USA; Astrobiology Workshop: Leadership in Astrobiology; Dec. 1996, pp. A57-A58; In English; Also announced as 19970025374; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche; Abstract Only; Abstract Only

The recent discoveries of other planetary systems and inconclusive evidence for ancient life on Mars have supported the long-held view that intelligent life on Earth was the result of common processes which should have occurred in many planetary systems. The most substantial controversies remaining concern the frequency with which biotas produce intelligent, technology-using species, and the lengths of time that technological civilizations produce detectable manifestations of their existence. It would appear that these two controversies can only be resolved through the detection of extraterrestrial intelligent life. In any case, the planetary and Martian discoveries encourage further searches for extraterrestrial intelligent life and have served to motivate increased contributions of resources to searches and the magnitude of the searches themselves.

Author

Extraterrestrial Life; Radio Astronomy; Project Seti; Radio Signals; Exobiology

Subject Term Index

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Personal Author Index

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7011 (448)		

4. Title and Subtitle	5. Report Date
Aerospace Medicine and Biology A Continuing Bibliography (Supplement 448)	September 22, 1997
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address	
NASA Scientific and Technical Information Program Office	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681	Special Publication
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report lists reports, articles and other documents recently announced in the NASA STI Database.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerospace Medicine Bibliographies Biological Effects	Unclassified – Unlimited Subject Category – 52

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	34	A03/HC

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