

## Part II

### Authors Database

1. Ackerman, Phillip L.; Schneider, Walter; Wickens, Christopher D. (U Illinois, Champaign). Deciding the existence of a time sharing ability: A combined methodological and theoretical approach. *Human Factors*; 1984 Feb Vol 26(1) 71-82; 1984; CODEN: HUFAA6; ISSN: 00187208. Note: Human. Contends that experimental and statistical methods for examining time-sharing ability in dual-task performance are inadequate. Unsophisticated use of correlational and factor analytic procedures has resulted in errors in the following areas: (1) derivation of simple structure and time-sharing ability, (2) number of factors, (3) lack of single tasks as marker variables, (4) orthogonality, (5) Ss and variables, (6) scoring techniques, (7) low reliability, and (8) practice effects. Based on a reanalysis of available data (the nature of task selection, scoring methods, and control of practice and reliability issues) in 4 previous studies, a time-sharing ability is not rejected. However, it is suggested that simulation, incorporation of theory in planning models, and crucial tests of hypotheses be incorporated into future methods for assessing the time-sharing ability. (20 ref) (PsycLIT Database Copyright 1984 American Psychological Assn, all rights reserved).
2. ANDERSON, W. J. (Michigan, University, Ann Arbor, Mich.); WEENER, E. F. Human power production in a caged situation. AIAA, MIT, and SSA, International Symposium on the Technology and Science of Low Speed and Motorless Flight, 2nd, Cambridge, Mass., Sept. 11-13, 1974, AIAA 10 p; Sep. 1974. Note: Report No.: AIAA PAPER 74-1027 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA7421 Mechanical efficiencies are calculated for a human doing work in a standing and stooping cycle while enclosed in a cage. An unsteady force is generated which does useful work in oscillating the cage on its suspension system. Such a vertical pumping motion has been proposed for a man-powered ornithopter. Analog simulation reveals that square wave force excitation is more efficient than sinusoidal or triangular. Design curves show some unexpected requirements for matching man and machine, and very poor efficiency if care is not taken. Losses are due to gravity and human inability to store energy in unloading portions of the cycle. A spring-dashpot suspension allows efficiencies of up to 88% in cases involving sinusoidal excitation. A freely floating suspension (the flight situation) allows only 64% efficiency for harmonic excitation. ((Author)).
3. ATTWOOD, D. A. /DEFENCE RESEARCH BOARD, DEFENCE RESEARCH ESTABLISHMENT, TORONTO, CANADA; WIENER, E. L. /MIAMI, U., DEPT. OF INDUSTRIAL ENGINEERING, CORAL GABLES, FLA./ Automated instruction for vigilance training (Subjects trained in visual monitoring task with autoinstructional device, showing higher signal detection rate than group trained by practice alone). *JOURNAL OF APPLIED PSYCHOLOGY*, VOL. 53, PT. 1, P. 218-223; Jun. 1969 15 Refs. Note: Contract No.: PHS-UI-00014 Language: English Country of Origin: Canada Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7002 Source of Abstract/Subfile: AIAA/TIS.
4. ATTWOOD, D. A. /MIAMI, U., DEPT. OF INDUSTRIAL ENGINEERING, CORAL GABLES, FLA./; WIENER, E. L. Training for vigilance - Combined cueing and knowledge of results. (Combined cueing and knowledge of results for transfer of training in visual monitoring). *JOURNAL OF APPLIED PSYCHOLOGY*, VOL. 52, NO. 6, P. 474-479; 1968 18 Refs. Note: Contract No.: PHS-UI-00014 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA6913 Source of Abstract/Subfile: AIAA/TIS.
5. Babladelis, Georgia; Deaux, Kay; Helmreich, Robert L.; Spence, Janet T. (California State U, Hayward). Sex related attitudes and personal characteristics in the United States. *International Journal of Psychology*; 1983 Apr Vol 18(1-2) 111-123; 1983; CODEN: IJPSBB; ISSN: 00207594. Note: Human. Investigated differences in attitudes and beliefs toward masculine and feminine roles as well as legal and social facts in the US. Despite women's and civil rights movements, inequalities and barriers for changing are still not overcome. Differences in temperament and motivation between men and women are assumed to be based

- on biological and/or socializing factors. In the US sample, sex differences emerged on the following variables: marriage importance, masculinity score for self, femininity score for self, femininity score for ideal man, masculinity score for ideal women, and competitiveness. Academic orientation also influenced the educational aspirations and expectations and the masculinity score for the ideal woman. Future research should investigate techniques to decrease sex stereotypes, conditions responsible for the traditional masculine and feminine roles in American society, and how these roles no longer are appropriate. (18 ref) (PsycLIT Database Copyright 1984 American Psychological Assn, all rights reserved).
6. Bakeman, Roger; Helmreich, Robert (Georgia State U). Cohesiveness and performance: Covariation and causality in an undersea environment. *Journal of Experimental Social Psychology*; 1975 Sep Vol 11(5) 478-489; 1975. Note: Human. Studied the relationship between group cohesiveness and performance, using data from a field setting. Ss were 40 scientists and 8 engineers. An index of leisure time cohesion correlated highly with work performance, accounting for 42% of performance variance. Although many studies assume that cohesiveness causes performance, in many contexts the dominant direction of causality may be from performance to cohesiveness instead. Laboratory experimental studies impose a causal direction and thus cannot answer a question of this kind. It is concluded, at least in the context of this study, that cohesiveness was not an important determinant of performance, but that good performance may well have been a cause of cohesiveness. (23 ref) (PsycLIT Database Copyright 1976 American Psychological Assn, all rights reserved).
  7. Barnett, Barbara J.; Wickens, Christopher D. (U Illinois, PhD Program in Engineering Psychology, Champaign, US). Display proximity in multicue information integration: The benefits of boxes. *Human Factors*; 1988 Feb Vol 30(1) 15-24; 1988; CODEN: HUF666; ISSN: 00187208. Note: Human. Investigated the ability of 24 university students to integrate probabilistic information from a number of sources, focusing on the extent to which this integration was influenced by display proximity in space, time, and object configuration. Ss were asked to envision themselves as military aircraft pilots deciding in midflight whether to abort a mission. Data indicate that integration performance was clearly ordered according to the degree of display integrality: Those in the more integral rectangle conditions were significantly better at integration than those in the bar graph condition. Proximity of space had little effect, whereas proximity in time improved performance in all 3 format conditions. Speed stress hindered performance. Memory for isolated unintegrated attributes of a cue was not harmed by the increasing integrality of the rectangle formats. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
  8. BOEHM-DAVIS, D. A.; CURRY, R. E.; HARRISON, R. L. (NASA, Ames Research Center, Moffett Field, CA); WIENER, E. L. (Miami University, Coral Gables, FL). Human factors of flight-deck automation - Report on a NASA-industry workshop. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Oct. 1983 6 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8404 The scope of automation, the benefits of automation, and automation-induced problems were discussed at a workshop held to determine whether those functions previously performed manually on the flight deck of commercial aircraft should always be automated in view of various human factors. Issues which require research for resolution were identified. The research questions developed are presented. Previously announced in STAR as N81-16022 (A.R.H.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). *Ergonomics* (ISSN 0014-0139), vol. 26, Oct. 1983, p. 953-961.
  9. BOEHM-DAVIS, D. A.; CURRY, R. E.; WIENER, E. L. (Miami Univ., Coral Gables, Fla.); HARRISON, R. L. Human Factors of Flight-deck Automation: NASA/Industry Workshop. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Jan. 1981 26P. Note: Report No.: NASA-TM-81260; A-8432 Language: English Country of Origin: United States Document Type: COLLOQUIA Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR8107 The scope of automation, the benefits of automation, and automation-induced problems were discussed at a workshop held to determine whether those functions previously performed manually on the flight deck of commercial aircraft should always be automated in view of various human factors. Issues which require research for resolution were identified. The research questions developed are presented. (A.R.H.) Source of Abstract/Subfile: NASA STIF COSATI Code: 1C Aircraft. Presentation Note: Workshop held at Burlingame, Calif., 17-18 Jul. 1980.
  10. Boies, David B.; Wickens, Christopher D. (Rensselaer Polytechnic Inst, NY, US). Display formatting in

- information integration and nonintegration tasks. *Human Factors*; 1987 Aug Vol 29(4) 395-406; 1987; CODEN: HUF6A6; ISSN: 00187208. Note: Human. Investigated (1) whether there was an interaction between pure vs mixed format displays and task demands and (2) whether reaction time (RT) differences existed between analog numerical indicators and verbal or digital indicators, using 2 experiments with a total of 60 undergraduates. Analog, digital, and verbal formats were employed with numerical judgment tasks requiring either the integration or nonintegration of display elements. Results show that integration tasks do not call for mixed-format displays. As predicted by multiple resource theory, the dual task (nonintegration) did benefit from a mixed-format display. Analog indicators were responded to more quickly than were digital or verbal indicators. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
11. Bortolussi, M. R.; Kantowitz, B. H.; Hart, S. G. (Behavioral Ins. for Technology & Science, West Lafayette, IN). Measuring pilot workload in a motion base trainer: A comparison of four techniques. *Special Issue: Ergonomics in aviation. Applied Ergonomics*; 1986 Dec Vol 17(4) 278-283; 1986; CODEN: AERGBW; ISSN: 00036870. Note: Human. Compared methods of predicting and measuring pilot workload, using 12 male pilots and a GAT-1 trainer. Two scenarios with different levels of difficulty were designed to test a visual 2- and a 4-choice reaction time (RT) task, time production, retrospective multidimensional subjective ratings, and in-flight verbal workload estimates. All 4 techniques were able to distinguish between the overall levels of scenario complexity. Three secondary tasks and workload ratings obtained in-flight were generally able to distinguish among levels of difficulty for different segments within the scenarios. Results show that the insertion of secondary tasks does not significantly affect flight performance. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
  12. BORTOLUSSI, MICHAEL R. (Western Aerospace Laboratories, Inc., Moffett Field, CA); HART, SANDRA G.; SHIVELY, ROBERT J. (NASA, Ames Research Center, Moffett Field, CA). Measuring moment-to-moment pilot workload using synchronous presentations of secondary tasks in a motion-base trainer. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; 1987. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8817 A simulation was conducted to determine whether the sensitivity of secondary task measures of pilot workload could be improved by synchronizing their presentation to the occurrence of specific events or pilot actions. This synchronous method of presentation was compared to the more typical asynchronous method, where secondary task presentations are independent of pilot's flight-related activities. Twelve pilots flew low- and high-difficulty scenarios in a motion-base trainer with and without concurrent secondary tasks (e.g., choice reaction time and time production). The difficulty of each scenario was manipulated by the addition of 21 flight-related tasks superimposed on a standard approach and landing sequence. The insertion of the secondary tasks did not affect primary flight performance. However, secondary task performance did reflect workload differences between scenarios and among flight segments within scenarios, replicating the results of an earlier study in which the secondary tasks were presented asynchronously (Bortolussi et al., 1986). ( Author) Source of Abstract/Subfile: AIAA/TIS. IN: International Symposium on Aviation Psychology, 4th, Columbus, OH, Apr. 27-30, 1987, Proceedings (A88-42927 17-53). Columbus, OH, Ohio State University, 1987, p. 651-657.
  13. Bortolussi, Michael R.; Hart, Sandra G.; Shively, Robert J. (Western Aerospace Labs, Moffett Field, CA, US). Measuring moment to moment pilot workload using synchronous presentations of secondary tasks in a motion based trainer. *Aviation, Space, and Environmental Medicine*; 1989 Feb Vol 60(2) 124-129; 1989; CODEN: AEMEAY; ISSN: 00956562. Note: Human. 12 pilots flew low- and high-difficulty scenarios in a motion-base trainer with and without concurrent secondary tasks (e.g., choice reaction time (RT), time production). The difficulty of each scenario was manipulated by the addition of 21 flight-related tasks superimposed on a standard approach and landing sequence. Results indicate that both choice RT and time production secondary tasks can be useful measures of pilot workload. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved) KP: high vs low difficulty scenarios in motion base trainer with vs without concurrent secondary tasks; workload assessed through choice RT & time production; pilots.
  14. Braune, Rolf; Wickens, Christopher D. (U Illinois-Willard Airport Inst of Aviation, Aviation Research Lab, Savoy). The functional age profile: An objective decision criterion for the assessment of pilot performance capacities and capabilities. *Human Factors*; 1985 Dec Vol 27(6) 681-693; 1985; CODEN: HUF6A6; ISSN: 00187208. Note: Human. Developed a computer-based information-processing performance battery with aviation-relevant task structures to assess performance capability within and

across age groups. 60 males (aged 20-60 yrs) completed the test battery; results show a decline in some spatial abilities, dichotic listening, and perceptual-motor coordination across all age groups; a decline in speed beyond age 40 yrs; and no apparent decline in time-sharing or hidden-figures task abilities. (23 ref) (PsycLIT Database Copyright 1986 American Psychological Assn, all rights reserved).

15. Braune, Rolf; Wickens, Christopher D. (U Illinois Inst of Aviation, Aviation Research Lab, Savoy). Time sharing revisited: Test of a componential model for the assessment of individual differences. Special Issue: Aviation psychology. *Ergonomics*; 1986 Nov Vol 29(11) 1399-1414; 1986; CODEN: ERGOAX; ISSN: 00140139. Note: Human. Time-sharing ability as an individual differences variable in dual task performance was examined using a componential model. Five proposed components were assessed: (1) serial processing ability, (2) an internal model of the system dynamics, (3) performing heterogeneous operations, (4) adaptation to rapidly changing dynamic conditions, and (5) parallel processing ability. The approach combined methodologies from experimental psychology and from individual differences research. 40 20-31 yr old males were given 4 single task pretests and performed a compensatory tracking task in dual task combinations administered during 6 sessions over a period of 3 days. Results of a factor analysis and a series of stepwise multiple-regression analyses revealed 2 important dimensions of individual differences in dual task performance: (1) individual differences in cognitive style linked to the concept of field dependence-independence and (2) individual differences in time-sharing ability. The individual differences in cognitive style were identified by the 1st derived factor. Based on the results, the concept of a process-specific time-sharing ability is introduced. (French & German abstracts) (32 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
16. Carswell, C. Melody; Wickens, Christopher D. (U Illinois, Champaign). Information integration and the object display: An interaction of task demands and display superiority. *Ergonomics*; 1987 Mar Vol 30(3) 511-527; 1987; CODEN: ERGOAX; ISSN: 00140139. Note: Human. Compared 2 graphical display formats, using 2 tasks, varying in their demands to integrate multiple information sources. An object display utilized different dimensions of a single perceptual object to display task-relevant information. A contrasting bar graph technique used the same dimension of separate objects to present identical information. In Exp I, 24 Ss (aged 18-30 yrs) used both displays to perform a simulated process control task in which integration of information from several time-varying sources was required. In Exp II, 20 additional Ss (aged 18-26 yrs) used both displays in a nonintegration task that required monitoring for particular values of 6 independent system outputs. Results of the integration experiment reveal that performance was superior when the object display was used. In the nonintegration task the bar graphs provided more efficient performance. (French, German & Japanese abstracts) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
17. Carswell, C. Melody; Wickens, Christopher D. (U Illinois, Champaign). Lateral task segregation and the task hemispheric integrity effect. *Human Factors*; 1985 Dec Vol 27(6) 695-700; 1985; CODEN: HUF6A6; ISSN: 00187208. Note: Human. The task-hemispheric integrity effect (THIE) refers to the high time-sharing efficiency obtained for the concurrent performance of a verbal and spatial task when the spatial task is displayed to the left of the operator's midline and is controlled by the left hand and the verbal components are located in the operator's right. Two experiments designed to test the contribution of lateral display or control separation to the THIE were conducted with 16 right-handed males. Results show that reduction of display separation reduced the effects associated with hemispheric compatibility and that allocation of both controls to the same hand eliminated these effects. It is suggested that the THIE (1) is a dominant factor in performance only when the components of the 2 tasks can be laterally segregated at all stages of information processing, (2) describes the superiority of hand and visual field only in the dual-task case, and (3) is a less potent determinant of performance than spatial stimulus-response compatibility. (8 ref) (PsycLIT Database Copyright 1986 American Psychological Assn, all rights reserved).
18. CASPER, PATRICIA A. (Purdue University, West Lafayette, IN); SHIVELY, ROBERT, J.; HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Decision support for workload assessment - Introducing WC FIELDE. *Purdue Univ., West Lafayette, Ind*; 1987 10 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AJAA Technical Library Journal Announcement: IAA8814 Currently there is a great demand for mental workload evaluation in the course of system design and modification. In light of this demand, a microprocessor-based decision support system has been created called WC FIELDE: Workload Consultant for FIELD Evaluation. The system helps the user select workload measures appropriate to his or her application from the large pool of currently available techniques. Both novices

- and those with some workload experience may benefit from using WC FIELDE, since the system's operation is entirely transparent and all rules involved in the decision process are available for the user to examine. WC FIELDE recommends several assessment methodologies in decreasing order of appropriateness, and provides additional information on each measure at the end of the program in the form of text files. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: Human Factors Society, Annual Meeting, 31st, New York, NY, Oct. 19-23, 1987, Proceedings. Volume 1 (A88-35401 14-54). Santa Monica, CA, Human Factors Society, 1987, p. 72-76.
19. CHARNY, LEONID; HORNSBY, MARY E.; SHERIDAN, THOMAS B. (MIT, Cambridge, MA). An interactive multi-objective decision-aiding system for tactical mission planning. IN: Human Factors Society, Annual Meeting, 31st, New York, NY, Oct. 19-23, 1987, Proceedings. Volume 1 (A88-35401 14-54). Santa Monica, CA, Human Factors Society, 1987, p. 432-436; 1987 9 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Journal Announcement: IAA8814 This paper describes an interactive computer-aiding system for tactical aircraft mission planning. A Multiple-Objective Decision-Making approach has been applied to the tactical mission planning domain. The planner specifies a set of potential flight routes and selects an optimum one as the result of a human-computer dialogue. In this dialogue, the planner iteratively specifies acceptable constraints and desired weights on several mission-related decision objectives. The system provides graphic feedback about the merit of the selected route vis a vis the specified objectives, and allows the planner to tailor the mission route plan to meet explicit decision objectives. (Author) Source of Abstract/Subfile: AIAA/TIS. Documents available from AIAA Technical Library.
20. CHARNY, LEONID; SHERIDAN, THOMAS B. Satisficing decision-making in supervisory control, part 2 Final Report, Mar. 1983 - Jul. 1986. Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab; Jul. 1986 59P. Note: Report No.: AD-A174631 Contract No.: N00014-83-K-0193 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A04/MF A01 Journal Announcement: STAR8712 This paper describes a flexible graphics system GramAD for aiding a human decision-maker in making a selection out of a discrete set of alternatives while trading off several criteria. Three major components of this selection process, called satisficing, are identified and three modes of information presentation to the decision-maker are studied. Necessary elements of multiple-objective computer aiding systems are discussed. Results of experiments with human subjects working with the GramAD system are discussed. (GRA) Source of Abstract/Subfile: DTIC COSATI Code: 5A Administration & Management.
21. CHIDESTER, THOMAS R.; KANKI, BARBARA G. (NASA, Ames Research Center, Moffett, Field, CA); HELMREICH, ROBERT L. (Texas, University, Austin). Performance evaluation in full-mission simulation - Methodological advances and research challenges (in air transport operations). National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; 1989 14 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA9010 The crew-factors research program at NASA Ames has developed a methodology for studying the impact of a variety of variables on the effectiveness of crews flying realistic but high workload simulated trips. The validity of investigations using the methodology is enhanced by careful design of full-mission scenarios, performance assessment using converging sources of data, and recruitment of representative subjects. Recently, portions of this methodology have been adapted for use in assessing the effectiveness of crew coordination among participants in line-oriented flight training. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: International Symposium on Aviation Psychology, 5th, Columbus, OH, Apr. 17-20, 1989, Proceedings. Volume 1 (A90-26176 10-53). Columbus, OH, Ohio State University, 1989, p. 15-21.
22. Collins, Allan; Adams, Marilyn J.; Pew, Richard W. (Bolt Beranek & Newman, Cambridge, MA). Effectiveness of an interactive map display in tutoring geography. Journal of Educational Psychology; 1978 Feb Vol 70(1) 1-7; 1978; CODEN: JLEPAX; ISSN: 00220663. Note: Human. Evaluated the teaching effectiveness of different aspects of the SCHOLAR computer-assisted instruction system. The experiment compared how well students learn using SCHOLAR with (a) the interactive map display of Map-SCHOLAR, (b) a static labeled map, and (c) an unlabeled map. The 9 high school and 9 college students learned significantly more with the interactive map display than with either the labeled map or the unlabeled map. A new method called backtrace analysis was used to assess the effectiveness of specific aspects of the tutoring strategy and the map system used in the experiment. (PsycLIT Database Copyright 1979 American Psychological Assn, all rights reserved).
23. Diaz, Loving, Rolando; Diaz, Guerrero, Rogelio; Helmreich, Robert L. Soence, Janet T. IN: U. Texas,

- América. Comparación transcultural y análisis psicométrico de una medida de rasgos masculinos (instrumentales) y femeninos (expresivos). (Cross cultural comparison and psychometric analysis of masculine (instrumental) and feminine (expressive) traits.) . Revista de la Asociación Latinoamericana de Psicología Social; 1981 Jan-Jun Vol 1(1) 3-37 ; 1981. Note: Human. 594 Mexican and 2,310 North American students, aged 16-25 yrs, were administered the Personal Attitude Questionnaire and the Bem Sex-Role Inventory. In both sample populations, females tended to score much higher on F+ traits (those that are especially socially desirable for women), while males tended to score considerably higher on M+ traits (i.e., those that are especially socially desirable for males). Evaluation of the masculine-feminine (M-F) traits, however, showed that Mexican males scored significantly lower on such items as "never cries" and "does not feel hurt easily" than all female Ss or American male Ss. The median scores from both US sexes were significantly below the median scores of the Mexican sample. Findings indicate that M-F traits as previously reported by US investigators are also applicable to Mexican sample, even though sex-role differences seem to be more pronounced in traditional Mexican society. (26 ref) (PsycLIT Database Copyright 1982 American Psychological Assn, all rights reserved).
24. Doerr, Bridget T.; Fuchina, Edwin B. (U Pennsylvania, School of Nursing, Philadelphia). Health risk appraisal: Process, problems, and prospects for nursing practice and research. . Nursing Research; 1981 Sep-Oct Vol 30(5) 299-306; 1981. Note: Human. Reviews studies of the technical characteristics of health-risk appraisal instruments and of their utility as motivators for behavioral change conducive to positive health. An example is described of an intake instrument that processes information about life-style, family history, and certain physical measures to produce the client's risk age (which may be higher or lower than CA), the age that could be achieved through changes in life-style, and health hazards facing the client. (35 ref) (PsycLIT Database Copyright 1983 American Psychological Assn, all rights reserved)
25. DONCHIN, EMANUEL (Illinois Univ., Urbana-Champaign); HART, SANDRA G. HARTZELL, EARL J. Workshop on Workload and Training, and Examination of their Interactions: Executive summary. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. Jul. 1967 40P. Note: Report No.: NASA-TM-89459; A-87212; NAS 1.15:89459 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR8719 The goal of the workshop was to bring together experts in the fields of workload and training and representatives from the Dept. of Defense and industrial organizations who are responsible for specifying, building, and managing advanced, complex systems. The challenging environments and requirements imposed by military helicopter missions and space station operations were presented as the focus for the panel discussions. The workshop permitted a detailed examination of the theoretical foundations of the fields of training and workload, as well as their practical applications. Furthermore, it created a forum where government, industry, and academic experts were able to examine each other's concepts, values, and goals. The discussions pointed out the necessity for a more efficient and effective flow of information among the groups represented. The executive summary describes the rationale of the meeting, summarizes the primary points of discussion, and lists the participants and some of their summary comments. (Author) Source of Abstract/Subfile: NASA STIP COSATI Code: 5H Man-machine Relations. Presentation Note: Workshop held in Carmel, Calif., 5-10 Jan. 1966.
26. DUFFENDACK, J. C. /MICHIGAN, U., DEPT. OF AEROSPACE ENGINEERING AND DEPT. OF PSYCHOLOGY, HUMAN PERFORMANCE CENTER, ANN ARBOR, MICH./; FENSCH, L. K. /MICHIGAN, U., DEPT. OF PSYCHOLOGY, HUMAN PERFORMANCE CENTER, ANN ARBOR, MICH./; FEW, R. W. Sine-wave tracking revisited. (Sine wave tracking, studying operator manual control performance). IEEE TRANSACTIONS ON HUMAN FACTORS IN ELECTRONICS, VOL. HFE-8, JUN. 1967, P. 130-134. 9 REFS; Jun. 1967. Note: Contract No.: NASR-54/06; NGR-23-005-906 Language: English Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA6717 Source of Abstract/Subfile: AIAA/TIS.
27. DUFFENDACK, J. C.; FENSCH, L. K.; FEW, R. W. Summary of sine-wave tracking studies ( Sine-wave tracking studies indicate predictability of input and control device dynamics in manual control by human operator). Michigan Univ., Ann Arbor; 1966. Note: Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Journal Announcement: STAR6706. IN NASA, WASHINGTON MANUAL CONTROL 1966 P 15-24 REFS /SEE N67-15850 06-65/ GPO- HC \$2.50, CPSTI- MF \$0.65.
28. Erwin, C. W.; Wenzel, E. L.; Linotta, M. I.; Truscott, T. R. Alcohol induced drowsiness and vigilance

- performance. *Journal of Studies on Alcohol*; 1978 Mar Vol 39(3) 505-516; 1978; CODEN: JSALDP; ISSN: 0096882X. Note: Human. Visual vigilance was tested in 8 men and 7 women social drinkers (age 21-26yrs) after they drank 0, 0.5, 0.8, and 1.2 g of 95% alcohol per kg of body weight. The mean blood alcohol concentrations before the task were 0.0362, 0.070, and 0.102%. Ss viewed pseudo-randomly presented signal lights embedded in nonresponse stimuli occurring at 1-sec intervals in an oscilloscope for 30 min. The percentage of correct bryptic responses was significantly lower after the high dose of alcohol, and the response time was significantly longer. Deterioration in performance was also related to time at the task but there were no significant interactions with the alcohol effect. Men consistently detected more signals than women; the 2-way ANOVA indicated significant main effects for alcohol and sex but no interaction. Eyelid position was continuously monitored; overall, 66% of the misses occurred with the eyes open, 26% with the eyes closed longer than 1 sec, and 8.3% from eyeblinks (less than 1 sec). Alcohol had the greatest effect on eyelid-closed misses; the effect increased linearly with the dose. (PsycLIT Database Copyright 1979 American Psychological Assn, all rights reserved).
29. (NASA-Ames Research Ctr, Moffett Field US Naval Air Station, CA). Evaluation of the potential format and content of a cockpit display of traffic information. AU: Hart, Sandra G.; Loomis, Les L. *Human Factors*; 1980 Oct Vol 22(5) 591-604; 1980; CODEN: HUFPA6; ISSN: 00187208. Note: Human. Results from 3 experiments with 51 airplane pilots indicate several display features (e.g., flightpath predictors) that might contribute to a pilot's ability to perceive the traffic situation correctly. Also provided is information about the impact of different aspects of the geometry of an encounter between 2 aircraft targets on an observer's ability to evaluate the horizontal and vertical relationship between them. (5 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved).
30. FADDEN, D. M.; WEENER, E. F. (Boeing Commercial Airplane Co., Seattle, Wash.). Computer generated displays and pilot effectiveness. In: *International Air Transportation Conference*, New Orleans, La., April 30-May 3, 1979, Proceedings, Volume 2. (A81-18051 06-01) New York, American Society of Civil Engineers, 1979, p. 553-561; 1979. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Journal Announcement: IAA8106 On-board digital computers and electronic display equipment for 757 and 767 aircraft permit almost any reasonable format or presentation and computation of flight parameters previously unavailable for display. Previous computer display programs have indicated the necessity of dynamic simulation to maximize display effectiveness; optimization in the format of information displays can reduce the mental calculations by the pilot, allowing more time for managing the flight. The pilot panel mockup, pilot adaptation enhancement, and the duties of the pilot as the flight manager are outlined, concluding that the new computer displays will allow the pilot to operate more accurately and efficiently. (A.T.) Source of Abstract/Subfile: AIAA/TIS.
31. FOUSHEE, H. CLAYTON (NASA, Ames Research Center, Moffett Field, CA) HELMREICH, ROBERT L. (Texas, University, Austin). Group interaction and flight crew performance. *National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA*; 1988 36 Refs. Note: Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Documents available from AIAA Technical Library Journal Announcement: IAA8914 The application of human-factors analysis to the performance of aircraft-operation tasks by the crew as a group is discussed in an introductory review and illustrated with anecdotal material. Topics addressed include the function of a group in the operational environment, the classification of group performance factors (input, process, and output parameters), input variables and the flight crew process, and the effect of process variables on performance. Consideration is given to aviation safety issues, techniques for altering group norms, ways of increasing crew effort and coordination, and the optimization of group composition. (T.K.) Source of Abstract/Subfile: AIAA/TIS. IN: *Human factors in aviation* (A89-34431 14-54). San Diego, CA, Academic Press, Inc., 1988, p. 189-227.
32. Foushee, H. Clayton; Helmreich, Robert L.; Spence, Janet T. (U Texas, Austin). Implicit theories of masculinity and femininity: Dualistic or bipolar? *Psychology of Women Quarterly*; 1979 Spr Vol 3(3) 259-269; 1979; CODEN: PWOQDY; ISSN: 03616843. Note: Human. Investigated whether persons' implicit personality theories include the notion that masculine and feminine characteristics tend to preclude each other so that the 2 clusters of attributes are perceived to be negatively correlated. 124 female and 120 male undergraduates were given 1 of 4 basic descriptions of a group of men or women. These descriptions specified the presence or absence of "masculine" or "feminine" attributes as defined by the Personal Attributes Questionnaire. Ss given descriptions specifying the presence or absence of "masculine" characteristics were asked the extent to which they could make inferences about the presence or absence of "feminine" characteristics. An analogous procedure was implemented for the descriptions

specifying the presence or absence of "feminine" characteristics. Results confirm the hypothesis that individuals tend to perceive a negative relationship between masculinity and femininity in others. (11 ref) (PsycLIT Database Copyright 1980 American Psychological Assn, all rights reserved) KP: implicit personality theories; perception of relationship between masculinity & femininity in others; male vs female college students.

33. Fracher, Martin L.; Wichans, Christopher D. (Armstrong Aerospace Medical Research Lab, Wright-Patterson US Air Force Base, OH, US). Resources, confusions, and compatibility in dual axis tracking: Displays, controls, and dynamics. *Journal of Experimental Psychology Human Perception and Performance*; 1989 Feb Vol 15(1) 80-96; 1989; CCMEN: JPHPDH; ISSN: 00961523. Note: Human. Why do people often find that performing two tasks at once is harder than performing one task at a time? These mechanisms of task interference that might answer that question were investigated: resource competition, confusions, and incompatible task proximity between processing stages. The subjects performed dual-axis compensatory tracking with error displays that were either integrated or separated, with axis controls that either were integrated into one stick or remained separate, and with control dynamics on the two axes that were either the same or different. Tracking error increased and control activity decreased as a function of the combined difficulty of the two control dynamics. Integrated displays and integrated controls both led to increased confusions between tracking axes although error was not reliably affected. Significantly, performance was also affected by whether the integrality of displays matched that of controls. These results suggest that resource competition, confusions, and compatibility of proximity play distinct roles in dual-axis tracking performance. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
34. GANDER, P. H.; KRONAUER, R. E.; GRAEBER, R. C. (NASA, Ames Research Center, Moffett Field, CA; Harvard, University, Cambridge, MA). Phase shifting two coupled circadian pacemakers - Implications for jet lag. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif, 1985 19 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAAB619 Two Van der Pol oscillators with reciprocal linear velocity coupling are utilized to model the response of the human circadian timing system to abrupt displacements of the environmental time cues (zeitgebers). The core temperature rhythm and sleep-wake cycle simulated by the model are examined. The relationship between the masking of circadian rhythms by environmental variables and behavioral and physiological events and the rates of resynchronization is studied. The effects of zeitgeber phase shifts and zeitgeber strength on the resynchronization rates are analyzed. The influence of intrinsic pacemaker periods and coupling strength on resynchronization are investigated. The simulated data reveal that: resynchronization after a time zone shift depends on the magnitude of the shift; the time of day of the shift has little influence on resynchronization; the strength of zeitgebers affects the rate and direction of the resynchronization; the intrinsic pacemaker periods have a significant effect on resynchronization; and increasing the coupling between the oscillators results in an increase in the rate of resynchronization. The model data are compared to transmeridian flight studies data and similar resynchronization patterns are observed. (LF.) Source of Abstract/Subfile: AIAA/TIS. *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology* (ISSN 0363-6119), no. 249, 1985, p. E704-E719.
35. GANDER, P. H.; MYHRE, G.; GRAEBER, R. C.; ANDERSEN, H. T.; LAUBER, J. K. Effects of 9-hour time zone changes on fatigue and circadian rhythms of sleep/wake and core temperature. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif, Dec. 1985 38P. Note: Report No.: NASA-TM-88197; A-86057; NAS 1.15:88197 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR8607 Physiological and psychological disruptions caused by transmeridian flights may affect the ability of flight crews to meet operational demands. To study these effects, 9 Royal Norwegian Airforce P3-Orion crewmembers flew from Norway to California (-9 hr), and back (+9 hr). Rectal temperature, heart rate and wrist activity were recorded every 2 min, fatigue and mood were rated every 2 hr during the waking day, and logs were kept of sleep times and ratings. Subjects also completed 4 personality inventories. The time-zone shifts produced negative changes in mood which persisted longer after westward flights. Sleep quality (subjective and objective) and duration was slightly disrupted (more after eastward flights). The circadian rhythms of sleep/wake and temperature both completed the 9-hr delay by day 5 in California, although temperature adjusted more slowly. The size of the delay shift was significantly correlated with scores on extraversion and achievement need personality scales. Response to the 9-hr advance were more



variable. One subject exhibited a 15-hr delay in his temperature rhythm, and an atypical sleep/nap pattern. On average, the sleep/wake cycle (but not the temperature rhythm), completed the 9-hr advance by the end of the study. Both rhythms adapted more slowly after the eastward flight. (Author) COSATI Code: 6S Stress Physiology.

36. GANDER, PHILIPPA H.; CONNELL, LINDA J.; GRAEBER, R. CURTIS (NASA, Ames Research Center, Moffett Field, CA). Masking of the circadian rhythms of heart rate and core temperature by the rest-activity cycle in man. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. 1986 14 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8710 Experiments were conducted to estimate the magnitude of the masking effect produced in humans by alternate periods of physical activity and rest or sleep on the circadian rhythms of heart rate and core temperature. The heart rate, rectal temperature, and nondominant wrist activity were monitored in 12 male subjects during 6 days of normal routine at home and during 6 days of controlled bed-rest regimen. The comparisons of averaged waveforms for the activity, heart rate, and temperature indicated that about 45 percent of the range of the circadian heart rate rhythm during normal routine and about 14 percent of the range of the circadian temperature rhythm were attributable to the effects of activity. The smaller effect of activity on the temperature rhythm may be partially attributable to the fact that core temperature is being more rigorously conserved than heart rate, at least during moderate exercise. (I.S.) Source of Abstract/Subject: AIAA/TE. Journal of Biological Rhythms, vol. 1, no. 2, 1986, p. 119-135.
37. Gander, Philippa H.; Graeber, R. Curtis (NASA Ames Research Cr, Moffett Field, CA, US). Sleep in pilots flying short haul commercial schedules. 2nd CEC Workshop: Irregular and abnormal hours of work (1987, Brighton, England). Ergonomics; 1987 Sep Vol 30(9) 1365-1377; 1987; CODEN: ERGOAX; ISSN: 00140139. Note: Human. In 74 pilots monitored before, during, and after 3- or 4-day duty schedules, they fell asleep later and woke up earlier on trip nights. Timing and duration of sleep were strongly correlated with timing and duration of the time available for sleep. Sleep quality was most consistently related to the number of segments flown in the preceding duty day rather than the duration of the duty day. Sleep was generally better after days with more flight segments, unless long duty days encroached on the time available for sleep. There was evidence of recuperation after a trip, where the duration of sleep was longest, the time taken to fall asleep was shortest, sleep ratings were highest, and snoring was most common. (French, German & Japanese abstracts) (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved) KP: number of flights & hours of duty & between duty days; sleep patterns & quality before vs during vs after 3-4 day duty schedules; commercial pilots on short haul schedules; conference presentation.
38. Gander, Philippa H.; Myhre, Grete; Graeber, R. Curtis; Andersen, Harald T.; Et, Al IN: NASA Ames Research Cr, Aviation Systems Research Branch, Moffett Field, CA, US. Adjustment of sleep and the circadian temperature rhythm after flights across nine time zones. Aviation, Space, and Environmental Medicine; 1989 Aug Vol 60(8) 733-743; 1989; CODEN: AEMBAY; ISSN: 00956562. Note: Human. Adjustment of sleep-wake patterns and circadian temperature rhythm was monitored in 9 Royal Norwegian Air Force volunteers during a westward training deployment across 9 time zones. They recorded all sleep times, rated sleep quality, and completed personality inventories. Rectal temperature, heart rate, and wrist activity were continuously monitored. Adjustment was slower after the return eastward flight than after the outbound westward flight. Interindividual differences in adjustment of the temperature rhythm were correlated with some of the personality measures. Larger phase delays in the overall temperature waveform (as measured on the 5th day after westward flight) were exhibited by extraverts, and less consistently by evening types. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
39. GANDER, PHILIPPA H.; MYHRE, GRETE; GRAEBER, R. CURTIS; LAUBER, JOHN K. (NASA, Ames Research Center, Moffett Field, CA); ANDERSEN, HARALD T. (Royal Norwegian, Air Force, Institute of Aviation Medicine, Oslo, Norway). Adjustment of sleep and the circadian temperature rhythm after flights across nine time zones. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; Aug. 1989 28 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8921 The adjustment of sleep-wake patterns and the circadian temperature rhythm was monitored in nine Royal Norwegian Airforce volunteers operating P-3 aircraft during a westward training deployment across nine time zones. Subjects recorded all sleep and nap times, rated nightly sleep quality, and completed personality inventories. Rectal temperature, heart rate, and wrist activity were

continuously monitored. Adjustment was slower after the return eastward flight than after the outbound westward flight. The eastward flight produced slower readjustment of sleep timing to local time and greater interindividual variability in the patterns of adjustment of sleep and temperature. One subject apparently exhibited resynchronization by partition, with the temperature rhythm undergoing the reciprocal 15-h delay. In contrast, average heart rates during sleep were significantly elevated only after westward flight. Interindividual differences in adjustment of the temperature rhythm were correlated with some of the personality measures. Larger phase delays in the overall temperature waveform (as measured on the 5th day after westward flight) were exhibited by extraverts, and less consistently by evening types. (Author) Source of Abstract/Subfile: AIAA/TIS. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 60, Aug. 1989, p. 733-743.

40. GRAEBER, R. C. Crew factors in flight operations. Part 4: Sleep and wakefulness in international aircrews. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. Feb. 1986 113P. Note: Report No.: NASA-TM-88231; A-86182; NAS 1.15:88231 Contract No.: NCC2-302 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A06/MF A01 Journal Announcement: STAR8619 Physiological recordings of sleep and wakefulness in operating international (B-747) flight crews were obtained. Crews spent their first layover (48 h) of a trip in a sleep laboratory where standardized EEG, electro-oculograph (EOG), and electromyograph (EMG) sleep recordings were carried out whenever volunteers chose to sleep. During periods of wakefulness they underwent multiple sleep latency tests every 2 h in order to assess daytime drowsiness. The same standardized recordings were carried out at a home-based laboratory before departure. Approximately four crews each participated in flights over 7 to 9 time zones on five routes. All participants were encouraged to use whatever sleep-wake strategies they thought would provide them with the most satisfactory crew rest. Overall, layover sleep quality was not seriously disturbed, but eastward flights produced greater sleep disruption. The contributors of individual factors and the usefulness of various sleep strategies are discussed in the individual laboratory reports and in an operational summary. (Author) COSATI Code: 6P Physiology.
41. GRAEBER, R. C.; CUTHBERT, B. N.; SING, H. C.; SCHNEIDER, R. J.; SESSIONS, G. R. Rapid transmeridian deployment: Cognitive performance and chronobiologic prophylaxis for circadian dyschronism. Walter Reed Army Inst. of Research, Washington, D.C.; Jun. 1980 15P. Note: Report No.: AD-A090393 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A02/MF A01 Journal Announcement: STAR8103 Rapid deployment of combat units to overseas locations is a primary concern of today's strategic planners. Such movements require the airlifting of units across multiple time zones. Numerous studies have documented the adverse physiological and behavioral consequences accompanying the rapid crossing of three or more time zones. These effects result from the requirement that the body must adjust its circadian rhythms to the new local time. Under normal conditions, these daily cycles are synchronized by the external Zeitgebers (i.e., time-givers) of the local environment. The sudden shifting of these Zeitgebers causes the shifting at different rates of the body's physiological, biochemical, and behavioral rhythms. While some circadian rhythms adjust quite rapidly, others adjust very slowly. Consequently, the passenger's circadian system is not only out of synchrony with the environment but is also internally desynchronized. It is the latter condition, circadian dyschronism, which is particularly responsible for the fatigue and malaise typically reported as 'jet lag' during the first several days following rapid transmeridian flight. (GRA) Source of Abstract/Subfile: DTIC COSATI Code: 6S Stress Physiology.
42. Graeber, R. Curtis; Dement, William C.; Nicholson, Anthony N.; Sasaki, Mitsuo; Et. Al (NASA-Ames Research Ctr, Aeronautical Human Factors Research Office, Moffett Field, CA ). International cooperative study of aircrew layover sleep. Operational summary. Aviation, Space, and Environmental Medicine; 1986 Dec Vol 57(12, Sect II) 10-13 ; 1986; CODEN: AEMEAY; ISSN: 00956562. Note: Human. In a study of layover sleep, it was found that eastward flight produced more sleep disruption than westward. Different sleep and scheduling strategies are recommended for each flight direction, and the importance of individual crewmember factors is discussed in relation to age and circadian type. (3 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved) KP: eastward vs westward flight & work scheduling; sleep disruption; aircraft crew members .
43. Graeber, R. Curtis; Lamber, John K.; Connell, Linda J. Gander, Philippa H. (NASA-Ames Research Ctr, Aeronautical Human Factors Research Office, Moffett Field, CA ). International aircrew sleep and wakefulness after multiple time zone flights: A cooperative study. . Aviation, Space, and Environmental

- Medicine; 1986 Dec Vol 57(12, Sect II) 3-9 ; 1986; CODEN: AEMEAY; ISSN: 00956562. Note: Human. Provides an overview of an international EEG study of sleep and wakefulness in flight crews operating long-haul routes across 7 or 8 time zones, using 56 crewmembers (aged 31-61 yrs). The study's history, research design, and standardization of procedures are discussed. The overall results are consistent among 4 participating laboratories and support the feasibility of cooperative international sleep research in the operational arena. (15 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
44. GRAEBER, R. CURTIS; LAUBER, JOHN K.; CONNELL, LINDA J.; GANDER, PHILIPPAH (NASA, Ames Research Center, Moffett Field, CA). International aircrew sleep and wakefulness after multiple time zone flights - A cooperative study. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Dec. 1986 15 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8710 An international research team has carried out an electroencephalographic study of sleep and wakefulness in flight crews operating long-haul routes across seven or eight time zones. Following baseline recordings, volunteer crews (n = 56) from four airlines spent their first outbound layover at a sleep laboratory. This paper provides an overview of the project's history, its research design, and the standardization of procedures. The overall results are remarkably consistent among the four participating laboratories and strongly support the feasibility of cooperative international sleep research in the operational arena. (Author) Source of Abstract/Subfile: AIAA/TIS. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Dec. 1986, p. B3-B9.
45. GRAEBER, R. CURTIS (NASA, Ames Research Center, Moffett Field, CA) DEMENT, WILLIAM C. (Stanford University, CA); NICHOLSON, ANTHONY N. (RAF, Institute of Aviation Medicine, Farnborough, England); SASAKI, MITSUO (Japan, Air Lines, Co., Ltd., Flight Crew Medical Dept., Tokyo); WEGMANN, HANS, M. (DFVLR, Institut fuer Flugmedizin, Cologne, West Germany). International cooperative study of aircrew layover sleep Operational summary. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Dec. 1986. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8710 The findings of this cooperative study of layover sleep have direct implications for flight operations. In the consensus view of the principal investigators, these can be divided into their relevance for eastward or westward flight. Eastward flight produced more sleep disruption than westward. Different sleep and scheduling strategies are recommended for each flight direction, and the importance of individual crewmember factors is discussed in relation to age and circadian type. Despite the limitations of this study with regard to trip simplicity and the baseline data, the results for each airline are highly consistent and should be applicable to a wide range of long-haul crewmembers and carriers. (Author) Source of Abstract/Subfile: AIAA/TIS. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Dec. 1986, p. B10-B13.
46. GRAEBER, R. CURTIS (NASA, Ames Research Center, Moffett Field, CA; U.S. Army, Medical Service Corps, Washington, DC). Aircrew fatigue and circadian rhythmicity. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; 1988 46 Refs. Note: Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Documents available from AIAA Technical Library Journal Announcement: IAA8914 Recent statistical and experimental studies on the role of circadian rhythms in aircrew fatigue and aviation accidents are reviewed from a human-factors perspective, and typical data are presented in extensive graphs. Consideration is given to the biological clock and the limits of endurance, circadian desynchronization, sleep and sleepiness, short-haul and long-haul operational studies, and the potential advantages of cockpit automation. (T.K.) Source of Abstract/Subfile: AIAA/TIS. IN: Human factors in aviation (A89-34431 14-54). San Diego, CA, Academic Press, Inc., 1988, p. 305-344.
47. Geon, Paul; Few, Richard W. (U Michigan Human Performance Ctr). Evaluating pictographic symbols: An automotive application. Human Factors; 1978 Feb Vol 20(1) 103-114; 1978; CODEN: HUFAA6; ISSN: 00187208. Note: Human. 50 university students participated in a laboratory experiment which examined 19 pictographic symbols previously used or proposed for labeling automobile controls and displays. Association norms, measures of familiarity, and magnitude estimates of the symbols' communicativeness were collected. 20 Ss also participated in a paired-associate learning task and a 2-alternative, forced-choice reaction-time (RT) task in which they made same-different judgments in response to verbally presented symbol labels followed by visually presented pictograms. It was found that, in general, the relative order of merit for the individual symbols was not consistent across tasks.

Specifically, ratings of communicativeness were well correlated with associative strength and to a lesser extent with RT, but associative strength was only weakly correlated with RT. Ease of learning was found to be an independent measure. (26 ref) (PsycLIT Database Copyright 1979 American Psychological Assn. all rights reserved).

48. GREGORICH, STEVE; HELMREICH, ROBERT L.; WILHELM, JOHN A. (Texas, University, Austin); CHIDESTER, THOMAS (NASA, Ames Research Center, Moffett Field, CA). Personality based clusters as predictors of aviator attitudes and performance. Texas Univ., Austin; 1989 16 Refs. Note: Contract No.: NCC2-286 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA9010 The feasibility of identification of personality-based population clusters was investigated along with the relationships of these subpopulations to relevant attitude and performance measures. The results of instrumental and expressive personality tests, using the Personal Characteristics Inventory (PCI) test battery and the Cockpit Management Attitudes Questionnaire, suggest that theoretically meaningful subpopulations exist among aviators, and that these groupings are useful in understanding of personality factors acting as moderator variables in the determination of aviator attitudes and performance. Out of the three clusters most easily described in terms of their relative elevations on the PCI subscales ('the right stuff', the 'wrong stuff', and the 'no stuff'), the members of the right stuff cluster tended to have more desirable patterns of responses along relevant attitudinal dimensions. (I.S.) Source of Abstract/Subfile: AIAA/TIS. IN: International Symposium on Aviation Psychology, 5th, Columbus, OH, Apr. 17-20, 1989, Proceedings, Volume 2 (A90-26176 10-53), Columbus, OH, Ohio State University, 1989, p. 686-691.
49. GRIGNETTI, M. C.; MILLER, D. C.; NICKERSON, R. S.; PEW, R. W. Information processing models and computer aids for human performance. Task 2: Human-computer interaction models ( Queuing theory model of dynamic human behavior in time sharing computer system) Semiannual Technical Report, 1 Jan. - 30 Jun. 1971. Bolt, Berneck, and Newman, Inc., Cambridge, Mass; Jun. 1971 104P. Note: Report No.: AD-732913; BBN-2190; AFOSR-71-2845TR; SATR-1 Contract No.: F44620-71-C-0065; ARPA ORDER 890 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR7208 A queuing system was implemented to obtain the statistical parameters necessary to specify a queuing theory model of the dynamic behavior of a state-of-the-art time-shared computer system, and present results on the statistics of usage of one such computer system. A methodology is presented for the performance of experiments involving human users and for the interpretation of their results. It is expected that these results will yield predictive models for the overall efficiency of the user-computer system under various circumstances. (Author (GRA)) Source of Abstract/Subfile: DTIC COSATI Code: 9B Computers.
50. Half, Henry M.; Hoffman, James D.; Hutchins, Edwin L. (Half Resources Inc, Arlington, VA). Cognitive science and military training. Special issue: Psychological science and education. American Psychologist; 1986 Oct Vol 41(10) 1131-1139; 1986; CODEN: AMPSAB; ISSN: 0003066X. Note: Human. Discusses how the massive scale and diversity of training needs in the military render it an enterprise that offers extensive opportunity for the application of cognitive science. Training in maintenance, in tactics, and in piloting or control of aircraft present several issues of interest to cognitive scientists. Four recently developed military training systems illustrate the potential for cognitive science to improve military training. These systems include a family of memorization games based on semantic networks; a simulator for steam propulsion plants with a graphic, schematic student interface; a system for training in problems of relative motion that provides explicit representations of spatial concepts and problem-solving procedures; and a method of building a new cognitive skill for air-intercept control based on principles for the development of automaticity. These systems illustrate the importance of making relevant knowledge concrete and explicit, of using problem-solving contexts for instruction in basic principles, and of careful management of information processing during learning. (28 ref) (PsycLIT Database Copyright 1987 American Psychological Assn. all rights reserved).
51. HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Crew workload-management strategies - A critical factor in system performance. National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA; 1989. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA9010 This paper reviews the philosophy and goals of the NASA/USAF Strategic Behavior/Workload Management Program. The philosophical foundation of the program is

based on the assumption that an improved understanding of pilot strategies will clarify the complex and inconsistent relationships observed among objective task demands and measures of system performance and pilot workload. The goals are to: (1) develop operationally relevant figures of merit for performance, (2) quantify the effects of strategic behaviors on system performance and pilot workload, (3) identify evaluation criteria for workload measures, and (4) develop methods of improving pilots' abilities to manage workload extremes. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: International Symposium on Aviation Psychology, 5th, Columbus, OH, Apr. 17-20, 1989, Proceedings. Volume 1 (A90-26176 10-53). Columbus, OH, Ohio State University, 1989, p. 22-27.

52. HART, SANDRA G. Crew workload strategies in advanced cockpits. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; Oct. 1990. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC/MF A12 Journal Announcement: STAR9102 Many methods of measuring and predicting operator workload have been developed that provide useful information in the design, evaluation, and operation of complex systems and which aid in developing models of human attention and performance. However, the relationships between such measures, imposed task demands, and measures of performance remain complex and even contradictory. It appears that we have ignored an important factor: people do not passively translate task demands into performance. Rather, they actively manage their time, resources, and effort to achieve an acceptable level of performance while maintaining a comfortable level of workload. While such adaptive, creative, and strategic behaviors are the primary reason that human operators remain an essential component of all advanced man-machine systems, they also result in individual differences in the way people respond to the same task demands and inconsistent relationships among measures. Finally, we are able to measure workload and performance, but interpreting such measures remains difficult; it is still not clear how much workload is too much or too little nor the consequences of suboptimal workload on system performance and the mental, physical, and emotional well-being of the human operators. The rationale and philosophy of a program of research developed to address these issues will be reviewed and contrasted to traditional methods of defining, measuring, and predicting human operator workload. Viewgraphs are given. (Author) Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: SH Man-machine Relations. In NASA, Langley Research Center, Aviation Safety/Automation Program Conference p. 105-125 (SEE N91-10936 02-03).
53. HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Helicopter human factors. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; 1988 116 Refs. Note: Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Documents available from AIAA Technical Library Journal Announcement: IAAB914 The state-of-the-art helicopter and its pilot are examined using the tools of human-factors analysis. The significant role of human error in helicopter accidents is discussed; the history of human-factors research on helicopters is briefly traced; the typical flight tasks are described; and the noise, vibration, and temperature conditions typical of modern military helicopters are characterized. Also considered are helicopter controls, cockpit instruments and displays, and the impact of cockpit design on pilot workload. Particular attention is given to possible advanced-technology improvements, such as control stabilization and augmentation, FBW and fly-by-light systems, multifunction displays, night-vision goggles, pilot night-vision systems, night-vision displays with superimposed symbols, target acquisition and designation systems, and aural displays. Diagrams, drawings, and photographs are provided. (T.K.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). IN: Human factors in aviation (A89-34431 14-54). San Diego, CA, Academic Press, Inc., 1988, p. 591-638.
54. HART, SANDRA G. Measurement of pilot workload. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Jun. 1987. Note: Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A07/MF A01 Journal Announcement: STAR8724 A multistage process for evaluating the workload of a five-minute segment of flight including approach and landing for a typical transport aircraft was described. The goal of the analysis was to compare the workload of the two pilots. Four types of measurement techniques were suggested: Analytic (a preliminary task and time line analysis identified task requirements and target performance levels); Performance (flight path control, communications, and interval production); Physiological (heart rate and heart rate variability); and Subjective ratings (a multidimensional technique developed at NASA Ames). (Author) Source of Abstract/Subfile: NASA STIP Subject Classification: 7554 Man/System Technology & Life Support

(1975-). In *Advisory Group for Aerospace Research and The Practical Assessment of Pilot Workload* p 116-122 (SEE N87-30034 24-54).

55. HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Overview of NASA Rotorcraft Human Factors Research. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; 1989 34 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA9011 The principal areas of research supported by the NASA Rotorcraft Human Factors Research Branch are reviewed. The program elements addressed include situational awareness, pilot/vehicle interface, mission management, and training. Representative examples of research conducted in these areas since 1987 are summarized. (C.D.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). IN: AHS, Annual Forum, 45th, Boston, MA, May 22-24, 1989, Proceedings (A90-28151 11-01). Alexandria, VA, American Helicopter Society, 1989, p. 441-453.
56. HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). The relationship between workload and training - An introduction. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; 1986. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8713 This paper reviews the relationships among workload, performance, and training. Its goal is to introduce the concepts of workload and training and to suggest how they may be related. It suggests some of the practical and theoretical benefits to be derived from their joint consideration. Training effectiveness can be improved by monitoring trainee workload and the reliability of workload predictions, and measures can be improved by identifying and controlling the training levels of experimental subjects. ( Author) Source of Abstract/Subfile: AIAA/TIS. IN: Human Factors Society, Annual Meeting, 30th, Dayton, OH, Sept. 29-Oct. 3, 1986, Proceedings. Volume 2 (A87-33001 13-54). Santa Monica, CA, Human Factors Society, 1986, p. 1116-1120.
57. HART, SANDRA G., comp. Research papers and publications (1981-1987): Workload research program. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Aug. 1987 124P. Note: Report No.: NASA-TM-100016; A-87196; NAS 1.15:100016 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A06/MF A01 Journal Announcement: STAR8804 An annotated bibliography of the research reports written by participants in NASA's Workload Research Program since 1981 is presented, representing the results of theoretical and applied research conducted at Ames Research Center and at universities and industrial laboratories funded by the program. The major program elements included: 1) developing an understanding of the workload concept; 2) providing valid, reliable, and practical measures of workload; and 3) creating a computer model to predict workload. The goal is to provide workload-related design principles, measures, guidelines, and computational models. The research results are transferred to user groups by establishing close ties with manufacturers, civil and military operators of aerospace systems, and regulatory agencies; publishing scientific articles; participating in and sponsoring workshops and symposia; providing information, guidelines, and computer models; and contributing to the formulation of standards. In addition, the methods and theories developed have been applied to specific operational and design problems at the request of a number of industry and government agencies. ( Author) Source of Abstract/Subfile: NASA STIP COSATI Code: 5I Personnel Selection, Training, & Evaluation.
58. Hart, Sandra G.; Bortolussi, Michael R. (NASA-Ames Research Ctr, Moffett Field, CA). Pilot errors as a source of workload. Special Issue: Aviation psychology. *Human Factors*; 1984 Oct Vol 26(5) 545-556; 1984; CODEN: HUPAA6; ISSN: 00187208. Note: Human. 12 pilots estimated the effect of 163 events and activities that they had encountered during their previous flying experiences on performance, effort, workload, and stress. The events, described in the context of flight scenario segments, included control, navigation and communications activities, aircraft and system failures, and pilot errors. In general, workload, stress, and effort ratings were significantly correlated with each other but not with performance ratings. However, some different response patterns were found as a function of flight segment and type of event. Workload, stress, and performance, but not effort, ratings varied with flight phase. Errors were found as a significant source of change for workload, stress, and performance, suggesting that errors could be conceptualized as a cause of workload rather than as a symptom. Findings can be used to create simulation scenarios that are predicted to impose subjectively different levels of workload. (8 ref) (PsychLit Database Copyright 1985 American Psychological Assn, all rights reserved) KP: flight scenario

& events of previous flying; performance & effort & work load & stress; pilots .

59. HART, SANDRA G.; BRICKNER, MICHAEL S. (National Academy of Sciences -National Research Council, Washington, DC.). Helmet-mounted pilot night vision systems: Human factors issues. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA; Jul. 1989. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A99/MF A04 Journal Announcement: STAR9016 Helmet-mounted displays of infrared imagery (forward-looking infrared (FLIR)) allow helicopter pilots to perform low level missions at night and in low visibility. However, pilot experience high visual and cognitive workload during these missions, and their performance capabilities may be reduced. Human factors problems inherent in existing systems stem from three primary sources: the nature of thermal imagery; the characteristics of specific FLIR systems; and the difficulty of using FLIR system for flying and/or visually acquiring and tracking objects in the environment. The pilot night vision system (PNVS) in the Apache AH-64 provides a monochrome, 30 by 40 deg helmet-mounted display of infrared imagery. Thermal imagery is inferior to television imagery in both resolution and contrast ratio. Gray shades represent temperatures differences rather than brightness variability, and images undergo significant changes over time. The limited field of view, displacement of the sensor from the pilot's eye position, and monocular presentation of a bright FLIR image (while the other eye remains dark-adapted) are all potential sources of disorientation, limitations in depth and distance estimation, sensations of apparent motion, and difficulties in target and obstacle detection. Insufficient information about human perceptual and performance limitations restrains the ability of human factors specialists to provide significantly improved specifications, training programs, or alternative designs. Additional research is required to determine the most critical problem areas and to propose solutions that consider the human as well as the development of technology. (Author) Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In its Spatial Displays and Spatial Instruments 21 p (SEE N90-22918 16-54).
60. HART, SANDRA G.; HARTZELL, E. JAMES; VOORHEES, JAMES W.; BUCHER, NANCY M.; SHIVELY, R. JAY (Army Aviation Systems Command, Moffett Field, Calif.). An integrated approach to rotorcraft human factors research. National Aeronautics and Space Administration. Ames Research Center, Moffett Fkld, Calif; Feb. 1988. Note: Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A17/MF A01 Journal Announcement: STAR8809 As the potential of civil and military helicopters has increased, more complex and demanding missions in increasingly hostile environments have been required. Users, designers, and manufacturers have an urgent need for information about human behavior and function to create systems that take advantage of human capabilities, without overloading them. Because there is a large gap between what is known about human behavior and the information needed to predict pilot workload and performance in the complex missions projected for pilots of advanced helicopters, Army and NASA scientists are actively engaged in Human Factors Research at Ames. The research ranges from laboratory experiments to computational modeling, simulation evaluation, and inflight testing. Information obtained in highly controlled but simpler environments generates predictions which can be tested in more realistic situations. These results are used, in turn, to refine theoretical models, provide the focus for subsequent research, and ensure operational relevance, while maintaining predictive advantages. The advantages and disadvantages of each type of research are described along with examples of experimental results. (Author) Source of Abstract/Subfile: NASA STIF Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In NASA, Washington, NASA/Army Rotorcraft Technology. Volume 3: Systems Integration, Research Aircraft, and Industry p 1167-1188 (SEE N88-16650 09-01).
61. Hart, Sandra G.; Hauser, Jan R. (NASA-Ames Research Ctr, Moffett Field, CA). Inflight application of three pilot workload measurement techniques. Aviation, Space, and Environmental Medicine; 1987 May Vol 58(5) 402-410; 1987; CODEN: AEMEAY; ISSN: 00956562. Note: Human. Tested 3 measures of workload during 11 routine missions conducted by anairborn observatory: communications performance, subjective ratings, and heart rate (HR). Nine pilots served as Ss. The activities that contributed to crewmember workload varied; the commander was responsible for aircraft control and navigation whereas the copilot handled communications. Ss' ratings of workload, stress, and effort were highly correlated and varied across flight segments, peaking during takeoff and landing. Subjective fatigue increased significantly from takeoff to landing for all flights. HR was significantly higher for the commander than for the copilot. Although HR peaked for both Ss during takeoff and landing, the amount of change was significantly greater for the commander. Subjective ratings of stress, workload, and mental effort were

significantly correlated with HR and communications frequency. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).

62. HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA); HAUSER, JAN, R. (Xerox, Inc., Palo Alto, CA). Inflight application of three pilot workload measurement techniques. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; May 1987 12 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8717 Three inflight techniques for workload measurement were tested in nine pilots flying the NASA Kuiper Airborne Observatory: subjective ratings, heart rate, and communication performance. The activities that contributed to the crew-member workload varied; the commander was responsible for aircraft control and navigation whereas the copilot handled communications. The three workload measures were found to provide different information. Pilot ratings of workload, effort, and stress were sensitive to variations in flight-related task demands across flight segments but did not reflect specific differences in the type of demands imposed on the commander and the copilot. The heart rate was sensitive to the differential impact of duties, being higher for the commander than for the copilot. The rate of communications per minute of flight proved to be the most sensitive indicator. It was related to workload, stress, effort rating, and average heart rate across flight segments. (I.S.) Source of Abstract/Subfile: AIAA/TIS. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 58, May 1987, p. 402-410.
63. Helmsreich, Reinhard (U Constance, W Germany). Media specific learning effects: An empirical study of the effects of television and radio. . Communication Research; 1976 Jan Vol 3(1) 53-62; 1976. Note: Human. Studied the comparative learning effects of identical programs broadcast by TV or radio. 168 German undergraduates watched or listened to a program on life in Australia and completed questionnaires on its content and semantic differential measures of their emotional reactions either immediately, 1, 2, or 3 wks later. Results indicate that both of these media impart knowledge to the same extent and that the forgetting of the knowledge is not media-specific. However, emotional impressions were different for television viewers and radio listeners and did not change with the passing of time after the program presentation. (PsycLIT Database Copyright 1976 American Psychological Assn, all rights reserved).
64. Helmsreich, Robert (U Texas, Austin). Applied social psychology: The unfulfilled promise. Personality and Social Psychology Bulletin; 1975 Feb Vol 1(4) 548-560; 1975. Note: Human. Examines the conflict between applied and theoretical social psychology. It is argued both that this applied-theoretical distinction is a pernicious one which diverts attention from more basic issues of generality and validity, and that the applicability of mainstream social psychology is disappointingly slight. While developments in statistical techniques and computer data processing have increased the opportunities for larger-scale, multivariate research which may reflect more accurately the complexities of the natural world, most reports in the major journals of the field continue to be of small, laboratory experiments using college students as Ss. The prospects for future change in orientation are discussed. (33 ref) (PsycLIT Database Copyright 1976 American Psychological Assn, all rights reserved).
65. Helmsreich, Robert L. (U Texas, Austin). Applying psychology in outer space: Unfilled promises revisited. American Psychologist; 1983 Apr Vol 38(4) 445-450; 1983; CODEN: AMPSAB; ISSN: 0003066X. Note: Human. Argues that numerous issues directly relevant to the field of personality and social psychology are present and may become increasingly important in the US space program. It is suggested that data from personality and social psychology have been underused resources in the US space program. The responsibility for this outcome is seen as resting both with investigators and in structural aspects of the National Aeronautics and Space Administration. The contrasting centrality of psychology in the Russian space program is noted. Suggestions for increasing the role of personality and social psychology in the US space program are offered. (25 ref) (PsycLIT Database Copyright 1984 American Psychological Assn, all rights reserved).
66. Helmsreich, Robert L. (U Texas, Austin). Cockpit management attitudes. Special Issue: Aviation psychology. Human Factors; 1984 Oct Vol 26(5) 583-589; 1984; CODEN: HUF A A 6; ISSN: 00187208. Note: Human. Administered a cockpit management attitudes survey to 245 airline pilots (mean age 33 yrs). The observed divergence in attitudes indicated that many Ss were unaware or unconvinced of previous findings concerning effective flight-deck management. Data suggest that these attitudes were independent of personality traits and that training in cockpit resource management may improve performance in line operations. Differences in attitudes were noted between captains and first officers with respect to the importance of avoiding negative comments on the performance of other crew members, the



value of casual conversation in improving performance, and conditions under which first officers should question the decisions of the captain. Training programs in cockpit management are recommended that would combine factual presentations, moderated group discussions, and behavioral exercises. (6 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved) KP: personality traits; attitudes toward cockpit management; airline pilots.

67. HELMREICH, ROBERT L. (Texas, University, Austin). Explorations in achievement motivation. Texas Univ., Austin; Aug. 1982 8 Refs. Note: Contract No.: NAG2-137 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA8801 Recent research on the nature of achievement motivation is reviewed. A three-factor model of intrinsic motives is presented and related to various criteria of performance, job satisfaction and leisure activities. The relationships between intrinsic and extrinsic motives are discussed. Needed areas for future research are described. (Author) Source of Abstract/Subfile: AIAA/TIS. American Psychological Association, Annual Meeting, Washington, DC, Aug. 24, 1982, Paper. 10 p.
68. HELMREICH, ROBERT L. (Texas, University, Austin). Exploring flightcrew behaviour. Texas Univ., Austin; 1987 30 Refs. Note: Contract No.: NCC2-286 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8813 A program of research into the determinants of flightcrew performance in commercial and military aviation is described, along with limitations and advantages associated with the conduct of research in such settings. Preliminary results indicate significant relationships among personality factors, attitudes regarding flight operations, and crew performance. The potential theoretical and applied utility of the research and directions for further research are discussed. (Author) Source of Abstract/Subfile: AIAA/TIS. Social Behaviour (ISSN 0885-6249), vol. 2, 1987, p. 63-72.
69. HELMREICH, ROBERT L. Living in contained environments: Research implications from undersea habitats (undersea habitats). Texas Univ., Austin. Dept. of Psychology; 1986 15P. Note: Presented at Individuals and Group Behavior in Toxic and Contained Environments: A Conference to Explore the Psychological Effects of Chemical and Biological Warfare, Austin, Tex., 13 Dec. 1986 Report No.: NASA-CR-180341; NAS 1.26:180341 Contract No.: NCC2-286 Language: English Country of Origin: United States Document Type: REPORT; CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A02/MF A01 Journal Announcement: STAR8721 A cost-reward model is used to frame a discussion of differences in observed behavior of individuals and groups in confined environments. It has been observed that the high cost of functioning in a stressful environment is likely to produce poor performance when anticipated rewards are low but that participants can manage the stress and achieve high performance if they anticipate high rewards. The high-reward environment is exemplified by early undersea habitats such as Sealab and Tekite and by early space missions. Other aspects of behavior occur in all confined environments and point to an important area for future research. Of particular interest are intergroup conflicts arising between the confined group and its external control. Also, individual differences in personality seem always to have an impact in confined environments. Recent research has focused on: (1) predicting performance and adjustment based on instrumental and expressive aspects of the self; (2) the differential predictive power of achievement striving and irritation/irritability in Type A personalities; and (3) the nature and role of leadership in small, isolated groups. (J.P.B.) Source of Abstract/Subfile: NASA STIP Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. Presentation.
70. HELMREICH, ROBERT L. (Texas, University, Austin). Personality and organizational influences on aerospace human performance. Texas Univ., Austin; 1989 22 Refs. Note: Report No.: AAS PAPER 87-646 Contract No.: NCC2-286 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8919 Individual and organizational influences on performance in aerospace environments are discussed. A model of personality with demonstrated validity is described along with reasons why personality's effects on performance have been underestimated. Organizational forces including intergroup conflict and coercive pressures are also described. It is suggested that basic and applied research in analog situations is needed to provide necessary guidance for planning future space missions. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: Space - A new community of opportunity; Proceedings of the Thirty-fourth Annual AAS International Conference, Houston, TX, Nov. 3-5, 1987 (A89-43702 19-12). San Diego, CA, Univelt, Inc., 1989, p. 231-238.
71. HELMREICH, ROBERT L. (Texas, University, Austin). Pilot selection and training. Texas Univ., Austin;

- Aug. 1982. Note: Contract No.: NAG2-137 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA8801 Personality and situational factors relevant to individual and group performance in highly demanding environments, such as those faced by astronauts or by jet transport crew, are discussed. It is emphasized that although technical competence and proficiency in pilot selection are prerequisites for safety, operating a modern jet transport is a group endeavor that requires the effective coordination of the entire crew. A self-report test battery for measuring positive and negative personality traits of pilot candidates, termed the Personal Characteristics Inventory, is described. (I.S.) Source of Abstract/Subfile: AIAA/TIS. American Psychological Association, Annual Meeting, Washington, DC, Aug. 24, 1982, Paper. 12 p.
72. HELMREICH, ROBERT L. (Texas, University, Austin). The role of psychologists in future spaceflight. Texas Univ., Austin; Apr. 1985. Note: Contract No.: NAG2-137 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA8801 The need for psychologists to have a more active role in planning space missions is discussed. It is suggested that it would be beneficial if psychologists conducted research aimed at optimizing the organization, composition, and performance of crews; participated in the selection and training of crews; and monitored the actual performance and adjustment of crews during missions. The areas which require further research and the types of research strategies to be implemented are described. The desirable traits for future space personnel and the role of psychologists in mission control are examined. (I.F.) Source of Abstract/Subfile: AIAA/TIS. SPACEFAIR '85, Meeting, Boston, MA, Apr. 14, 1985, Paper. 9 p.
73. HELMREICH, ROBERT L. (Texas, University, Austin). Social psychological research in NASA - History, status, prospects. American Psychological Association, Annual Convention, 94th, Washington, DC, Aug. 22-26, 1986, Paper. 5 p; Aug. 1986 8 Refs. Note: Language: English Country of Origin: United States Document Type: PREPRINT Journal Announcement: IAA8813 The history of psychological research in NASA is reviewed with consideration given to changes and new roles for psychology. With a view to establishing a permanent presence in space in the form of the Space Station, consideration is currently being given to a plan for research in aviation and space psychology. Multiple methodologies and research settings would be utilized, ranging from the laboratory to the simulator to the undersea habitat and to the simultaneous examination of behavior at the organizational, group, and individual level. (K.K.) Source of Abstract/Subfile: AIAA/TIS. Documents available from AIAA Technical Library.
74. HELMREICH, ROBERT L. Studying flight crew behavior: A social psychologist encounters the real world. Texas Univ., Austin. Dept. of Psychology; 1986 18P. Note: Presented at the Annual Meeting of the American Psychological Association, Washington, D.C., Aug. 1986 Report No.: NASA-CR-180284; NAS 1.26:180284 Contract No.: NAG2-137 Language: English Country of Origin: United States Document Type: REPORT; CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A02/MF A01 Journal Announcement: STAR8722 Considerable social psychological research has been conducted on the relationship between personality and performance in various occupational settings. Of special interest are situations where the performer is under pressure or the consequences of poor performance can be serious, as in aircraft operation. Some significant findings are summarized, including those related to Type A personality factors, achievement motivation factors, and attitude factors. Future research should focus on group behavior. (J.P.B.) Source of Abstract/Subfile: NASA STIP COSATI Code: 51 Personnel Selection, Training, & Evaluation. Presentation.
75. HELMREICH, ROBERT L. (Texas, University, Austin). Training - Behavioral and motivational solutions? Texas Univ., Austin; Dec. 1983 11 Refs. Note: Contract No.: NAG2-137 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA8801 Psychological factors which govern interpersonal activities in the cockpit are examined. It is suggested that crew members should be selected based on personality characteristics required for the position and that training does not cause long lasting personality changes, it only teaches and improves task performance skills. The effects of mindlessness as defined by Langer (1978) and the attribution theory of Jones and Nisbett (1971) on flight deck communications and cockpit management are described. The needs for a new system of training crew members, with emphasis on strategies that induce cognitive processes and awareness, and for field investigations of pilots are discussed. (I.F.) Source of Abstract/Subfile: AIAA/TIS. Air Line Pilots Association, Beyond Pilot Error - A Symposium of Scientific Focus, Washington, DC, Dec. 6-8, 1983, Paper. 11 p.

76. HELMREICH, ROBERT L. (Texas, University, Austin). What changes and what endures - The capabilities and limitations of training and selection. Texas Univ., Austin; Oct. 1983 12 Refs. Note: Contract No.: NAG2-137 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA8801 The contributions of psychology to aviation in the areas of selection, training, and evaluation, and the implementation of new technologies are discussed. The concept of personality traits versus modification of human behavior through principles of learning are analyzed. Particular consideration is given to achievement motivation (defined in terms of mastery, work, and competitiveness) and the differences between traits and attitudes. It is argued that personality traits are important dimensions of the self and are useful measures of individual differences. The selection of individuals with desired personality characteristics and the training of personnel to improve crew coordination, flight-deck management, and interpersonal efficacy are examined. (I.F.) Source of Abstract/Subfile: AIAA/TIS. Irish Air-Line Pilots Association and Aer Lingus, Flight Operations Symposium, Dublin, Ireland, Oct. 19, 20, 1983, Paper. 13 p.
77. Helmreich, Robert; Bakeman, Roger; Radloff, Roland (U Texas, Austin). The Life History Questionnaire as a predictor of performance in Navy diver training. *Journal of Applied Psychology*; 1973 Apr Vol 57(2) 148-153; 1973. Note: Human. Describes a new demographic instrument, the Life History Questionnaire (LHQ), which elicits demographic data longitudinally by providing a question-by-year matrix of responses. Variables derived from the LHQ were used to predict success in US Navy diver training. Validation and cross-validation data were obtained from 115 enlisted men in 5 diving classes. 2 criteria were developed for the samples-pass-fail indicator and a 4-point performance criterion. Correlational data for 12 predictors (e.g., social status, health, and educational performance) are presented. The LHQ appears to provide sufficient longitudinal data to enable detailed investigation of relationships among a variety of life settings and experiences and to relate these to subsequent behavior. (16 ref) (PsycLIT Database Copyright 1975 American Psychological Assn, all rights reserved).
78. Helmreich, Robert L.; Beane, William; Lucker, G. William; Spence, Janet T. (U Texas, Austin). Achievement motivation and scientific attainment. *Personality and Social Psychology Bulletin*; 1978 Apr Vol 4(2) 222-226; 1978; ISSN: 01461672. Note: Human. Applied a 3-component (work orientation, mastery needs, and competitiveness) measure of achievement motivation to a criterion from the Science Citation Index for 103 male PhD scientists and engineers. Significant interactions between work and mastery and work and competitiveness were found. The relationship between this model of achievement motivation and scientific attainment is discussed. (13 ref) (PsycLIT Database Copyright 1980 American Psychological Assn, all rights reserved).
79. Helmreich, Robert L.; Et, Al (U Texas, Austin). Making it in academic psychology: Demographic and personality correlates of attainment. *Journal of Personality and Social Psychology*; 1980 Nov Vol 39(5) 896-908; 1980; CODEN: JPSPB2; ISSN: 00223514. Note: Human. Examined personality, demographic characteristics, publication rate, and citations to published work in a sample of 141 male and 55 female academic psychologists. Reputational rankings of their graduate schools and current institutions were significantly related to citations, as were components of achievement motivation. Mastery and work needs were positively related to citations, whereas competitiveness was negatively associated with the criterion. Large sex differences were found in citations, with men receiving significantly more recognition and producing at a higher rate. A model of attainment in psychology is proposed, and possible explanations for the differential attainment of the sexes are explored. (26 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved) KP: sex differences & personality traits & demographic characteristics & publication rate & citations; attainment in academic psychology; personality & social psychologists.
80. Helmreich, Robert L.; Foushee, H. Clayton; Benson, Robert; Russini, William (U Texas, Austin). Cockpit resource management: Exploring the attitude performance linkage. Third Symposium on Aviation Psychology (1985, Columbus, Ohio). *Aviation, Space, and Environmental Medicine*; 1986 Dec Vol 57(12, Sect 1) 1198-1200 CO: AEMEAY; 1986; ISSN: 00956562. Note: Human. Measured attitudes regarding cockpit management in 114 pilots whose lineflying performance was independently evaluated as above or below average. Data indicate that these attitudes were significant predictors of behavior. The performance of 95.7% of the Ss was correctly classified by the analysis. Implications for cockpit resource management training and pilot selection are discussed. (10 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
81. HELMREICH, ROBERT L. (Texas, University, Austin); HOLLAND, ALBERT W. SANTY, PATRICIA

- A. (NASA, Johnson Space Center, Houston, TX); ROSE, ROBERT M. (Minnesota, University, Minneapolis); MCFADDEN, TERRY J. Strategies for crew selection for long duration missions. Texas Univ., Austin; Sep. 1990 19 Refs. Note: Report No.: AIAA PAPER 90-3762 Contract No.: NCC2-286 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA9101 Issues surrounding psychological reactions to long duration spaceflight are discussed with respect to the definition of criteria for selecting crewmembers for such expeditions. Two broad dimensions of personality and behavior are defined - instrumentality including achievement orientation, leadership, and ability to perform under pressure and Expressivity encompassing interpersonal sensitivity and competence. A strategy for validating techniques to select in candidates with the optimum psychological profile to perform successfully on long duration missions is described. (Author) Source of Abstract/Subfile: AIAA/TIS. AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 6 p.
82. HELMREICH, ROBERT L.; SAWIN, LINDA L.; CARSRUD, ALAN L. (Texas, University, Austin). The honeymoon effect in job performance - Temporal increases in the predictive power of achievement motivation. Texas Univ., Austin; 1986 19 Refs. Note: Contract No.: NCC2-286; NAG2-137 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8806 Correlations between a job performance criterion and personality measures reflecting achievement motivation and an interpersonal orientation were examined at three points in time after completion of job training for a sample of airline reservations agents. Although correlations between the personality predictors and performance were small and nonsignificant for the 3-month period after beginning the job, by the end of six and eight months a number of significant relationships had emerged. Implications for the utility of personality measures in selection and performance prediction are discussed. (Author) Source of Abstract/Subfile: AIAA/TIS. Journal of Applied Psychology (ISSN 0021-9010), vol. 71, no. 2, 1986, p. 185-188.
83. Helmreich, Robert L.; Spence, Janet T.; Fred, Robert S. (U Texas, Austin, US). Making it without losing it: Type A, achievement motivation, and scientific attainment revisited. Personality and Social Psychology Bulletin; 1988 Sep Vol 14(3) 495-504; 1988; ISSN: 01461672. Note: Human. In a study by K. A. Matthews et al (see PA, Vol 66:8070), responses by 118 male academic psychologists to the Jenkins Activity Survey for Health Prediction (JAS), a measure of the Type A construct, were found to be significantly, positively correlated with 2 measures of attainment—citations by others to published work and number of publications. In the present study, JAS responses from the Matthews et al sample were subjected to a factor analysis with oblique rotation and 2 new subscales were developed on the basis of this analysis. Achievement Strivings was found to be significantly correlated with both the publication and citation measures; Impatience and Irritability was uncorrelated with the achievement criteria. Results suggest that the current formulation of the Type A construct may contain two components, one associated with positive achievement and the other with poor health. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
84. Helmreich, Robert L.; Spence, Janet T.; Thorbecke, William L. (U Texas, Austin). On the stability of productivity and recognition. Personality and Social Psychology Bulletin; 1981 Sep Vol 7(3) 516-522; 1981; ISSN: 01461672. Note: Human. Examined the auto- and cross-lagged correlations between productivity (measured by number of publications) and recognition (measured by citations to published work) in 82 personality and social psychologists for 1965, 1970, and 1975. Citation rates were more stable over time than publication rates, although all autocorrelations were significant. Those classified as prolific scientists (productive and highly cited) on the basis of 1965 data retained this position 5 and 10 yrs later, silent scientists (low publications and low citations in 1965) continued to be unproductive and unrecognized in 1970 and 1975. Institutional effects on productivity are also discussed. (18 ref) (PsycLIT Database Copyright 1982 American Psychological Assn, all rights reserved).
85. Helmreich, Robert L.; Spence, Janet T.; Holahan, Carole K. (U Texas, Austin). Psychological androgyny and sex role flexibility: A test of two hypotheses. Journal of Personality and Social Psychology; 1979 Oct Vol 37(10) 1631-1644; 1979; CODEN: JPSPB2; ISSN: 00223514. Note: Human. In a conceptual replication and extension of a study by S. L. Bem and E. Lenney (1976), 90 male and 118 female college students rated their comfort in and preference for performing several series of masculine, feminine, and neutral activities. Correlations between ratings and scores on the masculinity (instrumentality) and femininity (expressiveness) scales of the Personal Attributes Questionnaire (PAQ) of J. T. Spence and R. L. Helmreich (1978) tended to be theoretically reasonable in sign but in each sex were low in magnitude and only occasionally significant. Classification of Ss into 4 PAQ groups (androgynous,

display techniques Letter progress report, Jun. 1 - Aug. 31, 1965 (Human performance characteristics in manual control tasks, and techniques for data analysis and systems simulation). Michigan Univ., Ann Arbor. OFFICE OF RESEARCH ADMINISTRATION; Nov. 1965. Note: Report No.: NASA-CR-66981 Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR6604 Source of Abstract/Subfile: NASA STIF COSATI Code: 5H Man-machine Relations. 5 NOV. 1965 5 P ITS REPT.-06343-6-P.

96. HOWE, R. M.; PEW, R. W. (Man-machine performance measurements) development of on-line man-machine system performance measurement and display techniques. Michigan Univ., Ann Arbor. OFFICE OF RESEARCH ADMINISTRATION; Jul. 1965. Note: Report No.: NASA-CR-64106 Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR6519 Source of Abstract/Subfile: NASA STIF. 9 JUL. 1965 34 P REFS.
97. Howell, W. C.; Colle, H. A.; Kantowitz, B. H.; Wiener, E. L. (Rice U). Guidelines for education and training in engineering psychology. *American Psychologist*; 1987 Jun Vol 42(6) 602-604; 1987; CODEN: AMPSAB; ISSN: 0003066X. Note: Human. Presents guidelines for education and training in engineering psychology to aid faculty and curriculum planners in the design of graduate programs at both the master's and doctoral level. Topics discussed include a definition of engineering psychology, the guiding philosophy, 4 domains of competency, and the need for supervised research and practical application experience. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
98. HUTCHINS, EDWIN. Metaphors for interface design. California Univ., San Diego, La Jolla. Inst. for Cognitive Sci; Apr. 1987 33P. Note: Report No.: AD-A182248; AD-E951026; ICS-8703 Contract No.: N0001-85-C-0133; DA PROJ. RR0-4206 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR5722 Computer system designers and computer users frequently utilize metaphors as organizing structures for dealing with the complexity of behavior of human/computer interfaces. This paper considers four metaphors concerning the mode of interaction between user and machine: the conversation metaphor, the declaration metaphor, the model world metaphor and the collaborative manipulation metaphor. It is argued that the key to the functional properties of an interface lie in the reference relations between the expressions in the interface language and the things to which the expressions refer. The ways in which such metaphors are suggested by advances in I/O technology and the ways they constrain the possibilities we see in technology are discussed. Each of the metaphors discussed promotes a particular type of reference relation. Furthermore, because the computer is a medium in which types of reference relations that are not possible in ordinary language can be realized, the space of interface metaphors is quite likely much larger than we presently imagine it to be. (GRA) Source of Abstract/Subfile: DTIC COSATI Code: 9B Computers.
99. JOHNSON, WALTER W.; HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Stop tracking shrinking targets. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; 1987. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAASS14 Four models describing how people might acquire targets that dynamically vary in size were examined; two that described movement speed as a simple function of target size (either initial or final) and two that described movement speed as a function of the predicted size of the targets at a fixed time in the future (one was referenced to the beginning of the reaction time phase, and the other to the end of this phase). It was found that movement time was best described as a function of a size prediction made at the end, rather than the start, of the reaction time phase. Subjective workload ratings primarily reflected the total amount of time needed to acquire the targets rather than the time pressure imposed by the diminishing size of these targets. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: Human Factors Society, Annual Meeting, 31st, New York, NY, Oct. 19-23, 1987, Proceedings. Volume 1 (A88-35401 14-54). Santa Monica, CA, Human Factors Society, 1987, p. 248-252.
100. Johnson, Walter W.; Tsang, Pamela S.; Bennett, C. Thomas; Phatak, Anil V. (NASA/Ames Research Ctr, Moffett Field, CA, US). The visually guided control of simulated altitude. *Aviation, Space, and Environmental Medicine*; 1989 Feb Vol 60(2) 152-156; 1989; CODEN: AEMEAY; ISSN: 00956562. Note: Human. Simulated flights over 3 different ground textures were used to examine the ability of 5 right-handed Ss (aged 17-35 yrs) to extract optical information useful for active regulation of altitude. The

display techniques Letter progress report, Jun. 1 - Aug. 31, 1965 (Human performance characteristics in manual control tasks, and techniques for data analysis and systems simulation). Michigan Univ., Ann Arbor. OFFICE OF RESEARCH ADMINISTRATION; Nov. 1965. Note: Report No.: NASA-CR-68981 Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR6604 Source of Abstract/Subfile: NASA STIF COSATI Code: 5H Man-machine Relations. 5 NOV. 1965 5 P ITS REPT.-06343-6-P.

96. HOWE, R. M.; PEW, R. W. (Man-machine performance measurements) development of on-line man-machine system performance measurement and display techniques. Michigan Univ., Ann Arbor. OFFICE OF RESEARCH ADMINISTRATION; Jul. 1965. Note: Report No.: NASA-CR-64106 Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR6519 Source of Abstract/Subfile: NASA STIF. 9 JUL. 1965 34 P REFS.
97. Howell, W. C.; Collie, H. A.; Kantowitz, B. H.; Wiener, E. L. (Rice U). Guidelines for education and training in engineering psychology. *American Psychologist*; 1987 Jun Vol 42(6) 602-604; 1987; CODEN: AMPSAB; ISSN: 0003066X. Note: Human. Presents guidelines for education and training in engineering psychology to aid faculty and curriculum planners in the design of graduate programs at both the master's and doctoral level. Topics discussed include a definition of engineering psychology, the guiding philosophy, 4 domains of competency, and the need for supervised research and practical application experience. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
98. HUTCHINS, EDWIN. Metaphors for interface design. California Univ., San Diego, La Jolla. Inst. for Cognitive Sci; Apr. 1987 33P. Note: Report No.: AD-A182248; AD-E951026; ICS-8703 Contract No.: N0001-85-C-0133; DA PROJ. RR0-4206 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR8722 Computer system designers and computer users frequently utilize metaphors as organizing structures for dealing with the complexity of behavior of human/computer interfaces. This paper considers four metaphors concerning the mode of interaction between user and machine: the conversation metaphor, the declaration metaphor, the model world metaphor and the collaborative manipulation metaphor. It is argued that the key to the functional properties of an interface lie in the reference relations between the expressions in the interface language and the things to which the expressions refer. The ways in which such metaphors are suggested by advances in I/O technology and the ways they constrain the possibilities we see in technology are discussed. Each of the metaphors discussed promotes a particular type of reference relation. Furthermore, because the computer is a medium in which types of reference relations that are not possible in ordinary language can be realized, the space of interface metaphors is quite likely much larger than we presently imagine it to be. (GRA) Source of Abstract/Subfile: DTIC COSATI Code: 9B Computers.
99. JOHNSON, WALTER W.; HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Step tracking shrinking targets. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. 1987. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IA8814 Four models describing how people might acquire targets that dynamically vary in size were examined; two that described movement speed as a simple function of target size (either initial or final) and two that described movement speed as a function of the predicted size of the targets at a fixed time in the future (one was referenced to the beginning of the reaction time phase, and the other to the end of this phase). It was found that movement time was best described as a function of a size prediction made at the end, rather than the start, of the reaction time phase. Subjective workload ratings primarily reflected the total amount of time needed to acquire the targets rather than the time pressure imposed by the diminishing size of these targets. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: Human Factors Society, Annual Meeting, 31st, New York, NY, Oct. 19-23, 1987, Proceedings. Volume 1 (A88-35401 14-54). Santa Monica, CA, Human Factors Society, 1987, p. 248-252.
100. Johnson, Walter W.; Tsang, Pamela S.; Bennett, C. Thomas; Phatak, Anil V. (NASA/Ames Research Ctr, Moffett Field, CA, US). The visually guided control of simulated altitude. *Aviation, Space, and Environmental Medicine*; 1989 Feb Vol 60(2) 152-156; 1989; CODEN: AEMEAY; ISSN: 00956562. Note: Human. Simulated flights over 3 different ground textures were used to examine the ability of 5 right-handed Ss (aged 17-35 yrs) to extract optical information useful for active regulation of altitude. The

textures were regularly spaced lines as follows: orthogonal to the direction of flight (latitude texture); parallel to the direction of flight (meridian texture); and parallel and orthogonal (square texture). Visual constant velocity forward flight simulations were displayed on a screen, and Ss were asked to maintain 1 of 3 initial altitudes using a rate control stick. Adjusted root mean square errors showed altitude regulation was most difficult at higher altitudes and over meridian textures. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).

101. KANTOWITZ, BARRY H. (Batelle Memorial Institute, Seattle, WA) BORTOLUSSI, MICHAEL R. (Western Aerospace Laboratories, Inc., Moffett Field, CA); HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Measuring pilot workload in a motion base simulator. III - Synchronous secondary task. Batelle Memorial Inst., Seattle, 1987. Note: Contract No.: NCC2-228 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8814 This experiment continues earlier research of Kantowitz et al. (1983) conducted in a GAT-1 motion-base trainer to evaluate choice-reaction secondary tasks as measures of pilot work load. The earlier work used an asynchronous secondary task presented every 22 sec regardless of flying performance. The present experiment uses a synchronous task presented only when a critical event occurred on the flying task. Both two- and four-choice visual secondary tasks were investigated. Analysis of primary flying-task results showed no decrement in error for altitude, indicating that the key assumption necessary for using a choice secondary task was satisfied. Reaction times showed significant differences between 'easy' and 'hard' flight scenarios as well as the ability to discriminate among flight tasks. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: Human Factors Society, Annual Meeting, 31st, New York, NY, Oct. 19-23, 1987, Proceedings. Volume 2 (A88-3540) 14-54). Santa Monica, CA, Human Factors Society, 1987, p. 834-837.
102. KING, TERESA (San Jose State University, CA); HAMERMAN-MATSUMOTO, JOY (Bio-Dynamics, Research and Development Corp., Eugene, OR); HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Dissociation revisited - Workload and performance in a simulated flight task. San Jose State Univ., CA: 1989. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA9010 The multiple resource model has been used as the theoretical basis for interpreting single-to-dual task changes in measures of performance and workload ratings. Inconsistent relationships among these measures have been termed dissociation. It is possible they are an artifact of the way performance and workload measures are collected; performance measures are available for the components of a complex task whereas workload ratings are integrated across all of the tasks performed within an interval of time. This study compared component ratings with global ratings and found that component ratings provide better information about subjects' task strategies and in interpreting the resultant relationships between workload ratings and performance. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: International Symposium on Aviation Psychology, 5th, Columbus, OH, Apr. 17-20, 1989, Proceedings. Volume 2 (A90-26176 10-53). Columbus, OH, Ohio State University, 1989, p. 796-801.
103. Kramer, Arthur F.; Wickens, Christopher D.; Donchin, Emanuel (U Illinois, Cognitive Psychophysiology Lab, Urbana-Champaign). An analysis of the processing requirements of a complex perceptual motor task. Human Factors; 1983 Dec Vol 25(6) 597-621; 1983; CODEN: HUF A A 6; ISSN: 00187208. Note: Human. Examined the joint effect of system order, the number of tracking dimensions, and the amount of practice on mental workload. The event-related brain potential (ERP) is introduced as a promising mental-workload index. 19 college students participated in a series of studies in which they were required to perform a target acquisition task while covertly counting either auditory or visual probes. The effects of several task-difficulty manipulations on the P300 component of the ERP elicited by the counted stimulus probes were investigated. With sufficiently practiced Ss, the amplitude of the P300 decreased with increases in task difficulty. The 2nd experiment also provided evidence that the P300 is selectively sensitive to task-relevant attributes. A 3rd experiment demonstrated a convergence in the amplitude of the P300s elicited in the simple and difficult versions of the tracking task. The amplitude of the P300 was also found to covary with the measures of tracking performance. Results illustrate the sensitivity of the P300 to the processing requirements of a complex target acquisition task. Findings are discussed in terms of the multidimensional nature of processing resources. (53 ref) (PsycLIT Database Copyright 1984 American Psychological Assn, all rights reserved).
104. Kramer, Arthur F.; Wickens, Christopher D.; Donchin, Emanuel (U Illinois, Champaign). Processing of stimulus properties: Evidence for dual task integrality. Journal of Experimental Psychology Human

- Perception and Performance; 1985 Aug Vol 11(4) 393-408; 1985; CODEN: JPHPDH; ISSN: 00961523.**  
**Note: Human.** Assessed the conditions under which dual-task integrity can be fostered by manipulating 4 factors likely to influence the integrality between tasks: intertask redundancy (ITD), the spatial proximity of primary and secondary task displays, the degree to which primary and secondary task displays constitute a single object, and the resource demands of the 2 tasks. The resource allocation policy was inferred from changes in the amplitude of the P300 component of the event-related brain potential. 12 university students participated in 3 experimental sessions in which they performed both single and dual tasks. The primary task was a pursuit step tracking task. The secondary tasks required Ss to discriminate between different intensities or different spatial positions of a stimulus. Task pairs that required the processing of different properties of the same object resulted in better performance than task pairs that required the processing of different objects. These same object-task pairs led to a positive relation between primary task difficulty and the resources allocated to secondary task stimuli. ITD and the physical proximity of task displays produced similar effects of reduced magnitude. (54 ref) (PsycLIT Database Copyright 1986 American Psychological Assn, all rights reserved).
105. **Lucasello, Georgann; Toole, Tonya; Cairnagh, James** (Florida State U, Tallahassee). Searching short term memory for linear positioning movements. *Perceptual and Motor Skills*, 1983 Aug Vol 57(1) 267-274; 1983; CODEN: PMOSAZ; ISSN: 00315125. **Note: Human.** To determine whether memory search for movements is serial or parallel, the search processes involved in a short-term motor-memory paradigm were investigated. A linear-positioning task was used to present a series of 1, 2, or 3 movements in a memory set. Upon completion of a memory set, Ss (4 undergraduates) were presented with a search movement. The search movement was either the same length as 1 of the memory set movements ("yes" response) or a different length ("no" response). Ss completed 3 consecutive days of testing. On Day 1, RT and movement length were practiced. On Day 2, Ss were required to search a memory set of movements and respond in the yes condition by lifting the index finger of the left hand. This movement terminated an RT search clock. The same procedures were followed on Day 3, except that a no response was indicated by lifting the index finger. A 2 \* 3 \* 3 (Response \* Memory Set \* RT trials) within-Ss analysis yielded nonsignificant main effects and interactions. Results are discussed in relation to verbal memory. (18 ref) (PsycLIT Database Copyright 1984 American Psychological Assn, all rights reserved).
106. **Lucker, G. William; Beane, William E.; Helmsreich, Robert L.** (U Michigan, Ctr for Human Growth & Development, Ann Arbor). The strength of the halo effect in physical attractiveness research. *Journal of Psychology*, 1981 Jan Vol 107(1) 69-75; 1981; CODEN: JOPSAM; ISSN: 00223980. **Note: Human.** Two studies of the strength of the "halo effect" (the effect of physical attractiveness on person perception) examined the ratings of 24 male and female targets by 155 male and 155 female college students. Both the 1st study and its replication indicate that the halo effect is much more limited than previously implied. However, 3 attributes--sexiness, femininity/masculinity, and liking--showed a strong relationship to physical attractiveness, especially for female targets. (8 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved).
107. **MASSIMINO, MICHAEL J.; SHERIDAN, THOMAS B.** Variable force and visual feedback effects on teleoperator man/machine performance. Massachusetts Inst. of Tech., Cambridge; Jan. 1989. **Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER** Documents available from AIAA Technical Library Other Availability: NTIS HC A21/MF A03 Journal Announcement: STAR9023 An experimental study was conducted to determine the effects of various forms of visual and force feedback on human performance for several telemanipulation tasks. Experiments were conducted with varying frame rates and subtended visual angles, with and without force feedback. (Author) **Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations.** In JPL, California Inst. of Tech., Proceedings of the NASA Conference on Space Telerobotics, Volume 1 p 89-98 (SEE N90-29000 23-54).
108. **Matthews, Karen A.; Helmsreich, Robert L.; Beane, William E.; Lucker, G. William IN: U. Pittsburgh.** Pattern A, achievement striving, and scientific merit: Does pattern A help or hinder? *Journal of Personality and Social Psychology*, 1980 Nov Vol 39(5) 962-967; 1980; CODEN: JPSPB2; ISSN: 00223514. **Note: Human.** Clinical observations and recent theorizing offer 2 opposing predictions about the relationship between the Type A behavior pattern and the merit of one's work: (a) Type A helps; (b) Type A hinders. To test these 2 possibilities, 118 male members of the Society of Experimental Social Psychologists completed the Jenkins Activity Survey for Health Prediction and the Work and Family Orientation Questionnaire. Ss' citation scores were derived from the Social Science Citation Index 1973-1975. Assuming that citations are a rough measure of meritorious work, results reveal that Type A



- behavior by men was associated with superior scientific work. (29 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved) KP: Type A behavior & merit of scientific work; male members of the Society of Experimental Social Psychologists .
109. Mendel, Max B.; Sheridan, Thomas B. (Massachusetts Inst of Technology, Man-Machine Systems Lab, Cambridge, US). Filtering information from human experts. IEEE Transactions on Systems, Man, and Cybernetics; 1989 Jan-Feb Vol 19(1)6-16 ; 1989; CODEN: ISYMAW; ISSN: 00189472. Note: Human. Proposes a model or "filter" for debiasing and combining opinions from multiple experts into a single consistent estimate of some variable of interest. A distinguishing feature of the approach consists of making the calibration of experts an integral part of filtering, enabling the filter to learn from previous experience with the experts. The theoretical development takes a Bayesian perspective exploiting B. de Finetti's (1937, 1964) notion of exchangeability. Experimental results with a preliminary computer implementation of the filter involving 2 postgraduate students in mechanical engineering show that its estimates were better than those from comparable filters that did not involve calibration. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved) .
110. MENDEL, MAX B.; SHERIDAN, THOMAS B. (MIT, Cambridge, MA). Filtering information from human experts. Massachusetts Inst. of Tech., Cambridge; Feb. 1989 26 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8918 The authors propose a model, or filter, for debiasing opinions from multiple experts and combining them into a single consistent estimate of some variable of interest. A distinguishing feature of the approach consists of making the calibration of experts an integral part of filtering. This enables the filter to learn from previous experience with the experts. The theoretical development takes a Bayesian perspective, using de Finetti's (1964) notion of exchangeability. Experimental results with a preliminary computer implementation of the filter show that its estimates are better than those from comparable filters that do not involve calibration. (I.E.) Source of Abstract/Subfile: AIAA/TIS. IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. 19, Jan-Feb. 1989, p. 6-16. Research supported by NASA, Westinghouse Electric Corp., and U.S. Navy.
111. MENDEL, MAX B.; SHERIDAN, THOMAS B. Optimal combination of information from multiple sources, part 3 Final Report, Mar. 1983 - Jul. 1986. Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering; Jul. 1986 69P. Note: Report No.: AD-A174726 Contract No.: N00014-83-K-0193 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A04/MF A01 Journal Announcement: STAR8712 A computer decision aiding system for debiasing and combining information from multiple sources (e.g., human experts, sensors) is proposed. The algorithm is based on six assumptions that apply when the sources are relatively knowledgeable with respect to the operator on the variable of interest, and the operator is willing to base his evaluation of their performance on a previously selected (finite) sequence of so called calibration variables. It is also assumed that the operator is interested in maximizing gains, that is, he wishes to act in an optimal or Bayesian manner. An experiment with two human sources of information was conducted to evaluate the performance of the aiding system under a variety of loss functions. On a family of bilinear loss functions, the output of the aid was found to perform better than a naive scheme like simply believing the information the two sources gave. The combination rule was also found to perform better than the output to any individual source. (Author (GRA)) Source of Abstract/Subfile: DTIC COSATI Code: 5H Man-machine Relations.
112. MILLER, D. C.; MURALIDHARAN, R.; BARON, S.; FEEHRER, C. E.; PEW, R. W. Development of human performance models for man-machine system simulation Interim Report, 1 Oct. 1976 - 30 Sep. 1977. Bolt, Beranek, and Newman, Inc., Cambridge, Mass; Oct. 1978 78P. Note: Report No.: AD-A069879; BBN-3739; AFOSR-79-0674TR Contract No.: F44620-76-C-0029; AF PROJ. 2313 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A05/MF A01 Journal Announcement: STAR7921 This report contains discussions and program flow charts pertinent to bottom-up and top-down models developed by BBN to predict the performance of RPV controllers. Included are brief discussions of the control task itself and of problems and issues encountered during model development. (GRA) Source of Abstract/Subfile: DTIC Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5E Human Factors Engineering.
113. MILLER, RONALD C. (Sterling Software, Palo Alto, CA); BORTOLUSSI, MICHAEL R. (BITS, Inc., Moffett Field, CA); HART, SANDRA G. (NASA, Ames Research Center, Moffett Field, CA). Evaluating

- the subjective workload of directional orientation tasks with varying display formats. Sterling Software, Moffett field, Calif; 1986 6 Refs. Note: Report No.: SAE PAPER 861640 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8801 The impact of various flight-related tasks on the workload imposed by the requirement to compute new headings, course changes, and reciprocal headings is investigated experimentally. It is shown that, in terms of speed and accuracy, pilots are more efficient when alphanumeric display formats are provided. It is suggested that a voice command of 'turn to a specific heading' would provide the optimal method for issuing heading changes when used in conjunction with an alphanumeric display format. (K.K. ) Source of Abstract/Subfile: AIAA/TIS. IN: Aerospace Behavioral Engineering Technology Conference, 5th, Long Beach, CA, Oct. 13-16, 1986, Proceedings (A88-10152 01-54). Warrendale, PA, Society of Automotive Engineers, Inc., 1986, p. 133-138.
114. Monk, Timothy H.; Moline, Margaret L.; Graeber, R. Curtis (U Pittsburgh School of Medicine, Western Psychiatric Inst & Clinic Sleep/Evaluation Ctr, PA, US ). Inducing jet lag in the laboratory: Patterns of adjustment to an acute shift in routine. . Aviation, Space, and Environmental Medicine; 1988 Aug Vol 59(8) 703-710; 1988; CODEN: AEMEAY; ISSN: 00956562. Note: Human. Eight adult males were studied in a temporal isolation experiment lasting 15 days. After 5 days and nights of entrainment to his own habitual routine, each S experienced an acute, unheralded 6-hr phase advance in routine, accomplished by truncating his 6th sleep episode. For the remaining 10 days of the study, Ss were held to a routine 6-hr phase advance to the original. Significant symptoms of jet lag appeared in mood, performance efficiency, sleep, and circadian temperature rhythms. When plotted as a function to "days postshift," some variables (i.e., temperature phase, percent REM sleep) showed a fairly monotonic recovery to baseline levels. Other variables (i.e., actual sleep duration, percent slow-wave sleep, motivation loss, subjective sleepiness) showed a zig-zag recovery pattern, suggesting the interaction of 2 competing processes and reinforcing the need for greater sophistication in the development of jet lag coping strategies. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
115. MONK, TIMOTHY H. (Western Psychiatric Institute and Clinic, Pittsburgh, PA); MOLINE, MARGARET L. (Cornell University, White Plains, NY); GRAEBER, R. CURTIS (NASA, Ames Research Center, Moffett Field, CA). Inducing jet lag in the laboratory - Patterns of adjustment to an acute shift in routine. Pittsburgh Univ., Pa; Aug. 1988 29 Refs. Note: Contract No.: NCC2-253 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8821 Eight middle-aged males were studied in a temporal isolation experimental lasting 15 d. After 5 d and nights of entrainment to his own habitual routine, each subject experienced an acute unheralded 6-h phase advance in routine, accomplished by truncating his sixth sleep episode. For the remaining 10 d of the study, subjects were held to a routine 6-h phase advance to the original. Significant symptoms of jet lag appeared in mood, performance efficiency, sleep, and circadian temperature rhythms. When plotted as a function to days postshift, some variables showed a fairly monotonic recovery to baseline levels, but other variables showed a zig-zag recovery pattern, suggesting the interaction of two competing processes, and reinforcing the need for greater sophistication in the development of jet-lag coping strategies. (Author) Source of Abstract/Subfile: AIAA/TIS. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 59, Aug. 1988, p. 703-710.
116. NAGEL, DAVID C.; HART, SANDRA G. Helicopter human factors research. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Feb. 1988. Note: Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A25/MF A01 Journal Announcement: STAR8809 Helicopter flight is among the most demanding of all human-machine integrations. The inherent manual control complexities of rotorcraft are made even more challenging by the small margin for error created in certain operations, such as nap-of-the-Earth (NOE) flight, by the proximity of the terrain. Accident data recount numerous examples of unintended conflict between helicopters and terrain and attest to the perceptual and control difficulties associated with low altitude flight tasks. Ames Research Center, in cooperation with the U.S. Army Aeroflightdynamics Directorate, has initiated an ambitious research program aimed at increasing safety margins for both civilian and military rotorcraft operations. The program is broad, fundamental, and focused on the development of scientific understandings and technological countermeasures. Research being conducted in several areas is reviewed: workload assessment, prediction, and measure validation; development of advanced displays and effective pilot/automation interfaces; identification of visual cues necessary for low-level, low-visibility flight and modeling of

- visual flight-path control; and pilot training. (Author) Source of Abstract/Subfile: NASA STIF Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In NASA, Washington, NASA/Army Rotorcraft Technology. Volume 2: Materials and Structures, Propulsion and Drive Systems, Flight Dynamics and Control, and Acoustics p 929-947 (SEE NBS-16632 09-01).
117. NICKERSON, R. S. (Bolt Beranek and Newman, Inc., Cambridge, Mass.); PEW, R. W. (Michigan, University, Ann Arbor, Mich.). Visual pattern matching - An investigation of some effects of decision task, auditory codability, and spatial correspondence. *Journal of Experimental Psychology*, vol. 98, Apr. 1973, p. 36-43; Apr. 1973 10 Refs. Note: Contract No.: F44620-69-C-0115 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7313.
118. NORMAN, DONALD A.; HUTCHINS, EDWIN L., JR. Computation via direct manipulation Final Report, 1 Dec. 1984 - 29 Feb. 1988. California Univ., San Diego, La Jolla, Inst. for Cognitive Science; Aug. 1988 31P. Note: Report No.: AD-A198417 Contract No.: N00014-85-C-0133; RR04206 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR8906 Interfaces to complex equipment can often impose severe difficulties for the user. In part, these difficulties are caused by the abstract nature of the interaction that many modern interfaces present to the operator. A new class of interfaces, the direct manipulation interface, appears to offer improvements in ease of use and understandability because the abstraction of the normal interface is replaced with what might be called the modal world metaphor, where the user can feel as if the operations are done directly upon the external environment. Research under this contract examined in detail the nature of directness in the use of computer interfaces. The research demonstrates that the concept of directness is a complex one, involving at least four different aspects of the interface, including two gulfs, one for execution and one for evaluation, and two different kinds of mappings: semantic mappings and referential distance. The experimental and theoretical work reported under this contract examines the complexities of the differences among interface styles, demonstrates the importance of visibility and sound in the performance of tasks, and presents a new, detailed analysis of the general attributes of cognitive artifacts, including an important new theoretical construct: the object-symbol. (GRA) Source of Abstract/Subfile: DTIC Subject Classification: 7554 Man/System Technology & Life Support (1975-).
119. Nypist, Linda; Slivken, Karis; Spence, Janet T.; Helmsrich, Robert L. (U Texas, Austin). Household responsibilities in middle class couples: The contribution of demographic and personality variables. *Sex Roles*; 1985 Jan Vol 12(1-2) 15-34; 1985; CODEN: SROLDH; ISSN: 03600025. Note: Human. 164 middle-class fathers (mean age 35 yrs) and mothers (mean age 34 yrs) of 1st- and 2nd-grade children were administered a battery of self-report instruments to investigate the contribution of demographic and personality variables to household responsibilities in middle-class couples. The self-report measures included the Personal-Attributes Questionnaire (PAQ), Work and Family Orientation Scale (FOS), and a household activities questionnaire inquiring about the relative responsibility of husband and wife for routine domestic tasks traditionally assigned to women, maintenance tasks traditionally assigned to men, decision making, and child rearing. Results show that, in the modal couple, child-rearing and decision-making responsibilities were shared approximately equally by husband and wife, but in most homes, everyday household tasks were divided among traditional gender lines. Several demographic factors, particularly the employment status of the wife, accounted for significant portions of the variability among couples in degree of responsibility assumed by the wife and husband for decision making and for feminine tasks. The division of responsibility was also related to PAQ scores of instrumentality and expressiveness and to FOS items dealing with achievement motivation. (21 ref) (PsycLIT Database Copyright 1986 American Psychological Assn. all rights reserved) KP: demographic & personality variables; household responsibilities; middle class parents of 1st & 2nd grades.
120. PAPAIZIAN, BRUCE; ROBERTS, R. B.; REDICK, DONALD J.; TANL, DANIEL M.; PEW, RICHARD, W. An intelligent tool for the design of presentations: A system identification study Final Report, Mar. - Oct. 1988. BBN Systems and Technologies Corp., Cambridge, MA; Oct. 1989 186P. Note: Report No.: AD-A215770; BBN-6932; RADC-TR-89-197 Contract No.: F30602-87-D-0093 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A09/MF A01 Journal Announcement: STAR9010 This report summarizes a study to identify the appropriate role of knowledge based technology in the design of user-computer interfaces and to assess the suitability of the published human factors design guidelines as a

source of interface design knowledge. In addition to specific recommendations in these areas, the report incorporates a literature review of the following topics: the development of knowledge-based systems, rules-of-thumb concerning the types of problems to which knowledge-based systems have been successfully applied, the general nature of design problem solving, interface design methods, the use of human factors guidelines in interface design, and the state-of-the-art in interface design support tools. (GRA) Source of Abstract/Subfile: DTIC.

121. Patterson, Kay; Helmreich, Robert; Stapp, Joy (U Texas, Austin). Likability, sex role congruence of interest, and competence: It all depends on how you ask. . Journal of Applied Social Psychology; 1975 Apr-Jun Vol 5(2) 93-109; 1975. Note: Human. 572 female and 385 male undergraduates were shown 1 of 4 videotaped versions of a male or female stimulus person (SP) being interviewed, the SP's being Competent or Incompetent and Masculine or Feminine in their interests. All Ss were asked to rate the SPs' likability on an objective questionnaire, those in one condition (Standard) immediately after viewing the tape, and in another (Projective) after first having responded to a series of open-ended, TAT-like questions about the SP. In the Standard condition, the major results were 2 highly significant effects-- Competent SPs were liked better than Incompetent ones, and the Masculine Competent SPs more than their feminine counterparts. Several changes occurred in the Projective condition. Only profeminist female Ss continued to prefer the Masculine Competent female SP to the Feminine Competent, the other group reversing their ratings. In response to the male SPs, profeminist male Ss in the Projective condition preferred both masculine SPs to the feminine ones and, in comparison with other groups, exhibited a reduced competency effect. (PsycLIT Database Copyright 1976 American Psychological Assn, all rights reserved)
122. FEW, R. W. /MICHIGAN, U., DEPT. OF PSYCHOLOGY, HUMAN PERFORMANCE CENTER, ANN, ARBOR, MICH./ Human information-processing concepts for system engineers. (Human information processing concepts examining read-in, storage, decision making and read-out subsystems). IN: SYSTEM ENGINEERING HANDBOOK. EDITED BY R. E. MACHOL, W. P. TANNER, JR., AND S. N. ALEXANDER. NEW YORK, MCGRAW-HILL BOOK CO., 1965, P. 31-3 TO 31-19. 49 REFS; 1965. Note: Contract No.: AF 49/638/1235 Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Documents available from AIAA Technical Library Journal Announcement: IAA6514 Source of Abstract/Subfile: AIAA/TIS.
123. FEW, R. W. Human information processing and reaction time ( Proportional relationship between reaction time and information processing in humans as factor of system design). Bolt, Beranek, and Newman, Inc., Cambridge, Mass; Mar. 1971 14P. Note: Report No.: AD-728217; BBN-2111; AFOSR-71-2193TR Contract No.: F44620-69-C-0115; AF PROJ. 9778 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR7204 The report was prepared to summarize for an engineering-oriented audience some of the basic principles underlying the determination of the time for human information processing. (Author (GRA)) Source of Abstract/Subfile: DTIC COSATI Code: SJ Psychology (Individual & Group Behavior).
124. FEW, R. W. /MICHIGAN, U., DEPT. OF PSYCHOLOGY, HUMAN PERFORMANCE CENTER, ANN, ARBOR, MICH./ A model of human controller performance in a relay control system. ( Human operator performance in bang-bang control system in phase plane, interpreting results in terms of switching lines). IN: NATIONAL SYMPOSIUM ON HUMAN FACTORS IN ELECTRONICS, 5TH, SAN DIEGO, CALIF., MAY 5, 6, 1964, PROCEEDINGS. SPONSORED BY THE PROFESSIONAL TECHNICAL GROUP ON HUMAN FACTORS IN ELECTRONICS OF THE INST. OF ELECTRICAL AND ELECTRONICS ENGINEERS. NORTH HOLLYWOOD, CALIF., WESTERN PERIODICALS CO., 1964, P. 241- 251. 7 REFS; 1964. Note: Contract No.: AF 49/638/449; AF 49/638/1235 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA6420 Source of Abstract/Subfile: AIAA/TIS.
125. FEW, R. W. /MICHIGAN, U., DEPT. OF PSYCHOLOGY, HUMAN PERFORMANCE CENTER, ANN, ARBOR, MICH./ Performance of human operators in a three-state relay control system with velocity-augmented displays. ( Performance of human operators in three-state relay control system with velocity augmented displays). IEEE TRANSACTIONS ON HUMAN FACTORS IN ELECTRONICS, VOL. HFE-7, JUN. 1966, P. 77-83. 5 REFS; Jun. 1966. Note: Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA6616 Source of Abstract/Subfile: AIAA/TIS.

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126. PEW, R. W. Proceedings of the 8th Annual Conference on Manual Control (Proceedings of conference on manual control to show interplay between man and machine and application of control theory in medicine and psychology). Michigan Univ., Ann Arbor, Jul. 1972 649P. Note: Report No.: NASA-CR-131244; AD-754908; AFFDL-TR-72-92 Contract No.: NSR-23-005-364 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR7311 The volume presents recent developments in the field of manual control theory and applications. The papers give analytical methods as well as examples of the important interplay between man and machine, such as how man controls and stabilizes machine dynamics, and how machines extend man's capability. Included in the broad range of subjects are procedures to evaluate and identify display systems, controllers, manipulators, human operators, aircraft, and non-flying vehicles. Of particular interest is the continuing trend of applying control theory to problems in medicine and psychology, as well as to problems in vehicle control. (Author (GRA)) Source of Abstract/Subfile: DTIC COSATI Code: 1C Aircraft. Presentation Note: Conf. held at Ann Arbor, Mich., 17-19 May 1972.
127. PEW, R. W. /MICHIGAN, U., DEPT. OF PSYCHOLOGY, ANN ARBOR, MICH./ Recent psychological research relevant to the human factors engineering of man-machine systems. (Psychological research relevant to human factors engineering of man-machine systems, discussing information processing). NATIONAL ELECTRONICS CONFERENCE, CHICAGO, ILL., OCT. 25-27, 1965, PROCEEDINGS. VOLUME 21. <A66-14553-05-09> CONFERENCE SPONSORED BY THE ILLINOIS INST. OF TECH., THE INST. OF ELECTRICAL AND ELECTRONICS ENGINEERS, NORTHWESTERN U., THE U. OF ILLINOIS, ARGONNE NATIONAL LAB., ELECTRONIC REPRESENTATIVES ASSN., SCIENTIFIC APPARATUS MAKERS ASSN., THE SOCIETY OF MOTION PICTURE AND TELEVISION ENGINEERS, IOWA STATE U., MARQUETTE U., MICHIGAN STATE U., THE U. OF MINNESOTA, PURDUE U., THE U. OF MICHIGAN, THE U. OF NOTRE DAME, OHIO STATE U., AND THE U. OF WISCONSIN. CHICAGO, NATIONAL ELECTRONICS CONFERENCE, INC., 1965, P. 678-682. 14 REFS; 1965. Note: Contract No.: AF 49/638/-1235; AF 33/615/-1817 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA6605 Source of Abstract/Subfile: AIAA/TIS.
128. PEW, R. W. /MICHIGAN, U., ANN ARBOR, MICH./ The speed-accuracy operating characteristic (Speed-accuracy interrelationship in human performance as operating characteristic for reaction time under variety of task conditions). Note: SYMPOSIUM SPONSORED BY THE INST. FOR PERCEPTION RESEARCH. IN- ATTENTION AND PERFORMANCE II, PROCEEDINGS OF THE DONDERS CENTENARY SYMPOSIUM ON REACTION TIME, EINDHOVEN, NETHERLANDS, JUL. 29-AUG. 2, 1968. P. 16-26. /A70-24710 10-05/ Contract No.: NASR-54/06/ AF 49/638/-1235 Language: English Document Type: REPORT; CONFERENCE PAPER Journal Announcement: IAA7010. Publication Presentation.
129. PEW, R. W.; ANDERSON, N. S.; CHAPANIS, A.; FISCHOFF, B.; GOLDSTEIN, I. L. Research needs for human factors. National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors; Jan. 1983 219P. Note: Report No.: AD-A129899; RESEARCH-NOTE-83-07 Contract No.: N00014-81-C-0017 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A11/MF A01 Journal Announcement: STAR8323 This report describes basic research needed to improve the scientific basis of applied human factors work. Six topical areas are covered; human decision making; eliciting information from experts; user-computer interaction; supervisory control systems; population group differences; and applied methods. (Author (GRA)) Source of Abstract/Subfile: DTIC Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5E Human Factors Engineering.
130. PEW, R. W.; BARON, S. (Bolt Beranek and Newman, Inc., Cambridge, MA). Perspective on human performance modelling. Automatica (ISSN 0005-1098), vol. 19, Nov. 1983, p. 663-676; Nov. 1983 33 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Journal Announcement: IAA8408 An overview of, and perspective on, human performance modelling is presented. The role of human performance models in the design process for complex man-machine systems is discussed. Then psychologically-based models and a control-theoretic approach to modelling are reviewed. Finally, a recently developed model that illustrates how features of the two approaches may be synthesized to analyze a wider range of supervisory control problems is described and discussed.

(Author) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). Documents available from AIAA Technical Library.

131. PEW, R. W.; FEEHRER, C. E.; BARON, S.; MILLER, D. C. Critical review and analysis of performance models applicable to man-machine systems evaluation Interim Scientific Report, 1 Oct. 1975 - 30 Sep. 1976. Bolt, Beranek, and Newman, Inc., Cambridge, Mass; Mar. 1977 306P. Note: Report No.: AD-A038597; BBN-3446; AFOSR-77-0520TR Contract No.: F44620-76-C-0029 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A14/MF A01 Journal Announcement: STAR7718 This report focuses on the review of potentially relevant models and on the identification of issues in model development and application that may have an important impact on models for large-scale, man-machine systems. A detailed and critical evaluation of several classes of human-performance models is presented. Interrelations among existing models are examined, and an evaluation is made on the needs and gaps in the technology. Modelling issues are identified, and research recommendations indicated. Approximately sixty models, techniques that have some applicability to the simulation modelling program are abstracted in the Appendix. (Author (GRA)) Source of Abstract/Subfile: DTIC Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations.
132. PEW, R. W.; JAGACINSKI, R. J. Mapping an operator's perception of a parameter space (Operator visual perception mapping during parameter adjustment in dynamic control system). Michigan Univ., Ann Arbor, 1972. Note: Contract No.: NSR-23-005-364 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: STAR7301 Operators monitored the output of two versions of the crossover model having a common random input. Their task was to make discrete, real-time adjustments of the parameters  $k$  and  $\tau$  of one of the models to make its output time history converge to that of the other, fixed model. A plot was obtained of the direction of parameter change as a function of position in the  $(\tau, k)$  parameter space relative to the nominal value. The plot has a great deal of structure and serves as one form of representation of the operator's perception of the parameter space. (Author) COSATI Code: 5E Human Factors Engineering. In NASA, Washington 7th Ann. Conf. on Manual Control p 201-206 (SEE N73-10104 01-05) Publication Note: Sponsored in part by NSF.
133. PEW, R. W.; ROBB, M. Skill training for the production of a memorized movement pattern (Efficacy of sensory feedback information given during training period for improving human performance in producing memorized movement pattern). Michigan Univ., Ann Arbor, Dec. 1968 37P. Note: Report No.: NASA-CR-1251 Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR6904 Source of Abstract/Subfile: NASA STIF COSATI Code: 5H Man-machine Relations.
134. PEW, R. W.; ROLLINS, A. M. Dialog specification procedures Final Report. Bolt, Beranek, and Newman, Inc., Cambridge, Mass; Sep. 1975 90P. Note: Report No.: PB-252976/6; BBN-3129-REV; USDA-ASCS-123351034-REV Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR7622 The ASCS dialog specification procedures manual is intended to promote the development of easily interpreted, friendly dialogs by: (1) Encouraging uniformity of dialogs from one application to another; (2) exploiting the full capabilities of programmable terminals for creating effective genuinely interactive dialog; and (3) providing designer aids for dialog creation and documentation. These aids meet the requirements for communicating the dialogs that are created to programmers who must implement them and managers who must review and approve them from a users viewpoint. (GRA) COSATI Code: 9B Computers. Announcements: Revised Publication Note: Sponsored by the Dept. of Agriculture.
135. PEW, R. W.; RUPP, G. L. /MICHIGAN, U., ANN ARBOR, MICH./ Two quantitative measures of skill development (Human perceptual motor skill development in tracking performance, using feedback control system gain and effective time delay as measures). JOURNAL OF EXPERIMENTAL PSYCHOLOGY, VOL. 90, P. 1-7; Sep. 1971 14 Refs. Note: Contract No.: NASR-54/06/ Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7121 Source of Abstract/Subfile: AIAA/TIS.
136. Pew, Richard W. (Bolt Beranek & Newman, Experimental Psychology Dept, Cambridge, MA). Human performance issues in the design of future Air Force systems. Aviation, Space, and Environmental

- Medicine; 1986 Oct Vol 57(10, Sect 2) 78-82; 1986; CODEN: AEMEA Y; ISSN: 00956562. Note: Human. Discusses 3 design and analysis issues relating to human performance in USAir Force systems along a continuum of levels of automation: (1) integrated information display for direct interpretation by the crew, (2) the design of interfaces to the expert systems that -- providing recommendations to the crew, and (3) the scope and depth of supervisory control that the crew should provide at the level of robotics. It is concluded that at all 3 levels, traditional task analyses are inadequate as a tool for beginning the crew-system design process. What is needed are design decisions that are driven by human performance issues, rather than having these issues enter the analysis process after the major technological decisions have been made. (5 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
137. PEW, RICHARD W.; CORKER, KEVIN M.; DAVIS, LAWRENCE. Human factors engineering workstation for model-based cockpit design. SAE, Aerospace Technology Conference and Exposition, Anaheim, CA, Oct 3-6, 1988. 9 p; Oct 1988 12 Refs. Note: Report No.: SAE PAPER 881475 Language: English Country of Origin: United States Document Type: PREPRINT Documents available from AIAA Technical Library Journal Announcement: IAA8910 A cockpit design workstation provides a graphic and software tool-based representation of the human operator, the goals, the task environment, the procedural constraints, and the equipment options. Simulations of man/machine system performance were used to study analytically the impact of system design on human performance. The merits of the object-oriented programming paradigm include the ability to combine object descriptions and the modular approach in the form of message interfaces. This programming approach was implemented in the cockpit automation technology program and in the Army/NASA aircrew/aircraft integration program. (A.A.F.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-).
138. RAJU, G. JAGANNATH; VERGHESSE, GEORGE C.; SHERIDAN, THOMAS B. (MIT, Cambridge, MA). Design issues in 2-port network models of bilateral remote manipulation. Massachusetts Inst. of Tech., Cambridge; 1989 13 Refs. Note: Contract No.: JPL-956892 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8924 A two-port impedance-network model of a single-degree-of-freedom remote manipulation system in which a human operator at the master port interacts with a task object at the slave port in a remote location is presented. The design of the network involves the selection of feedback gains for the servomechanisms that transmit motion and force information from one port of the two-port to the other in both directions. The proposed methodology allows this selection to be based on both stability requirements and specifications of desired port impedances, given models of the task and the human operator. The resulting design guidelines guarantee stability for any passive task object at the slave port and any passive human impedance at the master port. (L.B.) Source of Abstract/Subfile: AIAA/TIS. IN: 1989 IEEE International Conference on Robotics and Automation, Scottsdale, AZ, May 14-19, 1989, Proceedings. Volume 3 (A89-53401 24-63). Washington, DC, IEEE Computer Society Press, 1989, p. 1316-1321.
139. REMINGTON, R. W.; WIENER, E. L. Man-machine interface requirements - advanced technology. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif, Dec. 1984. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A15/MF A01 Journal Announcement: STAR8506 Research issues and areas are identified where increased understanding of the human operator and the interaction between the operator and the avionics could lead to improvements in the performance of current and proposed helicopters. Both current and advanced helicopter systems and avionics are considered. Areas critical to man-machine interface requirements include: (1) artificial intelligence; (2) visual displays; (3) voice technology; (4) cockpit integration; and (5) pilot work loads and performance. (B.W.) Source of Abstract/Subfile: NASA STIF Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In its Technical Workshop: Advanced Helicopter Cockpit Design Concepts p 247-266 (SEE NRS-14806 06-04).
140. Roth, E. M.; Bennett, K. B.; Woods, D. D. (Westinghouse Research & Development Ctr, Pittsburgh, PA, US). Human interaction with an "intelligent" machine. Special Issue: Cognitive engineering in dynamic worlds. International Journal of Man Machine Studies; 1987 Nov-Dec Vol 27(5-6) 479-525 ; 1987; CODEN: IJMMBC; ISSN: 00207373. Note: Human. Four technicians varying in level of experience and interactive style (passive or active) diagnosed faults in electromechanical equipment with the aid of an expert system. Results indicate that the standard approach to expert system design, in which the user

- gathers data for the machine, was inadequate in this instance. Problem solving was marked by novel situations outside the machine's competence, special conditions, underspecified instructions, and error recovery, all of which required substantial knowledge and active participation on the part of technicians. The authors argue that intelligent systems should be based on the notion of a joint cognitive system architecture in which computational technology aids the user in problem solving and the user manages varied knowledge sources. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
141. Roth, E. M.; Woods, David D. (Westinghouse Research & Development Ctr, Pittsburgh, PA, US). Aiding human performance: I. Cognitive analysis. *Travail Humain*; 1988 Jan Vol 51(1) 39-64; 1988; ISSN: 00411868. Note: Human. Explores issues in aiding human performance through an analysis of a natural problem-solving habitat: the control of water level in a boiler during the startup of a power plant. Two mutually reinforcing analyses were conducted to understand the existing system for feedwater/level control as a problem-solving system. One analysis focused on mapping the cognitive demands imposed by the task world itself or building a competence model. The other focused on developing a performance model, a description of what operators actually do, successfully and erroneously, to cope with the demands of the world. The analyses enabled identification of options to produce a better match between the cognitive demands of the task and the available resources. (French abstract) (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
142. SHERIDAN, THOMAS B. (MIT, Cambridge, MA). Supervisory control of telerobots in space. IN: *Machine intelligence and autonomy for aerospace systems (A89-31076 12-59)*. Washington, DC, American Institute of Aeronautics and Astronautics, Inc., 1988, p. 31-50; 1988 17 Refs. Note: Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Journal Announcement: IAA8912 An evaluation is made of the requirements for supervisory human control of teleoperation systems in orbit, with a view to aspects of man-machine roles and interactions that have been advanced as well as those that remain problematic. In order for a telerobot to perform a new task, its human supervisor must plan the new commands, transform them in coded form to the computer, monitor the automated execution of these programmed operations, perhaps intervene in the event of some problem, and finally, learn from the experience just gained. Attention is presently given to criteria for the allocation of responsibility to the human supervisor rather than computers possessing progressively greater degrees of autonomy. (O.C.) Source of Abstract/Subfile: AIAA/TIS. Documents available from AIAA Technical Library.
143. SHERIDAN, THOMAS B. (MIT, Cambridge, MA). The system perspective (for pilot-aircraft control interaction). IN: *Human factors in aviation (A89-34431 14-54)*. San Diego, CA, Academic Press, Inc., 1988, p. 27-51; 1988 13 Refs. Note: Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Journal Announcement: IAA8914 The application of systems theory to aviation human-factors analyses is discussed in an introductory overview. Topics addressed include small- and large-scale problems (pilot control of an aircraft vs the U.S. National Airspace System), aircraft production as a system, system definition and representation, and the advantages of a systems approach. Consideration is given to the history of systems analysis; current practices; goals, decision, and control; and supervisory control of systems. Extensive diagrams and flow charts are provided. (T.K.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). Documents available from AIAA Technical Library.
144. SHERIDAN, THOMAS B.; CHARNY, LEONID; MENDEL, MAX B.; ROSEBOROUGH, JAMES B. Supervisory control, mental models and decision aids, part I: Final Report, Mar. 1983 - Jul. 1986. Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering; Jul. 1986 20P. Note: Report No.: AD-A174727 Contract No.: N00014-83-K-0193 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A02/MF A01 Journal Announcement: STAR8712 This paper poses a framework for considering human supervisory control of semi-automatic systems. It analyzes supervisory control into specific human functions and gives examples of research that have been done and/or are needed with respect to each of these functions. For each such function it is argued that the human supervisory operator necessarily has a corresponding mental model, and potentially can have a computer-based decision aid. The relation of the proposed framework to the canonical modern control paradigm is also discussed, as are the reasonable limitations of our ability to model such a complex human machine interaction which itself exercises a high degree of free choice. Three accompanying papers offer detailed contributions to three of the supervisory functions (and corresponding decision aids) which heretofore have been neglected, namely: (1) formation



- of objectives by satisficing; (2) acquisition, calibration and combination of measures of process state; and (3) estimation of process state from current measure and past control actions. (GRA) Source of Abstract/Subfile: DTIC Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations.
145. SHERIDAN, THOMAS B.; KRUSER, DANA S.; DEUTSCH, STANLEY, eds. Human Factors in Automated and Robotic Space Systems: Proceedings of a symposium. Part 1. National Academy of Sciences - National Research Council, Washington, DC. Committee on Human Factors; 1987 475P. Note: Report No.: NASA-CR-182495; NAS 1.26:182495 Contract No.: NASW-4071 Language: English Country of Origin: United States Document Type: CONFERENCE PROCEEDINGS Documents available from AIAA Technical Library Other Availability: NTIS HC A20/MF A01 Journal Announcement: STAR8918 Human factors research likely to produce results applicable to the development of a NASA space station is discussed. The particular sessions covered in Part 1 include: (1) system productivity -- people and machines; (2) expert systems and their use; (3) language and displays for human-computer communication; and (4) computer aided monitoring and decision making. Papers from each subject area are reproduced and the discussions from each area are summarized. (A.D.) Source of Abstract/Subfile: NASA STIF Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. Presentation Note: Symposium held in Washington, DC, 29-30 Jan. 1987.
146. Sheridan, Thomas B.; Mann, Robert W. (Massachusetts Inst of Technology). Design of control devices for people with severe motor impairment. Human Factors; 1978 Jun Vol 20(3) 321-337; 1978; CODEN: HUF AAG; ISSN: 00187208. Note: Human. Reviews the incidence and demography of severe sensorimotor disablement in the US and discusses current technology in prostheses and orthoses for upper and lower limbs. Criteria for the design of such systems and tradeoffs which the system designer must make in the process of design are explained. It is concluded that after many years of neglect, engineers are designing more sophisticated and more economical devices; it is also noted, however, that many of these devices remain in experimental stages and that widespread benefit depends on continued effort to improve technology and to understand psychosocial aspects. (PsycLIT Database Copyright 1979 American Psychological Assn, all rights reserved).
147. SHERIDAN, THOMAS B.; RAJU, G. JAGGANATH; BUZAN, FORREST T.; YARED, WAELPARK, JONG. Adjustable impedance, force feedback and command language aids for telerobotics (parts 1-4 of an 8-part MIT progress report). Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab; Jan. 1989. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A21/MF A03 Journal Announcement: STAR9023 Projects recently completed or in progress at MIT Man-Machine Systems Laboratory are summarized. (1) A 2-part impedance network model of a single degree of freedom remote manipulation system is presented in which a human operator at the master port interacts with a task object at the slave port in a remote location is presented. (2) The extension of the predictor concept to include force feedback and dynamic modeling of the manipulator and the environment is addressed. (3) A system was constructed to infer intent from the operator's commands and the teleoperation context, and generalize this information to interpret future commands. (4) A command language system is being designed that is robust, easy to learn, and has more natural man-machine communication. A general telerobot problem selected as an important command language context is finding a collision-free path for a robot. (Author) Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In JPL, California Inst. of Tech., Proceedings of the NASA Conference on Space Telerobotics, Volume 1 p 81-88 (SEE N90-29000 23-54) Publication Note: Sponsored in part by NASA, Ames Research Center.
148. SHERIDAN, THOMAS B.; ROSEBOROUGH, JAMES B.; DAS, HARI; CHIN, KAN-PINGINOU, SEICHL. Use of graphics in decision aids for telerobotic control: (Parts 5-8 of an 8-part MIT progress report). Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab; Jan. 1989. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A23/MF A04 Journal Announcement: STAR9024 Four separate projects recently completed or in progress at the MIT Man-Machine Systems Laboratory are summarized. They are: a decision aid for retrieving a tumbling satellite in space; kinematic control and graphic display of redundant teleoperators; real time terrain/object generation: a quad-tree approach; and two dimensional control for three dimensional obstacle avoidance. (Author) COSATI Code: 5H Man-machine Relations. In JPL, California Inst. of Tech., Proceedings of

the NASA Conference on Space Telerobotics, Volume 3 p 533-541 (SEE N90-29780 24-54).

149. SHIVELY, ROBERT J. (U.S. Army, Aeroflightdynamics Directorate, MoffettField, CA); BORTOLUSSI, MICHAEL R. (Western Aerospace Laboratories, Inc., Moffett, Field, CA); BATTISTE, VERNOL; HART, SANDRA G. (NASA, Ames ResearchCenter, Moffett Field, CA); PEPITONE, DAVID D. (San Jose State University, CA); MATSUMOTO, JOY HAMERMAN. Inflight evaluation of pilot workload measures for rotorcraft research. Army Aviation Research and Development Command, Moffett Field, Calif, 1987 12 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8817 The effectiveness of heart-rate monitoring and the NASA TLX workload rating scale (Hart et al., 1985) in measuring helicopter-pilot workloads is investigated experimentally. Four NASA test pilots flew two 2-h missions each in an SH-3G helicopter, following scenarios with takeoff, hover, cross-country, and landing tasks; pilot performance on the tasks undertaken near the landing area was measured by laser tracking. The results are presented in graphs and discussed in detail, and it is found that the TLX ratings clearly distinguish the flight segments and are well correlated with the performance data. The mean heart rate (measured as interbeat interval) is correlated ( $r = -0.69$ ) with the TLX workload, but only the standard deviation of the interbeat interval is able to distinguish between flight segments; the correlation between standard deviation and TLX ratings is negative but not significant. (T.K.) Source of Abstract/Subfile: AIAA/TIS. IN: International Symposium on Aviation Psychology, 4th, Columbus, OH, Apr. 27-30, 1987, Proceedings (A88-42927 17-53). Columbus, OH, Ohio State University, 1987, p. 637-643.
150. Sorkin, R. D.; Pohlmann, L. D.; Woods, D. D. (Arizona State U). Decision interaction between auditory channels. Perception and Psychophysics; 1976 Apr Vol 19(4) 290-295; 1976. Note: Human. Two female students detected signals presented in a 2-channel, simultaneous detection task at 630 and 1,400 Hz. The familiar pattern of interference between the frequency channels was observed - detectability in one channel was depressed on trials when a signal or a yes response occurred in the other channel. On each trial, measures were made of the energy within specified frequency bands arounds each signal frequency. The relationships between these measures and performance in each channel were studied. There was no consistent relationship between the magnitude of the measure in one channel and performance in the other. It is suggested that interactions between the channels probably originate in the response process of the interfering channel. (PsycLIT Database Copyright 1976 American Psychological Assn, all rights reserved).
151. Spence, Janet T.; Helmreich, Robert L. (U Texas, Austin). Androgyny versus gender schema: A comment on Bem's gender schema theory. Psychological Review; 1981 Jul Vol 88(4) 365-368; 1981; CODEN: PSRVAX; ISSN: 0033295X. Note: Human. S. L. Bem (see PA, Vol 66:00000) proposes that the Bem Sex-Role Inventory (BSRI) measures individual differences in a unidimensional construct in addition to 2 independent dimensions, global self-concepts of masculinity and femininity. Evidence suggests that the BSRI measures primarily self-images of instrumental and expressive personality traits and that these trait clusters show little or no relationship to global self-images of masculinity and femininity or to unidimensional constructs such as the tendency to utilize gender schemata. (12 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved) KP: Bem Sex Role Inventory as measure of individual differences in self concepts vs global self images of masculinity & femininity; criticism of S. L. Bem's gender schemata.
152. SPENCE, JANET T.; HELMREICH, ROBERT L. (Texas, University, Austin). Beyond face validity - A comment on Nicholls, Licht, and Pearl ( gender-related personality traits). Texas Univ., Austin; 1983 17 Refs. Note: Contract No.: NAG2-137; NIH-MH-32066 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8810 In their discussion of the Bem Sex Role Inventory (BSRI; Bem, 1974) and the Personal Attributes Questionnaire (PAQ; Spence and Helmrich, 1978), Nicholls, et al. (1982) blur two issues. The first concerns the legitimacy of equating the clusters of gender-related personality traits tapped by these instruments with the global constructs of masculinity and femininity. The second concerns item similarity between the PAQ and BSRI M scales and measures of self-esteem and the question of whether the several instruments measure the same or separable constructs. Decisions about each of these issues involve complex considerations that do not directly involve face validity. (Author) Source of Abstract/Subfile: AIAA/TIS. Psychological Bulletin (ISSN 0033-2909), vol. 94, no. 1, 1983, p. 181-184.
153. Spence, Janet T.; Helmreich, Robert L. (U Texas, Austin). Comparison of masculine and feminine personality attributes and sex role attitudes across age groups. . Developmental Psychology; 1979 Sep Vol

- 15(5) 582-583; 1979; CODEN: DEVPA9; ISSN: 00121649. Note: Human. Scores on the Masculinity (M) and Femininity scales of the Personal Attributes Questionnaire were compared in 488 male and 682 female high school students, 308 male and 304 female college students, 325 mothers and 277 fathers of elementary school children, and 736 mothers and 736 fathers of college students. Significant age trends occurred only for males on M. Scores on the Attitudes Toward Women Scale suggested that females were more liberal than males and students more liberal than parents of college students. Results are explained in terms of the differential sex-role expectations and life experiences of males and females. (2 ref) (PsycLIT Database Copyright 1980 American Psychological Assn, all rights reserved).
154. Spence, Janet T.; Helmreich, Robert L.; Pred, Robert S. (U Texas, Austin, US). Impatience versus achievement strivings in the Type A pattern: Differential effects on students' health and academic achievement. *Journal of Applied Psychology*; 1987 Nov Vol 72(4) 522-528; 1987; ISSN: 00219010. Note: Human. Psychometric analyses of college students' responses to the Jenkins Activity Survey, a self-report measure of the Type A behavior pattern, revealed the presence of two relatively independent factors. On the basis of these analyses, two scales, labeled Achievement Strivings (AS) and Impatience-Irritability (II), were developed. In two samples of male and female college students, scores on AS but not on II were found to be significantly correlated with grade average. Responses to a health survey, on the other hand, indicated that frequency of physical complaints was significantly correlated with II but not with AS. These results suggest that there are two relatively independent factors in the Type A pattern that have differential effects on performance and health. Future research on the personality factors related to coronary heart disease and other disorders might more profitably focus on the syndrome reflected in the II scale than on the Type A pattern. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
155. Spence, Janet T.; Helmreich, Robert L. (U Texas, Austin). The many faces of androgyny: A reply to Locksley and Colten. *Journal of Personality and Social Psychology*; 1979 Jun Vol 37(6) 1032-1046; 1979; CODEN: JPSPB2; ISSN: 00223514. Note: Human. In their critique of the Bem Sex Role Inventory (BSRI) and Personal Attributes Questionnaire (PAQ), A. Locksley and M. Colten (see PA, Vol 64:10293) assume that a singular androgyny theory exists to which the rationale and the psychometric properties of these instruments are tied and that each is intended to be a broad-gauged measure of masculinity and femininity or of global self-images of these concepts. The present authors, however, conceive of the PAQ as a specialized measure of socially desirable instrumental and expressive characteristics, objectively defined trait dimensions that distinguish between the sexes to some degree and thus may be labeled "masculine" and "feminine." (34 ref) (PsycLIT Database Copyright 1980 American Psychological Assn, all rights reserved).
156. Spence, Janet T.; Helmreich, Robert L. (U Texas, Austin). Masculine instrumentality and feminine expressiveness: Their relationships with sex role attitudes and behaviors. *Psychology of Women Quarterly*; 1980 Win Vol 5(2) 147-163; 1980; CODEN: FWOQDY; ISSN: 03616843. Note: Human. Data from the Bem Sex-Role Inventory (BSRI) and the Personal Attributes Questionnaire (PAQ) Masculinity and Femininity scales have led to the hypothesis that androgynous individuals are more behaviorally flexible than others, manifesting both masculine and feminine role behaviors. Sex-role androgyny is also said to have other beneficial consequences such as high self-esteem. The content of these instruments, however, is largely confined to socially desirable instrumental (masculine) and expressive (feminine) personality traits. A review of the literature indicates that these abstract trait dimensions have only minimal relationships with sex-role attitudes and sex-role behaviors not tapping instrumentality and expressiveness, and provides little support for the general behavioral flexibility hypothesis. Although PAQ and BSRI findings cannot be generalized to sex-role behaviors in general, the literature suggests that instrumentality and expressiveness per se have important implications. Appreciation of their contributions may be advanced more rapidly if these trait dimensions are disentangled from global concepts of sex-roles or masculinity, femininity, and androgyny. (33 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved) KP: separation of instrumentality & expressiveness personality traits from sex role attitudes & behaviors.
157. Spence, Janet T.; Helmreich, Robert L.; Holahan, Carole K. (U Texas, Austin). Negative and positive components of psychological masculinity and femininity and their relationships to self reports of neurotic and acting out behaviors. *Journal of Personality and Social Psychology*; 1979 Oct Vol 37(10) 1673-1682; 1979; CODEN: JPSPB2; ISSN: 00223514. Note: Human. Negatively valued masculinity (M-super(-)) and femininity (F-super(-)) personality scales were developed to supplement the positively valued Masculinity (M-super(+)) and Femininity (F-super(+)) scales of J. T. Spence and R. L. Helmreich's

(1978) Personal Attributes Questionnaire. (M-super(-)) consisted of traits that had been judged to be (a) more typical of males than females, (b) undesirable in both sexes, and (c) agentic or instrumental in content. Two (F-super(-)) scales were developed, both containing stereotypically feminine, undesirable traits, one set of traits referring to communionlike characteristics and the other to verbal passive-aggressive qualities. In 220 male and 363 female undergraduates significant sex differences in the predicted direction were found on all scales. In both sexes, low and nonsignificant correlations were found between parallel positive and negative scales, but highly significant negative correlations were found between positive and negative cross-sex scales. Findings provide additional evidence for the multidimensionality of masculinity and femininity. Scores on a self-esteem measure were positively correlated with M-super(-) and F-super(+), uncorrelated with M-super(-), and negatively correlated with the F-super(-) scales. Different patterns were associated with 2 types of problem behaviors. Neuroticism was most highly correlated (negatively) with M-super(+), and acting out behavior was most strongly correlated (positively) with M-super(-). (14 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved).

158. Spence, Janet T.; Helmreich, Robert L. (U Texas, Austin). On assessing androgyny. *Sex Roles*; 1979 Dec Vol 5(6) 721-738; 1979; CODEN: SROLDH; ISSN: 03600025. Note: Human. Research with personality instruments containing separate masculinity (M) and femininity (F) scales has found them to be orthogonal, leading to the search for methods to express their conjoint relationships with other variables. The theoretical and/or empirical assumptions underlying 3 methods are explored: S. L. Bem's (1974) difference model; the absolute score method; and the difference/median method, which combines features of both. Bem's model and the difference/median method presuppose a unique combinatory model, while the absolute method detects a number of alternative possibilities. Empirical data (756 male and 1,010 female high school juniors and seniors) using the Personal Attributes Questionnaire are used to demonstrate that the joint contributions of M and F to the variance are not uniform and, consequently, that the absolute method has greater heuristic value. (15 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved) KP: difference vs absolute score vs difference/median methods for assessment of relationship between masculinity & femininity; female vs male high school & female college students.
159. Spence, Janet T.; Helmreich, Robert; Stapp, Joy (U Texas, Austin). Ratings of self and peers on sex role attributes and their relation to self esteem and conceptions of masculinity and femininity. *Journal of Personality and Social Psychology*; 1975 Jul Vol 32(1) 29-39; 1975. Note: Human. 248 male and 282 female college students were given the authors' Personal Attributes Questionnaire (consisting of 55 bipolar attributes drawn from the Sex Role Stereotype Questionnaire by P. S. Rosenkrantz et al) and were asked to rate themselves and then to compare directly the typical male and female college student. Self-ratings were divided into male-valued (stereotypically masculine attributes judged more desirable for both sexes), female-valued, and sex-specific items. Also administered was the Attitudes Toward Women Scale and a measure of social self-esteem (the Texas Social Behavior Inventory). Correlations of the self-ratings with stereotype scores and the Attitudes Toward Women Scale were low in magnitude, suggesting that sex role expectations do not distort self-concepts. For both men and women, "femininity" on the female-valued self items and "masculinity" on the male-valued items were positively correlated, and both were significantly related to self-esteem. Implications for a concept of masculinity and femininity as a duality which is characteristic of all individuals are discussed, as well as the use of the self-rating scales for measuring masculinity, femininity, and androgyny. (21 ref) (PsycLIT Database Copyright 1975 American Psychological Assn, all rights reserved).
160. Spence, Janet T.; Helmreich, Robert; Stapp, Joy (U. Texas, Austin). A short version of the Attitudes toward Women Scale (AWS). *Bulletin of the Psychonomic Society*; 1973 Oct Vol. 2(4) 219-220; 1973. Note: Human. Presents a short (25-item) version of the Spence-Helmreich Attitudes toward Women Scale. Correlations between scores on the short and the full (55-item) version for groups of male and female students (N = 527) and groups of their parents (N = 524) were .95 or above. Results of a factor analysis and part-whole correlations indicate the similarity of the 2 forms. Normative data for the student and parent samples are described. (PsycLIT Database Copyright 1974 American Psychological Assn, all rights reserved).
161. Spence, Janet T.; Fred, Robert S.; Helmreich, Robert L. (U Texas, Austin, US). Achievement strivings, scholastic aptitude, and academic performance: A follow up to "Impatience versus achievement strivings in the Type A pattern." *Journal of Applied Psychology*; 1989 Feb Vol 74(1) 176-178; 1989; ISSN: 00219010. Note: Human. A recent study of college students by J. T. Spence et al (see PA, Vol 75:9108)

demonstrated that the Jenkins Activity Survey measure of the Type A pattern consisted of two relatively independent factors labeled Achievement Strivings (AS) and Impatience-Irritability (II). Scores on the AS scale but not the II scale were significantly correlated with cumulative grade point average (GPA) on the basis of 2 or more semesters of work. Follow-up data on the academic performance of these students are reported here. Correlations between AS scores and updated GPAs that were based on at least 4 semesters of work were comparable in value with those reported by Spence et al. Scholastic Aptitude Test (SAT) scores, obtained from students' records, were also significantly related to GPA. However, SAT and AS scores were nonsignificantly correlated and combined additively to account for a substantial portion of the variability in GPAs. The R -sup-2s in four independent samples ranged from .22 to .36. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).

162. Strayer, David L.; Wickens, Christopher D.; Braune, Rolf (U Illinois, Urbana-Champaign). Adult age differences in the speed and capacity of information processing: II. An electrophysiological approach. *Psychology and Aging*; 1987 Jun Vol 2(2) 99-110; 1987; ISSN: 08827974. Note: Human. A total of 60 subjects performed different variants of the Sternberg memory search task in an experiment designed to evaluate aging differences in the speed of the human information-processing system. The present study examined the nature of the age-related slowing using convergent methodologies of Sternberg's additive factors logic, the speed-accuracy trade-off, and the P300 component of the event-related brain potential. These methodologies revealed that a substantial component of slowing was manifest in perceptual encoding, response criterion adjustment, and response execution, with a lesser component related to memory search speed. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
163. Stricker, Lawrence J.; Helmreich, Robert L.; Roberts, David C. (Educational Testing Service, Princeton, NJ). A survey of the society for personality and social psychology. *Personality and Social Psychology Bulletin*; 1986 Mar Vol 12(1) 131-144; 1986; ISSN: 01461672. Note: Human. Surveyed 1,805 members of the Society for Personality and Social Psychology (the Society) to determine their opinions about matters concerning the Society, including the relations of the Society and its members with the American Psychological Association (APA), the Society's structure, its publications, and its convention program. 88% of the respondents reported that they were very or extremely likely to retain membership in the APA. 73% supported more active involvement of the Society in APA affairs. 24% reported that they were very or extremely satisfied with the Society's communication with federal funding agencies about research in personality psychology. In the last year, respondents read a mean number of 10 articles in the Society's *Bulletin*, and 83% had read at least 1. The Society's Review was less widely read. Results concerning the Society's activities at APA conventions are also presented. (2 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved) KP: structure & publications & convention program & relations with American Psychological Association; members of Society for Personality & Social Psychology.
164. Tsinger, Jerald L.; Graeber, R. Curtis (US Army Natick Research & Development Command, Food Sciences Lab, MA). Use of oral antibiotics in studies of ingestive behavior in rats. *Physiology and Behavior*; 1976 Nov Vol 17(5) 861-864; 1976. Note: Animal. The occurrence of chronic respiratory disease (CRD) in animal colonies is a problem encountered in many laboratories. 16 female Holtzman albino rats were used to investigate the effects on food and water intake of the oral antibiotics most often used to treat CRD. Four concentrations (0.01, 0.05, 0.25, and 0.50%) of tetracycline hydrochloride (TH) and sodium sulfamethazine (SS) were presented at different times mixed with food or water. Ss were permitted to choose between each drugged and normal food or water combination for 4 days. Both drugs seriously affected fluid intake when placed in solution. When mixed with food, only SS produced a preference-aversion function and increased total daily food and water intake regardless of concentration. The presence of TH in the food had no effect on food choice or on total daily food intake at any concentration. (PsycLIT Database Copyright 1977 American Psychological Assn, all rights reserved).
165. Toole, Tonya; Arink, Elizabeth A. (Florida State U, Tallahassee). Movement education: Its effect on motor skill performance. *Research Quarterly for Exercise and Sport*; 1982 Jun Vol 53(2) 156-162; 1982. Note: Human. 47 1st graders were taught movement principles either by a movement education or a traditional approach. The Throw and Catch Test, a batting test, and 2 tests that measure performance on striking and kicking distance and accuracy were used as pre- and posttests. Teaching approach groups were not significantly different on the latter 2 tests that measured the transfer of training effect. Traditional learning was better than movement education in developing throwing, catching, and batting performance. Results suggest that when one's objective is to teach a specific skill within a relatively short

time period, a command style with demonstration is better than movement education. (28 ref) (PsycLIT Database Copyright 1983 American Psychological Assn, all rights reserved).

166. Toole, Tonya; Lucariello, Georgann (Florida State U, Motor Behavior Lab, Tallahassee). Attentional requirements for location and distance of movement: Encoding and recognition. *Perceptual and Motor Skills*; 1984 Jun Vol 58(3) 939-944; 1984; CODEN: PMOSAZ; ISSN: 00315125. Note: Human. Studied the early processing stages of encoding and recognition of slow movement in a short-term motor-memory paradigm using 20 undergraduates. These stages were examined by determining whether G. T. Laabs's (see PA, Vol 51:10455) differential decay rates for location of movement and distance of movement could be replicated when the interfering activity was performed during the criterion and replication movements. Ss performed a linear-positioning task in a  $2 * 2 * 2$  (count by movement type by retention interval) experimental design. 10 Ss in one condition counted backwards by 3's during the criterion and replication movements. There were no detrimental effects for location and distance-cue reproduction when attention was shared with counting backwards. Consistent with Laabs's results, location of movement was maintained over the 15-sec interval while distance of movement spontaneously changed. Results support the notion that the early stages of encoding and recognition of cues for movement can occur unaffected in a secondary task. (13 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).
167. Toole, Tonya; McCloskey, Dale; Rider, Robert A. (Florida State U, Coll of Education, Tallahassee). Retention of movement cues by visually impaired persons. *Journal of Visual Impairment and Blindness*; 1984 Dec Vol 78(10) 487-490; 1984; ISSN: 0145482X. Note: Human. Examined whether kinesthetic movement of information in a short-memory paradigm would be superior in visually impaired (VI) persons when compared with sighted individuals. It was predicted that VI Ss would have a more sophisticated and refined kinesthetic modality and less absolute and variable error on a movement-retention task. Results from 11 sighted and 11 VI college students indicate that groups were equally effective in using the kinesthetic system to retain distance and location cues but that VI Ss were significantly more variable in their movement reproduction than sighted Ss. (29 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).
168. Toole, Tonya; Pyne, Ann; McTarsney, Patricia A. (Florida State U, Motor Behavior Lab, Tallahassee). Age differences in memory for movement. *Experimental Aging Research*; 1984 Win Vol 10(4) 205-210; 1984; CODEN: EAGRDS; ISSN: 0361073X. Note: Human. Exp I investigated whether memory deficits for movement occur with age. 13 right-handed Ss in each of 4 age groups (18-32, 33-47, 48-62, and 63-77 yrs) were administered tests to determine Ss' ability to encode and recall as many as 12 consecutive linear movement lists. When minimal memory requirements were imposed, there were no significant differences in older and younger Ss' abilities to immediately recall movements. However, older Ss could not recall movements as well as younger Ss when greater memory demands, such as 9 or 12 movements, were made. Exp II examined whether experimenter-imposed organizational schemes would enhance memory for older Ss: 16 right-handed undergraduates and graduates and 16 right-handed elderly adults (aged 60-70 yrs) completed linear-positioning movement tasks. While experimenter-imposed organizational schemes improved recall for older Ss, age differences still existed when greater memory requirements were essential. Organizational schemes did not enhance memory for either young or old Ss when compared to a free-choice condition. (26 ref) (PsycLIT Database Copyright 1986 American Psychological Assn, all rights reserved).
169. Tsang, P. S. (U Illinois, Aviation Research Lab, Savoy). Can pilots time share better than non pilots? Special Issue: Ergonomics in aviation. *Applied Ergonomics*; 1986 Dec Vol 17(4) 284-290; 1986; CODEN: AERGBW; ISSN: 00036870. Note: Human. Compared time-sharing performance of 12 right-handed male pilots (average age 28.8 yrs) with that of 12 right-handed male undergraduates. In a secondary task paradigm, Ss were required to perform 5 dual tasks with various degrees of structural similarity. A higher degree of task interference was observed for the structurally more similar task pairs. Although the pilots appeared to be more efficient in one of the dual task conditions, evidence for a general difference in time-sharing ability between the students and the pilots was not strong. Data are consistent with previous research and support the concept of multiple resources. It is concluded that the degree to which time-sharing performance is structure-dependent is not easily alterable by training and that laboratory findings on the structural determinants of time-sharing efficiency are generalizable to operational environments. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
170. TSANG, PAMELA S. (Illinois Univ., Savoy.); HART, SANDRA G.; VIDULICH, MICHAEL, A. The

- effects of display-control I/O, compatibility, and integrality on dual-task performance and subjective workload. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif, Feb. 1987. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A14/MF A01 Journal Announcement: STAR8724 The utility of speech technology was evaluated in terms of three dual task principles: resource competition between the time shared tasks, stimulus central processing response compatibility, and task integrality. Empirical support for these principles was reviewed. Two studies investigating the interactive effects of the three principles were described. Objective performance and subjective workload ratings for both single and dual tasks were examined. It was found that the single task measures were not necessarily good predictors for the dual task measures. It was shown that all three principles played an important role in determining an optimal task configuration. This was reflected in both the performance measures and the subjective measures. Therefore, consideration of all three principles is required to insure proper use of speech technology in a complex environment. (Author's Source of Abstract/Subfile: NASA STIP Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In AGARD, Information Management and Decision Making in Advanced Airborne Weapon Systems 9 p (SEE N87-29503 24-06).
171. Tsang, Pamela S.; Johnson, Walter W. (Wright State U, Dayton, OH, US). Cognitive demands in automation. *Aviation, Space, and Environmental Medicine*; 1989 Feb Vol 60(2) 130-135; 1989; CODEN: AEMEAY; ISSN: 00956562. Note: Human. Examined the cognitive demands of automated systems and their implications on automation design and mental workload using 1 high-school and 5 college students (aged 17-31 yrs). A variety of tasks (continuous flight control, discrete target acquisition, and decision making) was used alone or in combination with other tasks. Performance and subjective workload ratings, obtained by 3 workload scales, were examined as a function of the level of automation. Results demonstrate the usefulness of the multiple resource approach to task analysis. The results also demonstrate the value of understanding the cognitive demands in the process of function allocation between human and machine. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
172. Tsang, Pamela S.; Wickens, Christopher D. (Wright State U, Dayton, OH, US). The structural constraints and strategic control of resource allocation. *Human Performance*; 1988 Vol 1(1) 45-72; 1988; ISSN: 00959285. Note: Human. Examines the structural limitations in time-sharing performance by manipulating the structural properties of the component time-shared tasks. 20 right-handed male students (aged 19-30 yrs) were divided equally between a strategy instructions group and a no-strategy instructions group. A mixed design was employed with 2 groups of Ss receiving different instructions but performing the same tasks. Time-sharing efficiency was found to decrease as the degree of shared resources between the time-shared tasks increased. The level of resource allocation possible, on the other hand, increased as the degree of shared resources increased. To the extent that resources were shared, the skill of dynamic allocation appeared to be one that could be improved by training. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
173. Tulga, M. Kamil; Sheridan, Thomas B. (Commercial Information Corp, Woburn, MA). Dynamic decisions and work load in multitask supervisory control. *IEEE Transactions on Systems, Man, and Cybernetics*; 1980 May Vol SMC-10(5)217-232 CO: ISYMAW; 1980; ISSN: 00189472. Note: Human. Develops a paradigm for the problem of allocating in time a single resource to multiple simultaneous task demands that appear randomly, last for various periods, and offer varying rewards for service. Based on a dynamic optimizing algorithm plus an estimator, and including response time and future discounting constraints, a model of the human decision maker is compared to experimental results for human Ss performing such a task at a computer-graphics terminal. Results indicate a reasonable fit, under various model parameters and task conditions, and suggest hypotheses about the nature of human "planning ahead" and mental work load. (38 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved).
174. Tzelgov, Joseph; Tsach, Uri; Sheridan, Thomas B. (Ben Gurion U of the Negev, Beersheba, Israel). Effects of indicating failure odds and smoothed outputs on human failure detection in dynamic systems. *Ergonomics*; 1985 Feb Vol 28(2) 449-462; 1985; CODEN: ERGOAX; ISSN: 00140139. Note: Human. Discusses efforts to detect failures in dynamic systems with parallel models, in which the operator is expected to make decisions about possible failures by comparing the outputs of the system and its model, in the context of human information processing. Eight university students participated in an experiment conducted to test different means for aiding the operator in this task. It was found that the detection

- process was improved by providing operators with estimates of the failure odds. When both the system and model outputs were noisy, additional improvement was achieved by providing operators with pre-smoothed outputs. (French, German & Japanese abstracts) (17 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).
175. Vidulich, M. A.; Tsang, P. S. (NASA-Ames Research Ctr, Moffett Field, CA). Techniques of subjective workload assessment: A comparison of SWAT and the NASA Bipolar methods. Special Issue: Aviation psychology. *Ergonomics*; 1986 Nov Vol 29(11) 1385-1398; 1986; CODEN: ERGOAX; ISSN: 00140139. Note: Human. Compared 2 methods of assessing subjective workload in system evaluations--(1) the Subjective Workload Assessment Technique (SWAT) that employed a conjoint measurement procedure to confer interval scale properties on the workload ratings and (2) a bipolar technique under development at the National Aeronautics and Space Administration (NASA) that used an individually weighted workload score. Both methods were applied in a laboratory experiment, using 24 18-36 yr old right-handed males. Half the Ss were college students; half were pilots. The experiment required the rating of a number of single- and dual-tracking and spatial transformation tasks. Both subjective assessment techniques displayed similar sensitivity to the different task manipulations. However, both techniques failed to detect the resource competition effects in the dual-task performance and were in general insensitive to response execution processing demands. A notable difference between the 2 techniques was that the NASA-bipolar ratings consistently had a smaller between-S variability than the SWAT ratings. Discussion centers around the issue of the validity of assessment of subjective workload in general and the construct and concurrent validity of the 2 techniques in particular. (French & German abstracts) (18 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
176. Vidulich, M. A.; Wickens, Christopher D. (NASA-Ames Research Ctr, Moffett Field, CA). Causes of dissociation between subjective workload measures and performance: Caveats for the use of subjective assessments. Special Issue: Ergonomics in aviation. *Applied Ergonomics*; 1986 Dec Vol 17(4) 291-296; 1986; CODEN: AERGBW; ISSN: 00036870. Note: Human. Investigated whether the influence of cognitive processing is equally represented in both performance and subjective workload assessments, using 40 college students. The difficulty of a memory search task was manipulated by varying stimulus presentation rate, stimulus discernibility, value of good performance, and automaticity of performance; the task conditions were performed both alone and concurrently with a tracking task. Bipolar subjective workload assessments were collected. Dissociations between workload and performance were found to be related to automaticity, presentation rate, and motivation. Results support the hypothesis that the specific cognitive processes responsible for subjective assessments can differ from those responsible for performance. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
177. Vidulich, Michael A.; Wickens, Christopher D. (NASA-Ames Research Ctr, Moffett Field, CA). Stimulus central processing response compatibility: Guidelines for the optimal use of speech technology. 14th Annual Conference of the Society for Computers in Psychology (1984, San Antonio, Texas). *Behavior Research Methods, Instruments, and Computers*; 1985 Apr Vol 17(2) 243-249; 1985; ISSN: 07433808. Note: Human. Stimulus-central processing-response (S-C-R) compatibility makes a 2-part set of predictions about the best input/output (I/O) configuration for a task on the basis of the type of central processing that the task requires. For tasks with predominately spatial central processing demands, the best I/O configuration is predicted to be visual/manual. For tasks with predominately verbal central processing demands, the best I/O configuration is expected to be auditory/speech. Three experiments are reviewed that support the concept of S-C-R compatibility. (11 ref) (PsycLIT Database Copyright 1986 American Psychological Assn, all rights reserved).
178. WALSH, T. M. (NASA, Langley Research Center, Hampton, Va.); WEENER, E. F. (Boeing Co., Seattle, Wash.). Automatic flight performance of a transport airplane on complex microwave landing system paths. National Aeronautics and Space Administration. Langley Research Center, Hampton, Va; Oct. 1977. Note: Language: English Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA7806 Essential characteristics of the U.S. microwave landing system (MLS) and the TCV B-737 aircraft used in flight demonstrations are described, with special emphasis on the analysis of the approach paths. MLS is used to provide the aircraft with guidance for automatic control on complex, curved descending paths with precision turns into short final approaches terminating in landing and rollout, even when subjected to strong and gusty tail- and cross-wind components and severe wind shear. The tracking performance achieved on these paths under MLS guidance is examined in detail, and the wind environment where the flights are conducted are quantified. The flights demonstrate the utility of the wide-area coverage of MLS for curved, descending paths



- commencing with a standard RNAV approach into a terminal area and continuation of this approach throughout the MLS coverage and onto the runway. (S.D.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7504 Aircraft Communications & Navigation (1975-). NATO, AGARD, Symposium on Guidance and Control Design Considerations for Low Altitude and Terminal Area Flight, 25th, Dayton, Ohio, Oct. 17-20, 1977, Paper. 13 p. Country of Origin: United States.
179. WALSH, T. M.; WEENER, E. F. (Boeing Co., Seattle). Automatic flight performance of a transport airplane on complex microwave landing system paths. National Aeronautics and Space Administration, Langley Research Center, Hampton, Va; Apr. 1978. Note: Language: English Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A14/MF A01 Journal Announcement: STAR7817 During this demonstration the microwave landing system was utilized to provide the terminal configured vehicle B-737 airplane with guidance for automatic control on complex, curved descending paths with precision turns into short final approaches terminating in landing and roll-out, even when subjected to strong and gusty tail- and cross-wind components and severe wind shear. The data collected from more than fifty approach flights during the demonstration provided an opportunity to analyze airplane flight performance on a statistical basis rather than on a single flight record basis as is customarily done with limited data replication. Mean and standard deviation data are presented for approach flight path tracking parameters. In addition, the adverse wind conditions encountered during these flights are described using three-dimensional wind vector characteristics computed from the extensive on-board sensor data. (L.S.) Source of Abstract/Subfile: NASA STIP Subject Classification: 7504 Aircraft Communications & Navigation (1975-). In AGARD Guidance and Control Design Considerations for Low-Altitude and Terminal-Area Flight 12 p (SEE N78-26049 17-01) Country of Origin: United States.
180. WEENER, E. F. The effect of simulator dynamics on pilot response. Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering; Oct. 1974 67P. Note: Report No.: NASA-CR-132459 Contract No.: NSR-23-005-364 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS Journal Announcement: STAR7424 The effects of visual display dynamics on the altitude tracking performance of a subject in a fixed base flight simulator are considered. The subject, flying the linearized longitudinal equations of motion, attempts to maintain the same altitude as two airplanes positioned three hundred feet ahead, as in level formation flying. The horizon together with the two leading aircraft are represented symbolically on a CRT display. The subject's aircraft is disturbed by atmospheric turbulence. The data indicate a relationship between the bandwidth of the display dynamics and the short period characteristics of the simulated airplane. For an airplane with a relatively fast pitch response the presence of altitude display dynamics, with a bandwidth as high as five times the short period natural frequency, causes significant degradation of altitude tracking performance. (Author) COSATI Code: 5E Human Factors Engineering.
181. WEENER, E. F. (Boeing Commercial Airplane Co., Seattle, WA). Flight deck automation decisions. IN: Aerospace Behavioral Engineering Technology Conference, 3rd, Long Beach, CA, October 15-18, 1984, Proceedings (A86-26001 10-54). Warrendale, PA, Society of Automotive Engineers, Inc., 1984, p. 3-8; 1984 5 Refs. Note: Report No.: SAE PAPER 841471 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8610 Effective man-machine interface design for an airplane flight deck depends strongly on providing appropriate levels of control capability for use by the flight crew. The range of control options available to the airplane system designer extends from manual through partially automatic to full automatic. Selection of appropriate types and levels of automation for each new airplane is a complex task. It involves understanding the capabilities and limitations of the human operator, airplane operational and functional considerations, as well as concerns for cost and available technology. Recent airplanes have demonstrated the practicality of providing different levels of automation which can be applied by the flight crew under different circumstances. This trend expands the options available to the flight crew in coping with the changing operational environment. It also allows the flight crew to participate directly in the choice of when and how to apply automation. This paper describes the various automation factors which are considered in the process of developing a design. (Author) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-).
182. WEENER, E. F. Stalled and partially stalled high aspect ratio, straight wings Ph.D. Thesis. Michigan Univ., Ann Arbor, 1975 234P. Note: Language: English Country of Origin: United States Document Type: THESIS Other Availability: Univ. Microfilms Order No. 76-9541 Journal Announcement:

STAR7613 A computer investigation of the steady state load distribution on high aspect ratio, straight wings at geometric angles of attack near and beyond stall was conducted. The load distributions were computed using Multhopp's Fourier series solution of the downwash integratin Prandtl's lifting line theory. Analog computer solutions at high angles of attack exhibited sharp changes or jumps of the variables which were due to instabilities of the nonlinear system. The stability properties were examined via linearized equations written about singular operating points of the nonlinear system. For a specific wing model, stability is shown explicitly in terms of the slopes of the local airfoil characteristics. (Dissert. Abstr.) Source of Abstract/Subfile: Dissert. Abstr. Documents available from AIAA Technical Library.

183. WEENER, E. F.; HOWE, R. M.; PEW, R. W. Effects of visual flight display dynamics on altitude tracking performance in a flight simulator. Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering; 1973. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: STAR7511 The effects were studied of visual display dynamics on pilot tracking performance in a simulator. The tracking task consisted of maintaining the piloted aircraft at the same altitude as two aircraft positioned three-hundred feet ahead; as would be required in level formation flying. The two leading aircraft were represented symbolically along with the horizon on a CRT display. Vertical position of these aircraft with respect to the horizon indicated the altitude of the subject's aircraft, which was disturbed by atmospheric turbulence. Various bandwidths of second-order dynamics were interposed between the true aircraft altitude and the displayed altitude, whereas no dynamics were interposed in the attitude display. Experiments were run using two experienced pilots and two substantially different longitudinal dynamics for the piloted aircraft. Preliminary results indicate a significant decrease in altitude tracking performance for display dynamics with natural frequencies below ten radians per second. (Author) COSATI Code: 5E Human Factors Engineering. In MIT Proc. of the 9th Ann. Conf. on Manual Control p 3-8 (SEE N75-19126 11-01).
184. Wickens, Carol; Tuber, David S.; Wickens, Delos D. (Ohio State U). Memory for the conditioned response: The proactive effect of preexposure to potential conditioning stimuli and context change. *Journal of Experimental Psychology General*; 1983 Mar Vol 112(1) 41-57; 1983; CODEN: JPGEDD; ISSN: 00963445. Note: Animal. Three experiments with 48 cats investigated memory for CR as a function of proactive inhibition. The proactive operation was the preexposure to quasi-random presentations of the potential CS and UCS. The possible CSs were light and tone, and the UCSs were brief mild shocks to either the right or left paw, which produced a brisk leg jerk. In Exp I, all possible combinations of CS and UCS components of the eventual CR were present in the preexposure period for one or another group as in the traditional interference paradigms of human paired-associate memory research. Exp II demonstrated that the decline cannot be attributed to a strategy type of interpretation that asserts that when the retention-extinction situation occurs, the "backward scan" and judge themselves to be once again in the preexposure period. Performance immediately after reaching the conditioning criterion did not differ between the controls that experienced no preexposure and the experimentals, but it did so after the 10-wk retention interval. Exp III investigated the role of context in the memory deficits by maintaining the same context in the preexposure, conditioning, and memory test situations or giving the preexposure experience in an environment different from the other 2 situations. Context change greatly reduced but did not eliminate the proactive inhibition. It is concluded that the CR is readily forgotten given appropriate interference and does not differ from other kinds of learning in this respect. (27 ref) (PsycLIT Database Copyright 1983 American Psychological Assn, all rights reserved).
185. Wickens, Christopher D.; Braune, Rolf; Stokes, Alan (U Illinois-Willard Airport, Aviation Research Lab, Savoy). Age differences in the speed and capacity of information processing: I. A dual task approach. *Psychology and Aging*; 1987 Mar Vol 2(1) 70-78; 1987; ISSN: 08827974. Note: Human. Sixty subjects, spanning the age range from 20 to 65, performed a series of tasks designed to evaluate the effects of aging on the speed and capacity of the human information-processing system. A tracking task was performed alone and concurrently with different versions of a Sternberg memory search task that varied the degree of resource competition with the tracking task. A dichotic-listening task, a tracking-task measure of perceptual-motor speed, and a complex transcription task were also performed. The data revealed a monotonic decrease in processing speed with age but no difference in time-sharing abilities between age groups. The latter conclusion was supported by a factor analysis of the test scores, which revealed that scores on the factor defining time-sharing did not differ with age. (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
186. Wickens, Christopher D.; Et, Al (U Illinois Inst of Aviation, Aviation Research Lab, Savoy). The

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- Sternberg memory search task as an index of pilot workload. Special Issue: Aviation psychology. *Ergonomics*; 1986 Nov Vol 29(11) 1371-1383; 1986; CODEN: ERGOAX; ISSN: 00140139. Note: Human. Describes the rationale for the use of the S. Sternberg (see PA, Vol 54:390) memory search task as a diagnostic measure of pilot workload and summarizes 7 investigations that have employed this task in flight simulators or aircraft environments. The details of 2 other flight simulator experiments in which workload was measured by an auditory Sternberg task are reported. Results indicate the diagnostic value of the task in discriminating between the perceptual/central processing and response demands of a holding pattern and an approach pattern, respectively. Perceptual and response load were greater in an approach phase, relative to a holding phase. Neither phase imposed a substantial central processing load. Based on the findings of the studies described, a set of recommendations for employing the Sternberg task in aviation environments is presented. These recommendations emphasize the importance of information display and response procedures, the choice of particular memory sets, the presentation data, and the need to avoid extremely difficult flight tasks. (French & German abstracts) (27 ref) (PsycLIT Database Copyright 1987 American Psychological Assn, all rights reserved).
187. Wickens, Christopher D.; Kramer, Arthur F. (U Illinois, Champaign). Engineering psychology. Annual Review of Psychology; 1985 Vol 36 307-348; 1985; CODEN: ARPSAC; ISSN: 00664308. Note: Human. Reviews research on the cognitive aspects of engineering psychology, issues in human-computer interaction, process control, and automation. Human performance limits are considered with respect to the following: detection; response processes; attention, including such factors as task configuration, individual differences in learning, and subjective and physiological measures of workload; and decision making, including decision aids, heuristics and cognitive limits, and applications to criminal justice and forecasting. Other issues considered include causal inference and diagnosis and errors and internal models in human performance. Process control is discussed in terms of the nature of alarm indicators, the diagnostic process, and diagnosis training. Human-computer interaction is examined in relation to the psychology of programming, the learning of text editors, data manipulation and retrieval, and the implementation of automation. (111/2 p ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).
188. Wickens, Christopher D.; Kramer, Arthur F.; Donchin, Emanuel (U Illinois, Cognitive Psychophysiology Lab, Champaign). The event related potential as an index of the processing demands of a complex target acquisition task. Sixth International Conference on Event Related Slow Potentials of the Brain (EPIC VI): Cognition, information processing, and language (1981, Lake Forest/Chicago, Illinois). Annals of the New York Academy of Sciences; 1984 Jun Vol 425 295-299; 1984; CODEN: ANYAA9; ISSN: 00778923. Note: Human. Two studies with 19 undergraduates investigated the effect of systems order on the amplitude of the P300 component of the event-related potential to test the hypothesis that the amplitude of the P300 is sensitive to the perceptual demands of a task as manifested in the display monitoring paradigm while being relatively insensitive to response load. Also studied was the effect of practice in the primary task on the amplitude of the P300 elicited by a secondary task problem. Ss performed a 3-dimensional tracking task while correctly counting the total number of occurrences of a visual probe. Results show that P300 amplitude was sensitive to changes in the difficulty of a tracking task, both as a function of system order and phase. P300 appears to provide a useful metric for determining the locus of visual attention that is not constrained by the assumption that the S is attending to the area he/she is fixating on. (9 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).
189. Wickens, Christopher; Kramer, Arthur; Vanasse, Linda; Donchin, Emanuel (U Illinois, Urbana-Champaign). Performance of concurrent tasks: A psychophysiological analysis of the reciprocity of information processing resources. *Science*; 1983 Sep Vol 221(4615) 1080-1082; 1983; CODEN: SCIEAS; ISSN: 00368075. Note: Human. 12 right-handed students performed a pursuit step-tracking task concurrently with 1 of 3 secondary tasks designed to elicit event-related brain potentials. Two of these latter tasks were clearly secondary, whereas stimuli for the 3rd were embedded in the primary task. Three additional conditions were included in which each of the 3 secondary tasks (auditory probe, visual probe flash, and visual probe step) was performed without the concurrent tracking task, even though the moving target remained on the screen. After performing each task, Ss were asked to rate the subjective difficulty of the task on a 7-point scale. Results show that as the resource demands of the tracking task increased, potentials elicited by the task-defined events increased in amplitude, whereas those elicited by secondary-task auditory stimuli decreased. Results provide additional support for the hypothesis that the reduction in the amplitude of the P300, elicited by the stimuli of secondary tasks, results from a depletion of the resources deployed in the service of the secondary task by competition for these resources from the primary task. It is suggested that the P300 manifests the activation of some information-processing

activity that is invoked by the appearance of task-relevant events, with its amplitude inversely related to its expectancy. Previous research suggests that this "subroutine" is involved in updating or revising the model of the environment maintained in working memory. (PsycLIT Database Copyright 1984 American Psychological Assn, all rights reserved).

190. Wickens, Christopher D.; Liu, Yili (U Illinois-Champaign Inst of Aviation, Aviation Research Lab, Savoy, US). Codes and modalities in multiple resources: A success and a qualification. Special Issue: Human information processing: Theory and applications. *Human Factors*; 1988 Oct Vol 30(5) 599-616; 1988; CODEN: HUF666; ISSN: 00187208. Note: Human. Discusses the relevance of codes (verbal-spatial) and modalities (auditory-visual) in the multiple-resource model to the prediction of task interference. Section 1 describes an experiment in which either verbal or spatial decision tasks, responded to with either voice or keypress, were time-shared with 2nd-order tracking. Decision problem difficulty was manipulated, and subjective workload as well as performance measures were assessed. Results provide support for the importance of the dichotomy between verbal and spatial processing codes in accounting for task interference. Section 2 suggests that scanning produces a dominant cost to intramodal configurations when visual channels are separated in space; when visual separation is eliminated, however, the differences between cross-modal and intramodal performance may be best accounted for by a mechanism of preemption. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).
191. Wickens, Christopher D.; Sandry, Diane L.; Vidulich, Michael (U Illinois, Champaign). Compatibility and resource competition between modalities of input, central processing, and output. *Human Factors*; 1983 Apr Vol 25(2) 227-248; 1983; CODEN: HUF666; ISSN: 00187208. Note: Human. Synthesized auditory displays and speech recognizers were used in 2 experiments to develop guidelines for their implementation in military aircraft. 10 right-handed male students and 10 22-46 yr old right-handed male employees of a naval air test center served as Ss. In Exp I, the competition between encoding and response modalities of concurrent tasks was examined. The memory search task was more susceptible to competition for visual encoding, whereas the tracking task bore the greater impact from shared manual responding. Exp II examined competition between tasks for encoding and response modalities and the optimum assignments of modalities to a given task. A simulated flight task was performed concurrently with either a spatial task (target acquisition) or a verbal task (memory). Best performance and least interference with the flight task were obtained when the spatial task was displayed visually and responded to manually and also when the verbal task was displayed auditorily and responded to with speech. (39 ref) (PsycLIT Database Copyright 1983 American Psychological Assn, all rights reserved).
192. Wickens, Christopher D.; Sandry, Diane L. (U Illinois, Urbana-Champaign). Task hemispheric integrity in dual task performance. *Acta Psychologica*; 1982 Dec Vol 52(3) 227-247; 1982; CODEN: APSOAZ; ISSN: 00016918. Note: Human. A condition of "task hemispheric integrity" is predicted to result in a dual task situation when the central processing and response components of each task are associated exclusively with a given cerebral hemisphere. The prediction that this condition will generate more efficient time-sharing was tested in a series of 4 experiments. In Exp I, with 9 right-handed male undergraduates, the prediction was confirmed when a spatial (tracking) and verbal (letter memory search) task were time-shared, and the hand assignment to task responses was manipulated. In Exp II, with 9 Ss, a spatial variant of the memory search was used instead of the verbal letter search, and hand assignment effects were not obtained, since when 2 spatial tasks are time-shared an integrity assignment is impossible. Exp III with 9 Ss validated the hemispheric lateralization of the 2 single task variants of the memory search task, while Exp IV with 8 Ss established the separate spatial and verbal resource demands of the 2 variants by observing their differential interference with concurrent spatial and verbal tasks. (28 ref) (PsycLIT Database Copyright 1983 American Psychological Assn, all rights reserved).
193. Wickens, Christopher D.; Vidulich, Michael; Sandry, Garza, Diane (U Illinois, Aviation Research Lab, Savoy). Principles of S C R compatibility with spatial and verbal tasks: The role of display control location and voice interactive display control interfacing. Special Issue: Aviation psychology. *Human Factors*; 1984 Oct Vol 26(5) 533-543; 1984; CODEN: HUF666; ISSN: 00187208. Note: Human. Presents a model of stimulus/central-processing/response (S-C-R) compatibility that is based on the assumption that a pilot's tasks may be categorized into those that demand predominantly verbal operations and those that are spatial. The present 2 experiments examined 2 principles of compatibility of interfacing such tasks with displays and controls. The 1st principle, based upon hemispheric laterality effects, defines compatibility according to the display location and the response hand; the 2nd defines compatibility according to the modality of display (auditory and visual) and response (manual and speech). Verbal tasks

are best served by auditory inputs and speech response, whereas spatial tasks are best served by visual-manual channels. In both experiments, these principles of compatibility were confirmed under dual-task conditions. Implications for cockpit design are discussed. (8 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).

194. Wickens, Christopher D.; Yeh, Yei Yu (U Illinois Inst of Aviation, Aviation Research Lab, Savoy). POCs and performance decrements: A reply to Kantowitz and Weldon. *Human Factors*; 1985 Oct Vol 27(5) 549-554; 1985; CODEN: HUFAA6; ISSN: 00187208. Note: Human. Responds to criticisms presented by B. H. Kantowitz and M. Weldon (see PA, Vol 73:18784) of the performance operating characteristics (POC) methodology used in an article by the 1st author and colleagues (see PA, Vol 66:445), arguing that Kantowitz and Weldon do not address the primary issue of importance to system designers--how to compare interference between different tasks--which is an issue that requires the assumption of a constant interference between different tasks across tasks. Two alternate techniques for standardizing performance decrements across tasks. Two alternate techniques for standardizing are described. (10 ref) (PsycLIT Database Copyright 1986 American Psychological Assn, all rights reserved).
195. WIENER, E. L. (Miami, University, Coral Gables, Fla.). 'Controlled flight into terrain /CFIT/' accidents - System-induced errors. In: *Human factors in our expanding technology*; Proceedings of the Nineteenth Annual Meeting, Dallas, Tex., October 14-16, 1975. (A76-32226 15-54) Santa Monica, Calif., Human Factors Society, 1975, p. 95-101; 1975 11 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Journal Announcement: IAA7615 A review of the major recent accidents in U.S. commercial aviation leads to the conclusions that CFIT accidents are the result of system-induced errors and that these errors will continue to be generated by the unwieldy system of vehicles, traffic control, and terminals that have emerged as a result of component-wise design. Since rebuilding the system from the very foundations will never be possible, it must be improved the same way it was created, by patchwork. The need for help from human factors specialists in this patchwork is indicated. (V.P.) Source of Abstract/Subfile: AIAA/TIS.
196. Wiener, E. L. (U. Miami). Adaptive measurement of vigilance decrement. *Ergonomics*; 1973 Jul Vol. 16(4) 353-363; 1973. Note: Human. Describes a computer-based monitoring task which is adaptive, or self-adjusting, with the size of the signal stimulus (compared to a fixed nonsignal stimulus) mediated by the detection score of the S to maintain a constant detection rate. Ss were 21 undergraduates. Data indicate that to maintain a fixed detection criterion over a 48-min vigil, the adaptive variable (separation distance of a pair of dots presented simultaneously) behaved in a manner consistent with the usual measures of vigilance decrement. Several adaptive strategies are discussed. (French & German summaries) (PsycLIT Database Copyright 1974 American Psychological Assn, all rights reserved).
197. WIENER, E. L. (Miami, University, Coral Gables, Fla.). Adaptive measurement of vigilance decrement. *Ergonomics*, vol. 16, July 1973, p. 353-363; Jul. 1973 12 Refs. Note: Contract No.: PHS-R01-OH-00346 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7323 This paper describes a computer-based monitoring task which is adaptive, or self-adjusting, with the size of the signal stimulus (compared to a fixed non-signal stimulus) being mediated by the detection score of the subject, so as to maintain a constant detection rate. Data are presented which indicate that in order to maintain a fixed detection criterion over a 48-min vigil, the adaptive variable (separation distance of a pair of dots presented simultaneously) behaved in a manner consistent with the usual measures of vigilance decrement. Several adaptive strategies are discussed. ((Author)).
198. WIENER, E. L. (Miami, University, Coral Gables, Fla.). An adaptive vigilance task with knowledge of results. *Human Factors*, vol. 16, Aug. 1974, p. 333-338; Aug. 1974 7 Refs. Note: Contract No.: PHS-R01-OH-00346 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7501 Four groups of subjects performed a 48-min, computer-controlled, visual watch-keeping task. Two groups were run under fixed, nonadaptive conditions, one with immediate knowledge of results (KR) and the other without (NKR). The KR group showed the usual superiority in detection rate over the NKR group, and made fewer commissive errors (false alarms). Two other groups, also KR and NKR, ran under adaptive conditions, wherein the size of the signals they watched for was adjusted during the vigil according to past performance, so as to maintain a preset detection rate. The resulting curves for the adaptive variable closely resembled the traditional performance measure, detection rate. Various adaptive strategies are discussed. ((Author)).

199. WIENER, E. L. (Miami, University, Miami, Fla.). Aircraft collisions. In: Human Factors Society, Annual Meeting, 23rd, Boston, Mass., October 29-November 1, 1979, Proceedings. (A80-24026 08-53) Santa Monica, Calif., Human Factors Society, Inc., 1979, p. 26-29; 1979 9 Refs. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Journal Announcement: IAA8008 The paper examines collisions from a human factors perspective, seeing them as 'system-induced errors' resulting from control systems that stress regulation and airspace allocation, and do not properly consider the human operator. It is argued that in order to avoid future accidents, system designers must consider such topics as basic assumptions in air traffic control, mixed IFR and VFR navigation, pilot-controller and controller-controller communications, extra-cockpit vision, workload of pilots and controllers, proposed regulations, and instrumentation. (M.E.P.) Source of Abstract/Subfile: AIAA/TIS.
200. WIENER, E. L. (Miami, University, Coral Gables, FL). Beyond the sterile cockpit (dangers of automatic flight control). Miami Univ., Coral Gables, Fla; Feb. 1985 59 Refs. Note: Contract No.: NCC2-152 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8516 Consideration is given to some of the negative aspects of the trend toward increased automation of aircraft flight decks. The history of automated devices for navigation, communications and detection on board aircraft is reviewed. Instances of automatic system failure are identified which have led to accidents, and the events surrounding the downing of Korean Airlines Flight 747 are reexamined within the context of a computer-based system failure. Finally, new software and interactive systems to reduce navigational error due to inadequate computer-assisted flight instruction (CAI) are described, with emphasis given to speech processing and intelligent CAI systems. (I.H.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). Human Factors (ISSN 0018-7208), vol. 27, Feb. 1985, p. 75-90.
201. WIENER, E. L. (Miami, University, FL). Cockpit automation - In need of a philosophy. Miami Univ., Fla; 1985 14 Refs. Note: Report No.: SAE PAPER 851956 Contract No.: NCC2-152 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8615 Concern has been expressed over the rapid development and deployment of automatic devices in transport aircraft, due mainly to the human interface and particularly the role of automation in inducing human error. The paper discusses the need for coherent philosophies of automation, and proposes several approaches: (1) flight management by exception, which states that as long as a crew stays within the bounds of regulations, air traffic control and flight safety, it may fly as it sees fit; (2) exceptions by forecasting, where the use of forecasting models would predict boundary penetration, rather than waiting for it to happen; (3) goal-sharing, where a computer is informed of overall goals, and subsequently has the capability of checking inputs and aircraft position for consistency with the overall goal or intentions; and (4) artificial intelligence and expert systems, where intelligent machines could mimic human reason. (K.K.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). IN: Aerospace Behavioral Engineering Technology Conference, 4th, Long Beach, CA, October 14-17, 1985, Proceedings (A86-35426 15-54). Warrendale, PA, Society of Automotive Engineers, Inc., 1985, p. 369-375.
202. WIENER, E. L. (Miami, University, Coral Gables, FL). Computers in the cockpit - But what about the pilots? Miami Univ., Coral Gables, Fla; 1983 6 Refs. Note: Report No.: SAE PAPER 831546 Contract No.: NCC2-152 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8412 The advent of the microprocessor has made it possible to design and implement small special purpose digital computers for the flightdeck of an aircraft. However, by the end of the 1970s, many in aviation and government were concerned about certain safety implications of developments related to automation which had occurred. As a result of these concerns, NASA was directed to examine the human factors of automation. A field investigation concerning the arising questions was conducted, taking into account the introduction of the Dash 80 airliner in 1980. Attention is given to the design philosophy of the aircraft, the study methodology, and preliminary results of the study, which are based on analysis of the first wave of questionnaire data and interviews. Almost all pilots, and check captains as well, expressed the view that the first 50 to 100 hours in the -80 were difficult. The reasons for these difficulties were related to cockpit automation and, in addition, to the fact that the new aircraft was more powerful than the older models to which they were accustomed. (G.R.) Source of Abstract/Subfile: AIAA/TIS. IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings (A84-29476 12-54). Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 453-458.

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203. WIENER, E. L. (Miami, University, Coral Gables, Fla.). Controlled flight into terrain accidents - System-induced errors. In: Human Factors, vol. 19, Apr. 1977, p. 171-181; Apr. 1977 28 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Journal Announcement: IAA7714 Controlled flight into terrain accidents are those in which an aircraft, under the control of the crew, is flown into terrain (or water) with no prior awareness on the part of the crew of the impending disaster. This paper examines recent experience with these accidents, seeing them as the result of errors generated by a complex air traffic control system with ample opportunities for system-induced errors. Such problem areas as pilot-controller communication, flightdeck workload, noise-abatement procedures, government regulation, visual illusions, and cockpit-and ground-radar warning devices are discussed, with numerous examples of recent accident cases. The failure of the human factors profession to play a more significant role in the air traffic complex is also considered. ((Author)). Documents available from AIAA Technical Library.
204. WIENER, E. L. Human factors in cockpit automation: A field study of flight crew transition. Miami Univ., Coral Gables, Fla. Dept. of Management Science; Jul. 1985 124P. Note: Report No.: NASA-CR-177333; NAS 1.26:177333 Contract No.: NCC2-152 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A06/MF A01 Journal Announcement: STAR8519 The factors which affected two groups of airline pilots in the transition from traditional airline cockpits to a highly automated version were studied. All pilots were highly experienced in traditional models of the McDonnell-Douglas DC-9 prior to their transition to the more automated DC-9-80. Specific features of the new aircraft, particularly the digital flight guidance system (DFGS) and other automatic features such as the autoflight system (AFS), autobrake, and digital display were studied. Particular attention was paid to the first 200 hours of line flying experience in the new aircraft, and the difficulties that some pilots found in adapting to the new systems during this initial operating period. Efforts to prevent skill loss from automation, training methods, traditional human factors issues, and general views of the pilots toward cockpit automation are discussed. (E.A.K.) Source of Abstract/Subfile: NASA STIF COSATI Code: 5H Man-machine Relations.
205. WIENER, E. L. Human factors in cockpit automation. Miami Univ., Coral Gables, Fla; Dec. 1984. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC A15/MF A01 Journal Announcement: STAR8506 The rapid advance in microprocessor technology has made it possible to automate many functions that were previously performed manually. Several research areas have been identified which are basic to the question of the implementation of automation in the cockpit. One of the identified areas deserving further research is warning and alerting systems. Modern transport aircraft have had one after another warning and alerting systems added, and computer-based cockpit systems make it possible to add even more. Three major areas of concern are: input methods (including voice, keyboard, touch panel, etc.), output methods and displays (from traditional instruments to CRTs, to exotic displays including the human voice), and training for automation. Training for operating highly automatic systems requires considerably more attention than it has been given in the past. Training methods have not kept pace with the advent of flight-deck automation. (B.W.) Source of Abstract/Subfile: NASA STIF Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In NASA. Ames Research Center Technical Workshop: Advanced Helicopter Cockpit Design Concepts p 173-186 (SEE N85-14806 06-04).
206. WIENER, E. L. (Miami, University, Coral Gables, Fla.). Midair collisions - The accidents, the systems, and the Realpolitik. Miami Univ., Coral Gables, Fla; Oct. 1980 42 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8103 Two midair collisions occurring in 1978 are described, and the air traffic control system and procedures in use at the time, human factors implications and political consequences of the accidents are examined. The first collision occurred in Memphis and involved a Falcon jet and a Cessna 150 in a situation in which the controllers handling each aircraft were not aware of the presence of the other aircraft until it was too late. The second occurred in San Diego four months later, when a Boeing 727 on a visual approach struck a Cessna 172 from the rear. Following the San Diego collision there arose a great deal of investigative activity, resulting in suggestions for tighter control on visual flight rules aircraft and the expansion of positive control airspace. These issues then led to a political battle involving general aviation, the FAA and the Congress. It is argued, however, that the collisions were in fact system-induced errors resulting from an air traffic control system which emphasizes airspace allocation and politics rather than the various human factors problems facing pilots and controllers. (A.L.W.) Source of Abstract/Subfile: AIAA/TIS. Human Factors, vol. 22, Oct. 1980, p.

## 521-533. NASA-supported research.

207. WIENER, E. L. (MIAMI, U., CORAL GABLES, FLA.). The performance of multi-man monitoring teams. (Multiman team performance for visual monitoring task). HUMAN FACTORS, VOL. 6, APR. 1964, P. 179-184. 12 REFS. PUBLIC HEALTH SERVICE; Apr. 1964. Note: Contract No.: PHS-G-AC-00126 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA6501 Source of Abstract/Subfile: AIAA/TIS.
208. WIENER, E. L. (Results of human performance in a monitoring task). Miami Univ., Coral Gables, Fla; Aug. 1962. Note: Report No.: AMRL-TDR-62-82 Language: English Document Type: THESIS Documents available from AIAA Technical Library Journal Announcement: STAR6301. MIAMI U., CORAL GABLES, FLA. KNOWLEDGE OF RESULTS IN A MONITORING TASK <FINAL REPORT> EARL L. WIENER /PH.D. THESIS, OHIO STATE U./ WRIGHT-PATTERSON AFB, OHIO, BEHAVIORAL SCIENCES LAB., AUG. 1962 51 P 41 REFS /SUPPORTED BY GRANT FROM OHIO STATE U. ENGINEERING EXPERIMENT STATION//AMRL-TDR-62-82/OTS- \$1.50.
209. WIENER, E. L. (Miami University, Coral Gables, Fla.). Stimulus presentation rate in vigilance. In: Human Factors, vol. 19, June 1977, p. 301-303; Jun. 1977 5 Refs. Note: Contract No.: PHS-R01-OH-00346 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7717 Four groups of 12 subjects were run for two sessions to determine the influence of stimulus presentation rate in a monitoring task. Two stimulus rates were used, 12 and 60 per minute. Stimulus rate significantly affected detections on both days, but no transfer effect was found. ((Author)).
210. WIENER, E. L. (Miami Univ., Coral Gables, Fla.); CURRY, R. E. Flight-deck automation: Promises and problems. National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif; Jan. 1980 27P. Note: Report No.: NASA-TM-81206; A-8210 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A03/MF A01 Journal Announcement: STAR8016 The state of the art in human factors in flight-deck automation is presented. A number of critical problem areas are identified and broad design guidelines are offered. Automation-related aircraft accidents and incidents are discussed as examples of human factors problems in automated flight. (R.E.S.) Source of Abstract/Subfile: NASA STIF Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations.
211. WIENER, E. L. (Miami University, Coral Gables, Fla.); CURRY, R. E. (NASA, Ames Research Center, Moffett Field, Calif.). Flight-deck automation - Promises and problems. Miami Univ., Coral Gables, Fla; Oct. 1980 31 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8105 The paper analyzes the role of human factors in flight-deck automation, identifies problem areas, and suggests design guidelines. Flight-deck automation using microprocessor technology and display systems improves performance and safety while leading to a decrease in size, cost, and power consumption. On the other hand negative factors such as failure of automatic equipment, automation-induced error compounded by crew error, crew error in equipment set-up, failure to heed automatic alarms, and loss of proficiency must also be taken into account. Among the problem areas discussed are automation of control tasks, monitoring of complex systems, psychosocial aspects of automation, and alerting and warning systems. Guidelines are suggested for designing, utilizing, and improving control and monitoring systems. Investigation into flight-deck automation systems is important as the knowledge gained can be applied to other systems such as air traffic control and nuclear power generation, but the many problems encountered with automated systems need to be analyzed and overcome in future research. (B.R.K.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). Ergonomics, vol. 23, Oct. 1980, p. 995-1011.
212. WIENER, E. L. (Miami University, Coral Gables, FL); CURRY, R. E. (NASA, Ames, Research Center, Moffett Field, CA); FAUSTINA, M. L. (San Jose State University, San Jose, CA). Vigilance and task load - In search of the inverted U. Miami Univ., Coral Gables, Fla; Apr. 1984 14 Refs. Note: Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8421 The 'Inverted-U Hypothesis' states that for a given task, there is an optimal level of workload or demand that yields the highest level of performance. A departure in either direction will result in a monotonically lower performance level, hence



an inverted-U-shaped relationship between task demand and quality of performance. Most studies to date have failed to demonstrate the left-hand branch of the curve, that is, the regime in which performance presumably rises as load increases. The purpose of this study was to explore whether low-level additional demand on the monitor would result in improved performance. Four groups of subjects performed a visual monitoring task for 48 min, then two of the four groups were given additional tasks, and a third had potentially distracting information on its display. Results indicated that the two groups with additional demand detected more signals than did the control group or the control-plus-distraction group. There were no significant differences in false alarms. (Author) Source of Abstract/Subfile: AIAA/TIS. Human Factors (ISSN 0018-7208), vol. 26, April 1984, p. 215-222.

213. WIENER, E. L.; KEELER, F. L. (Miami, University, Coral Gables, Fla.). Adaptive strategies in vigilance research. *Ergonomics*, vol. 18, July 1975, p. 403-414; Jul. 1975 9 Refs. Note: Contract No.: PHS-R01-OE1-00346 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA7520 In an adaptive, or self-adjusting vigilance task, numerous variables combine to define an adaptive strategy, a set of decision rules which govern the adjustments in task difficulty. This paper discusses several possible adaptive strategies, particularly variations in the number of scored signals and the amount of change in task difficulty (gain factors). A model by which the signal detection rate can be predicted is developed, and three experiments test the accuracy of this model, and the ability of an adaptive task to hold a constant detection rate over a 48 min vigil. (Author).
214. Wiener, Earl L. (U Miami). An adaptive vigilance task with knowledge of results. *Human Factors*; 1974 Aug Vol 16(4) 333-338; 1974. Note: Human. Groups of undergraduates performed a 48-min, computer-controlled, visual watch-keeping task. 2 groups of 14 Ss each were run under fixed, nonadaptive conditions, one with immediate knowledge of results (KR) and the other without (NKR). The KR group showed the usual superiority in detection rate over the NKR group and made fewer commissive errors (false alarms). 2 groups of 18 Ss each, also KR and NKP, ran under adaptive conditions wherein the size of the signals they watched for was adjusted during the vigil according to past performance, so as to maintain a preset detection rate. Resulting curves for the adaptive variable closely resemble the traditional performance measure, detection rate. Various adaptive strategies are discussed. (PsycLIT Database Copyright 1975 American Psychological Assn, all rights reserved).
215. Wiener, Earl L. (U Miami, Coral Gables, FL, US). Application of vigilance research: Rare, medium, or well done? Special Issue: Vigilance: Basic and applied research. *Human Factors*; 1987 Dec Vol 29(6) 725-736; 1987; CODEN: HUF AAG; ISSN: 00187208. Note: Human. Suggests that the failure to implement vigilance research may be attributed to insufficient interest in bridging the gap between the laboratory and the work world as: lack of data from the latter. It is argued that the situation will probably remain unremedied until more effort is made to understand the nature of complex systems and their dependence on human monitors and until the myth that automation of functions diminishes the need for human vigilance is abandoned. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
216. WIENER, EARL L. (Miami, University, Coral Gables, FL). Application of vigilance research - Rare, medium, or well done? Miami Univ., Coral Gables, Fla; Dec. 1987 37 Refs. Note: Contract No.: NCC2-377 Language: English Country of Origin: United States Document Type: JOURNAL ARTICLE Documents available from AIAA Technical Library Journal Announcement: IAA8809 In the years since Mackworth (1950) initiated research into problems of human vigilance, automated systems have become more complex and costly, with greater repercussions upon failure; this has led to a paradoxical enhancement of human monitoring's importance. Applications of vigilance research to well-designed systems that take human monitoring into account are rare, although the outlook for future systems is improving. Attention is presently given to problems encountered in considerations of signal rate, length of vigil, time decrements, and two examples of implementation from commercial aviation. (O.C.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). *Human Factors* (ISSN 0018-7208), vol. 29, Dec. 1987, p. 725-736.
217. Wiener, Earl L. (U Miami, FL). Beyond the sterile cockpit. Special Issue: Automation. *Human Factors*; 1985 Feb Vol 27(1) 75-90; 1985; CODEN: HUF AAG; ISSN: 00187208. Note: Human. Examines the role of automation in airplane technology and how this movement may affect pilot performance and the safety and reliability of commercial air travel. Certain dramatic accidents and incidents in recent years, as well as the destruction of Korean Airlines Flight 007, have been interpreted as automation-induced by many observers. The pros and cons of this trend are discussed in terms of economy, reliability, and

maintenance; workload reduction; display flexibility; and economy of space. The changing nature of piloting is described, and it is argued that humans must be brought back into a more active role in the control loop aided by decision support systems. (59 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved).

218. WIENER, EARL L. (Miami, University, Coral Gables, FL). Cockpit automation. Miami Univ., Coral Gables, FL; 1988 58 Refs. Note: Contract No.: NCC2-377 Language: English Country of Origin: United States Document Type: ANALYTIC OF COLLECTED WORK Documents available from AIAA Technical Library Journal Announcement: IAA8914 The aims and methods of aircraft cockpit automation are reviewed from a human-factors perspective. Consideration is given to the mixed pilot reception of increased automation, government concern with the safety and reliability of highly automated aircraft, the formal definition of automation, and the ground-proximity warning system and accidents involving controlled flight into terrain. The factors motivating automation include technology availability; safety; economy, reliability, and maintenance; workload reduction and two-pilot certification; more accurate maneuvering and navigation; display flexibility; economy of cockpit space; and military requirements. (T.K.) Source of Abstract/Subfile: AIAA/TIS. IN: Human factors in aviation (A89-34431 14-54). San Diego, CA, Academic Press, Inc., 1988, p. 433-461. Z
219. WIENER, EARL L. (Miami, University, Coral Gables, FL). Fallible humans and vulnerable systems - Lessons learned from aviation. Miami Univ., Coral Gables, Fla; 1987 41 Refs. Note: Contract No.: NCC2-377 Language: English Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8819 It is suggested that the problems being experienced in complex automatic systems are essentially due to the failure of information management and communication. The failure covers the entire spectrum: display devices and techniques, coding information so as to reduce human error, and information economy, i.e., resisting the temptation to bombard the operator with unlimited information simply because the system possesses the capability to do so. Since there has been great progress in hardware engineering, it is suggested that further attention is needed in the 'soft' side of systems. The approach should focus on (1) preventing human cognitive slips and (2) making the systems less vulnerable to such slips when they do occur. Most of the examples are taken from studies of cockpit automation. (B.J.) Source of Abstract/Subfile: AIAA/TIS. IN: Information systems: Failure analysis; Proceedings of the NATO Advanced Research Workshop, Bad Windsheim, Federal Republic of Germany, Aug. 18-22, 1986 (A88-46506 19-66). Berlin and New York, Springer-Verlag, 1987, p. 163-181. Country of Origin: United States Country of Publication: Germany, Federal Republic of. Z
220. WIENER, EARL L. Human factors of advanced technology (glass cockpit) transport aircraft. Miami Univ., Coral Gables, FL. Dept. of Management Science; Jun. 1989 222P. Note: Report No.: NASA-CR-177528; NAS 1.26:177528 Contract No.: NCC2-377 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A10/MF A01 Journal Announcement: STAR8920 A three-year study of airline crews at two U.S. airlines who were flying an advanced technology aircraft, the Boeing 757 is discussed. The opinions and experiences of these pilots as they view the advanced, automated features of this aircraft, and contrast them with previous models they have flown are discussed. Training for advanced automation; (2) cockpit errors and error reduction; (3) management of cockpit workload; and (4) general attitudes toward cockpit automation are emphasized. The limitations of the air traffic control (ATC) system on the ability to utilize the advanced features of the new aircraft are discussed. In general the pilots are enthusiastic about flying an advanced technology aircraft, but they express mixed feelings about the impact of automation on workload, crew errors, and ability to manage the flight. (Author) COSATI Code: 1C Aircraft. Z
221. WIENER, EARL L. Human factors of the high technology cockpit. Miami Univ., Coral Gables, FL: Oct. 1990. Note: Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Other Availability: NTIS HC/MF A12 Journal Announcement: STAR9102 The rapid advance of cockpit automation in the last decade has outstripped the ability of the human factors profession to understand the changes in human functions required. High technology cockpits require less physical (observable) workload, but are highly demanding of cognitive functions such as planning, alternative selection, and monitoring. Furthermore, automation creates opportunity for new and more serious forms of human error, and many pilots are concerned about the possibility of complacency affecting their performance. On the positive side, the equipment works as advertised with high reliability, offering highly efficient, computer-based flight. These findings from the cockpit studies probably apply equally to other industries, such as nuclear power production, other modes Z

of transportation, medicine, and manufacturing, all of which traditionally have looked to aviation for technological leadership. The challenge to the human factors profession is to aid designers, operators, and training departments in exploiting the positive side of automation, while seeking solutions to the negative side. Viewgraphs are given. (Author) Subject Classification: 7554 Man/System Technology & Life Support (1975-) COSATI Code: 5H Man-machine Relations. In NASA, Langley Research Center, Aviation Safety/Automation Program Conference p 83-90 (SEE N91-10936 02-03).

222. WIENER, EARL (Miami University, Coral Gables, FL). Management of human error by design. Miami Univ., Coral Gables, Fla; 1988 9 Refs. Note: Report No.: SAE PAPER 872505 Contract No.: NCC2-377 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA8901 Design-induced errors and error prevention as well as the concept of lines of defense against human error are discussed. The concept of human error prevention, whose main focus has been on hardware, is extended to other features of the human-machine interface vulnerable to design-induced errors. In particular, it is pointed out that human factors and human error prevention should be part of the process of transport certification. Also, the concept of error tolerant systems is considered as a last line of defense against error. (V.L.) Source of Abstract/Subfile: AIAA/TIS. IN: Human Error Avoidance Techniques Conference, Washington, DC, Dec. 1-3, 1987, Proceedings (A89-10693 01-53). Warrendale, PA, Society of Automotive Engineers, Inc., 1988, p. 7-11.
223. Wiener, Earl L. (U Miami). On simultaneous monitoring and tracking. *Journal of Applied Psychology*; 1975 Feb Vol 60(1) 100-105; 1975. Note: Human. Conducted a study of 72 undergraduates to examine the effects of time-sharing between a tracking and monitoring task presented on the same visual display and to evaluate the possibility that knowledge of results on the monitoring task might offset any harmful effects due to time-sharing demands. Ss first performed a visual monitoring task with no knowledge of results; 2 days later they were assigned to 1 of 6 groups and performed the same task with or without knowledge of results under 1 of 3 levels of secondary task loads: high-frequency input compensatory tracking, low-frequency tracking, and no tracking. In addition, a 7th group (n = 12) performed the tracking task only. Results show that time-sharing between monitoring and tracking degraded performance on both tasks, but tracking input frequency did not affect monitoring performance. Groups which received knowledge of results neither improve nor declined in monitoring performance when the time-sharing load was imposed. (PsycLIT Database Copyright 1975 American Psychological Assn, all rights reserved).
224. WIENER, EARL L. (Miami University, Coral Gables, FL). Reflections on human error - Matters of life and death. Miami Univ., Coral Gables, FL; 1989 21 Refs. Note: Contract No.: NCC2-377 Language: English Country of Origin: United States Document Type: CONFERENCE PAPER Documents available from AIAA Technical Library Journal Announcement: IAA9012 The last two decades have witnessed a rapid growth in the introduction of automatic devices into aircraft cockpits, and elsewhere in human-machine systems. This was motivated in part by the assumption that when human functioning is replaced by machine functioning, human error is eliminated. Experience to date shows that this is far from true, and that automation does not replace humans, but changes their role in the system, as well as the types and severity of the errors they make. This altered role may lead to fewer, but more critical errors. Intervention strategies to prevent these errors, or ameliorate their consequences include basic human factors engineering of the interface, enhanced warning and alerting systems, and more intelligent interfaces that understand the strategic intent of the crew and can detect and trap inconsistent or erroneous input before it affects the system. (Author) Source of Abstract/Subfile: AIAA/TIS. IN: Human Factors Society, Annual Meeting, 33rd, Denver, CO, Oct. 16-20, 1989, Proceedings. Volume 1 (A90-31326 12-54). Santa Monica, CA, Human Factors Society, 1989, p. 1-7.
225. Wiener, Earl L. (U Miami, Coral Gables). Stimulus presentation rate in vigilance. *Human Factors*; 1977 Jun Vol 19(3) 301-303; 1977; CODEN: HUF666; ISSN: 00187208. Note: Human. Attempted to determine the influence of stimulus presentation rate in a monitoring task performed by 4 groups of 12 undergraduates over 2 sessions. Two stimulus rates were used, 12 and 60/min. Results indicate that stimulus rate significantly affected detections on both days, but no transfer effect was found. (PsycLIT Database Copyright 1978 American Psychological Assn, all rights reserved).
226. Wiener, Earl L.; Carry, Renwick E. (U Miami, Coral Gables). Flight deck automation: Promises and problems. *Ergonomics*; 1980 Oct Vol 23(10) 995-1011; 1980; CODEN: ERGOAX; ISSN: 00140139. Note: Human. Discusses the state-of-the-art in human factors in flight-deck automation, identifies critical problem areas, and offers broad design guidelines. Automation-related aircraft accidents and incidents are discussed as examples of human factors problems in automated flight. (French & German abstracts) (31

ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved).

227. Wiener, Earl L.; Curry, Renwick E.; Faustina, Mary L. (U Miami, FL). Vigilance and task load: In search of the inverted U. *Human Factors*; 1984 Apr Vol 26(2) 215-222; 1984; CODEN: HUFAA6; ISSN: 00187208. Note: Human. The "inverted-'U' hypothesis" states that for a given task, there is an optimal level of work load or demand that yields the highest level of performance. A departure in either direction will result in monotonically lower performance level, hence an inverted-'U'-shaped relationship between task demand and quality of performance. Most studies to date have failed to demonstrate the left-hand branch of the curve, that is, the regime in which performance presumably rises as load increases. The present explored whether low-level additional demand on the monitor would result in improved performance. 52 college-age Ss were divided into 4 groups and asked to perform a visual monitoring task for 48 min. Two of the 4 groups were given additional tasks, and a 3rd had potentially distracting information on its display. Results indicate that the 2 groups with additional demand detected more signals than did the control group or the control-plus-distraction group. There were no significant differences in false alarms. (14 ref) (PsycLIT Database Copyright 1985 American Psychological Assn, all rights reserved). 232.
228. Wiener, Earl L.; Keefer, F. Laurence (U Miami, FL). Adaptive strategies in vigilance research. *Ergonomics*; 1975 Jul Vol 18(4) 403-414; 1975. Note: Human. Discusses several possible strategies, particularly variations in the number of scored signals and the amount of change in task difficulty (gain factors). A model by which the signal detection rate can be predicted is developed, and 3 experiments test the accuracy of this model and the ability of an adaptive task to hold a constant detection rate over a 48-min vigil. (French & German summaries) (PsycLIT Database Copyright 1976 American Psychological Assn, all rights reserved). 233.
229. WIENER, EARL L. (Miami, University, Coral Gables, FL); NAGEL, DAVID C. (NASA, Ames Research Center, Moffett Field, CA), EDS. Human factors in aviation (Book). Miami Univ., Coral Gables, FL; 1983. Note: Language: English Country of Origin: United States Document Type: COLLECTED WORK Journal Announcement: IAA8914 The fundamental principles of human-factors (HF) analysis for aviation applications are examined in a collection of reviews by leading experts, with an emphasis on recent developments. The aim is to provide information and guidance to the aviation community outside the HF field itself. Topics addressed include the systems approach to HF, system safety considerations, the human senses in flight, information processing, aviation workloads, group interaction and crew performance, flight training and simulation, human error in aviation operations, and aircrew fatigue and circadian rhythms. Also discussed are pilot control; aviation displays; cockpit automation; HF aspects of software interfaces; the design and integration of cockpit-crew systems; and HF issues for airline pilots, general aviation, helicopters, and ATC. (T.K.) Source of Abstract/Subfile: AIAA/TIS Subject Classification: 7554 Man/System Technology & Life Support (1975-). San Diego, CA, Academic Press, Inc., 1988, 704 p. For individual items see A89-34432 to A89-34450. 234.
230. Woods, D. D.; Roth, E. M. (Westinghouse Research & Development Ctr, Pittsburgh, PA, US). Aiding human performance: II. From cognitive analysis to support systems. *Travail Humain*; 1988 Jun Vol 51(2) 139-172; 1988; ISSN: 00411868. Note: Human. Explores issues about building various types of performance aids, given the results of a cognitive analysis in a companion paper by the present authors (see PA, Vol 76:10412). The present paper focuses on how the results of analyses of the sources of task difficulties, operator skill, and errors are used to create support systems (e.g., online advisory system, exploratory learning environments). The 2 papers provide a tour of one natural problem solving habitat to reveal the substantive cognitive engineering challenges that arise when attempting to use machine power to improve human performance. (French abstract) (PsycLIT Database Copyright 1990 American Psychological Assn, all rights reserved). 2
231. WOODS, D. D.; WISE, J. A.; HANES, L. F. Evaluation of safety-parameter display concepts, volume 2 Final Report. Westinghouse Electric Corp., Pittsburgh, Pa; Feb. 1982 224P. Note: Report No.: DES2-902072; EPRI-NP-2239-VOL-2 Contract No.: EPRI PROJ. 891-5 Language: English Country of Origin: United States Document Type: REPORT Documents available from AIAA Technical Library Other Availability: NTIS HC A10/MF A01 Journal Announcement: STAR8314 New control room equipment designed to improve operator performance must be evaluated before adoption and installation. Two experimental concepts for a Safety Parameters Display System (SPDS) were evaluated to assess benefits and potential problems associated with the SPDS concept and its integration into control room operations. Participants were licensed utility operators undergoing retaining on a nuclear power plant simulator. Both quantitative and qualitative data were collected and analyzed on crew response to seven 2

simulated accident conditions. Data on operator decisions and actions were organized into timelines. Analysis of the timelines and observations collected during testing provide important insights about the potential impact of the SPDS concept on control room operations. (DOE) Source of Abstract/Subfile: DOE.

232. Woods, David D. (Westinghouse Research & Development Ctr, Pittsburgh, PA, US). Cognitive technologies: The design of joint human machine cognitive systems. *AI Magazine*; 1986 Win Vol 6(4) 86-92; 1986; ISSN: 07384602. Note: Human. Explores the implications of one type of cognitive technology, techniques, and concepts to develop joint human-machine cognitive systems for the application of computational technology by examining the joint cognitive system implicit in a hypothetical computer consultant that outputs some form of problem solution. Some of the problems that can occur in cognitive system design are revealed (e.g., machine control of the interaction, the danger of a responsibility-authority double-bind). Applied cognitive psychology is challenged to provide models, data, and techniques to help designers build an effective combination between the human and machine elements of a joint cognitive system. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
233. Woods, David D. (Westinghouse Research & Development Ctr, Pittsburgh, PA, US). Commentary: Cognitive engineering in complex and dynamic worlds. Special Issue: Cognitive engineering in dynamic worlds. *International Journal of Man Machine Studies*; 1987 Nov-Dec Vol 27(5-6) 571-585; 1987; CODEN: IJMMBC; ISSN: 00207373. Note: Human. Suggests a cognitive language of description for use in discussing the coupling of human intelligence and problem-solving machines. The 3 elements of this language (the world to be acted on, agents who act on the world, and external representations through which the world is experienced) are illustrated through a discussion of the factors that modulate a world's cognitive demands. The problem of unexpected variability in preplanned problem-solving routes and the question of how cognitive engineering can enhance problem-solving performance are explored. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
234. Woods, David D. (Westinghouse Research & Development Ctr, Pittsburgh, PA). Visual momentum: A concept to improve the cognitive coupling of person and computer. *International Journal of Man Machine Studies*; 1984 Sep Vol 21(3) 229-244; 1984; CODEN: IJMMBC; ISSN: 00207373. Note: Human. Discusses means by which computer display system users integrate data across successive displays. It is argued that this problem of across-display processing is analogous to the question of how the visual system combines data across successive glances (fixations). Research from cognitive psychology on the latter question is used to formulate guidelines for the display designer. The result is a new principle of person-computer interaction, visual momentum, which captures knowledge about the mechanisms that support the identification of relevant data in human perception so that display system design can support an effective distribution of user attention. The negative consequences of low visual momentum on user performance are described, and display design techniques are presented to improve user across-display information extraction. These techniques are appropriate for successive views across different units within the database and successive states in the kind of view or representation of a single data unit. The relationship between visual momentum and user mental work load and user data sampling behavior is discussed, and principles of human-machine cognitive performance are outlined. (63 ref) (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
235. Woods, David D.; Hollnagel, Erik (Westinghouse Research & Development Ctr, Pittsburgh, PA). Mapping cognitive demands in complex problem solving worlds. Special Issue: Knowledge acquisition for knowledge based systems: II. *International Journal of Man Machine Studies*; 1987 Feb Vol 26(2) 257-275; 1987; CODEN: IJMMBC; ISSN: 00207373. Note: Human. Describes a problem-driven approach to understanding the cognitive activities performed by joint human-machine cognitive systems. The approach combines an analysis of the domain to determine psychological (particularly cognitive) demands and a psychological analysis of human (especially problem solving) performance given those demands; the basic unit of description is a goals-means or functional interrelationship. Illustrations of the goals-means network are provided. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).
236. Woods, David D.; Roth, Emilie M. (Ohio State U, Columbus, US). Cognitive engineering: Human problem solving with tools. Special Issue: Expert systems. *Human Factors*; 1988 Aug Vol 30(4) 415-430; 1988; CODEN: HUF A A 6; ISSN: 00187208. Note: Human. Defines cognitive engineering as an applied cognitive science that draws on the knowledge and techniques of cognitive psychology and related disciplines to provide the foundation for principle-driven design of person-machine systems. The

fundamental features that characterize cognitive engineering are examined and the issues it faces are reviewed. An example of how cognitive and computational technologies interact is provided. (PsycLIT Database Copyright 1989 American Psychological Assn, all rights reserved).

237. Woods, David D.; Sorkin, Robert D.; Boggs, George J. (Purdue U, West Lafayette). Stimulus context and duration discrimination. *Perception and Psychophysics*; 1979 Aug Vol 26(2) 127-132; 1979; CODEN: PEPSBJ; ISSN: 00315117. Note: Human. The ability of human observers to discriminate duration was assessed in 2 types of tasks: (1) pulse tasks, in which the observer compared the duration of 2 brief increments in an ongoing sinusoid, and (2) gap tasks, in which the observer compared the duration of 2 brief interruptions in an ongoing sinusoid. Observers were 3 females: 2 experienced graduate students and 1 naive undergraduate. Performance was assessed in 3 contexts: noise alone, noise plus continuous sinusoids, and noise plus continuous sinusoids chosen to induce a pitch segregation effect. Performance in the pulse task was independent of changes in context; in the gap task, it changed as a function of context. There was a large decrement in observers' ability to discriminate duration when the stimulus ensemble induced the pitch segregation effect. (22 ref) (PsycLIT Database Copyright 1981 American Psychological Assn, all rights reserved).
238. Yeh, Yei Yu; Wickens, Christopher D. (Honeywell Systems & Research Ctr, Phoenix Technology Group, AZ, US). Dissociation of performance and subjective measures of workload. *Human Factors*; 1988 Feb Vol 30(1) 111-120; 1988; CODEN: HUF A A 6; ISSN: 00187208. Note: Human. Discusses a theory designed to identify sources that produce dissociations between performance and subjective work load measures (SWMs). The theory states that performance is determined by (1) amount of resources invested, (2) resource efficiency, and (3) degree of competition for common resources. It is argued that subjective perception of work load increases with greater amounts of resource investment and demands on working memory. Performance and SWMs dissociate when greater resources are invested to improve performance, when demands on working memory are increased, and when performance is sensitive to resource competition and subjective measures are more sensitive to total investment. (PsycLIT Database Copyright 1988 American Psychological Assn, all rights reserved).