Technical Report 606

Abstracts of ARI Research Publications FY 1983

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U. S. ARMY RESEARCH INSTITUTE
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A Field Operating Agency under the Jurisdiction of the

Deputy Chief of Staff for Personnel

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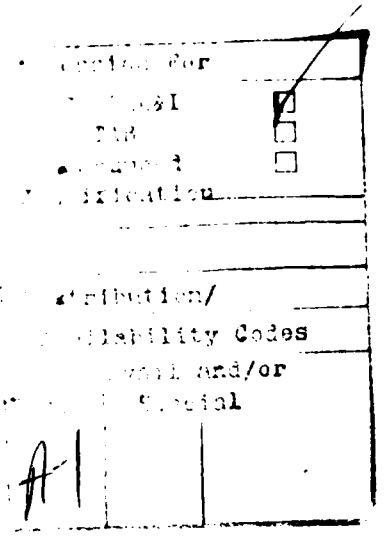

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
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Office, Deputy Chief of Staff for Personnel
Department of the Army

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Abstracts

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FOREWORD

The Army Research Institute for the Behavioral and Social Sciences (ARI) publishes a series of abstracts that summarize the research on which final or interim reports have been published during each fiscal year. The series began in 1957. This Technical Report contains the abstracts for Research publications for FY 1983, October 1982 to September 1983.

During this period, ARI was the Army's agency for behavioral and social science research and a field operating agency under the Office of The Deputy Chief of Staff for Personnel. Independent laboratories and supporting operational field units working together provided a flexible research program on personnel utilization, training and evaluation, leadership and management, simulation systems, manpower and education systems, human factors in systems integration, state-of-the-art computer technology, and information sciences research for the modern Army.

EDGAR M. JOHNSON
Technical Director

ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1983

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ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1983

INTRODUCTION

The present volume of abstracts, continuing the series begun in 1957, summarizes the research publications of the Army Research Institute for the Behavioral and Social Sciences (ARI) for the fiscal year 1983. Each volume of the series provides a synopsis of research efforts which reached publication stage during the period covered. The abstracts have been written, as far as possible, to describe the principal research findings in nontechnical terms; technical language is used to communicate efficiently the details of research analysis. Indexing by author and research area provides access to individual reports and topics.

Publication Categories

ARI Research publications are divided into separate, consecutively numbered categories appropriate to their intended audience and function. In FY 1983 the following categories of technical documentation were represented:

Research Report. A report of completed research intended primarily for dissemination to military managers. Research Reports may deal with policy-related issues but typically do not include specific policy recommendations.

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Research Note. This may be either an interim or a final report, but is typically of limited interest outside of ARI and is not printed or distributed except to Defense Technical Information Center. Included in this category are in-house reports and appendix materials to Research or Technical Reports.

Research Product. A user-oriented document intended for distribution to field personnel. Examples are handbooks, manuals, and guidebooks. Non-textual materials which are intended to be part of a Research Product, such as computer cards, electronic storage discs, video or audio tapes or cassettes, and special types of packaging, should ideally be a contract "deliverable" and not something which needs to be duplicated by ARI as a separate effort.

Distribution of ARI Publications

Initial distribution of these reports was made directly by ARI. Research Reports, Technical Reports, and Research Products were distributed primarily to operational and research facilities and their sponsors in the Defense Department, to other interested Government agencies, and to the Defense Technical Information Center (DTIC), and were also sent to the Library of Congress, which sends documents to Federal depository libraries. Research Notes were deposited in DTIC, and are available only from DTIC or its coordinating agency, the National Technical Information Service (NTIS), in hardcopy or microfiche.

Qualified requesters may obtain copies of reports deposited in the Defense Technical Information Center directly from DTIC, Cameron Station, Alexandria, Va., 22314. Anyone may purchase documents from NTIS, Department of Commerce, Springfield, Va., 22161. The multidigit AD number given for each report is the accession number that should be used in requesting documents from DTIC or NTIS.

Research Reports, Technical Reports, and Research Products may also be obtained on loan from depository libraries in many metropolitan and university centers. A list of these libraries is given at the end of this publication.

ABSTRACTS OF RESEARCH PUBLICATIONS

Research Reports

RR 1280. Van Nostrand, S. J. Career Strategy Longitudinal Evaluator (CASTLE). October 1980. (AD A120 130)

A computerized personnel assignment model, the Career Strategy Longitudinal Evaluator (CASTLE), can help decision makers choose among alternative within-specialty personnel management policies by projecting the long-term effects of each alternative. Career management problems in the Engineer officer specialty were evaluated using CASTLE, although the model is designed to be non-specialty-specific and should be useful in evaluating other specialties within the Officer Personnel Management System (OPMS). This report reviews the unique aspects of OPMS and describes the CASTLE model and its use.

RR 1289. Erwin, D. E., Stein, E. S., Root, R. T., & DiGrazia, J. Air-Ground Engagement Simulation (AGES) field test--USAREUR 1978. August 1980. (AD A127 988)

A field experiment was carried out to assess the training effectiveness of the Air-Ground Engagement Simulation (AGES) tactical training system relative to conventional air defense training on the Army's three short-range air defense artillery (ADA) weapon systems: Chaparral, Vulcan, and Redeye. Twelve squads were randomly assigned to one of two training conditions, AGES or conventional, and given 1 week of training. Performance was evaluated during each training exercise using a Controllers' Evaluation form, which is a checklist and rating form. This procedure was followed for a second group of 12 squads. AGES squads on the Chaparral and Vulcan showed improved performance through the third day of training. This improvement was superior to that of conventionally trained squads. Redeye teams trained with AGES did not demonstrate greater improvement than that achieved with conventional methods.

A demonstration of a three-dimensional engagement simulation was accomplished during a third training week. This exercise consisted of integrating AGES with ground maneuver engagement simulation known as REALTRAIN. Personnel involved stated that the training was highly realistic and motivating.

RR 1291. Bickley, W. R. Training device effectiveness: Formulation and evaluation of a methodology. September 1980. (AD A122 777)

Assume that as the amount of simulator training increases, the amount of aircraft training required to reach criterion decreases to some nonnegative minimum. Also assume that, at that point in antecedent simulator training, the rate at which subsequent required aircraft training decreases is a fixed proportion of the difference between present required aircraft training and the minimum required training achievable. Then the function relating x, the amount of simulation training received, with y, the subsequent training required in the aircraft to attain criterion, will be of the form $y = ae^{-bx} + c$. This formulation has tremendous utility in allowing the training analyst to

calculate the most cost-effective mixes of simulator and aircraft training. This approach was applied in the U.S. Army's acceptance tests of the AH-1 helicopter flight simulator. Nonlinear regression analyses of data collected on some 30 individual maneuvers indicate the methodology is viable. A straightforward methodology for incorporating these results into analysis of the combined cost and training effectiveness of the AH-1 simulator and similar training devices is presented.

RR 1298. Schendel, J. D., & Hagman, J. D. On sustaining procedural skills over prolonged retention intervals. July 1980. (AD A120 758)

The purpose of this research was to determine (a) if the long-term retention of procedural skills depends on how periodic "refresher" training sessions are scheduled and (b) if soldiers can estimate in advance of retention testing how much training they require to regain proficiency. Thirty-eight Army reservists were divided into three groups and trained under one of the following schedules: Control, where initial training continued til the soldier achieved a criterion of one errorless performance; Massed sessions (MS), where initial training was extended 100% beyond criterion perfc nce; and Spaced Sessions (SS), where 100% overtraining trials were provide midway through the retention interval. Performance was measured on the dis embly and assembly of the M60 machinegun, and it was measured following 8 w el of no practice. Immediately prior to retention testing and retraining, s diers completed a questionnaire designed to assess whether they could estimate the amount of training they required to regain proficiency on the experimental task.

Key findings were (a) soldiers did not forget substantially more following 8 weeks of no practice than following 4 weeks of no practice; (b) SS and MS soldiers performed with equal facility during retention testing and relearning, outperforming their counterparts in the Control group; and (c) as a group, soldiers demonstrated knowledge of how much training was required for them to regain proficiency on the experimental task.

When the amount of training is held constant, an MS approach to training can be as effective as an SS approach. The costs and risks associated with refresher training procedural skills can be reduced by using the MS approach, at least for procedural tasks that are not particularly dangerous or fatiguing.

Data on the feasibility of using soldier-generated retention estimates to facilitate predictions about the scheduling of refresher training were suggestive, but not definitive, and require more development.

RR 1305. Smootz, E. R. Human factors evaluation of selected STANO devices employed in a mechanized infantry platoon. December 1980. (AD A128 086)

This research was conducted as a human factors evaluation of four Surveillance, Target Acquisition, and Night Observation (STANO) devices undergoing operational testing at Fort Hood, TX. The devices tested included the Platoon Early Warning System, the TOW Night Sight, the Dragon Night Tracker, and the Night Observation Device-Long Range. Rating forms and interviews were used to collect data related to the adequacy of controls and displays

of the devices, the procedures needed for satisfactorily operating the devices, psychological and physiological symptoms experienced while operating the devices, and safety hazards encountered. The most important finding concerned the problems that soldiers experienced in using the TOW Night Sight and the Dragon Night Tracker while wearing their protective masks.

RR 1309. Hagman, J. D. Effects of training schedule and equipment variety on retention and transfer of maintenance skill. November 1980. (AD A120 167)

To help guide training course revision efforts of the U.S. Army Ordnance Center and School (USAOCS), the present experiment examined the effects of training schedule and equipment variety on maintenance task retention and transfer. The experiment contained a training and a testing segment. During training, four groups of 15 student Fuel and Electrical Repairers, 63G Military Occupational Specialty (MOS), performed the task of testing charging system electrical output. Each group performed three task repetitions under one of four training conditions formed by the factorial combination of two training schedules (massed, spaced) and two levels of equipment variety (present, absent). Massed scheduling allowed no rest pauses between successive task repetitions; spaced scheduling allowed 1-day rest pauses between repetitions. When equipment variety was present, students performed one repetition on each of three charging systems. When equipment variety was absent, all three repetitions were performed on the same charging system.

Testing included two retention tests and one transfer test. The first retention test occurred immediately after training; the second test occurred an average of 14 days later. The transfer test was given immediately after the delayed retention test.

Retention test performance was faster and more accurate after spaced than after massed training. Only the massed schedule groups showed significant ($p < .05$) retention losses between immediate and delayed testing. Spaced scheduling also promoted superior transfer test performance. Equipment variety had no effect on retention, but enhanced transfer test performance when training was spaced. Thus, the best transfer resulted when training task repetitions were spaced and performed on different equipment.

It was concluded that (a) spacing of task repetitions during training is an effective way to improve both retention and transfer of maintenance skill and (b) added transfer improvements can be obtained by coupling spaced task repetitions with increased equipment variety during training.

This report is intended for military training personnel.

RR 1315. Rose, A. M., Shettel, H. H., & Wheaton, G. R. (American Institutes for Research); & Bolin, S. F., & Barba, M. A. (ARI). Evaluating the effectiveness of Soldier's Manuals: A field study. February 1981. (AD A130 928)

Since 1976, the U.S. Army has been preparing and distributing to each soldier a series of documents called Soldier's Manuals (SMs). These manuals describe all the tasks critical to the successful performance of his or her duties in his or her MOS and skill level. This 2-year study was designed to

provide those who prepare SMs with information on how they are being used, factors that influence use or disuse, and the relationship between SM usage and the soldier's ability to perform his or her job skills, as measured by SQT scores. Questionnaire data were obtained from 1,224 soldiers in CONUS and USAREUR from 25 combat and noncombat MOS. Patterns of reported usage were examined and characteristics of the documents themselves were analyzed. SQT scores were related to usage factors to see to what extent they were correlated. Finally, senior-level interviews were used to obtain insights into ways the SM is functioning as part of the larger EPMS. Recommendations are made relating to the physical characteristics of the SM; the preparation, contents, and format of the SM; and the general climate of support for SM use.

RR 1316. Radtke, P. H., & Shettel, H. H. (American Institutes for Research). Executive summary: Evaluating the effectiveness of Soldier's Manuals: A field study. May 1981. (AD A130 940)

Since 1976, the U.S. Army has been preparing and distributing to each soldier a series of documents called Soldier's Manuals (SMs). These manuals describe all the tasks critical to the successful performance of his or her duties in his or her MOS and skill level. This 2-year study was designed to provide those who prepare SMs with information on how they are being used, factors that influence use or disuse, and the relationship between SM usage and the soldier's ability to perform his or her job skills, as measured by SQT scores. Questionnaire data were obtained from 1,224 soldiers in CONUS and USAREUR from 25 combat and noncombat MOS. Patterns of reported usage were examined and characteristics of the documents themselves were analyzed. SQT scores were related to usage factors to see to what extent they were correlated. Finally, senior-level interviews were used to obtain insights into ways the SM is functioning as part of the larger EPMS. Recommendations are made relating to the physical characteristics of the SM; the preparation, contents, and format of the SM; and the general climate of support for SM use.

RR 1317. Morrison, J. E., & Bessemer, D. W. Training and retention of armor machinegun tasks. May 1981. (AD A128 824)

Platoons within three Armor One Station Unit Training (OSUT) companies were assigned to one of three M85 training schedules: a single 4-hour block, two 4-hour blocks received in 1 day, or two 4-hour blocks separated by at least 1 week. One of the three companies was also shown videotaped demonstrations of M85 tasks. GO/NO GO data on M85 and M240 tasks were gathered by evaluators from the Directorate of Plans and Training (DPT) at Fort Knox. M85 performance was measured at the end of the OSUT cycle, whereas M240 scores were gathered at both mid- and end-of-cycle tests. In addition to GO/NO GO performance, ARI data gatherers collected execution times on M240 tasks.

The findings included (a) no effect of training schedule and introduction of videotaped demonstrations on M85 task performance or M240 retention, (b) poor performance on M85 mechanical training tasks that the OSUT personnel did not expect on the end-of-cycle test, (c) reliable decreases in M240 performance between mid- and end-of-cycle tests, and (d) subtle changes in performance not shown by GO/NO GO scores as revealed by task execution times.

RR 1318. Brown, W. R., & Dohme, J. A. (ARI); & Wick, D. C. (Canyon Research Group). Evaluation of minority and female performance in Army Rotary Wing aviation training. Volume I: Executive summary. May 1980. (AD A130 938)

This report contains the Executive Summary of the evaluation of minority (black, Hispanic, Asian, American Indian) and female performance in the Army's Initial Rotary Wing flight training program. Each minority group was compared to a matched sample of majority students. The groups were matched on FAST score, GT score, education level, age, rank, and source of entry. The performance of the two groups (each minority and its matched control group) was compared on the following criteria: (a) Warrant Officer Candidate Military Development Course grades, (b) academic grades by phase of training, (c) flight performance grades by phase of training, (d) overall grade, (e) attrition experience during the Warrant Officer Development Course, and (f) attrition experience during the flight portion of training.

RR 1319. Brown, W. R., & Dohme, J. A. (ARI); & Wick, D. C. (Canyon Research Group). Evaluation of minority and female performance in Army Rotary Wing aviation training. Volume II: Evaluation report. May 1980. (AD A130 959)

This report contains the evaluation of minority (black, Hispanic, Asian, American Indian) and female performance in the Army's Initial Entry Rotary Wing flight training program. Each minority group was compared to a matched sample of majority students. The groups were matched on FAST score, GT score, education level, age, rank, and source of entry. The performance of the two groups (each minority and its matched control group) was compared on the following criteria: (a) Warrant Officer Candidate Military Development Course grades, (b) academic grades by phase of training, (c) flight performance grades by phase of training, (d) overall grade, (e) attrition experience during the Warrant Officer Development Course, and (f) attrition experience during the flight portion of training.

RR 1322. Actkinson, T. R. Human factors evaluation of the Multiple Integrated Laser Engagement System (MILES) in an operational environment. November 1980. (AD A129 730)

This report documents results of the human factors evaluation of the Multiple Integrated Laser Engagement System (MILES) during OT II. The research was designed to assess the man-machine interface and user acceptance of MILES.

RR 1329. Bauer, R. W. Review of methodologies for analysis of collective tasks. May 1981. (AD A130 971)

The state of the art in methodologies for analysis of collective tasks was examined in a literature review and a survey of U.S. Army Centers and Schools. Current concepts and principles in analytic methods were compared. A brief survey of collective analyst personnel at seven Army Centers indicated prevailing analytic activities and needs. An annotated terminology list was included in an appendix.

RR 1331. Burke, W. P. Aircraft and equipment factors in the occurrence of suspension line twists with the T-10 and MC1-1B parachutes. August 1980. (AD A129 867)

Data were collected by self-report from the trainees of two classes of the Basic Airborne course at Fort Benning, GA, who were asked if they had developed twists in their suspension lines during each of the five jumps of the course. These data were then related to the conditions of deployment for each jump--type of parachute used, type of equipment carried, type of aircraft jumped from, etc. The proportion of jumpers with twists during a given jump, with its associated conditions of deployment, was compared by the chi-square test with the proportion of jumpers with twists from other jumps made under different conditions of deployment. Using this method, it was shown that there was no effect of type of parachute on the occurrence of twists, but there was a strong and significant effect of combat equipment associated with an increase in the proportion of twists. There was, in addition, a significant, but slightly smaller, effect attributable to the type of aircraft used for jumps, with more twists occurring during jumps from the C-141 than during jumps from the C-123.

RR 1332. Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, & Army Research Institute. Improving the selection, classification, and utilization of Army Enlisted Personnel. Project A: Research plan. May 1983. (AD A129 728)

This research report describes a research plan for a project whose objectives are to (a) validate current and future ASVAB against soldier performance, (b) develop new selection and classification procedures and measures to optimize the match between soldier abilities and MOS requirements, and (c) develop computer-based decision aids for managers of the Army's manpower processes.

The objectives of the research will be met by (a) developing new ways to measure and collect data on the military applicant pool, (b) developing and evaluating new predictors of soldier performance (e.g., psychomotor, perceptual, cognitive abilities, and biographical information), (c) developing new methods to measure and analyze training performance, and (d) developing and refining adequate, efficient soldier performance measures and predictors of enlisted personnel and NCO success.

RR 1333. Thompson, T. J. Range estimation training and practice: A state of the art review. July 1982. (AD A132 616)

This report summarizes the findings of laboratory, field, and military land-based range estimation research conducted since 1904. It includes a review of training techniques that have been demonstrated effective in field environments directly relevant to military requirements for such enhancement techniques. The result of the literature and field experimentation reviewed indicated that with practice and by using aids to establish relative size relationships between known size targets and a reference, estimates of distance to the targets can be improved. The level of skill resulting from the present range estimation training in the U.S. Army is not high enough to

conduct comparative program training effectiveness analysis research. The author recommends that a program of skill enhancement be developed at the small unit level to train improved range judgments using perceptual cues, relevant to the unit's operational environment. Once a general base of ranging skill is established, it would be appropriate to develop specific research plans for testing potentially effective interventions.

RR 1336. Witmer, B. G., & Kristiansen, D. M. Development and field trial of a system for evaluating the effectiveness and efficiency of a training program. March 1982. (AD A133 160)

A unique system designed to assist training managers or evaluators in increasing the effectiveness of training programs has been developed, tested, and refined. The Training Program Evaluation (TPE) system offers advantages over traditional approaches of assessing program effectiveness. TPE involves the direct observation of training and testing and does not rely on second-hand accounts of training given by trainers or trainees. Neither does TPE require the construction and administration of specially designed tests to evaluate soldier performance, but uses instead the tests routinely given after each block of instruction. During its development, TPE has undergone frequent field testing to determine its utility to the Army. The major test of TPE came during the M1 tank OT-III, when TPE was used to evaluate the effectiveness of the M1 transition training program and to suggest program improvements. The utility of TPE was clearly demonstrated during the M1 tank OT-III, when several agencies used TPE to gather training effectiveness information used to improve the training program. This report describes the development of TPE and its field trial during the M1 tank OT-III.

Lessons learned during the field testing of TPE have been incorporated into the TPE system and have resulted in a highly useful product. TPE procedures and forms are described in four job aids: ARI Research Products 81-15, 81-16, 81-17, and 81-18.

Technical Reports

TR 479. Claudy, J. G., & Caylor, J. S. (American Institutes for Research). Development of job-based reading tests. November 1982. (AD 123 324)

This report describes the development, validation, and standardization of three parallel forms of a short multiple-choice test of job-related reading skills. The test was built to specifically measure skill in performing Army job reading tasks, i.e., skill at obtaining the information a soldier needs to perform actual job tasks by reading the Army printed material that is furnished to provide that job information. Each form of the test contains material representing the four types of Army job reading tasks identified in prior research ("Locating Job Information in an Index, in Tables and Graphs, and in Narrative Descriptions" and "Following Directions in Filling in Forms"). The reading passages were drawn equally from Army publications used in job training for six major, high-density MOS areas (Clerk, Combat, Communications, Cook, Mechanics, and Medical). A simplified test format was developed to reduce administrative problems that might hinder some soldiers in taking the test, and testing time was held to 40 minutes. Norm

tables were developed to convert raw scores to their percentile equivalents in the standard mobilization base population.

TR 481. Harris, A. H. (Division of Behavioral Biology, Johns Hopkins University School of Medicine). Organizational structure and leadership factors as determinants of small group performance. June 1980. (AD A120 127)

The major developmental effort has been in establishing a biofeedback system for the autonomic self-regulation task. Following the "tooling up" phase of our work, experiments were conducted that focused on motivational and organizational variables influencing group and individual performance, social interactions, and morale.

Experiments have been conducted as part of this protocol with the objective of determining how human subjects, when given the opportunity to earn money for either themselves individually or through group effort, chose to distribute their work performance under conditions where a group effort was most efficient to protect accumulated earnings from possible loss.

With regard to motivational control, the unexpected outcome of these experiments was that daily earnings were relatively stable and insensitive to changes in the form of earnings (i.e., individual versus group bank accounts). Our current hypothesis regarding this outcome is that the effects of such motivational systems are directly influenced by the temporal distribution of daily work and nonwork activities. That is, if the nature of a task is such that hourly segments of work-nonwork cycles naturally occur, then a motivational system (e.g., individual versus group) available on the same temporal scale will be relatively more effective than one that is much longer than the natural alteration of work and nonwork behaviors.

TR 487. Krumboltz, J. D., & Hamel, D. A. (School of Education, Stanford University). Effect of decision training on career decision-making competence. August 1980. (AD A124 139)

This research investigated the effectiveness of a multicomponent training program in career decision making (CDM) on attitudes about, knowledge of, and ability to perform a specified set of CDM behaviors.

Participants from third-year high school English classes were stratified by sex and randomly divided into experimental and control groups. Experimental students participated in a career decision skills training program consisting of seven weekly meetings of about 1 hour each, plus a variety of homework assignments. The control students did not receive any CDM training.

Three criterion measures were used to assess the effectiveness of the CDM skills treatment. The Check List of Decision-Making Ability, administered before and after training, measures self-rated efficacy estimates of ability to perform certain decision behaviors and provides data from the affective domain. The Career Decision-Making Skills Assessment Exercise measures knowledge of facts and procedures relevant to CDM and is a cognitive instrument. Performance domain data were generated by a Career Decision

Simulation, an individually administered instrument that assesses how well a person performs a simulated decision task.

Results provide evidence that a structured training program in career decision making based on social learning principles is effective in producing superior scores on measures of career decision-making competence.

TR 506. Fujii, D. S. (Purdue University). A dyadic interactive approach to the study of leader behavior. July 1975. (AD A127 904)

Eighty male college students assigned roles as supervisors and workers performed experimental tasks in a study that focused on (a) the degree of leader-follower compatibility, (b) Vertical Dyad Linkage (VDL) versus the Average Leadership Style (ALS) analysis of leader behavior, and (c) the general problem of assessing leader behavior on the basis of subordinate description. Results indicated that compatibility in the leader-member dyad appears to be an important element in the group setting. It is related to performance rating satisfaction and the leader behaviors perceived by group members. However, the strength of the observed relationships must be tempered by the post hoc nature of the compatibility measure. Moderate statistical support was shown for the superiority of the VDL approach to understanding leader behavior effects on member responses. The data also demonstrate that individual members of the group do not provide valid ratings of the leaders' behavior toward individual subordinates.

TR 509. Morrison, J. Annotated bibliography of literature on social indicators; future studies, and policy analysis. November 1980. (AD A130 911)

This bibliography is divided into three sections: The first section reviews the literature for social indicators; the second reviews the literature on future studies; and the third reviews the literature on policy planning and analysis. The articles listed were published primarily between 1970 and 1980.

TR 510. Kottas, B. L., & Bessemer, D. W. Comparison of potential critical feature sets for simulator-based target identification training. September 1980. (AD A128 344)

Effective representation of armored vehicles in simulation displays demands a careful evaluation of human perceptual capabilities. This holds especially true for computer-generated target displays, which must provide sufficient detail to allow vehicle identification within limitations of computer processing time and display resolution. Even in image generation and display systems not incurring such limitations, the image detail should not exceed human perceptual and cognitive information processing capabilities. Care must be given to vehicle representation to assure that the features represented and emphasized are those most valuable for identifying targets. The current research compared the effectiveness of two different sets of vehicle features for target identification training. Results showed that the two sets of features, in the context of the training in which they were embedded, produced equivalent levels of target identification accuracy, and both

produced large gains in performance. Results also revealed that any effects due to range-specific learning of features were very small relative to the improvement produced by training and were insignificant when data for one of the programs were analyzed separately. For both feature sets, training generalized over a wide difference in target ranges. One can also conclude from the results that highly detailed vehicle representations are unnecessary for target identification training.

TR 513. Goldberg, S. L., Drillings, M., & Dressel, J. D. Mastery training: Effect on skill retention. March 1981. (AD A120 762)

The objective of the research was to determine the effects of mastery training and length of retention interval on retention of a procedural skill.

Armor crewmen were individually trained to boresight and zero the main gun of the M60A1 tank. Crewmen were trained to either of two criteria: one correct performance (standard training) or three consecutive correct performances (mastery training). Crewmen's retention of the task was tested either 1 or 5 weeks after training. Each step of the task performance was scored "GO" or "NO GO." When a crewman performed a step incorrectly, the scorer would correct the step before permitting the crewman to continue.

The results indicate a significant effect of both amount of training and length of retention interval on recall of the task, but no interaction between the variables. Crewmen perform better on the retention test after the shorter retention interval or after more intensive training. Differences in performance among the groups are caused mostly by differences on the first retention trial. There is no correlation between ability to perform or retain the task and mental category. The reason for this result may be the lack of variance among crewmen's mental categories.

Although the mastery training provided aided retention of the task, only 15% of the mastery-trained crewmen were able to perform the task correctly on the first retention trial. The results indicate that mastery training is not efficient for all tasks. Mastery training as compared to refresher training, however, may be useful for tasks that have few steps, that must be recalled from memory, that must be performed correctly on the first attempt, or for which there are inadequate resources for refresher training.

TR 514. Mikos, R., & Casey, R. J., Jr. (Canyon Research Group, Inc.); & Lockhart, J. (ARI). Extension and validation of research on acquisition and retention of cognitive versus perceptually oriented training materials. June 1980. (AD A130 975)

The purpose of the study was to investigate the relationships between existing population-specific aptitude patterns and training performance for experienced REDEYE gunners and initial CHAPARRAL/VULCAN trainees. The technical objective was "to expand on current, successful research efforts in the application of population specific instructional strategies by determining the generalizability of present categories of trainee population characteristics and by analyzing training specifications of existing Short Range

Air Defense (SHORAD) weapons systems as a function of existing population characteristics and specified instructional strategies."

The program was accomplished in two phases, the REDEYE study and tne CHAPARRAL/VULCAN (C/V) training analysis. Within the REDEYE study were two different phases of analysis (confirmatory and exploratory). The REDEYE study was conducted using an extension of the basic aptitude × treatment interaction (ATI) approach.

The confirmatory analysis was designed to test the interaction between specific aptitude profiles, which had been identified in earlier research, and the instructional strategies designed to match the profiles on performance. Results confirmed the existence of the same three aptitude profiles for REDEYE gunners that had been previously identified. Whereas significant aptitude profile by instructional strategy interaction effects was not observed, at least one of the strategies had a differential effect on performance for different profile groups.

The ATI methodology that was used in Phase I (building and implementing instructional strategies appropriate to aptitude characteristics of a specific population) remains a promising approach for the improvement of military training if appropriate controls can be maintained while the methodology is perfected.

After completion of the confirmatory analyses, exploratory analyses (factor analyses and canonical correlation analyses) were conducted in an effort to explain the underlying structure on which the aptitude profiles were based and to investigate the relationships between the set of performance measures and an expanded set of aptitude variables. Factor analytic results suggested additional variables important to the underlying structure of aptitude patterns in the REDEYE sample.

Phase II, the CHAPARRAL/VULCAN training analysis, was entirely exploratory in nature. The analyses paralleled those during the exploratory portion of the REDEYE study.

Activities during the C/V analysis included analyzing existing Advanced Individual Training (AIT) and collecting and analyzing AIT performance data as they related to the aptitude patterns in the C/V samples. Two independent sets of data were collected during Phase II, one for CHAPARRAL and one for VULCAN. Results suggested that the most important aptitudes characterizing C/V trainees are not necessarily the most important in predicting training performance.

Finally, the results of the Phase I exploratory analyses and the C/V analyses were synthesized to suggest common patterns concerning psychological abilities that relate to air defense training performance. In addition, the synthesis revealed some unique patterns between the three groups (REDEYE, CHAPARRAL, and VULCAN).

The second part of Phase I and all of Phase II resulted in the identification of many common factors that varied in both strength and relative predictive ability. The analyses suggested a number of additional variables

that appear to be important as part of aptitude profiles and that may be important for instructional strategy development.

TR 515. Davis, R. H. (Michigan State University). Role of innovation in organizational development. June 1981. (AD A124 037)

Written originally as a chapter in a book on organizational change while the author was on sabbatical leave at ARI, this article examines some of the implications of innovation research for organizational development. Since the underlying values that guide organizational development activities are humanistic, change agents are often invited to concentrate their energies more on increasing personal growth than on the improvement of organizational performance. There is, however, no basis for assuming that self-actualization will make organizations more effective or efficient. The aim of this article is to show how, by focusing on innovation (technical, structural, and physical changes), organizational development can contribute to both individual growth and increased effectiveness.

TR 516. Ilgen, D. R. (Purdue University); & Knowlton, W. A. (U.S. Military Academy). Performance attributional effects on feedback from superiors. June 1981. (AD A133 105)

This report is the first in a series entitled "The Effective Use of Feedback in Organizational Settings: A Process Centered Approach." Forty supervisors of three-person work groups directed the performance activities of group members and gave feedback to one of the three subordinates. In each case, confederates served as subordinates and both performance and attributionally relevant information about performance were manipulated. The data showed that when supervisors were required to give feedback to subordinates, they significantly distorted their feedback to make it more positive for low performers; this effect was most pronounced for those whose poor performance they believed was due to lack of ability. In addition, the nature of specific feedback given to subordinates varied as a function of performance attributions.

TR 517. Ilgen, D. R. (Purdue University); & Mitchell, T. R., & Frederickson, J. W. (University of Washington). Poor performers: Supervisors' and subordinates' responses. June 1981. (AD A128 747)

This report is the second in a series entitled "The Effective Use of Feedback in Organizational Settings: A Process Centered Approach." Forty-two three- or four-person groups with appointed supervisors worked on a clerical task for three 10-minute sessions and received feedback on their performance. Supervisors evaluated subordinate performance and provided feedback for the subordinates. Four variables were manipulated in a two-phased study. These were the supervisor's influence over subordinate pay (high power), the degree of interdependence between supervisors and their subordinates (high and low), the nature of feedback to subordinates (general, specific with a focus on quantity, and specific with a focus on quality), and the level of subordinate performance reported to the supervisor. It was found that the responses of supervisors toward subordinates were

influenced by both the level of subordinate performance and by the degree of interdependence. Subordinates, on the other hand, were influenced by the leader's power as it interacted with the nature of the feedback. These influences were entirely on attitudes and beliefs; they did not influence performance on the task after feedback.

TR 518. Allen, J. P. Military, biographical, and demographic correlates of Army career intentions. June 1981. (AD A130 272)

This report explores organizational and personal correlates of intentions to reenlist or remain on active duty in the Army for both officers and enlisted service members.

Prediction of career intention proved to be efficient and parsimonious for enlisted personnel. Only three characteristics (time in service, age, and job satisfaction) cumulatively accounted for 48% of the variance in the criterion. Among officers, nine predictors explained only 41% of the variance. Other variables associated with enlisted career intention were certain types of military occupational specialty and units of assignment, education, race, and appraisal of other members of the unit. Officer correlates of career intention were age, time in service, certain types of occupational specialties, and units of assignment, deviance, and assessment of unit readiness.

Implications of these correlates are presented from perspectives of possible Department of the Army policy initiatives and considerations in unit personnel management style.

TR 519. Sawyer, C. R., Fiorello, M., Kidd, J. S., & Price, H. E. (BioTechnology, Inc.). Measuring and enhancing the contribution of human factors in military system development: Case studies of the application of impact assessment methodologies. July 1981. (AD A122 031)

This document reports (a) the feasibility of an impact assessment methodology for measuring the value (cost-benefits) of human factors R&D in system acquisition and (b) the outline of a human factors impact handbook for the systems developer. Three basic interrelated steps were involved in this effort. First, two case studies, a maneuver control system and the F/A-18, were selected, and a detailed plan for application of the impact methodology was developed. Second, human factors-related elements (e.g., trade-offs, deficiencies, and costs) were examined and the impact analysis was applied to demonstrate its utility in evaluating selected design options that bear on operator performance and compatibility issues. This exercise indicated that the impact methodology is a feasible tool for assessing the value of human factors in systems development. Third, a human factors impact handbook for systems developers was outlined, based on the rationale, methodology, and findings of the overall effort.

TR 520. Hunt, J. G., Osborn, R. N., & Martin, H. J. (Southern Illinois University). A multiple influence model of leadership. April 1981. (AD A128 679)

This report describes efforts to test a model of leadership effectiveness that centers on "macro variables" and "discretionary leadership" (DL). Macro variables are represented by the complexity of the environment and context and structure of a unit. Discretionary leadership is conceptually defined as influence over and above that typically vested in a managerial or command role.

Empirical testing used a mixture of mail questionnaires and secondary data concerning 68 telecommunications units of the Army Seventh Signal Command. Correlation and regression analysis were used, and six major propositions and two exploratory aspects of the model were investigated. The results of the propositional tests were as follows: (a) Greater complexity in the structure of the unit was associated with more discretionary leadership. (b) Structural complexity was directly related to employee maintenance (employee maintenance included several measures of satisfaction and attachment to the system), and environmental complexity was marginally related to unit performance (unit performance included machine error rates in messages sent). (c) Discretionary leadership was related to both performance and employee maintenance, and associations were clearer than for more traditional measures of leader behavior. (d) Generally, as complexity in macro variables increased, more discretionary leadership was needed to achieve higher performance and employee maintenance. (e) Selected characteristics of the group being supervised did not alter the relationship between leadership and criteria. (f) The expertise of the unit did not make a difference in the effectiveness of discretionary leadership. Empirical extensions suggested that lateral leadership was potentially important, particularly in combination with macro variables. Also, the model predicted substantial portions of criterion variance even though the research design was based on a strong inference approach. Theoretical extensions and specific applications are discussed in addition to supplementary supporting data.

TR 522. Mitchell, T. R. (School of Business, University of Washington). Leader attributions and leader behavior: First stage testing of theoretical model. August 1981. (AD A128 495)

There are two main sections in this report. The first section presents a theory about how supervisors decide on the causes of a subordinate's poor performance and what they do about it. A two-stage process is suggested. The first stage involves the supervisor making attributions about the causes of the poor performance. This stage involves processing a great deal of information, and a variety of errors may be made by the supervisor. The second stage involves choosing a response to the poor performance. Various social norms may influence this stage. Literature relevant to the construction of the model is reviewed.

The second section reviews ARI research to date on the model. A variety of studies using different types of subjects and methodologies are described. It is generally concluded that the model has been helpful in understanding this judgment process, but that further work is needed.

TR 523. Sterling, B., & Carnes, D. Relationship between perceptions of company leadership climate and measures of unit effectiveness. April 1981. (AD A130 907)

A model of company leadership was developed by means of extensive interviews with troops and leaders in a USAREUR battalion. Surveys (one for troops and one for leaders) were built using this model and revised on the basis of a pilot study. Revised surveys were administered to 513 troops and 237 leaders in a USAREUR brigade. Criterion measures of personnel readiness at company level were collected for a 6-month period immediately preceding survey administration. Then t-tests were performed on each survey item, examining the differences in means between troops from companies falling above versus below the median on that criterion. Items showing significant mean differences on at least two criteria were factor analyzed, scores on items loading moderately on the factors were calculated, and t-tests were performed on the scale scores.

Results indicate that troops and leaders from companies with higher rates of complaints, punishments, and awards, as well as lower numbers of sick calls, rated leaders highly in task-related and interpersonal areas. Thus, effective leaders may use higher levels of punishments as well as rewards and perhaps may inspire more complaints among soldiers resenting the structure effective leaders impose.

TR 524. Roberts-Gray, C., Clovis, E. R., Gray, T., Muller, T. H., & Cunningham, R. F. (Perceptronics, Inc.). Field survey of current practices and problems in Army unit training, with implications for fielding and training with the MILES. Volume I: Report. May 1981. (AD A128 479)

A survey of CONUS active infantry and armored divisions was conducted (a) to determine how they actually manage, prepare, and conduct unit tactical training, (b) to describe the operational environment into which training must be fitted, and (c) to find out why REALTRAIN/SCOPES has not been more widely used. Much relevant information was gathered and is tabulated in the report. Among the findings was evidence that training frequently loses out in the competition for time and resources to nontraining demands made by higher headquarters; decentralization of training is not working as conceived; qualified trainers, particularly NCOs, are in critically short supply and are often diverted to nontraining functions having higher "real" priorities than does training; REALTRAIN/SCOPES is rarely used because it is thought to require too many assets and too much effort, given the perceived "real" priority of training. Many other findings are included. The significance of the findings for the Multiple Integrated Laser Engagement System (MILES) program is discussed.

TR 525. Roberts-Gray, C., Clovis, E. R., Gray, T., Muller, T. H., & Cunningham, R. F. (Perceptronics, Inc.). Field survey of current practices and problems in Army unit training, with implications for fielding and training with the MILES. Volume II: Appendixes. September 1981. (AD A127 388)

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TR 528. Hawley, J. K., & Dawdy, E. D. (Applied Science Associates, Inc.). Cost and Information Effectiveness Analysis (CIEA): A methodology for evaluating a training Device Operational Readiness Assessment Capability (DORAC). February 1981. (AD A127 943)

This report presents an overview of a problem that accompanies the development of a Training Device Operational Readiness Assessment Capability (DORAC): determining when the value of the information received from the DORAC is greater than or equal to the cost of obtaining it. This determination may be needed as a part of specifying the requirements for a device or as a basis for deciding between two or more design options developed to satisfy the requirements. An analysis focused on this issue is termed Cost and Information Effectiveness Analysis (CIEA).

As a first step, the concept of information is defined and characterized by two attributes: amount and value. Amount is measured formally through indices like Shannon's H; value is a function of the changes resulting from the receipt of information by decision makers.

Because of the problems inherent in determining strict information value, it is proposed that information utility be used as a proxy measure for information value. Accordingly, an information worth assessment procedure based on multiattribute utility measurement (MAUM) is developed and presented. The MAUM information worth assessment procedure is integrated into a standard cost-effectiveness analysis methodology to form the core of a preliminary CIEA methodology, denoted MAUM-CIEA. An exemplary CIEA for a hypothetical set of DORAC alternatives is presented with the methodological discussion.

The final section of the report summarizes the assumptions underlying the use of MAUM-CIEA. In addition, methodological issues relevant to the widespread application of MAUM-CIEA are listed and discussed. Recommendations for additional methodological development are also presented.

TR 529. Hawley, J. K., & Dawdy, E. D. (Applied Science Associates, Inc.). Training Device Operational Readiness Assessment Capability (DORAC): Feasibility and utility. April 1981. (AD A128 369)

This report presents the results of an investigation of the feasibility and utility of implementing the Training Device Operational Readiness Assessment Capability (DORAC) concept throughout the Army. The investigation

addresses three separate aspects of feasibility: acceptability to end-users, technical feasibility, and financial feasibility.

Another aspect of DORAC concept feasibility concerns the ability to select the most cost-effective proficiency assessment capability from among a range of alternatives. To this end, a Cost and Information Effectiveness Analysis (CIEA) methodology based on multiattribute utility measurement (MAUM) was developed and is presented in a companion report. In this report, the MAUM-CIEA methodology is demonstrated using a set of hypothetical DORACs for the M16A1 rifle.

The final section of the report integrates the feasibility results into a series of recommendations for optimizing the payoff from a DORAC, and suggests a series of steps for further investigation of the concept and related technologies.

TR 531. Boyd, N. K., & Griesemer, H. A. (Lawrence Johnson and Associates, Inc.); & Hart, R. J., & Goehring, D. J. (ARI). Racial crises in the Army: Prediction, prevention, and intervention. July 1981. (AD A122 854)

A theoretical model of racial climate in the Army was developed to help military leaders predict, prevent, and if necessary intervene in racial crisis situations. The conceptualization of the model was supported in subsequent field investigations of soldiers' perceptions of the racial climate at their installations and their opinions regarding effective command strategies for alleviating racial tension. Soldiers' perceptions of racial climate were validated successfully against certain records maintained in company files. A computer simulation demonstrated the application of the model in hypothetical situations characterized by the existence of racial tension.

TR 535. Hagman, J. D. Testing during training: Why does it enhance long-term motor task retention? July 1981. (AD A120 761)

Retention of movement kinesthetic cues was examined for training methods emphasizing either presentation (p) or test (t) trial repetition. Four groups of government employees received training: Two learned movement distance, i.e., Distance Presentation (DP) and Distance Test (DT) and two learned end location, i.e., End Location Presentation (LP) and End Location Test (LT). During training each group performed three six-trial cycles containing p- and t-trials. P-trials were experimenter-defined study movements terminated by a mechanical stop; t-trials were learner-defined recall movements terminated without the aid of the stop. Training methods differed in their emphasis on p- and t-trials performed during each cycle. Group DT performed cycles containing an initial criterion p-trial followed by five successive t-trials. Group DP performed cycles containing six successive p-trials. The first was the criterion distance, but the next five were yoked in distance to the corresponding t-trials of group DT. Yoking was also applied to the two end location groups to ensure equal movement variability during training across groups. During retention, each group performed a single t-trial at both 3 minutes and 24 hours after training.

Absolute (unsigned) error revealed that Presentation groups (DP, LP) had marked error increases after training, whereas Test groups (DT, LT) did not. As a result, 24 hours after training the two Test groups displayed better retention than the two Presentation groups.

The data were consistent with the hypothesis that retention benefits obtained from testing during training result from better initial learning (encoding) of kinesthetic movement cues generated under a learner-defined than under an experimenter-defined movement execution mode. Reasons for this learning difference are discussed.

TR 541. Hart, R. J., & Bradshaw, S. C. Reliability estimation for aggregated data: Applications for organizational research. July 1981. (AD A129 740)

To study organizations it is important to be able to measure organizational functioning with a minimum of error. The report that follows provides the statistical tools necessary to measure the extent of error that exists in survey data and organizational record data. Traditional methods of measuring error are either inappropriate or incomplete when applied to organizational groups, necessitating the statistical development given here. Appropriate methods of measuring error are particularly important when organizational change is being studied. In this case, the same variables are measured at more than one point in time. The investigator wants to identify real organizational change. However, real change cannot be separated from changes in measurement error, unless separate estimates of measurement error are available at each point in time. This paper tells how to get separate error estimates so that real organizational change can be studied.

When studying groups within organizations, what level of the hierarchy should be studied? A statistical technique for estimating the level of the hierarchy that actually controls the subject matter at hand is provided. This measure can be used as a guide for selecting groups at appropriate levels of hierarchy for study.

These statistical techniques provide improved procedures for studying the operation of the Army and other organizations.

TR 549. Harman, J. Training for skill qualification testing. November 1981. (AD A130 964)

Infantry soldiers scheduled to take written Skill Qualification Tests were given a pretest designed to diagnose training needs prior to official testing. Participants received immediate feedback about pretest performance and their units received summaries of troops' results. Pretested soldiers performed better on the written Skill Qualification Test than did nonpretested soldiers.

Developing and administering pretests as training for written Skill Qualification testing could save training time devoted to tasks soldiers already know, could supplant post-SQT remedial training, and could reduce soldiers' test anxiety.

TR 550. Burke, W. P. An experimental evaluation of stress-management training for the airborne soldier. June 1980. (AD A126 621)

The Jumpmaster course at Fort Benning, GA, trains airborne personnel to conduct airdrops of men and equipment and features relatively stressful training jumps during which instructors grade the performance of students acting as jumpmasters for actual airdrops.

One class of Jumpmaster students was divided into pairs matched by rank and the members of each pair were randomly distributed into either an experimental or a control group. The experimental group was taught a method of stress management, respiration control, to be used immediately before and during training jumps. The groups were then compared on heart rate, perceived stress, and grades received for performance as jumpmasters during training jumps.

The results showed that the experimental groups had significantly lower heart rates during the two night jumps of the course--jumps which, because of limited visibility, are somewhat more dangerous and therefore more stressful than daylight jumps. There were no other statistically significant differences between the groups.

TR 552. Allen, J. P., & Hazer, J. T. Development of a field-oriented measure of soldier morale. December 1981. (AD A128 381)

The purpose of this project was to construct brief yet meaningful measures of military morale and motivation using scales that permit easy administration, scoring, and interpretation by Army officers lacking professional training in behavioral science.

The current effort involved extending analyses of attitudinal data collected under the auspices of the U.S. Army Research Institute for the Behavioral and Social Sciences (Borman & Bleda, 1978). In the earlier project, subscale scores on a lengthy battery of self-report instruments were submitted to factor analysis, and six dimensions of motivation and morale were identified. Nineteen subscales, many consisting of large numbers of items, appeared to assess these factors. Our reanalysis of the Borman and Bleda data resulted in reducing the number of items (200) on these scales to 64 questions assessing the same six dimensions. Efforts were also made to simplify the working and scoring of items to facilitate use of the instrument in the field, such as serving as a portion of the "Troop Preparedness Estimate," a measure of personnel combat readiness.

TR 558. Baum, D. R., Smith, D. A., & Hirshfeld, S. F. (Honeywell Systems and Research Center); Klein, G. A. (Klein Associates); Swezey, R. W. (Science Applications, Inc.); & Hays, R. T. (ARI). Specification of training simulator fidelity: A research plan. February 1982. (AD A127 346)

This report presents a conceptual framework for identifying factors that may impact training simulator effectiveness. A research strategy is proposed for the empirical determination of necessary levels of training simulator fidelity. Preliminary studies consistent with this strategy are

described to explore the effects of device fidelity on the transfer of training of perceptual-motor and cognitive maintenance tasks.

TR 559. Oliver, L. W. (ARI); & Spokane, A. R. (University of Maryland). Sufficiency in the reporting of research results: Some guidelines. March 1982. (AD A127 088)

An abundance of research exists on topics relevant to the decisions organizations must take in allocating and developing their resources. This paper addresses the problem of integrating those research results. Data needed for the meta-analysis approach to research integration are sometimes not available in the published literature. Inadequacies of research reporting encountered by research integrators include failure to provide needed data, selective reporting of data, and incomplete descriptions of samples or interventions. Attempts to obtain needed information from authors are generally unsuccessful, especially if considerable time has elapsed since the research was conducted. Some guidelines are presented for reporting research results. If authors follow these guidelines, the integration of research results will be facilitated.

TR 560. Rogers, R. W., Lilley, L. W., Wellins, R. S., Fischl, M. A., & Burke, W. P. (Development Dimensions International). Development of the precommissioning leadership assessment program. February 1982. (AD A130 927)

One of the recommendations from the report A Review of Education and Training for Officers (RETO) was to develop a performance-based assessment program to gauge the leadership potential of applicants to Army precommissioning programs. The program was developed in three phases. First, an analysis was performed to identify the behavioral dimensions of the Second Lieutenant job. Second, simulations designed to elicit behaviors on these dimensions were prepared. Workbooks, training manuals, and texts necessary for assessor training and for administration of assessment centers were also developed. Third, field tests were conducted in ROTC and Officer Candidate School to evaluate program contents and design.

The job analysis identified 12 dimensions of leadership. These dimensions were oral communication, oral presentation, written communication, influencing others, initiative, sensitivity, planning and organizing, delegation, administrative control, problem analysis, judgment, and decisiveness. Based on the job analysis, five simulations were developed: an in-basket exercise, conduct of an interview, a scheduling exercise, an oral presentation, and a leaderless group discussion. Associated workbooks, materials, and films were also developed for officers responsible for conducting and administering the Leadership Assessment Program.

TR 562. Nogami, G. Y., Gade, P. A., Schendel, J., & Farr, B. Colloquium on selected topics in behavioral science research. January 1983. (AD A130 211)

In 1980, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) sponsored a colloquium of selected topics from the Basic Research program. Twenty-one principal investigators on research funded by

ARI presented their findings. The proceedings are grouped into five broad topic areas: computer-based systems; information processing; learning, memory, and transfer; human relations; and issues and trends.

TR 563. Goldman, N. L. (University of Chicago); & Wiegand, K. L. (Towson State University Foundation). Utilization of women in combat: An historical and social analysis of twentieth-century wartime and peacetime experience. January 1982. (AD A131 041)

In Russia, women fought in World War I individually under the tsar and in women's battalions under the provisional government. The role of women was expanded in the Civil War, with the Communists using 80,000 in various capacities, including combat. In World War II, women's roles expanded dramatically with more than 1 million women involved, most of them in uniform and many in direct combat as snipers, riflewomen, machinegunners, tankers, pilots, and air force crew members. The ratio of combatant women to men in Communist-led Anti-Fascist Council of the People's Liberation of Yugoslavia (AVNOJ) partisan forces in Yugoslavia during World War II was even higher than in Russia. Some Israeli women fought as combatants in the War of Independence. At the other pole, Germany, although it employed women as civilians in both world wars, did not take them into the armed forces or permit them any military status or combat role. The British utilized women on a small scale in World War I and on a grand scale in World War II in a variety of roles but denied them a combat or arms-carrying function. As an armed neutral, Sweden mobilized 150,000 women as noncombatant auxiliaries during World War II. Under postwar conditions the liberal-democratic countries--except for West Germany--gave greater latitude to women in the armed forces than did the Communist countries.

TR 566. de Haan, H. J. Preferred listening rate as a function of exposure to time-compressed speech and type of time compression. June 1982. (AD A130 937)

Two experiments investigated preferred listening rates. Preferred listening rates were found to be initially low--approximately at the normal rate of speech--at the beginning of exposure to time-compressed speech. The rates were lower for speeded speech than for compressed speech. After exposure to time-compressed speech for approximately 1 hour, equally divided between the two types of time-compressed speech, the rates rose. The gain was relatively greater for compressed speech than for speeded speech, and postexposure compressed speech rates were comparable to other preferred listening rate values reported in the literature. The gain in rates was discussed in terms of learning, habituation, and type of information processing.

TR 567. Eaton, N. K., Weltin, M., & Wing, H. Validity of the Military Applicant Profile (MAP) for predicting early attrition in different educational, age, and racial groups. December 1982. (AD A130 939)

The Military Applicant Profile (MAP) was developed to serve as an applicant screening instrument to reduce attrition. Since 1979, it has been used operationally to screen 17-year-old non-high-school graduate males. The Army Research Institute (ARI) was asked to explore the extension of MAP to older

(above 17) nongraduate males, who have higher attrition rates than younger nongraduate males. Using 1976-1977 data, this research evaluated the validity of MAP for education, race, and age subgroups. Results showed that MAP scores were significantly related to the 180-day stay-leave attrition criterion. Neither race (black-white) nor age interacted with the MAP-attrition relationship; education level did. The function relating MAP scores to attrition for graduates was significantly below that for nongraduates. MAP would appear to have great utility in reducing the much higher attrition rate of nongraduates. These findings require verification by research, which is currently in progress.

TR 569. Allen, T. W., Johnson, E., III, & Wheaton, G. R. (American Institutes for Research); Knerr, C. M. (Human Resources Research Organization); & Boycan, G. G. (ARI). Methods of evaluating tank platoon battle run performance: Design guidelines. March 1982. (AD A131 969)

The platoon battle run is a relatively new concept. It emphasizes target hits on multiple targets; teamwork in getting those hits; the ability of the unit to shift, distribute, and control its fires; tactical movement; and maneuvering to take advantage of the terrain. Performance data collected during the battle run are used to make decisions about training deficiencies and qualifications. The guidelines in this document are designed to assist the local battalion in the complex tasks of planning, conducting, and evaluating the platoon Table IX battle run. It is aimed at the Battalion S-3 and his designated Officer-in-Charge (OIC).

Guidance is provided in the detailed planning for the battle run. Procedures are suggested for mission selection, a range/terrain reconnaissance, the specification of the mission scenario (e.g., development of orders, target composition, and location), the selection of mission tasks for evaluation, the specification of task conditions, the specification of performance standards, and the development of evaluation forms. Guidelines primarily concerned with procedures for evaluator selection and training (e.g., duties and responsibilities, observation and recording techniques, reporting procedures) are provided to assist in the conduct of the battle run. A platoon battle run wargame, using a terrain board representation of the range, is presented to assist the local battalion in setting performance standards and in training the evaluation team. Guidance is provided for using the performance data collected during the battle run. Techniques are suggested to assist in data collection and the interpretation of performance data for qualification and diagnosis. Finally, guidance is provided for the proper documentation of the Table IX effort to allow for a more consistent implementation of Table IX and to prevent future planners from having to repeat much of the same work.

TR 570. Carter, R. J. An investigation of geometric radar shapes for stereotyping. August 1981. (AD A131 120)

This investigation sought to determine whether any of the symbols currently being used or proposed for use in future air defense systems are stereotyped with the meanings hostile, friendly, and unknown.

One hundred male service members sorted 60 shapes into four categories: "friend," "hostile," "unknown," and "other" depending on what each shape connoted. The personnel also rank-ordered the shapes that had been sorted into the first three categories. Chi-square statistics were used to analyze the data.

Shapes were identified that are stereotyped with the three meanings. The 5-pointed star, heart, and flag were associated with "friend." The swastika and question mark were associated with "hostile" and "unknown," respectively.

The results of this experiment will be used in future research aimed at deriving a standard symbology for radar-assisted air defense systems.

TR 573. Hawley, J. K., & Howard, C. W. (ARI); & Martellaro, A. J. (Applied Science Associates, Inc.). Optimizing operator performance on advanced training simulators: Preliminary development of a performance assessment and modeling capability. February 1982. (AD A133 135)

This report presents results from the first phase of a project concerning human-machine integration in computer-aided systems, with a specific focus on the PATRIOT air defense missile system. The objective of the work is the development of a performance optimization model that will relate human-operator performance to aspects of operator training and selection, human-machine integration, and system deployment.

Thus, the first set of project activities concerns the quantification of operator performance in the PATRIOT system. A hierarchy of performance measures characterizing operator performance at the system, mission, and individual task levels was developed and implemented on a PATRIOT environmental full-task simulator. Procedures for adjusting raw operator scores to reflect environmental scenario difficulty were also developed.

The second set of project activities involves the development of a simulation model of a PATRIOT Engagement Control Station console operator. This simulation model is to be used as a partial surrogate for experimentation with actual console operators in the construction of an operator performance optimization model. The logical basis for the operator model is described, and procedures for parameterizing and validating the model are presented. Results from a preliminary implementation of the model are also discussed. Finally, future directions for the performance measurement and modeling activities are noted.

Research Notes

RN 80-21. Spears, W. D., Maxey, J. L., & Roush, M. D., II (Seville Research Corporation). Methodologies for correcting deficiencies in training programs. April 1980. (AD A125 892)

This report has four major sections. Section 1, introduction and approach, discusses the scheme developed to guide training analysts in pinpointing shortcomings in instructional practices so that corrections would

be specific to the problems. Section 2 presents and explains 15 principles regarding practice, guidance, and feedback. A training analyst should be thoroughly familiar with these 15 principles when conducting a training program evaluation (TPE), determining sources of performance deficiencies, and identifying revisions needed in instructional practices. Section 3 examines instructional deficiencies that might be indicated by items of evidence listed by the Harless Performance Guild, Inc. (contracted to develop a prototype TPE methodology). Ways to pinpoint sources of training problems are explained together with corrective measures that focus on the sources. Section 4 discusses the five areas of administrative responsibility critical to effective training programs.

RN 80-22. Miller, R. L. (Human Resources Research Organization). Effects of leader transition on unit performance: An evaluation of the COMTRAIN transition guide. October 1979. (AD A128 345)

The effectiveness of a program of structured interviews (COMTRAIN) with battalion resource personnel in facilitating transition in command at the company level was examined. Comparisons of 45 commanders who implemented the COMTRAIN transition package with 45 who did not demonstrated no overall performance enhancement from COMTRAIN use. However, COMTRAIN was found to improve performance ratings for commanders (a) without experience in the battalion prior to assumption of command, (b) with an external orientation to perceived control, and (c) without command exposure during their previous assignment. Transition activities were found to impact most significantly immediately after transition with less impact over time. Other variables found to affect early performance were completion of the Officer's Advanced Course, tenure with the battalion, previous assignment, and prior command experience. Evaluations by COMTRAIN users were uniformly positive as to its benefit.

RN 80-31. Card, J. J., Farrell, W. S., Jr., & Armstrong, T. R. (American Institutes for Research). A longitudinal investigation of the Army officer career commitment process. November 1979. (AD A129 835)

The first-year activities of a 6-year longitudinal investigation of the Reserve Officers' Training Corps (ROTC) route to becoming an Army officer are reported. The investigation will refine a model of ROTC/Army career commitment developed earlier. The first year of the longitudinal project was devoted to planning, sampling, and instrument development activities. The second through sixth years will be devoted to data collection from a national sample of ROTC students as they progress through college and begin Army service. Comparison data will be collected yearly from new ROTC students and from college students not enrolled in ROTC.

During the first year, a sample of 20 colleges was drawn, and arrangements were made for their participation in the study; the career commitment model being examined by the investigation was expanded to enrich the notion of commitment and to include the variable of performance; appropriate survey instruments were developed and pretested; and a data analysis plan was developed. These activities were supported by reviews of the literature on organizational commitment and performance; interviews with ROTC instructors,

ROTC students, and non-ROTC students at six colleges; and a survey of 931 college students (461 in ROTC) at 13 colleges across the country.

RN 80-34. Fink, C. D., Masterson, T. J., & Dantzler, W. D. (Kinton, Inc.). Evaluation and design of a prototype system for management of Supervised On-the-Job Extension Training program (SOJET). February 1980. (AD A125 889)

This report describes the formative evaluation of a new system for centrally administering nonresident training through the Army Correspondence Course Program. This system is designed to support first-line supervisors in conducting on-the-job training (OJT) for tasks performed under their supervision. The major objective of this evaluation was to refine administrative procedures and to streamline manually administered portions of the system for eventual incorporation into a computerized information management system. Criteria used during the formative evaluation of this system were field acceptance, administrative feasibility, and costs. The training materials administered under this new system were specially designed to support duty position OJT for combat arms operations and intelligence sergeants and assistants.

Major features of the new system are (a) each student is required to have a supervisor registered in the system; (b) pretests and posttests for each training package requested are mailed directly to the supervisor, and lesson materials are mailed directly to the student; (c) all training packages requested are mailed in a one-shot mailing to ensure that supervisor and student have full flexibility in sequencing training to meet local priorities; and (d) supervisor functions as the OJT trainer by counseling the student on task training needs, administering pretests and posttests for each training package, reviewing test results with the student, and forwarding results for inclusion in the student's centrally maintained record file.

Student and supervisor responses obtained during questionnaire and interview surveys were highly supportive of the major features of this system. The separate mailing of test packages to the supervisor and lesson materials to the student makes the new system cost approximately 32% more per student per year than courses not directly involving the supervisor. All other costs for the two systems are essentially the same. Supervisor and student responses were in favor of retaining the separate mailing. Data indicate that supervisors were performing the OJT trainer functions and felt they could handle the limited amount of time required. Direct comparison of student performance under the new system with student performance under existing correspondence course methods not directly involving the supervisor was not possible at this time. The existing management information system does not permit identification and retrieval of student record data required for these comparisons. Such comparisons will be possible when the Army's new management information system is installed. It was concluded that, as a result of the revisions and streamlining accomplished during this effort, the revised system is ready to be incorporated into the development of the Army Correspondence Course Program's new management information system. Supplementary materials can be found in RN 80-35 and RN 80-36.

RN 80-35. Fink, C. D., Masterson, T. J., & Dantzler, W. D. (Kinton, Inc.). Evaluation and design of a prototype system for management of Supervised On-the-Job Extension Training program (SOJET). Annex A: Course guide, questionnaires and data tables. February 1980. (AD A125 890)

These materials serve as a supplement to ARI RN 80-34. Other supplemental materials are contained in ARI RN 80-36.

RN 80-36. Fink, C. D., Masterson, T. J., & Dantzler, W. D. (Kinton, Inc.). Evaluation and design of a prototype system for management of Supervised On-the-Job Extension Training program (SOJET). Annex B: SOJET program implementation handbook. February 1980. (AD A125 891)

These materials serve as a supplement to ARI RN 80-34. Other supplemental materials are contained in ARI RN 80-35.

RN 80-41. Bloom, R. F., Pepler, R. D., Schimenz, M. V., & Lenzycki, H. P. (Dunlap and Associates, Inc.). IFV/CFV personnel selection analysis. July 1979. (AD A129 107)

This report describes the development and application of an analytic methodology to identify specific needs for "extranormal" (above average levels), aptitudes, characteristics, or behaviors for each IFV/CFV crew position. Tests for assessing those extranormal attributes were also identified. Other issues addressed were the need for special personnel selection and management procedures, the proportions and sources of the personnel pool likely to be trainable or crosstrainable in each of the IFV/CFV crew positions, and implications for IFV/CFV MOS career structures.

RN 81-1. Hodge, M. H. (University of Georgia). Land-based range estimation. January 1981. (AD A125 888)

An analysis and evaluation of the range estimation skills involved in the aiming and firing of modern antitank weapons under varying meteorological, illumination, and terrain conditions are described. Following a detailed presentation of the Ono-Gogel model of distance perception, an attempt is made to explore the model's implications for range estimation. It is concluded that estimating the range of distant targets (beyond 50 m) requires judgments of both absolute and relative distance of target and nontarget objects in the field of view. If weapon users are to attain the level of proficiency needed to guarantee satisfactory hit rates, it is recommended that trainees complete a brief training program in distance estimation. The report also discusses the advantages and disadvantages of several different ranging aids. Finally, several suggestions for additional research are presented.

RN 81-3. Brown, D. K., Edmonds, W. S., White, S. J., Sevilla, E. R., Jr., & Nordlie, P. G. (Human Sciences Research, Inc.). A second study of race relations/equal opportunity training in USAREUR. January 1979. (AD A133 079)

Human Sciences Research, Inc., conducted a second study of Equal Opportunity Training programs in USAREUR as a follow-up to the earlier study conducted in 1976-77 and reported in Gilbert, M. A., & Nordlie, P. G., An analysis of race relations/equal opportunity training in USAREUR (Presidio of Monterey, CA: ARI Field Unit, July 1978), James A. Thomas, Technical Monitor.

In general, the findings of the earlier study were confirmed and extended. The racial climate is continuing to worsen slowly. While some improvements were noted in community-level EO training, unit-level EO training continues to decline. Large perceptual disparities were noted between enlisted and chain-of-command personnel with chain-of-command personnel tending to see a far more positive race relations and equal opportunity situation than do enlisted personnel. The solutions recommended to counteract the generally worsening EO climate centered around more effective EO training for chain-of-command personnel at all levels.

RN 81-4. Little, R. W. (University of Illinois at Chicago Circle). Social and psychological differentials in combat survival. July 1981. (AD A125 532)

This research analyzes the characteristics of fatal casualties in the Vietnam conflict in relation to military participation and individual attributes. The population statistics used were casualties from the state of Illinois. No significant differentials were found, except for higher rates of casualties early in the tour because of the rapid deployment of inexperienced replacements.

RN 81-10. Orend, R. J., & Wallace, M. J. (Human Resources Research Organization). Impact of STOV on unit time utilization. May 1981. (AD A127 745)

The objectives of this study were (a) to determine whether or not time is made available to units through the provision of support services by STOV and (b) given that time is made available in this way, to determine whether or not that time is channelled into mission-oriented training activities.

Two types of data were collected in the five battalions of 2AD (Fwd) and in three comparable units in other parts of Germany: (a) descriptions of assigned time utilization in units and (b) descriptions of individual time utilization, as reported by SMs using time diaries. A total of 378 diaries were completed in 2AD (Fwd); 331 were completed in control units. Subjects were randomly assigned to days of the week on which to complete the diaries, with unit data provided for each survey day by unit First Sergeants.

The results show that (a) only in building and grounds maintenance are STOV-supported units (2AD [Fwd]) required to assume fewer functions, the requirements for guard support are comparable in both STOV-supported and control units; (b) the impact of STOV support on the proportion of time

devoted to special details, as reported by units, is not significant; and (c) the impact of STOV support on the proportion of time devoted to work/job-related activities, as reported by individuals (and further collapsed into half-day blocks), is insignificant.

RN 81-11. Campbell, R. C. (Human Resources Research Organization). Design and development of diagnostic measures for armor crewmen performance--XM1. September 1980. (AD A125 895)

Individual and crew tests are necessary to support XM1 tank gunnery goals and to reduce ammunition expenditures by assuring proficiency before progression to full crew performance exercises. This research focused on developing diagnostic tests for individual crewman and crew performance evaluations for crew drills that are administerable at platoon level within 4 hours and do not involve live fire. Nineteen individual tests were developed, and remediation guidance that was developed is centered on immediate correction of specific deficiencies. For crew performance, the 14 crew drills contained in ARI Research Product 79-17, A prototype crew drills training program for XM1 tank gunnery: Company commander's manual, were analyzed, and three drills were selected that best represent the range of gunnery behavior. Tests were developed for those three drills, and remediation guidelines that focus on crew performance were prepared. Supporting material for platoon leaders and tank commanders who serve as scorers was also developed. The testing material to be issued in the unit is included as an appendix.

RN 81-12. Jones, J., & Smootz, E. R. Survey of soldier quality of life at Fort Hood. January 1980. (AD A127 161)

A questionnaire was developed and administered in fall 1975 to a sample of soldiers at Fort Hood to determine lower ranking soldiers' satisfaction with living, working, and training at Fort Hood. Analysis of the results led to the conclusions that areas of soldier dissatisfaction involved problems over which a post commander usually has little relative control, whereas areas of soldier satisfaction included areas over which a post commander usually has a relatively large amount of control.

RN 81-13. Shaket, E., Saleh, J., & Freedy, A. (Perceptronics, Inc.). Application of rule-based computer models to the evaluation of combat training: A feasibility study. July 1981. (AD A127 050)

This report describes the approach, product, and results of an exploratory effort in employing computer rule-based techniques and adaptive programming technology to the modeling of small-unit tactical engagements. The model was to be used as a training evaluation aid to improve exercise evaluation in training systems, such as REALTRAIN, SCOPE, and MILES. The techniques are expected to lead to greater training effectiveness by providing the training officer with a means for identifying lacking skills and incorrect tactical behaviors in the exercising unit.

The work focuses on adapting a rule-based, event-driven model to the representation of tactical engagements. The model describes a military mission as a hierarchy of tasks performed by a unit and its components. The tasks are connected by production rules-conditional events that cause transition to new tasks. This model, when represented explicitly in a computer, provides the framework for the implementation of an interactive computer program for evaluation of tactical tasks performed during a field exercise. The explicit model allows the computer program to compare directly the preferred solution of the exercise to what was actually performed in the exercise and to identify the significant intermediate steps that caused eventual success or failure.

A demonstration package was implemented as part of this effort, which includes interactive programs, written in the PASCAL programming language, which handle man-machine communication. The demonstration simulates a typical interaction between a training officer performing a postexercise evaluation of a tank platoon. The tactical knowledge base is limited in scope at this stage to the "Bounding Overwatch" maneuver during the "Move to Contact" phase of a "Hasty Attack." The program's responses are derived by comparing the internal description of this mission with the user's input and, if the user needs assistance, by prompting the user with information available from the tactical knowledge base.

RN 81-14. Badre, A. N. (Georgia Institute of Technology). Representing and displaying information for tactical decision processing. September 1979. (AD A131 205)

One of the main tasks required in developing user-compatible systems is the specification of criteria for the development of algorithms that search for, classify, and order the display of chunks of tactical information so that they are meaningful to the decision maker. In previously completed ARI research, the focus had been on designing experiments to locate and determine various characteristics of the informational chunks that decision makers formulate when viewing and analyzing static map positions of tactical situations. The aim of this study was two-fold: (a) to investigate the effects of the sequential displaying of chunks on the assimilation of tactical information and (b) to determine the effects of presenting a tactical scenario as a member of a sequence of scenarios on chunking.

Two experiments were designed and conducted. The general procedure was to use battlefield scenarios to be reconstructed and copied under varying conditions of presentation and viewing by a select group of battlefield commanders (participants).

The first experiment examined the hypothesis that if tactical information is presented to the participant incrementally and sequentially by meaningful chunks, it is likely to lead to greater information assimilation (measured by recall accuracy) than if the same information is presented either by a sequence of nonmeaningful chunks or all at once. Also, it was conjectured that the order of presentation of meaningful chunks would have a significant effect on assimilation performance. The results indicated that presenting information sequentially and incrementally by meaningful chunks leads to higher recall accuracy than if the same information is presented either in

nonmeaningful chunks or in meaningful chunks that are viewed in an order different from that of the original reconstruction. Those results suggest that not only is it important to present information in meaningful structures, but in the case where the information can not be presented all at once, the effectiveness of information assimilation increases when the meaningful structures are presented in a proper sequence.

The second experiment examined the effects of varying the placement of the criterion scenario in a sequential context on chunking characteristics and accuracy of recall. The findings show no difference in accuracy of recall under varying contextual conditions, suggesting that the viewer's recall strategy is to foreground the entire sequence of scenarios, not only the one to be reconstructed. Sequential context had no effect on chunk size. The availability of an invariance in the sequence of scenarios had a significant effect on the order in which symbols were reconstructed and on chunk content.

RN 81-15. Marston, P. T., Kubala, A. L., & Kraemer, A. J. (Human Resources Research Organization). The impact of adopting physical fitness standards on Army personnel assignment: A preliminary study. January 1981. (AD A127 963)

The research literature on physical strength and stamina was reviewed to determine the probable impact of the physical demands classification for Military Occupational Specialties (MOS) proposed by the Army Research Institute for Environmental Medicine (ARIEM). The minimum standards for stamina were well within the capacity of most current soldiers, but strength requirements may exclude a substantial number of persons, especially women, from a majority of Army jobs. The number of people excluded will depend very much on the precise conditions for testing strength.

Many of the MOS with high physical demands are in technical areas that require persons with high mental aptitude. In many instances, personnel shortage for these jobs already exists and will be aggravated by imposing physical demands standards, especially if many other high-aptitude MOS are competing on the basis of the same strength criteria. This problem can be alleviated by changing the job to minimize the physical demands, using techniques such as job modification, job aids, or task reassignment. Not only will such changes increase the number of persons available, but these changes will also have the side benefit of reducing the number of job-related injuries. The changes will also provide wider and more efficient use of the pool of female soldiers available to the Army.

A research effort is proposed for examining five critical MOS that are both physically demanding (according to ARIEM standards) and that require high mental aptitude for success to develop and evaluate a general procedure for conducting job analyses related to physical demands and to recommend specific job changes for these MOS.

RN 81-16. Connelly, E. M., & Johnson, P. (Performance Measurement Associates, Inc.); & Shipley, B. D. (ARI). An analytical model for developing objective measures of aircrew proficiency with multivariate time-sequenced data. Volume I: Analysis and results. May 1981. (AD A128 070)

This report presents a theoretical investigation of analytic methods for deriving differential weighting functions from preselected samples of multivariate, time-sequenced observations of aircrew performance. The research effort resulted in an analytic model that could be used to prepare and to further investigate differential weighting functions as a means of establishing relationships between time-sequenced observations of aircrew performance and independent assessments of aircrew proficiency.

A companion report, Volume II: Computer Program Documentation (RN 81-17), provides documentation of the basic computer programs used in the Measurement Analysis Processor (MAP).

RN 81-17. Connelly, E. M., & Johnson, P. (Performance Measurement Associates, Inc.); & Shipley, B. D. (ARI). An analytical model for developing objective measures of aircrew proficiency with multivariate time-sequenced data. Volume II: Computer program documentation. May 1981. (AD A127 313)

This volume contains computer programs used to analyze the subject data, procedures for the use of the programs, and example outputs. These programs are the result of a theoretical investigation of analytic methods for deriving differential weighting functions from preselected samples of multivariate, time-sequenced observations of aircrew performance. The research effort resulted in an analytic model that could be used to prepare and to further investigate differential weighting functions as a means of establishing relationships between time-sequenced observations of aircrew performance and independent assessments of aircrew proficiency. Volume I: Analysis and Results (RN 81-16) is a companion report.

RN 81-18. Siegel, A. I., & Wolf, J. J. (Applied Psychological Services, Inc.). Chronicle of the evolution and potential of the NETMAN model. May 1981. (AD A125 896)

The NETMAN computer simulation model, its development, its evolution, and results from its sensitivity and validity testing and application are chronicled. NETMAN simulates message processing in computer-based military field exercise control systems. To present NETMAN in historical perspective, its genealogy and its parent model (MANMOD) are described. Emphasis, however, is given to the efforts devoted to NETMAN during the past 3 years of research, which this report also summarizes.

The logic and structure of NETMAN are presented, and the model's strength and weakness are assessed in a critical evaluation of its current status as a tool.

RN 81-19. Siegel, A. I., Madden, E. G., & Wolf, J. J. (Applied Psychological Services). Application of computer simulation techniques in military exercise control system development. May 1981. (AD A126 248)

A previously developed computer simulation model, NETMAN, was employed to evaluate a novel exercise monitoring and reporting system (EMARS). The application of the NETMAN model to EMARS possessed two purposes: (a) to investigate the flexibility of the NETMAN model by applying the model to a system that is in the conceptual stage of development, and (b) to provide a detailed evaluation of the EMARS concept.

The results supported contentions favoring the flexibility of the NETMAN model. The present results, when coupled with prior sensitivity and validation test results, serve to suggest that NETMAN possesses considerable utility.

The simulation results indicated that the EMARS concept possesses considerable advantage over one current exercise management system (TWSEAS), but indicated also some EMARS modifications were required.

RN 81-22. O'Brien, L. H., & Livingston, G. H. (Dynamics Research Corporation). Early Training Estimation System: Final yearly report number 1. August 1980. (AD A126 365)

This report describes the major products developed during the first year of the Early Training Estimation System (ETES) development project.

The ETES is designed to deal with two major deficiencies in existing technologies: (a) the lack of a systematic tool for describing, storing, and updating system concepts and for transmitting this information to all of the various participants in the development/acquisition process and (b) the lack of a comprehensive set of training analysis tools appropriate for the early phases of design. The ETES will have four major components: a System Description Technology (SDT), training estimation aids and procedures, human performance simulation models, and a user's guide.

The SDT will be an automated tool for describing actual and projected system elements, including functional requirements, design concepts, tasks, skills, training program elements and their associated resources; for storing the above information; for changing and updating this information; and for transmitting the information among all of the participants in the acquisition process.

The training estimation aids and procedures will be specifically designed for early training estimation. They will include procedures (automated whenever possible) for (a) identifying comparable equipments, (b) generating and modifying tasks, (c) generating and modifying courses, (d) selecting and assigning tasks to training settings and methods, (e) determining the number of personnel to be trained, (f) determining training resources, and (g) developing training cost measures.

The human performance-system performance simulation models will be used to relate human task performance to system performance. The simulation

models will provide the capability for trading off training-related system elements with other system elements.

The user's guide will provide a detailed, step-by-step handbook describing the use of the other three tools to assess early training requirements.

The first year of the study concentrated on the development of the SDT, the most important component of ETES. The SDT will provide a data base management tool capable of describing most of the major elements of an emerging system. As such, the SDT will provide an important data base management capability that has wide-ranging applicability, far beyond training-related issues.

This yearly report outlines specifications for the SDT development, provides a description of the physical and operational features of a prototype SDT concept, and describes the analytical procedures underlying the development of this concept.

RN 81-23. Melching, W. H., & Osborn, W. C. (Human Resources Research Organization); & Bessemer, D. W. (ARI). Field evaluation of the ESSLR and CESSLR devices. August 1981. (AD A126 144)

The range estimation capabilities of two eye-safe filters (densities of 2.9 and 5.5) for the M60A3 rangefinder were evaluated under specified conditions of target distance, target reflectivity, and target angle. Both filters were able to range targets out to at least 2,000 m when targets were enhanced with appropriate reflective materials. Whereas both filters may be useful in tank gunnery training, only the 5.5 density filter can be used in freeplay exercises based on safety conditions.

RN 81-24. Gaeth, G. J., & Shanteau, J. (Kansas State University). Training to reduce the use of irrelevant information in personnel selection. September 1981. (AD A127 633)

This study presents a summary of work in progress on the role of irrelevant information in personnel selection. The research was designed to advance previous work on training agricultural experts to avoid irrelevant information. This was accomplished in two ways. First, Nagy's (1981) results showing that subjects used irrelevant job applicant information in making hiring recommendations was replicated. It was found that in addition to relevant information, irrelevant information of age, sex, and physical attractiveness were used as a part of hiring judgments.

Second, two training programs (one lecture-based, one interactively based) designed to reduce the use of irrelevant information were evaluated. These training programs were adapted from ones successfully used in an earlier study involving soil judges (Shanteau & Gaeth, 1981). The two training programs were tested separately using a pretest, training, posttest design. The results, although only tentative, show that both the lecture training and the interactive training reduced the influence of the irrelevant information. These results suggest that the training techniques developed

previously for agricultural judgment can be successfully extended to improve personnel selection judgments.

RN 81-25. Gaeth, G. J., & Shanteau, J. (Kansas State University). Bibliography of research on the influence of irrelevant information on psychological judgments. September 1981. (AD A125 368)

This bibliography provides a partial listing of published studies that demonstrate an effect of irrelevant information on human judgment. Whereas it is apparent that there are numerous studies of irrelevance, there have been no previous efforts to compile a listing of these papers. However, it is clear from the bibliography that the use of irrelevant information has been reported in a wide range of research areas. Moreover, there are a number of parallel research efforts on irrelevance not previously documented.

RN 81-26. Brink, J. R., Newman, S., Spurgeon, M., & Stock, J. R. (Battelle Columbus Laboratories). Study of effectiveness of Army Continuing Education System (ACES). August 1981. (AD A126 352)

The purpose of the research was to evaluate the impact of participation in the Army Continuing Education System (ACES) on soldier performance. Four ACES programs were selected for evaluation: Basic Skills Education Program I, Literacy Phase (BSEP I-Lit); Basic Skills Program I, English as a Second Language (BSEP I-ESL); Skill Development, General Vocational-Technical (Vo-Tech); and Veterans Educational Assistance Program (VEAP). Independent, dependent, and control variables were selected and sample sizes were determined. Sources, including computerized sources, for obtaining the variable data were identified and four installations were selected for manual collection of Vo-Tech data. A methodology was designed for the collection, storage, and management of data. A comparative statistical analysis of the results was not completed because problems were encountered in accessing, obtaining, and processing computerized and manual soldier performance data.

RN 81-27. Hill, H. G., & Sticht, T. G. (Human Resources Research Organization). Perspectives on battalion training management. July 1981. (AD A127 057)

Four battalion commanders were interviewed at length to explore their philosophies and goals for training, training management practices, and training and evaluation techniques. Other topics discussed were ways that staff positions were used, the ways that commanders prepared for command, and the utility of training management doctrine and guidance. Positions taken by the commanders are described as representing points on a management/leadership continuum. Comparisons and contrasts are drawn among the four approaches to training management.

This report is most likely to be of interest to researchers involved in studying the subjects of training management and leadership. It is a subtask report for a project to evaluate a battalion training management model developed at the USAREUR Field Unit of the U.S. Army Research Institute. Each of the battalion commanders reviewed the training management guidebook,

which incorporates this management model, and provided evaluative comments. The preponderance of opinions was critical of the guidebook. The authors recommend that further study be directed toward alternative delivery systems of training management doctrine as well as the preparation of officers and their development as managers. It is concluded that a variety of approaches may be appropriate and effective in meeting training goals. It is further suggested that discussions such as those contained in this report could provide useful material to officers who are preparing to assume command and who are in the process of formulating their own training management approaches.

RN 81-28. Swezey, R. W. (Science Applications, Inc.); & Evans, R. A. (ARI). Development of a user's guidebook for TRAINVICE II. December 1981. (AD A126 143)

This report documents the effort to develop a user's guidebook for the application of the transfer of training model known as TRAINVICE II (see Research Note 81-29). In addition to presenting the development process and providing an overview of the guidebook, this report discusses a variety of technical concerns regarding the TRAINVICE II model. Recommendations are also provided in terms of future research and development for such approaches.

RN 81-29. Swezey, R. W. (Science Applications, Inc.); & Evans, R. A. (ARI). Guidebook for users of TRAINVICE II. December 1981. (AD A126 197)

This user's guidebook documents a transfer-of-training model known as TRAINVICE II. Each of the components of TRAINVICE II is documented so that a user can apply the model in training equipment evaluations.

The development of the guidebook was based primarily on ARI Research Memorandums 79-6 and 79-7. Some changes, however, are reflected in the formula reported here.

Potential users of the model are cautioned as to a variety of technical issues that remain unresolved. A more detailed discussion of these issues can be found in the final report for this project (Research Note 81-28).

RN 82-1. Harris-Bowlsbey, J., & Rabush, C. M. (Discover Foundation, Inc.). Functional specifications: The Army Education Information System (AREIS). December 1980. (AD A126 974)

This document provides the details and specifications for the completion and implementation of the Army Education Information System (AREIS). AREIS is a computer-based educational and vocational guidance system. A plan for a field tryout of the completed system and evaluation is also provided. Additionally, background information is given on computer-based educational information systems.

RN 82-2. Harris-Bowlsbey, J., & Rabush, C. M. (Discover Foundation, Inc.). The Army Education Information System (AREIS): A conceptualization. December 1979. (AD A125 369)

The Army's need for a computer-based educational and vocational guidance system is summarized. A design for the Army Educational Information System (AREIS) is provided.

RN 82-3. Rabush, C. M. (Discover Foundation, Inc.). Field tryout of the Army Education Information System (AREIS). August 1980. (AD A126 884)

The results of a field tryout of portions of the Army Education Information System (AREIS) are summarized. The AREIS is a computer-based educational and vocational information system. The field tryout was conducted at Fort Sill, OK, with Education Center counselors and soldiers.

RN 82-4. Harris-Bowlsbey, J., & Rabush, C. M. (Discover Foundation, Inc.). Cost/benefit analysis of the Army Education Information System (AREIS). November 1980. (AD A126 930)

The purpose of this document is to (a) indicate alternative modes for the delivery of the Army Education Information System (AREIS) to Army Education Centers worldwide, (b) project cost figures related to each of these delivery modes, and (c) indicate anticipated benefits that may accrue to the Army and to soldiers by using the computer system.

RN 82-5. Wallis, M. R., Korotkin, A. L., & Marshall-Mies, J. C. (Gibboney Associates, Inc.). Evaluation of data elements for training information feedback system in context of post-CGSC assignments. August 1980. (AD A127 022)

The key objective of this research was to create and evaluate a methodology for developing data elements capable of providing objective feedback from the field to define the structure and direction of a professional self-development program for field grade officers. The research exploited data bases and research results obtained in both the development of duty modules and a training information feedback system (TIFS) for junior officers. An exploratory investigation was also conducted to create a methodology for the identification of soft skills related to specific Command and General Staff College (CGSC) curriculum content.

Part 1 reports on the feasibility of collecting job survey data by mail response for use in clustering related tasks into job components that have essentially the same meaning in each assignment in which they are components. From these job components applicable to 20 salient assignments for officers in the 7 to 9 years following graduation from the CGSC (or their nongraduate peers), job-component certification instruments (JCCI) were developed capable of defining, measuring, and tracking the assignments of incumbents. Procedures for development of all required sequential steps in the creation of data elements and in their application to a TIFS for field grade officers are presented.

Part 2 reports on the results of examining Officer Personnel Management System specialty 48, Foreign Area Officer, utilization of subcourse 771, "Low-Intensity Conflict" in the performance of duties involving "soft skills." Of the 32 learning objectives for the subcourse, 22 were rated by survey respondents as requiring a skill level of moderate or above for officers to effectively carry out FAO assignment duties. The remaining 10 learning objectives were illuminated for examination by curriculum designers to determine whether they should be retained, changed, or dropped from the subcourse.

RN 82-7. Schurman, D. L., Joyce, R. P., Porsche, A. J., & Garvin, C. P. (Applied Science Associates, Inc.). Guidelines: Assessing use of information sources and quality of performance at the work site. December 1980. (AD A125 366)

This report describes a sample training schedule and training materials for observers to use unobtrusive observation techniques in U.S. Army organizational-level and direct support-level automotive shops. Training materials include conceptual models and practical instructions for performing front-end analyses of tasks common to these shops. Instructions for using methodology to predict information seeking and errors are also given.

RN 82-8. Dyer, J. L. Prediction of infantry squad errors during training: Pilot investigation. January 1982. (AD A126 975)

Individuals with previous company command experience were asked to predict the errors made by rifle squads during an MOUT (military operations in urbanized terrain) exercise based on a written description of the training setting. The agreement between these predictions and the errors that actually occurred was determined. Although experienced individuals could predict errors made by squads, the overlap among the predictions was not high. Actual and predicted errors reflected both individual and squad mistakes. The use of experienced individuals to predict specific team and individual errors likely to be made by trainees in performing particular missions appears to be an approach worth further exploration. Documentation of these predictions could provide very useful training requirement information to incoming commanders and trainers. Such documentation would provide continuity and maintain quality in training despite the constant turnover in training personnel. Further modifications of the procedure used in the present study and investigation of additional issues, such as identifying errors that are difficult to correct, are needed, however, before such guidelines can be incorporated in training materials.

RN 82-9. Schurman, D. L., & Porsche, A. J. (Applied Science Associates, Inc.). Baseline data. Volume I. Likelihood of occurrence (one or more times) of information-seeking or error events under different task conditions. September 1980. (AD A126 916)

Data on occurrence of information-seeking and performance errors are presented for track and wheel vehicle mechanics classified by amount of prior task experience. Within this framework, information-seeking behaviors are identified by type of information source used and type of information

sought in relation to characteristics of the task performed. Error data are similarly displayed for type of performance error in relation to presence or absence of information seeking during the task performance and characteristics of the task performed.

These data are based on unobtrusive observations of U.S. Army mechanics performing their usual duties at their normal work sites. These observations were restricted to organizational-level motor pools and to mechanical repair tasks on vehicles in the M151 jeep series, M35 2½-ton truck series, M54 5-ton truck series, M113 armored personnel carrier series, and M60 tank series. Observers recorded the mechanics' performance in a step-by-step fashion, noting when information was sought during the performance and the errors made during the performance.

RN 82-10. Schurman, D. L., & Porsche, A. J. (Applied Science Associates, Inc.). Baseline data. Volume 2. Relative frequency of types of information-seeking or error events occurring under each type of task conditions. September 1980. (AD A127 416)

Data on occurrence of information-seeking and performance errors are presented for track and wheel vehicle mechanics classified by amount of prior task experience. Within this framework, information-seeking behaviors are identified by type of information source used and type of information sought in relation to characteristics of the tasks performed. Error data are similarly displayed for type of performance error in relation to presence or absence of information seeking during the task performance and characteristics of the task performed.

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RN 82-11. Schurman, D. L., & Porsche, A. J. (Applied Science Associates, Inc.). Baseline data. Volume 3. Mean frequency for types of information-seeking or error events occurring under each type of task condition. September 1980. (AD A126 888)

Data on occurrence of information-seeking and performance errors are presented for track and wheel vehicle mechanics classified by amount of prior task experience. Within this framework, information-seeking behaviors are identified by type of information source used and type of information sought in relation to characteristics of the tasks performed. Error data are similarly displayed for type of performance error in relation to presence or absence of information seeking during the task performance and characteristics of the tasks performed.

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RN 82-12. Harper, W. R. (Anacapa Sciences, Inc.). Maintenance performance system, User's Reference Manual. Volume I. System description. April 1981. (AD A126 976)

The final year of a 3-year project to develop, implement, and evaluate an Army Maintenance Performance System (MPS) is described. From specific maintenance-related performance measures provided by the MPS, managers and supervisors can assess maintenance effectiveness and relate it to repairmen skills and maintenance training needs. The MPS establishes training priorities and specifies training resources and methods for overcoming specific deficiencies.

In work completed prior to the final year, a prototype MPS was developed and operated by the contractor staff. Maintenance managers reported that the MPS provided useful, unique, and valid information to aid maintenance operations. During the 46-week period in which the prototype system was operated at Fort Carson, CO, the relationships among maintenance workload, efficiency, and skill were studied. As workload increased, efficiency decreased. However, changes in skill levels, through personnel turbulence and/or training, mediated between workload and efficiency. For example, efficiency might actually increase with increased workload, if skill levels increased as well. This finding supported the underlying premise of the MPS, that effort expended on increasing maintenance skills would pay off in increased maintenance effectiveness.

The final year produced a streamlined and expanded MPS that could be handed over to and operated by Army personnel. The system encompassed 10 technical Military Occupational Specialties (MOSs) and the equipment of a mechanized infantry division. The system was proven during a 10-week implementation period at Fort Carson, CO. Also, a study of MPS potential in geographically dispersed operations, such as in USAREUR, concluded that the MPS would operate satisfactorily if data collection from outlying units were coordinated with maintenance control system procedures.

A total of 34 reports, manuals, system descriptions, and performance aids were prepared and submitted during the 3-year project. These publications provide details on the project and the resulting MPS.

RN 82-13. Harper, W. R., & Gutman, J. C. (Anacapa Sciences, Inc.). Develop and evaluate new training and performance systems for maintenance jobs evaluation: Findings, plans, and examples. April 1981. (AD A127 082)

This report describes the final year of a 3-year project to develop, implement, and evaluate an Army Maintenance Performance System (MPS). From

specific maintenance-related performance measures provided by the MPS, managers and supervisors can assess maintenance effectiveness and relate it to repairmen skills and maintenance training needs. The MPS establishes training priorities and specifies training resources and methods for overcoming specific deficiencies.

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A total of 34 reports, manuals, system descriptions, and performance aids were prepared and submitted during the 3-year project. These publications provide details on the project and the resulting MPS.

RN 82-14. Harper, W. R., Simpson, H. K., Fuller, R. G., & Harris, D. H. (Anacapa Sciences, Inc.). Develop and evaluate new training and performance systems for maintenance jobs: Final report. April 1981. (AD A127 080)

The final year of a 3-year project to develop, implement, and evaluate an Army Maintenance Performance System (MPS) is described. From specific maintenance-related performance measures provided by the MPS, managers and supervisors can assess maintenance effectiveness and relate it to repairmen skills and maintenance training needs. The MPS establishes training priorities and specifies training resources and methods for overcoming specific deficiencies.

In work completed prior to the final year, a prototype MPS was developed and operated by the contractor staff. Maintenance managers reported that the MPS provided useful, unique, and valid information to aid maintenance operations. During the 46-week period in which the prototype system was operated at Fort Carson, CO, the relationships among maintenance workload, efficiency, and skill were studied. As workload increased, efficiency decreased. However, changes in skill levels, through personnel turbulence and/or training, mediated between workload and efficiency. For example, efficiency might actually increase with increased workload, if skill levels increased as well.

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A total of 34 reports, manuals, system descriptions, and performance aids were prepared and submitted during the 3-year project. These publications provide details on the project and the resulting MPS.

RN 82-15. Pask, G. (System Research Limited). Specialised forms and individual subtasks of the Team Decision System. June 1981. (AD A127 081)

A detailed study of decision making in complex command and control systems was carried out using the "Team Decision System" with a "Space" scenario with many novel features. The data are coherent if sufficiently detailed. Prediction of planning is possible.

RN 82-16. DePuy, W. E., & Bonder, S. (Vector Research, Inc.). Integration of MPT supply and demand and the system acquisition process. March 1982. (AD A130 229)

This effort was conducted to identify behavioral science research activities to help assess and integrate manpower, personnel, and training (MPT) requirements in the acquisition process. A structure is presented to describe the interactions between MPT demand (requirements) and MPT supply. This structure is used to develop recommended research efforts.

RN 82-17. Harris, J. H., & Melching, W. H. (Human Resources Research Organization); & Morrison, J. E., & Goldberg, S. L. (ARI). Development and evaluation of a stabilized gunnery training program. February 1982. (AD A126 873)

A program to train M60A3 tank gunners in stabilized gunnery was developed, tried out, revised, and tried out again on a sample of soldiers. Whereas experimental groups acquired significantly more knowledge about stabilized gunnery techniques than did control groups, the experimental groups did not perform significantly better than controls on the criterion test.

RN 82-19. Johnston, D. M. (Harvard University). Research and evaluation in support of an executive program in national security. March 1982. (AD A127 634)

The Harvard executive training program methodology was applied to the development of a short-term training program for senior U.S. national security officials. The model program was assessed for effectiveness in meeting the program objectives. The principal strategy used in evaluation was participants' perceived competence in dealing with seven major national and international security areas where their personal decisions could critically affect political, economic, or military interests of the United States. Results showed that each group of participants (29 in 1978, 30 in 1979, 79 in 1980) reported substantial gains from preprogram to postprogram evaluations and further gains at 6 months postprogram points. (The 1980 course was increased to 80 spaces because of the widespread interest generated by the earlier attendees.) Additionally, War College graduates characteristically experienced marginally higher gains than did non-War College attendees. Also, each year's group was brought to essentially the same 6-month postprogram level of perceived competence, independent of its respective preprogram levels. The course was continued in 1981 and will continue for the foreseeable future.

RN 82-20. Barron, J. M., & Avant, T. L. (McFann-Gray & Associates, Inc.). Evaluation/refinement of a draft guideline for preparing infantry battle drills. February 1982. (AD A127 482)

As part of the overall project on the "Development of the Individual Extension Training System (IETS) through the Company/Battery Level: Field Test," an ARI in-house work unit developed a concept of integrating individual and collective training for small units (e.g., rifle squad, fireteam). The essence of this concept is to analyze the ARTEP missions to identify "chunks" or "slices" of battle. Each of these "slices" or segments would be the basis for conducting specific training in the form of drills. A specific product of the ARI in-house research effort was the development of a Guidelines for Designing Drill Training Packages (Hiller, Hardy, & Meliza, in preparation) which provides directions on how to develop drills. This report describes a process used to evaluate/critique the guideline. It offers observations on and recommended revisions to the January 1982 draft.

RN 82-21. Campbell, R. C., Taylor, E. N., & Campbell, C. H. (Human Resources Research Organization). Crew performance requirements for emerging armor weapon systems: Studies of crew size and methods of forecasting human factors. January 1982. (AD A127 921)

This research examines (a) the effects of operating a lightweight armor combat vehicle with crews of varying size and (b) the effectiveness of two methods of forecasting human factors and training requirements for the same weapon system. These objectives were pursued in separate studies though both dealt with a conceptually new, lightweight, highly mobile armor combat vehicle. The lack of good criterion performance data weakened the research and led to a reliance on questionnaire data.

In Study I, experienced armor crewmen responded to questions about the impact on system performance of reductions in number of crewmen from four to three or two. The opinion data together with results of a literature review suggest that if a combat vehicle design employs automation and control-and-display redundancy well, a three-man crew may not only be ample but perhaps superior to a four-man crew; a reduction to two men would, in the judgment of the experts, be too extreme, producing some degradation in system effectiveness and crewman confidence.

In Study II, estimates of personnel requirements for the experimental weapon system were made by armor experts who were provided documents descriptive of the system but who had no first-hand experience with it. Their estimates, regardless of the kinds of descriptive materials used, did not differ significantly from judgments of the same requirements made by crewmen experienced with the weapon system. In task areas where estimates of time to perform were compared with observed performance time, the armor experts tended to overestimate time to perform; the shorter the actual time, the greater the overestimate.

RN 82-22. Hanson, T. G., Behm, A. N., Johnson, D. C., Hirshfeld, S. F., & Vestewig, R. E. (Honeywell, Inc.). Development and evaluation of a generalizable job proficiency matrix. May 1980. (AD A127 077)

The feasibility of constructing task-by-element matrices for three avionics MOSs--35L, 35M, and 35R--was explored. Matrix rows define critical tasks, and columns specify behavioral elements (soldier perceptions, decisions, and actions) required for successful task performance. The generalizable job proficiency matrix (GJPM) identifies commonalities among tasks within and across MOSs based on behavioral content. Concurrent with this analysis, a generalizable avionics troubleshooting guide was developed. The GJPM was used to develop prioritized task lists; logical issues relating to human factors research on computer-based systems are considered.

RN 82-25. Price, K. H., & Garland, H. (University of Texas). Leader responses to collective failure, and maintenance of group integration, task motivation, compliance, and leader endorsement. September 1980. (AD A120 168)

Eight research studies on leader and group member functioning, using undergraduate students as subjects, focused on the impact of leader behavior and on measures of compliance or performance. The research examined (a) leader interventions in response to collective failure, (b) the relationship between task expertise and compliance with a leader, (c) factors enhancing group member compliance, and (d) reward distributions. Results challenged the assumption that leader endorsement and group member compliance are positively related and suggested that positive feedback is more effective than negative feedback following collective failure. Group member compliance appears unrelated either to leader competence or to group member endorsement of the leader, and lack of group member competence appeared to influence compliance.

RN 82-27. Baum, D. R., & Riedel, S. L. (Honeywell Systems and Research Center). Training effectiveness as a function of training device fidelity: Appendixes. August 1982. (AD A133 104)

This volume contains appendixes related to "Training Effectiveness as a Function of Training Device Fidelity." The appendixes consist of computer program listings and user documentation, raw rating and performance data, illustrations of training devices, and instructions to subjects.

RN 82-29. Lenz, R. C., Chen, K., Skerl, J. A., Newman, R. L., Anderson, L. A., & Warner, R. L. (University of Dayton). Forecast of Army aviation training research and development requirements for the period 1985-2000. Volume II. Appendices. August 1981. (AD A130 209)

This research note presents the results of a survey designed to identify U.S. Army aviation system and subsystem acquisitions projected for the period 1985-2000, which will require behavioral research to support development of new aircrew training methods and equipment. Survey results are presented in questionnaire format, as they were originally obtained, together with information on scoring model weighting and a complete listing of the bibliographical references.

The related technical report (ARI Technical Report 565) describes the conduct and results of three tasks: (a) a survey to identify future Army aviation-related systems and subsystems; (b) the identification of systems with unique training needs; and (c) the determination of training requirements and the forecasting of behavioral research requirements for the systems with unique training needs.

This research is intended to help the Army identify behavioral research requirements for future Army aviation aircrew training before the new aviation systems and subsystems are introduced. The lead time provided the early initiation of behavioral research programs should aid the development of effective training systems. Requirements for the behavioral research needed to support Army aviation training programs during the period 1985-2000 are described. An integrated and future-oriented review of U.S. Army aviation training research and development needs is presented.

RN 82-30. Fishburne, R. P., Jr., Rolnick, S. J., & Larsen, J. Y., III (Calspan Corporation). Development of a methodology for conducting training effectiveness evaluations of air defense training, and abstracts of TEE-related literature. June 1982. (AD A130 246)

The development of a system for conducting Training Effectiveness Evaluations (TEE) on Army Air Defense training is described in detail. Background of the research and development requirement is presented together with a discussion of the purpose, scope, and context of the TEE. A series of events related to the TEE development process is identified, and the literature base is examined in depth. Guidelines for conducting the TEE are outlined by phases and steps, and a master list of evaluation questions is included. The report concludes with a discussion of the TEE development effort and recommendations for validation and follow-on research and

development requirements. The TEE system described in this report incorporates the principles of instructional systems development and provides for both product evaluation and process evaluation components. Documentation in support of the TEE system includes a proceduralized user's guide entitled "Guidelines for Conducting a Training Effectiveness Evaluation." The user's guide is in two volumes: Volume I, "TEE Evaluator's Handbook"; and Volume II, "Data Collector's Manual." All materials necessary for the conduct of a TEE, including training materials, job performance aids, and work sheets, are included in the user's guide.

RN 82-31. Miller, E. E., Nystrom, C. O., & Hicks, J. A., III (Human Resources Research Organization). Reading ability and other correlates of the SQT written component. April 1982. (AD A127 051)

SQT scores are correlated with reading ability, demographic variables, and questionnaire responses. Reading ability, as measured by a standard test, is substantially correlated (r = .46) with scores on the Written Component (WC), but much of the relationship may be explained in terms of general ability, since reading ability also correlates with the Hands-On Component (HOC) (r = .25). Soldiers who say they can understand the Soldier's Manual and the WC questions score higher on the WC. WC scores were not related appreciably to (a) perceived quality of training, (b) career satisfaction, (c) time in service, (d) age, or (e) civilian education.

RN 83-1. Warnick, W. L., & Kubala, A. L. (Human Resources Research Organization). Improvement of training realism for tactical units: Opposing force (OPFOR) program. September 1982. (AD A127 065)

This report presents the results of an effort to develop a more realistic approach to OPFOR-related training for tactical units. The report covers the selection of the OPFOR-related information to be included in training. The research team used a systems engineering approach, which resulted in a procedure to integrate OPFOR training directly into U.S. task training. NBC warfare was chosen to develop these procedures. The procedures derived can be employed by training managers to help develop US/OPFOR integrated training specific to their needs, identify performance measures for critical tasks, and identify behavioral elements common across tasks in one or more Military Occupational Specialties (MOSs). Skill Qualification Test (SQT) written components were developed for the three MOSs. The generalizable job proficiency matrix (GJPM) facilitated MOS content coverage while reducing unnecessary redundancy.

Interviews were conducted upon completion of the SQTs to evaluate the usefulness of the GJPM for SQT development, training design, training media evaluation, and MOS management and to discuss appropriate levels of matrix task and element specificity.

The project demonstrated that the GJPM facilitates SQT development. Interviews suggest that the GJPM will be useful for training, training device design, and test design and development. The GJPM is a systematic approach that can point out areas of commonality not previously apparent and can identify areas of differences where commonality had been assumed.

RN 83-2. DeWeaver, M. J., & Prather, C. J. (Lawrence Johnson & Associates, Inc.). State of the art assessment in basic skills education Program II. June 1980. (AD A127 478)

The Army currently needs to provide literacy and life-coping skills training for many soldiers to enable them to perform in their MOSs. General literacy training has been found ineffective in improving job performance, and a military job-specific functional literacy program has been mandated by the Army.

The purpose of this project was to assess the present state of the art in Army Basic Skills Education for soldiers in their first permanent duty assignment. On-going programs were assessed in relation to their goals and objectives, target populations, curriculum, delivery systems, personnel, and facilities.

Recommendations for improving the Army's functional literacy and life-coping skills training program were made, based on the Army's stated program goals; the discussion of pertinent issues in six papers produced by experts; the current practice in other military settings and in civilian settings; and interviews with recognized authorities on basic skills, adult basic education, and functional literacy. Project findings indicate that the Army should develop an instructional system to provide criterion-referenced functional literacy and life-coping skills training based on task analysis of MOS requirements.

RN 83-3. Freda, J. S., & Ozkaptan, H. An approach to fidelity in training simulation. June 1980. (AD A125 376)

General guidelines for determining fidelity requirements in training simulation are presented. An organizational matrix of Army training systems and media selection issues is also discussed. This report is intended primarily for psychologists involved with fidelity issues in training simulation.

RN 83-4. Johnson, W. B., Entwistle, W. C., & Gaddis, K. S. (University of Illinois). Development and demonstration of a laboratory tool for research in the design of games for training of troubleshooting skills. August 1982. (AD A127 128)

In 1979 the University of Illinois developed a computer-based simulation designed to help aviation maintenance trainees acquire troubleshooting skills. This simulation was named FAULT (Framework for Aiding in the Understanding of Logical Troubleshooting) and was originally designed for the DEC system 10 computer.

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) subsequently contracted with the Aviation Research Laboratory (ARL) of the University of Illinois to develop a FAULT simulation compatible with the PLATO system. The PLATO system is used extensively by the Army for both training and research.

Key modifications made by ARL researchers to the original FAULT simulation facilitate its use by troubleshooters and Army researchers.

As a training tool, PLATO FAULT simulates troubleshooting decisions in a game format. The object of the game is to find the single failed part as quickly as possible while incurring the minimum expense. The instructions and on-line help provided to the trainee have been redesigned to provide more information in natural language. Throughout the simulation the trainee has available a number of options that allow him to (a) gather information about the problem, (b) act on the information, and (c) receive information about the action. To present a realistic simulation of actual troubleshooting, FAULT assigns dollar charges to certain options and the list of options has been clearly presented to differentiate between options that are free and those that incur costs.

For research use, the PLATO version of FAULT allows the researcher to create demonstrations and experiments. The version provided to the Army contains one operational technical system (TRUCK ENGINE) for immediate use and the necessary documentation to modify this system and develop additional ones. Furthermore, the programming allows the experimenter to select the problems to be presented to the troubleshooter. The collection and accessibility of data have also been enhanced: Data can be collected and stored simultaneously from numerous PLATO IV terminals, and this data can be accessed either on a global level (i.e., average times and costs to problem solution) or on a very specific level (i.e., listing of each action required to solve a problem).

RN 83-05. Stone, D. E., Israelite, L., McMinn, M., Wilson, L., & Marx, A. (Hazeltine Corporation). Hypertext electronic job aid for maintenance. November 1982. (AD A133 103)

One of the most important tasks facing the military services today is maintenance of complex weapons systems. Unfortunately, this task is not always adequately performed despite its importance.

Electronic job aids have the potential to help Army personnel significantly improve maintenance of complex equipment, provided that the technical information presented is complete, accurate, and easy to understand and use.

The use of TICCIT Hypertext™ Display System to permit technicians of varying levels of expertise to access technical information describing the M-1 tank antenna maintenance procedure is described.

RN 83-6. Boneau, C. A. (Essex Corporation). Personnel affordability: A state of the art report. September 1979. (AD A130 347)

A conceptual scheme is developed to consider human resources in weapon systems development. Personnel affordability is defined and related to the design and development process, to the establishment of manpower requirements, and to the processes involved in developing personnel inventory to match requirements. Examples of recent and ongoing research efforts are described and discussed.

Data collection for this project was completed in August 1979.

RN 83-07. Committee on Human Factors (National Research Council). Research needs for human factors. January 1983. (AD A129 899)

This report describes basic research needed to improve the scientific basis of applied human factors work. Six topical areas are covered: (a) human decision making, (b) eliciting information from experts, (c) user-computer interaction, (d) supervisory control systems, (e) population group differences, and (f) applied methods.

RN 83-8. Nickerson, R. S., Meyer, T. H., Miller, D. C., & Pew, R. W. (BBN Inc.). User-computer interaction: Some problems for human factors research. September 1981. (AD A127 089)

This report discusses a variety of research problems that relate to the use of interactive computer systems in military contexts. First, several documents that describe planned or anticipated changes in the deployment and use of computers by the Department of Defense in the near-term future are reviewed. Then several generic military functions that involve the use of computer systems are discussed. Research problems are discussed under the general topics of user issues, interface issues, and system issues. Finally several methodological issues relating to human factors research on computer-based systems are considered.

RN 83-9. Badre, A. N. (Georgia Tech Research Institute). A workshop on the gathering of information for problem formulation. September 1981. (AD A127 507)

The purpose of this workshop was to bring together a group of research scientists from various disciplines to discuss and report their research findings on the problem representation for interactive information processing. During the planning phases of the project, it was agreed that the proposed general topic should be limited to the problems of representation and information processing in the context of human-computer interface. Based on this theme, the following set of topics was developed and used to select and organize speakers and panels: (a) psycholinguistic factors in computer communication, (b) compatible knowledge and memory structures for computer communication, (c) representing and structuring displayed information in computer communication, and (d) representing information for decision, learning, and help processes in computer communication.

The result was a very successful workshop that included 20 presentations and 40 participants.

RN 83-10. Harris, A. H. (Division of Behavioral Biology, Johns Hopkins University School of Medicine). Organizational structure and leadership factors as determinants of small group performance and team cohesiveness. December 1982. (AD A127 464)

The creation and maintenance of functional group units is related to the benefits that group members receive through their cooperation and participation in the group effort. An important determiner of group participation

and individual performance within a group is the method of distributing rewards and/or resources among group members. Based on the assumption of the overriding importance of an individual's immediate self-interest, the dominant theoretical formulation proposed to account for the "distributive problem" is equity theory, according to which outcomes (rewards) are allocated to persons according to their relative input. Recent research, however, has demonstrated that at least one other important norm of distributive justice appears to operate as a contrasting solution to the distributive problem. This position, described as equality theory, provides for distributing rewards among group members equally and without regard to relative inputs and emphasizes that a person's self-interests, especially over the long term, are better served by an allocation of rewards that benefit both him/herself and others.

Previous research findings showed that individuals in the small-group environment, although placed in close proximity and required to share in some of the available environmental resources, will nonetheless tend to function independently and prefer an equitable allocation of rewards. This tendency toward isolation (i.e., minimal socialization and communication) is all the more striking when under some circumstances it resulted in prolonged work days and self-imposed limits on earnings. Therefore, the most recent series of experiments focused on conditions that promote group organizations' using equal reward allocation and the social effects of such group formation.

The experimental procedure involved subjects' performing two work tasks: a manual work task (MT), available in each subject's private chamber, and the Alluisi Performance Battery (AP), available only in the work room. The methodology used to determine a participant's preference for equity versus equality in reward allocation was a choice paradigm in which subjects indicated their selection prior to each of several daily work episodes.

Our investigations into the relationships between reward allocation and group processes have revealed the following:

(a) Both men and women are responsive to incentives for group participation employing the equal distribution of rewards with women showing a greater sensitivity toward this allocation form.

(b) Once formed, groups tend to show cohesiveness and resistance to reverting to individual modes of operating even when allocation parameters, initially insufficient to generate group formation, are reinstated. This "inertia" principle in group formation is important because it suggests that initial investments in promoting group formation will not only be effective, but will have long-term beneficial residuals in that group members will tolerate the subsequent reduction of "seeding" incentives.

(c) Shifts to group modes of performance and reward allocation are accompanied by increased socialization, interpersonal communications, and morale as compared to those social expressions during individual performance conditions. These concomitant changes support the interpretation that this group formation process is "authentic" and results in cohesive group unit.

A team task, recently introduced, required the coordinated input of all three group members to solve the "dials problem" component of the Alluisi

Performance Battery. Under team task conditions, a selection of the group mode of work organization required the participants to choose both equal reward allocation as well as tripartite cooperation among team members during group work episodes. The results of this team performance experiment both confirmed and extended the previous findings of this thematic research program. Specifically, the transition to group (team) structure can be achieved through incentive "seeding" operations when this group mode involves both equal sharing of rewards as well as cooperation between participants for the effective execution of a team task. Further, analysis of component problems of the team performance on the Alluisi Battery revealed the systematic use of specialized assignments for each participant to the various components of the Alluisi Battery. Work report surveys revealed that this distribution of assignments occurred through mutual tripartite agreement and without the internal recognition of any individual as the team leader.

RN 83-11. Sterling, B. S., & Carnes, D. Perceptions of leadership in a USAREUR brigade. June 1980. (AD A125 603)

A model of leadership, with accompanying surveys, was developed through interviews with leaders and troops in a USAREUR battalion. The developed surveys (one for leaders and one for troops) were administered to 513 troops and 237 leaders (team to platoon leaders) selected from 15 companies. Responses on the 5-point scales were grouped according to whether they were less than the midpoint (i.e., 3), on the midpoint, or greater than the midpoint. Responses less than the midpoint were treated as perceived deficiencies in leadership whereas responses above the midpoint were considered positive perceptions of leadership. Leaders' responses were examined overall and by leaders' rank, position, time in position, and type of unit. Troop responses were analyzed overall and by troops' time in location and type of unit.

Results suggested that, overall, perceptions of leadership were positive, except concerning use of rewards. Also, squad level leaders were less positive than platoon level leaders concerning leaders' interpersonal skills, suggesting that lower level leaders have different views of equitable troop handling than do higher level leaders. Also, leaders in their position over 18 months and troops overseas more than 24 months have more negative perceptions of leadership, suggesting cynicism with leadership grows with contact. Further, headquarters company personnel perceived more deficiencies in leadership than personnel from other types of units, perhaps because of the dual chain of command and responsibilities in headquarters units.

RN 83-12. Smootz, E. R., & Jones, J. Soldier (E1-E4) quality of life at Fort Hood: 1975-77. May 1980. (AD A127 195)

In response to requests from the Secretary of the General Staff for the Commanding General of III Corps and Fort Hood, the Army Research Institute Field Unit at Fort Hood developed and administered a "Quality of Life" questionnaire in the fall of 1975 to a sample of soldiers drawn from the various units located at Fort Hood. The questionnaire consisted primarily of questions calling for ratings of soldier satisfaction with various aspects of living, working, and training at Fort Hood. This questionnaire was revised

and administered in the fall of 1976 and again revised and administered in 1977. The results were summarized for the post as a whole each year, and questions whose answers correlated significantly with stated intent to make a career of the Army were noted. Additionally, those questions for which there were significantly different responses between ethnic groups were noted.

The results indicated that, generally speaking, the quality of life for lower-ranking enlisted men at Fort Hood remained about the same during 1975-1977; that the few ethnic differences that appeared indicated that blacks were somewhat more satisfied with the Army than were whites or other ethnic groups; and that the areas most predictive of intent to make a career of the Army were job satisfaction, satisfaction with off-duty on-post activities, degree of harassment, and the challenge of training activities.

RN 83-13. Cullen, B. J., Klemp, G. O., Jr., & Rossini, L. A. (McBer and Company). Competencies of organizational effectiveness consultants in the U.S. Army. May 1981. (AD A125 753)

In Army selection, training, and performance evaluation efforts there is a need to identify the critical knowledge, skills, abilities, and characteristics required of Organizational Effectiveness Staff Officers (OESOs), for successful job performance under a wide range of job conditions. Competencies of OESOs that distinguish the superior performer from the rest of the OESO population were identified. Competencies are viewed here as characteristics of an individual that underlie effective work performance. Traditional techniques for identifying job characteristics, such as function analysis, typically provide only descriptive accounts of average performance in routine situations. The job competency assessment approach offers the advantage of yielding behaviorally derived competencies that identify behavioral characteristics of the superior performer in job performance situations. In addition, the present OESO curriculum was reviewed in relationship to the competencies and recommendations for revision to the course.

Thirty-two incumbent OESOs participated in a Behavioral Event interview specifying the major responsibilities and tasks fulfilled by the OESO job incumbent and the performer characteristics thought by the interviewee to be important to performing his or her job effectively. Interview data were subjected to content analysis by a panel of experts. Nine basic job competency clusters were identified from 34 distinct knowledge, skills, and abilities that distinguished the superior from the average OESO performer. Twenty-four of the 34 competencies differentiated superior from average OESO performers at the .10 level of significance, and 8 of the 9 competency clusters were validated against a job performance rating criterion. Seventeen competencies were identified as potential training objectives for OESOs with 5 competencies recommended as possible selection criteria.

RN 83-14. Spencer, L. M., Jr., & Cullen, B. J. (McBer and Company). Evaluation of Army organizational development interventions. July 1979. (AD A125 596)

Development and analysis of the 10 Organizational Effectiveness (OE) case studies in the field research phase of this project produced findings

about (a) the utility of the methodology, variable taxonomy, and data collection procedures developed for the study (Spencer & Cullen, 1978) and (b) findings about OE intervention variables--outcomes, consultant and client characteristics, intervention method, and processes--associated with successful OE operations. Research findings relating successful and nonsuccessful OE operations and outcomes, consultant characteristics, intervention methods, and the intervention process are discussed in detail.

RN 83-15. Kessler, J. J., & Oliver, L. W. Assessment of the OENCO pilot program: Class 1 results. July 1980. (AD A126 312)

A pilot program was established for training and using noncommissioned officers (NCOs) in organizational effectiveness (OE) work. Two classes of OENCOs (Organizational Effectiveness Noncommissioned Officers) were trained and placed in the field. This report contains information on the first class of 47 OENCOs and 6 other OENCOs who had previously been trained in the officer course. Questionnaires were administered to the OENCOs, their OESO supervisors, their key managers, and a sample of OE users. It was found that OENCOs and OESOs do many of the same things but with a different emphasis. (OESOs spend more time in initial contacts and in planning, whereas OENCOs spend more time collecting data and performing implementations.) Because of their senior NCO status, OENCOs may be more effective and credible than officers in dealing with enlisted personnel. All measures of effectiveness used to assess the program (attitudes, performance ratings, increase in OE office productivity, acceptance of OENCO, and OENCO job satisfaction) indicate that the program has been successful. The high degree of consistency of response across groups of respondents suggests that the results are highly reliable. The positive results of the program appear to be due, at least in part, to the selection criteria used.

This report is the first in a 1980-1981 series entitled "Assessment of the OENCO Pilot Program."

RN 83-16. Oliver, L. W. Organizational Effectiveness Staff Officer (OESO) perceptions of the Army's Organizational Effectiveness (OE) program. October 1981. (AD A126 294)

A 219-item questionnaire was administered to 150 experienced OESOs to provide preliminary data on their perceptions of their role as OESOs, their OESO positions, OE users, the nature of OE operations, and the use of the four-step APIE (Assessment/Planning/Implementation/Evaluation) approach to organizational development. The following findings were reported: About 74% of all Army OE operations are viewed by OESOs as being successful, and there is a higher reliance on subjective "gut feeling" indicators of success than on "hard data" measures. OESOs perceive lack of communication, need for planning, command transitions, and leadership/management concerns as the issues OE users most frequently wish to address. OE operations most frequently engaged in are action planning, survey feedback, and team building. OESOs seldom complete the four-step process and also report doing relatively little documentation and evaluation. The findings of this study will provide data for the ongoing analysis of the impact of the Army's OE program.

RN 83-17. Harris-Bowlsbey, J., & Rabush, C. M. (Discover Foundation, Inc.). A needs assessment for the Army Education Information System. December 1979. (AD A126 831)

The purpose of this effort was to identify the specific kinds and quantity of information provided to enlisted personnel by Army Education Center counselors and to determine the feasibility of providing this information by computer. The attitudes of Education Services Officers (ESOs) and counselors concerning the addition of a computer-based information system to their job was also recorded. Based on the results of questionnaires administered to personnel at Army Education Centers worldwide, it was determined that much of the transmission of information about the Army Continuing Education System programs could be supported by computer terminals. It should be noted that the application of this information would remain the responsibility of the Education Counselors. Counselors and ESOs reacted favorably to the development of a computer-based system for Education Centers.

RN 83-18. Leal, A. (Integrated Sciences Corporation). Evaluating the effectiveness of military decision support systems: Theoretical foundations, expert system design, and experimental plan. September 1982. (AD A133 080)

This program's main objective is to construct a flexible test bed to evaluate the effectiveness of computer-based expert systems in military training and planning.

The technical approach consists of simulating the characteristics of expert systems in a game-like environment. Such characteristics include (a) friendly and English-like (stylized) dialogue, (b) system explanations of rationale about decision recommendations, (c) an ability to make relevant suggestions and comments about situation assessments and about plans proposed by the user, and (d) the use of high-level strategic concepts and terminology.

The required software for such a program includes (a) a game environment simulator, (b) a simulated expert system for the game, and (c) an evaluation program for recording execution histories and for summarization. The game simulator will contain provisions for the experimenter to adjust critical parameters so that a controlled environment can be maintained. The expert system will monitor the progress of the game and can be interrogated as the user sees fit. A facility will also be provided for evaluating the user's performance under different modes of consultation with the expert system.

RN 83-19. Griesemer, H. A. (Lawrence Johnson & Associates, Inc.); & Hart, R. J. (ARI). Social psychological and institutional correlates of unit effectiveness. July 1981. (AD A133 092)

Survey and record data measures of a broad range of variables were collected from 60 combat line companies. Factor and item analyses were used to derive survey measures of leadership climate, leader strictness, enlisted cohesion, enlisted commitment, racial climate, moral climate, and unit effectiveness. Almost all the possible intercorrelations between these survey

scales were significant. When record data measures were correlated with the survey measures, officer experience, NCO experience, awards and commendations, and enlisted turbulence produced generally positive correlations with the survey scales (i.e., were associated with more positive perceptions of the unit). Officer turbulence, Article 15s, AWOLs, MP reports, high GTAS scores, promotions, and the percentage of minority soldiers were generally associated with more negative perceptions of the unit. Based on these results, a worksheet was designed for use by company commanders in monitoring the status of key record data variables in their units.

RN 83-20. Pask, G. (System Research Developments Ltd.). Knowledge and innovation of decision makers. July 1982. (AD A133 088)

In Sections 1, 2, and 3, the development of the Team Decision System (TDS in combination with THOUGHTSTICKER for representing a mission) is placed in the context of four conferences on Decision Making in Complex Systems. Sections 4, 5, and 6 are concerned with a recent (at the moment nearly completed) experimental series to determine the influence of rich geography in the TDS environment, over and above global connectivity. It appears that geography has a large effect on accurate mission recall. Further, an outline specification of a transportable TDS program is provided. The appendix is an exposition of one theoretical position (relevant aspects of Conversation Theory).

RN 83-23. Seashore, S. E., Cammann, C., Fichman, M., Ford, L., Ross, G., & Rousseau, D. (Institute for Social Research, University of Michigan). Organizational effectiveness: Development and validation of integrated models. Report I: Development of an integrated multivariate model of organizational effectiveness. April 1982. (AD A130 912)

Chapter 1 proposes the integration of three leading contemporary models for treating the concept "organizational effectiveness," gives a rationale for their merger, and discusses certain theoretical and practical implications. Chapter 2 addresses the practical and theoretical issues involved in the empirical validation of such an integrated model. Chapter 3 provides an analytical linkage from the properties of open systems to the generic problems arising from these properties to a scheme for identifying and anticipating the differential concern about these organizational problems among constituencies of unlike value priorities. Chapter 4 treats organizational environments and argues that the appropriate criteria for assessing organizational effectiveness are contingent upon the turbulence and episodic character of the environments as well as upon the zones of concurrence and contest among constituencies in such environments. The final chapter reviews the contemporary empirical literature employing indicators of organizational effectiveness, concluding that the contemporary practice is grossly deficient both in conception and in application.

The appendix contains brief abstracts of documents relating to organizational effectiveness. Thirty-three documents are abstracted to represent contemporary theoretical and conceptual contributions. Seventy-six are abstracted to represent contemporary empirical practice. Inclusion is selective, to emphasize divergent and innovative views and practices rather than prevailing ones.

RN 83-24. Seashore, S. E., Fichman, M., Fakhouri, J., Ford, L. H., Rousseau, D., & Sutton, R. I. (Institute for Social Research, University of Michigan). Organizational effectiveness: Development and validation of integrated models. Report II: Empirical studies of organizational effectiveness using multivariate models. April 1982. (AD A130 908)

This report is in three parts, each summarizing an empirical investigation concerning the relationships among criteria of organizational effectiveness. The first, "Problem Solving Adequacy in Organizational Subunits," tests hypotheses concerning the role of "appropriate structure" (four aspects) and of "problem-solving adequacy" (nine problem domains) to the rated performance effectiveness of hospital subunits. The second, "Organizational Effectiveness in a Retail Brokerage Firm," employs factorial analysis methods (49 objective performance variables, 160 brokerage offices) to ascertain the dimensions of office performance and the compatibility of interpretations derived from alternative models of organizational effectiveness. The third, "Technology and Organizational Effectiveness," examines the joint and independent effects of certain technological characteristics and certain input characteristics upon the goal attainment of short-stay general hospitals.

RN 83-26. Miller, E. E. (Human Resources Research Organization). Testing and training methods for skill qualification testing (SQT). April 1982. (AD A129 099)

A classification system is presented for tasks and items in the Skill Qualification Test (SQT) Written Component (WC) to help one decide whether that is the best means of testing. Ways of eliminating extraneous reading in WC are discussed. A new form of testing is described, in which the convenience of machine scoring with some advantages of hands-on testing is combined. A unit training strategy for SQT preparation is derived from the performance-oriented model, and developments needed for implementation are discussed.

RN 83-27. Warnick, W. L. (Human Resources Research Organization); & Smith, N. D. (ARI). Battlefield realism: The impact of Opposing Force (OPFOR) on Friendly Force task performance with implications for the National Training Center. Volume I. Discussion and findings. February 1981. (AD A129 638)

The main objective of the research was to determine if any U.S. job tasks needed to be modified or changed as a result of the manner in which the OPFOR (Threat) operated. It was reasoned that new training objectives specifically designed to counter the OPFOR would be needed only in those job areas where job behavior resulting from past training was ineffective in dealing with the OPFOR (Threat). Two field exercises were selected for study in which well-trained OPFOR groups employing realistic Soviet doctrine and tactics participated. Structured interviews and questionnaires were developed, and interviews with participants were conducted. Some of the major findings were (a) U.S. forces must learn to do their tasks faster and with fewer errors; there are no second chances; (b) significant changes in job content are not required, but improvement of existing skills is; (c) intensive and repetitive training against OPFOR tactics is the only way to be prepared; and (d) Home Station Training (HST) will play a major role in

preparing units to beat the OPFOR. Without a realistic OPFOR in HST, U.S. units may find the National Training Center a painful experience.

RN 83-28. Warnick, W. L. (Human Resources Research Organization); & Smith, N. D. (ARI). Battlefield realism: The impact of Opposing Force (OPFOR) on Friendly Force task performance with implications for the National Training Center. Volume II. OPFOR lessons learned. February 1981. (AD A129 425)

The main objective of the research was to determine if any U.S. job tasks needed to be modified or changed as a result of the manner in which the OPFOR (Threat) operated. It was reasoned that new training objectives specifically designed to counter the OPFOR would be needed only in those job areas where job behavior resulting from past training was ineffective in dealing with the OPFOR (Threat). Two field exercises were selected for study in which well-trained OPFOR groups employing realistic Soviet doctrine and tactics participated. Structured interviews and questionnaires were developed, and interviews with participants were conducted. Some of the major findings were (a) U.S. Forces must learn to do their tasks faster and with fewer errors; there are no second chances; (b) significant changes in job content are not required, but improvement of existing skills is; (c) intensive and repetitive training against OPFOR tactics is the only way to be prepared; and (d) Home Station Training (HST) will play a major role in preparing units to beat the OPFOR. Without a realistic OPFOR in HST, U.S. units may find the National Training Center a painful experience.

RN 83-29. Balcom, J. L., & Mannle, T. E., Jr. (Dynamics Research Corporation). Estimating the manpower, personnel and training requirements of the Army's Corps Support Weapon System using the HARDMAN methodology. September 1982. (AD A129 874)

The HARDMAN methodology is designed to assess the human resource requirements of emerging weapons systems. The goal of this project was to examine the manpower, training, and personnel demands of the Army's conceptual Corps Support Weapons System (CSWS), an indirect missile system capable of long-range interdiction missions. The project examined three alternative system configurations and compared them to a composite reference system. Steps 1 through 5 of the methodology were applied. The results of the project indicated that the multiple launch, tracked-vehicle alternative was preferred from a manpower, personnel, and training standpoint. Further information may be developed for the CSWS Special Task Force as required.

RN 83-31. Schroeder, J. E. (ARI); & Cook, W. A., Jr. (Litton Mellonics). Preliminary evaluation of the light pen as the key component in a microcomputer-based simulator. September 1983. (AD A132 596)

The Army Research Institute has developed a low-cost, microcomputer-based, part-task trainer, Multipurpose Arcade Combat Simulator (MACS). The key hardware element in MACS is a light pen that reads the raster scan on the monitor and provides the microcomputer with X and Y coordinates signifying where the light pen was aimed at that moment. The purpose of the present research was to conduct a preliminary evaluation of the reliability

of the light pen and determine the extent to which some real-world variables influence it (e.g., ambient light, glare, and distance from the monitor to the light pen). The reliability of the light pen was found to vary widely depending on the conditions of the test. The most important finding was an interaction between screen brightness and location on the screen in their joint effect on light-pen reliability. The reliability of the light pen was found to be unaffected by some of the variables (e.g., ambient light and trigger switch closure). The test results will provide valuable information about the hardware and/or software changes needed to maximize the reliability of the MACS system.

Research Products

RP 81-6. Harris, J. H., & Campbell, C. H. (Human Resources Research Organization); & Kraemer, R. E., & Bessemer, D. W. (ARI). Development of training objectives for XM1 UCOFT. January 1980. (AD A125 757)

This research product contains the training objectives for the XM1 Unit Conduct of Fire Trainer (UCOFT). The objectives were developed for both the Gunner and Tank Commander positions and include gunnery and gunnery-related tasks whose learning is expected to be promoted by practice using the UCOFT. The objectives may be viewed as both specifying what the UCOFT is supposed to do and identifying expectations as seen by designers and prospective users.

RP 81-7. Harris, J. H., & Campbell, C. H. (Human Resources Research Organization); & Bessemer, D. W. (ARI). Training materials and data requirements for Driver Trainer (DT) training test support plan. August 1980. (AD A125 758)

The material presented in this training test support plan for the XM1 19L10 driver trainer was developed for use during OT IT, to answer three of the operational issues asked in the IEP for the DT: Issue 2.2.1. What is the training effectiveness of the XM1 driver trainer as compared to the baseline training method? Issue 2.1.2. What is the training transfer of the XM1 driver trainer as compared to the baseline training method? Issue 2.1.3. What are the training resources used for each of the alternative training programs?

RP 81-8. Campbell, C. H., & Harris, J. H. (Human Resources Research Organization); & Bessemer, D. W. (ARI). Training materials and data requirements for Unit Conduct of Fire Trainer (UCOFT) training test support plan. August 1980. (AD A125 673)

The material presented in this training test support plan for the XM1 U-COFT was developed for use during OT II to answer three of the operational issues asked in the IEP for the U-COFT: Issue 2.1.1. What is the training effectiveness of each of the three XM1 training alternatives? Issue 2.1.3. What is the transfer effectiveness of the three XM1 training alternatives? Issue 2.1.4. What are the training resources required for each of the three XM1 training alternatives?

RP 81-9. Harris, J. H., & Campbell, C. H. (Human Resources Research Organization); & Bessemer, D. W. (ARI). Training materials and data requirements for Turret Organizational Maintenance Trainer (TOM-T) training test support plan. May 1980. (AD A125 379)

The material presented in this training test support plan for the XM1 45E turret organizational maintenance trainer was developed for use during OT II, to answer three of the operational issues asked in the IEP for the TOM-T Issue 2.2.2. Is the TOM-T training effective in teaching MOS 45E turret mechanics organizational maintenance-level troubleshooting, repair, and replacement when used in the context of the program of instructions? Issue 2.2.3. What is the training transfer of the TOM-T? Issue 2.2.4. What are the training resource requirements used to conduct the XM1 TOM-T program of instruction?

RP 81-12. Campbell, C. H., & Harris, J. H. (Human Resources Research Organization). Design institutional and unit sustainment training programs for XM1 armor crewmen. January 1981. (AD A124 429)

The material presented in this research product fulfills the requirement to design institutional training for XM1 driving and gunnery and unit sustainment training for XM1 gunnery. Specifically, three products are presented: (a) capabilities analyses for XM1 armor crewman training devices, (b) recommended training program for XM1 armor crewman institutional training, and (c) recommended unit sustainment training program for XM1 gunnery.

RP 81-13. Harris, J. H. (Human Resources Research Organization); Bessemer, D. W. (ARI); & McAleese, K. J. (Honeywell, Inc.). Training materials and data requirements for Combat Training Theater (CTT) training test support plan. December 1980. (AD A125 378)

This research product for the Combat Training Theater (CTT) was developed in response to the Independent Evaluation Plan (IEP) test concept to answer three of the operational issues asked in the IEP for the CTT: (a) What is the training effectiveness of the training alternatives (in developing and sustaining main gun engagement proficiency)? (b) What is the transfer effectiveness of the training alternatives? (c) What is the cost of training with each alternative?

RP 81-14. Smith, D. A. (Honeywell, Inc.); Bessemer, D. W. (ARI); & Harris, J. H. (Human Resources Research Organization). Training materials and data requirements for the BT-41 fire simulator Test Support Package (TSP). October 1980. (AD A126 040)

This research product for the SAAB BT-41 was developed in response to the Independent Evaluation Plan (IEP) test concept to answer three of the operational issues asked in the IEP for the CTT: (a) What is the training effectiveness of the BT-41? (b) What is the transfer effectiveness of the BT-41? (c) What is the cost of training with the BT-41?

Guidance is provided on the development of training objectives; on the conduct of practice events in training; on providing feedback or knowledge of results; on making training more efficient; and for modifying training programs to change the training environment, lecture/demonstration/practice events, and testing.

RP 81-18. Kristiansen, D. M., & Witmer, B. G. Guidelines for conducting a Training Program Evaluation (TPE). September 1981. (AD A120 775)

Training Program Evaluation (TPE) is a systematic method for identifying and correcting training program deficiencies by collecting and analyzing information on the training objectives, soldier test performance, and the process used in training and testing the soldiers. TPE is documented in four job aids that include (a) procedures for planning the training program evaluation; (b) guidance in using and evaluating the information provided in the lesson plans; (c) forms and procedures for observing training and testing as they are conducted; (d) methods for analyzing training, testing, and performance data to identify training program deficiencies; and (e) guidance in modifying training programs on the basis of problems discovered during training program evaluation.

This job aid provides guidelines for conducting the overall evaluation, including guidance on using the other three job aids. The other three job aids in the set are Research Product 81-15, A Job Aid for the Systematic Evaluation of Lesson Plans; Research Product 81-16, A Job Aid for the Structured Observation of Training; and Research Product 81-17, A Job Aid for Modifying Ineffective or Inefficient Training Programs.

RP 81-19. Siegel, A. I., Kopstein, F. F., & Federman, P. J. (Applied Psychological Services, Inc.); Ozkaptan, H. (ARI); Slifer, W. E. (Soldier Support Center); & Hegge, F. W., & Marlowe, D. H. (Walter Reed Army Institute for Research). Management of stress in Army operations. April 1981. (AD A122 029)

The two most important ingredients of combat stress are physical fatigue and mental stress. Combat stress is a result of exposure to battle conditions, just as injury and physical disease are results of battle conditions. In past wars, it was revealed that there was one combat stress casualty for every four wounded in action--one for every three wounded during lengthy periods of intense combat. In a war characterized by continuous operations in a high-intensity integrated battlefield, the relationship of stress casualties to wounded in action is expected to be at least one to three and conceivably even greater. However, combat stress is not solely a medical problem. It is also a command problem--both in terms of numbers lost from duty and reduced performance of duty. This report integrates and presents the latest research information with respect to the recognition, control, and management of stress in combat. It is designed principally for use by military personnel at Company level and below.

The research was conducted under contract DAHC19-77-C-0054, as part of Army project 2Q163743A774, Man-Machine Interface in Integrated Battle Control Systems, fiscal year 1979 work program. The research was sponsored by

RP 81-15. Kristiansen, D. M., & Witmer, B. G. A job aid for the systematic evaluation of lesson plans. September 1981. (AD A121 119)

This job aid addresses the problem of evaluating lesson plans with regard to the adequacy of the training prescriptions (description of the training events or learning experiences) contained in these plans. This aid is one of four job aids designed to evaluate formally the effectiveness and efficiency of the training process. The other three job aids in the set are Research Product 81-16, A Job Aid for the Structured Observation of Training; Research Product 81-17, A Job Aid for Modifying Ineffective or Inefficient Training Programs; and Research Product 81-18, Guidelines for Conducting a Training Program Evaluation.

Guidance is provided for evaluating training objectives, training process plans (plans for lectures, demonstrations, and practice events), and testing plans and instruments.

RP 81-16. Witmer, B. G. A job aid for the structured observation of training. September 1981. (AD A120 773)

This job aid was developed in response to the Army's need for a simple guide for persons whose job is collecting data for evaluating training programs. The job aid structures the manner by which training observers collect their data by telling them what to look for during the conduct of training and testing. Data on the procedures used for training and testing are recorded on preprinted worksheets that list the observations to be made. The worksheets described in this job aid include the (a) Training Plan Worksheet, (b) Training Environment Worksheet, (c) Training Observation Worksheet, and (d) Testing Observation Worksheet. For each worksheet, the items comprising the worksheet are identified and defined, and directions are given on how to use the worksheet in observing training.

This job aid is one of four job aids designed to formally evaluate the effectiveness and efficiency of the training process. The other three job aids in the set are Research Product 81-15, A Job Aid for the Systematic Evaluation of Lesson Plans; Research Product 81-17, A Job Aid for Modifying Ineffective or Inefficient Training Programs; and Research Product 81-18, Guidelines for Conducting a Training Program Evaluation.

RP 81-17. Kristiansen, D. M. A job aid for modifying ineffective or inefficient training programs. September 1981. (AD A120 774)

This job aid addresses the problem of how to modify a training program when the need for changes has been identified through a Training Program Evaluation. These changes are changes to the training process rather than the subject matter of training. It is one of four job aids designed to evaluate formally the effectiveness and efficiency of the training process. The other three job aids in the set are Research Product 81-15, A Job Aid for the Systematic Evaluation of Lesson Plans; Research Product 81-16, A Job Aid for the Structured Observation of Training; and Research Product 81-18, Guidelines for Conducting a Training Program Evaluation.

the Soldier Support Center at Fort Benjamin Harrison, Indianapolis, IN, and supported by the Walter Reed Army Institute for Research, Bethesda, MD.

RP 81-24. Brousseau, K. R. An organizational effectiveness officer tackles a management job: A follow-up OE case study. June 1981. (AD A127 530)

This report follows an earlier report documenting an OE effort conducted at a Personnel and Pay Services Division (PPSD) between July 1978 and February 1979. It describes events related to the OE effort that occurred at PPSD between February 1979 and May 1980. It presents information pertaining to the effects of the OE program on the division's effectiveness and on employee attitudes and documents long-term developments concerning the implementation of various OE methods including transition and action-planning workshops, leadership training, use of problem-solving groups, and organizational change principles. The success of this program was judged by independent ratings by the division chief/OESO and by his immediate supervisor, supported by limited statistical data. The implementation of the OE program led to perceived improvement in performance, morale, and unit image and was judged successful in the following specific areas: overall improvement of morale within the division, improvement in overall ratings, a decrease in error rates, and improvement in transaction timeliness. In addition to implementation of OE methods, the success of the program was attributed to the personality of the division chief/OESO in charge of the program during this period and to his commitment to the OE program.

RP 81-32. Siegel, A. I., & Wolf, J. J. (Applied Psychological Services). Digital behavioral simulation--state-of-the-art and implications. June 1981. (AD A128 641)

This report presents a comprehensive review, analysis, and appraisal of the state of the art in computer simulation models in which human performance characteristics play an important part. Concepts and considerations important to the development of such models are discussed, and examples of current models are presented to provide an overview of the status of the digital simulation field relative to behavioral simulation. Methods which have been or could be used in predicting and, or accounting for, human effects in Army system performance are identified and defined. Problems in model design are treated and the trade-offs of cost versus benefit, which characterize the models and are associated with current models, are discussed. Future trends in behavioral modeling are also projected, along with recommendations relative to the development and maintenance of current Army models.

RP 82-1. Barba, M. A., & Kessler, J. J. Guidelines for a one-on-one tactical course for riflemen. January 1982. (AD A128 685)

Guidelines are provided for setting up a sample one-on-one course for riflemen. The course for two players includes a defender with an M16 and an attacker with both an M16 and grenades. The course uses MILES and practice grenades with fuses. Scoring strategy of the exercise enhances the development of realistic weapons and combat tactics. The guidelines provide course requirements, instructions to scorers, procedures for scorers, instructions to both players, and scoresheets for both players.

RP 82-5. Harris, J. H. (Human Resources Research Organization); & Goldberg, S. L., & Morrison, J. E. (ARI). Stabilized gunnery training techniques. February 1982. (AD A130 909)

A training program to provide elementary skill in M60A3 stabilized gunnery was developed. The program, centered around 14 analytically derived principles of stabilized gunnery, is in three parts. The first, a knowledge videotape, familiarizes soldiers with "patterns" of reticle movement and demonstrates the correct point in the "pattern" to lase and fire. The second, a practice videotape, when used with a mock-up of the gunner's periscope and control handles, provides practice in "anticipating" the reticle movement, as well as in lasing and firing. The third, a series of tank-stabilized gunnery exercises, allows soldiers to practice on M60A3 tanks some of the things presented in the knowledge videotape and to practice using the practice tape device.

The three products of the training program development appear to be useful at the OSUT level. The knowledge videotape can be group administered using equipment available in any OSUT battalion. The gunner response device is relatively inexpensive to produce and can be set up in a dayroom or corner of a classroom. The M60A3 tank stabilized exercises can be practiced anytime a soldier is in the gunner's seat and the tank is moving, say from the motor pool to the firing range or driving course.

A description of the development and evaluation of the training products is presented in the final report for the project (Harris et al., 1982).

RP 82-6. Phelps, R. H., & Hall, J. (ARI); & Hoblitzell, C. (Decisions and Designs, Inc.). Intelligence aid for evaluating Enemy Courses of Action (ENCOA): Guide for manual and HP41-C/HP41-CV calculator procedures. June 1982. (AD A133 126)

This manual describes an intelligence aid for evaluating enemy courses of action based on decision-theoretic techniques. Use of this aid will encourage intelligence analysts to organize and evaluate available information logically and systematically in formulating their assessment and prediction of enemy intentions/activities/events. The manual contains complete background rationale, instructions, worksheets, and sample problems for using the aiding procedures manually or with the HP41-C/HP41-CV calculator. It is intended for use by intelligence analysts in field operations, tactical training, and academic instruction. Use of these procedures is expected to enhance the analyst's assessment of the enemy situation as well as the communication and mutual understanding between intelligence analysts and their commander. A computerized version of these procedures is described in ARI Research Product 83-10.

RP 83-6. Johnston, S. C., Peck, P., & Landee, B. M. (Perceptronics, Inc.). Tactical Symbology Catalog. May 1983. (AD A132 625)

The Tactical Symbology Catalog is a hard copy version of an automated symbol data base. The data base contains over 1,000 military tactical symbols from over 15 sources including the Army Standard FM 21-30, NATO D-49,

as well as Marine, Air Force, and other symbol sets. Symbols are catalogued by concept, category, and symbol source so that a user may index by any of these three to compare and contrast symbols. In addition, the catalog contains tutorial information regarding how to input new symbols into the catalog and a summary of recent U.S. Army Research Institute work in the area of tactical symbology issues.

RP 83-7. Burnside, B. L., Witmer, B. G., & Kristiansen, D. M. Training feedback handbook. January 1983. (AD A132 565)

This handbook is designed to assist training developers and evaluators in structuring their collection of feedback. Six methods of collecting feedback are described, and practical guidelines for their application are offered. Issues in the management and analysis of feedback are also discussed.

RP 83-10. Patterson, J. (Decisions and Designs, Inc.); & Phelps, R. H., & Hall, J. (ARI). Intelligence aid for evaluating Enemy Courses of Action (ENCOA): Manual for use on the Apple II Plus and the IBM 5110/5120 computers. March 1983. (AD A133 120)

This manual describes an intelligence aid for evaluating enemy courses of action based on decision-theoretic techniques. Use of this aid will encourage intelligence analysts to organize and evaluate available information logically and systematically in formulating their assessment and prediction of enemy intentions/activities/events. The manual contains complete background rationale, computer instructions, and sample problems. It is intended for use by intelligence analysts in field operations, tactical training, and academic instruction. Use of these procedures is expected to enhance the analyst's assessment of the enemy situation as well as the communication and mutual understanding between intelligence analysts and their commander. A manual and HP41-C/HP41-CV calculator version of these procedures is described in ARI Research Product 82-6.

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