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Technical Report 477

ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1978

U. S. Army
Research Institute for the Behavioral and Social Sciences

September 1980

U. S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the

Deputy Chief of Staff for Personnel

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Abstracts and bibliographic citations, including the DTIC accession number, are given for 118 Research Reports, Technical Papers, Utilization Reports, and Technical Reports published by the Army Research Institute (ARI) during Fiscal Year 1978. To complete the record of research accomplished by ARI in FY 78, abstracts or descriptions are included of 5 research products (e.g., Handbook for the Development of Skill Qualification Tests) and of 90 intra-agency Research Problem Reviews, Research Memorandums, and Technical Reports. All items
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Technical Report 477

ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1978

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
5001 Eisenhower Avenue, Alexandria, Virginia 22333

Office, Deputy Chief of Staff for Personnel
Department of the Army

September 1980

Abstracts

ARI Research Reports and Technical Reports are intended for sponsors of R&D tasks and for other research and military agencies. Any findings ready for implementation at the time of publication are presented in the last part of the Brief. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or Disposition Form.

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 1978, October 1977 through September 1978.

During this period, ARI was the Army's developing agency for behavioral and social science and a field operating agency under the Office of the Deputy Chief of Staff for Personnel. Two laboratories and nine operational field units provided a flexible research program on individual accession, training and evaluation, and equal opportunity; and on team effectiveness; unit proficiency; and systems integration. The field units particularly emphasized providing responsive solutions to operational problems.

JOSEPH ZEIDNER
Technical Director

ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1978

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ABSTRACTS OF ARI RESEARCH PUBLICATIONS, FY 1978

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 fiscal year 1978. 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 1978 the following categories were represented:

Research Reports. Operationally oriented, they describe completed research programs or projects which contribute directly to the solution of Army human factors problems in the broad areas of personnel management and enhancement of human performance, both of the individual and in the Army's manned systems. Special reports (S series) are also listed in this category.

Technical Papers. Research oriented, they present technical information on research methodology or basic psychological knowledge developed out of the ARI work program. They are primarily of interest to technically trained research workers in the Defense Department and other government agencies.

Research Problem Reviews. These are informal reports to military management, generally in response to questions raised by operating agencies requiring early answers. They may include presentations to military management, interim bases for changes in personnel operations, and bases for research decisions.

Research Memorandums. These are informal intra-agency reports on technical research problems. They may present details on the construction of experimental instruments, fragmentary or incidental data, or methodological developments related to in-house technical questions.

R&D Utilization Reports. Written by the ARI technical monitor of contract research projects, they document the ways in which the contract research results have been utilized.

Special Publications (P series). These are not reports about research but valuable results of research. Examples are the guidebooks for developing skill qualification tests or videotape simulation performance tests.

Technical Reports. Prepared by a contractor or grantee on contract research developed and technically monitored by ARI, and approved by ARI as meeting professional standards, they are usually operationally oriented. Distribution depends on the nature of the report--it may be that of a Research Report (A series) or a Research Problem Review (B series), or it may be oriented to scientists performing basic research (TH series).

Distribution of ARI Publications

Initial distribution of these reports was made directly by ARI. Research Reports, R&D Utilization Reports, and Technical Reports of the A series 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). Research Reports were also sent to the Library of Congress, which sends documents to Federal depository libraries. Technical Papers and Technical Reports in the TH series were distributed primarily to technically trained research workers, including those reached through DTIC and, for Technical Papers, the Library of Congress. Research Problem Reviews, Research Memorandums, and Technical Reports of the B series, as operating or intra-agency documents, seldom received general distribution; they are summarized here to provide a fuller record of ARI research. File copies may be maintained at ARI offices in Alexandria, Va., and record copies of many have been deposited in DTIC in accordance with the DTIC mission as an information center.

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 the National Technical Information Service (NTIS), Department of Commerce, Springfield, Va., 22151. 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 and Technical Papers 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 1192. Banks, J. H., Jr., Hardy, G. D., Scott, T. D., & Kress, G. (ARI); Word, L. E. (U.S. Army). REALTRAIN validation for rifle squads: Mission accomplishment. October 1977. (AD A043 515)

A field experiment was carried out to determine the relative effectiveness of REALTRAIN, an engagement simulation training system, and conventional training for infantry. Rifle squads were given a tactical pretraining test, 3 days of training using either REALTRAIN or conventional methods, and a posttraining test; then they took part in a series of tactical exercises in which REALTRAIN and conventional squads opposed one another.

Mission accomplishment data showed that REALTRAIN squads had a higher percentage of mission accomplishment, sustained fewer casualties, and inflicted more casualties in both attack and defense than did conventionally trained squads. In exercises in which training groups opposed one another, REALTRAIN squads again accomplished more missions, sustained fewer casualties, and inflicted more casualties in both attack and defense than did conventionally trained squads.

RR 1193. Maier, M. H., & Hirshfeld, S. F. Criterion-referenced job proficiency testing: A large scale application. February 1978. (AD A055 664)

To insure fair, standardized, and accurate job performance tests, procedures for developing Skill Qualification Tests (SQTs) were prepared and tested by Army test development agencies. This work included (a) formulating criterion-referenced, performance-based evaluations of task performance; (b) verifying that the tests were accurate measures of performance, and (c) providing guidelines and self-instructional materials for developing SQTs.

SQTs are designed to test levels of competence in performance on tasks crucial to an enlisted soldier's Military Occupational Specialty (MOS). Written and hands-on performance tests may be used, and test scores indicate a person's competence and hence pay grade or need for further training. Test scores also provide personnel managers with specific performance data on which to base personnel decisions.

These procedures have been used to develop more than 1,000 Army job proficiency evaluation tests. The guidelines and self-instructional materials have been used to train personnel in how to develop SQTs at more than 30 Army test development agencies.

RR 1194. Stewart, S. R. Utility of automation of Order of Battle and Target Intelligence data for intelligence analysis. September 1978. (AD A065 458)

Automated processing of the increasing quantities of battlefield intelligence information is expected to improve its usefulness. As part of a program to determine user requirements for a Tactical Operations System (TOS), ARI evaluated several software packages for potential inclusion in a prototype TOS. This study evaluates the first of these packages--automated Order of Battle (OB) and Target Intelligence (TI) files.

Two groups, each consisting of 10 intelligence analysts, performed a series of intelligence tasks. Both groups worked with a basic simulated TOS. The experimental group had access to automated OB and TI files; the control group used OB and TI files in manual form. Although automation of the files significantly increased the accuracy and completeness of the intelligence requirements, it did not increase their speed of completion.

RR 1195. Fineberg, M. L., Meister, D., & Farrell, J. P. An assessment of the navigation performance of Army aviators under nap-of-the-earth conditions. August 1978. (AD A060 563)

This research measured how navigational skills of Army aviators in nap-of-the-earth (NOE) flight are affected by (a) pilot experience, defined as number of flight hours; and (b) two levels of training, a 7-hour terrain analysis course and a 6-hour NOE course. Other objectives were to define a baseline on pilot navigation proficiency and to develop a field research methodology to measure pilot performance in NOE flight.

Thirty-five Army helicopter pilots with various levels of flight experience were tested in a series of flight experiments during which they flew simulated operational missions in a UH-1H aircraft to determine their NOE navigation proficiency. The mission was to navigate a specific route at NOE levels and identify all landing zones while staying within 250 meters of the course line. The results indicated that (a) the NOE navigation skill can be improved with training and (b) flight experience in itself does not improve NOE navigational skills.

RR 1196. Hicks, J. A., III, & Tierney, T. J., Jr. Cadre evaluations of the rifle laser and rimfire adapter rifle marksmanship training devices. August 1978. (AD A061 273)

This report presents results of questionnaires administered to training cadre during the Rifle Laser/Rimfire Adapter (RL/RFA) Evaluation conducted by the Combined Arms Test Activity (TCATA) at Fort Jackson, S.C., during spring 1977. The RF/RFA test compared the effectiveness of two training devices using four different amounts of ammunition. Pretest and posttest questionnaires were given to 71 male and female officers and noncommissioned officers. Respondents represented both Basic Rifle Marksmanship (BRM) committee group cadre and company cadre.

The RFA was evaluated positively and recommended for adoption in the marksmanship fundamentals phase of rifle training. One problem with the RFA, however, was an unacceptable frequency of weapon malfunctions.

The evaluation of the RL was decidedly more mixed, and its training effectiveness was not judged to be equal to that of live fire. Raters disagreed over the accuracy and sighting characteristics of the RL versus the M16 rifle. Characteristics frequently cited as presenting training disadvantages included lack of recoil and noise, inability to determine location of misses, and a trigger squeeze that differed from that of the M16 rifle. Raters were also concerned that RL trainees are less safety conscious.

RR 1197. Holman, G. L. Effectiveness of a Map Interpretation and Terrain Analysis Course on nap-of-the-earth navigation training of crewchief/observers. August 1978. (AD A060 564)

This report documents the training effectiveness of the Map Interpretation and Terrain Analysis Course (MITAC) in enhancing nap-of-the-earth (NOE) navigation skills of scout helicopter crewchief/observers in Europe. A two-group transfer-of-training study showed that MITAC-trained crewchief/observers could navigate scout helicopters while flying NOE with almost twice the speed and 35% fewer errors as could untrained crewchief/observers. This report compares these data with similar data from student aviators in the United States. It was concluded that MITAC could be used effectively to train crewchief/observers to navigate NOE and that MITAC could be used to train both aviators and nonaviators in Europe.

RR 1198. Holman, G. L. Evaluation of a Map Interpretation and Terrain Analysis Course for nap-of-the-earth navigation. August 1978. (AD A060 565)

This report documents the training effectiveness of a Map Interpretation and Terrain Analysis Course (MITAC) developed by ARI to enhance nap-of-the-earth (NOE) navigation skills. A two-group transfer-of-training study showed that MITAC-trained student aviators could navigate along NOE routes at twice the speed and with one-third fewer errors than could conventionally trained student aviators. Interviews with experienced NOE aviators indicated that exposure to the MITAC material also increased their navigation skills and understanding of student problems. The report recommends that all Army aviators with NOE flight requirements be given MITAC training.

RR 1199. Bynum, J. A. Evaluation of the Singer night visual system computer-generated image display attached to the UH-1 flight simulator. September 1978. (AD A060 566)

This report documents a 4-month evaluation of the Singer night visual system (NVS) computer-generated image display attached to the UH-1 Flight Simulator.

Three evaluations were made. In the first, four qualified contact instructor pilots formally rated the system's capability to accomplish each night contact maneuver in the Flight Training Guide. Next, 14 student

pilots were trained in the simulator on five night contact maneuvers, and their performance was compared to seven control student pilots in a transfer-of-training study. Finally, researchers conducted an informal evaluation, using instrument instructors, to determine the device's capability to enhance instrument approach to landing.

Instructor pilots rated the device acceptable for training, although they noted deficiencies in visual cueing and in UH1FS flight characteristics after integration of the NVS. No transfer effect was observed. The device was found to be acceptable as an adjunct to instrument approach training.

RR 1200. Hicks, J. A., III. A methodology for conducting human factors evaluations of vehicles in operational field tests. August 1978. (AD A061 808)

The purpose of this research was to develop a standardized methodology for conducting human factors evaluations of trucks and similar vehicles during operational field tests. The research focused on the assessment of the drivers' judgments and allowed for differential weighting of human factors characteristics. The key to this was the Human Factors Vehicular Evaluation Instrument (HFVEI), an interview form containing 85 human factors characteristics relevant to vehicle design and operation.

Twenty-nine licensed Army truck drivers, trained to drive three types of cargo trucks, drove each type of vehicle around a 4-mile test course and then were interviewed using the HFVEI. The drivers also were asked to rate the relative importance of each of the 85 human factors characteristics.

The methodology performed reasonably well during its initial use in the field. Researchers used six principal aspects--driver compartment, visibility, controls and control operation, instruments, handling characteristics, and ride characteristics--to make overall human factors comparisons among the three vehicles. A procedure was identified for assessing the impact of the differential weighting on the data.

RR 1201. Bickley, W. R. Evaluation of an achievement test for map interpretation in nap-of-the-earth flight. August 1978. (AD A061 781)

This research developed an achievement test to measure comprehension of the concepts and principles taught in the Army's Map Interpretation and Terrain Analysis Course (MITAC) for nap-of-the-earth (NOE) flight. Initial-entry rotary wing (IERW) aviator graduates of MITAC at the U.S. Army Aviation Center in Fort Rucker, Ala., were given a pool of test items designed to assess MITAC comprehension. The performance of these students as NOE navigators was evaluated later in the IERW curriculum, and achievement test results were validated against navigation performance results.

From the initial item pool, 49 items were identified as having significant item-to-total-score correlations and were statistically determined to address a common core of map interpretation knowledge. This test also was found to correlate marginally with later performance as an NOE navigator.

RR 1202. Griffith, D., & Actkinson, T. R. International road signs: Interpretability and training techniques. September 1978. (AD A061 782)

The drivers in a battalion being transferred to Germany were taught the meanings of international road signs by use of one of three techniques: Sign Only, in which road signs were shown from a slide projector and the names of the signs were provided orally by the instructor; Sign Elaboration, which was the same as the Sign Only condition except that a mnemonic cue was added to help the students remember each sign's meaning; and a Standard Control condition, in which a lecture was supplemented with standard training aids.

No significant differences were obtained in the performances of the groups. The analyses of the interpretability of individual signs showed that there was good reason to question the interpretability of many instructional road signs. Apparently, the more abstract the symbolic representation, the lower the interpretability. Training should stress selective instructional strategies for more abstract signs, using a longer instructional period.

Special Reports

Special Report S-5. Uhlaner, J. E. Management leadership in system measurement beds revisited. February 1978. (AD A057 479)

This report analyzes results of tests of noncognitive aspects of leader behavior--those that deal with values, emotional value judgments, and styles of action rather than with facts and logic--to support theories of the value of cognitive and noncognitive predictors of military leadership performance.

ARI developed a realistic assessment procedure for measuring noncognitive aspects of leader behavior in a situational "test bed." This test bed defined situational demands and yielded constructs interrelating leader characteristics, leader behaviors, and situational requirements.

Research using the system measurement bed divided Army officer positions into combat and technical/managerial domains. Qualifications for these positions fall into eight general personal leadership characteristics. The first six are dominantly noncognitive in nature. In the combat domain they are (1) combat leadership, (2) team leadership, and (3) command of men. In the technical/managerial domain they are (4) technical/managerial leadership and (5) executive direction. Cutting across both domains is (6) mission persistence. The last two personal characteristics are dominantly cognitive in nature: (7) technical staff skills in the combat domain and (8) technical staff skills in the technical/managerial domain.

Analysis of performance records of 900 officers in a 3-day Officer Evaluation Center program showed that noncognitive motivational variables were better predictors of performance in combat situations than were cognitive variables, and cognitive factors were better predictors in technical/managerial situations. Further analysis showed that decisiveness of leader behavior is the most important factor in combat, but knowledge of military technology or tactics is the most important factor in administration or

technical situations. Results affirmed the usefulness of the system measurement test bed.

Special Report S-6. Army Research Institute. Women Content in Units Force Development Test (MAX WAC). October 1977. (AD A050 022)

The Women Content in Units Force Development Test (MAX WAC) was designed to study the effect of increasing the proportion of women--as much as 35%--in noncombat Army field units. ARI adapted the MAX WAC tests to the standard operational Army Training and Evaluation Program (ARTEP) by selecting tasks, preparing scenarios, and developing a new scoring system.

In 1976 and 1977 ARI tested eight companies, designated experimental, control, or calibration, from each of five units--medical, maintenance, military police, transportation, and signal units. Of the eight, five calibration companies with women were tested once to establish an expected scoring range; one company was tested twice to control for the effect of a second test. In the 10 experimental companies, the percentage of women was controlled at 0% and 15% in the first test and increased to 15% and 35%, respectively, in the second test. ARI administered four additional questionnaires on organizational and individual factors affecting women's morale and performance.

The data indicated that the proportion of women, up to 35%, had no effect on measures of unit performance. Officers and evaluators thought that leadership, training, morale, and personnel turbulence affect performance more than proportion of women; data showed that supportive leadership of women favorably affected women's performance.

Part V of the report is an evaluation of MAX WAC data by the Army Operational Test and Evaluation Agency (OTEA) and a discussion of their own interviews.

Special Report S-7. Johnson, C. D., Cory, B. H., Day, R. W., Oliver, L. W., et al. Women content in the Army--REFORGER 77 (REF-WAC 77). May 1978. (AD A055 960)

In 1975 the short-term Women Content in Units Force Development Test (MAX WAC), described in Special Report S-6, revealed no significant performance differences in company units where the proportion of women was as high as 35%. MAX WAC results indicated the need for an extended field duty test on the effect of women on unit performance. This report, known as REF-WAC 77, evaluated the role of women participating in REFORGER 77, a 10-day war games field test.

Women comprised about 10% of the support units in REFORGER. ARI evaluated the group performance of maintenance, medical, military police, signal, and supply and transportation units during their field training and the individual performance of 123 women using event rating modules. ARI collected test data from 50 Test Directorate independent officer

evaluators and NCO data collectors each day of training and administered questionnaires to unit personnel before and after training.

Data analysis focused on performance, utilization of enlisted men and women, deployability, and background characteristics of enlisted men and women. Comparisons of performance data emphasized the effects of stress and the type of task. Results showed that 50% or more of the NCO supervisors and officers designated 18 of the 90 military occupational specialties in the 27 participating units as being physically too demanding for women. The report concludes that a 10% female population in units participating in a 10-day field exercise had negligible impact on unit performance.

Technical Papers

TP 280. Kneppreth, N. P., Hoessel, W., & Gustafson, D. H. (University of Wisconsin); Johnson, E. M. (ARI). A strategy for selecting a worth assessment technique. February 1978. (AD A055 345)

Worth assessment is the analysis of subjective value judgments and their reduction to a quantitative scale. This research studied the factors influencing the outcome of worth assessment and developed a strategy for selecting the best worth assessment technique for a specific decisionmaking problem.

A three-round Delphi procedure was used. The first questionnaire, distributed to 48 analysts in the worth assessment field, identified 41 factors that influence worth assessment technique selection and use. The second questionnaire was used to determine the relative importance of the 41 factors identified in the first round. Ten composite factors, four dichotomous and six continuous, appeared to account for the 41 factors and their relative weights. The third questionnaire was used to develop a profile for nine different worth assessment techniques on each of the six continuous factors. Then a three-step strategy based on the 10 composite factors was developed for selecting the best worth assessment technique for a specific problem.

The selection strategy can guide the user through an analysis of the problem using critical factors in the successful application of worth assessment and can improve worth assessment techniques applied to intelligence collection.

TP 283. Granda, T. M. An evaluation of visual search behavior on a cathode ray tube utilizing the window technique. February 1978. (AD A053 352)

Large or dense information displays cannot always be presented legibly on a cathode ray tube (CRT) all at once. This experiment evaluated the feasibility of using a window technique in CRT visual search. The first part of the experiment considered whether the super-display should be static and the window should move or whether the super-display should move and the window should be static. The second part of the experiment considered whether the length of a memorized target set affected information processing.

Ten participants searched a series of alphanumeric CRT displays for specific information targets. Display motion control, length of target list, target density, nontarget density, and window size were independent variables; time effects on performance were also measured. Five participants controlled window motion and five controlled super-display motion.

Results showed that a window technique is feasible for searching for targets on a CRT. Participants found most of the targets and made few movement errors. The most important variables were target density and the display-motion relationship. Participants using a moving window found more targets than those using the moving super-display; however, the moving super-display group made fewer control errors and took less time to view the entire display. Participants searched the displays as quickly for seven targets as they did for five or three targets. Window technique results can apply to any task in which the entire display cannot be presented at one time; information processing results can help structure similar tasks.

TP 284. Potash, L. M., & Jeffrey, T. E. Factors in design of hardcopy topographic maps. January 1978. (AD A049 621)

This report summarizes a literature survey of hardcopy (printed) map design factors that affect legibility, including visual coding and assessment techniques. The literature showed that scale, interrelatedness of symbols, and standardized symbols and coding are important map design determinants. Large scale, absence of crowding, and coding to differentiate information aid legibility. Color and shape coding are more effective than size coding, which requires space and long location time. Color and shape coding used together to differentiate the information will decrease location time.

Three assessment techniques--opinion sampling, theoretical analysis, and empirical analysis--are used to evaluate maps. Opinion sampling is easy and inexpensive but unreliable, and theoretical analysis is a limited first step. The most effective method is empirical analysis, which measures actual map-reading performance either by assessing direct or simulated performance with the map or by measuring map-reading skills. The report also reviews comparisons of photo-based and conventional line maps and reports by Army users on the difficulty of distinguishing topographic relief lines from contour lines.

TP 285. Bauer, R. W. Training transfer from mini-tank range to tank main gun firing. September 1978. (AD A061 566)

This report compares the effectiveness of two gunnery training devices, the mini-tank range and the tank coaxial machine gun, by evaluating transfer of training from the mini-tank range to the tank coaxial machine gun.

The research criterion measure was Gunnery Table VIII, a crew qualification exercise. Two experimental groups used two levels of training on the mini-tank range, and a control group used the current training method. Each group had 15 or more tank performances measured by independent evaluation

teams. The control group and one experimental group fired 130 rounds per man; the second experimental group fired 260 rounds per man.

The mini-tank range exercises were more accurate and efficient and less costly than those using the coaxial gun. The experimental group that fired 260 rounds had faster first-round time-to-fire scores, achieved the best overall scores, and had no crew failing. Differences among the three groups on main gun performance measures and the previous experience of gunners were not statistically significant.

TP 286. Miron, M. S., & Patten, S. M. (Syracuse University Research Corporation); Halpin, S. M. (ARI). The structure of combat intelligence ratings. September 1978. (AD A060 321)

This report studied the concepts underlying an intelligence analyst's judgments of combat intelligence information quality and recommended modifications in rating scales. Previous research has suggested that the standard Army source reliability scale and information accuracy scale ineffectively report analysts' ratings of the quality of combat intelligence.

Twenty-one trained and 34 untrained Army intelligence personnel evaluated 40 intelligence reports, using 50 different ratings that included the 6-point reliability and accuracy scales. Participants' responses were analyzed to determine the characteristics of judgments made and the relationships among the scales.

Analysis showed that participants did not discriminate between accuracy and reliability; instead, they judged factors tentatively labeled accuracy, relevance, and directness. Findings suggest that the 6-point accuracy and reliability scales should be replaced by unambiguous scales based on the accuracy, relevance, and directness factors after further study of the stability of these factors.

TP 287. Moses, F. L., & Vande Hei, R. P. A computer graphic-based aid for analyzing tactical sightings of enemy forces. January 1978. (AD A049 578)

To evaluate the effectiveness of computerized graphics and algorithms as battlefield interpretation aids, this research compared the accuracy of responses between aided and unaided participants in a hypothetical battlefield situation. Six participants answered 20 questions about direction, speed of movement, and changes in location of battlefield activity aided by computer calculations from a graphics display; six unaided participants also answered the questions. Participants used color television displays, a keyboard, and a displayed cursor connected to a trackball. In the aided group, the computer generated information for the display.

Comparison of accuracy of answers and time needed to solve the problems showed that the aided analysts were more accurate than analysts who used only graphic displays, but they needed the same amount of time for the tasks as the unaided group. Debriefed participants said they favored the use of computerized graphic displays of activity as a battlefield analysis aid with

or without computer calculation assistance. The superior accuracy of computer-assisted analysts supports the use of both graphics and algorithms.

TP 288. Seeley, L. C. (ARI); Rosen, T., & Stroad, K. (Human Resources Research Organization). Early development of the Military Aptitude Predictor (MAP). March 1978. (AD A052 953)

In 1973, ARI developed the Military Aptitude Predictor (MAP), which focused on age, education, aptitude test scores, and record of civilian convictions to help select enlisted personnel. MAP satisfactorily identified potential military delinquents but excluded large numbers of potentially successful soldiers. This report describes two successive MAP developments designed to improve the instrument.

Administration of an Early Experience Questionnaire (EEQ) added to MAP in 1974 showed the same failure as the original MAP--that is, more potentially good soldiers than poor would have been lost. The 1975 version, MAP-75, substituted school grades for aptitude test scores and added a physical fitness test. MAP-75 was administered to 195 enlisted men who were successfully completing boot camp training and 83 who were being discharged.

Analysis of results showed that the revised MAP would again screen out large numbers of potentially successful soldiers. MAP use was suspended in 1975. Followup interviews with recruiters showed they misunderstood, incorrectly administered, and undervalued MAP. The report suggests further development of the EEQ to improve MAP. (See also TR-78-A11, on the successful revision of the MAP.)

TP 289. Seeley, L. C., Fischl, M. A., & Hicks, J. M. Development of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 2 and 3. February 1978. (AD A053 457)

This report describes the development and validation of Forms 2 and 3 of the Armed Services Vocational Aptitude Battery (ASVAB), which were used from January 1973 to January 1976 to screen and classify high school students for entry into the Armed Services.

Steps in the development and validation of Forms 2 and 3 were as follows: (a) preparation of 200 new items for each of the eight cognitive tests of ASVAB-1; (b) field administration to approximately 4,000 Selective Service registrants, stratified to represent the male military age population, to obtain basic data on the items; (c) preparation of eight 25-item tests based on item analysis of the field data and two new forms of the noncognitive coding speed test; and (d) a second field administration to derive norms and other statistical characteristics of the new forms.

Forms 2 and 3 covered the required range of difficulty, internal consistency, equivalency of both forms, and relationship among the component tests to replace the original ASVAB forms.

ARI Research Report 1161 discusses the development of the first ASVAB, in use from 1968 to 1973.

TP 290. Brown, E. E., & Price, H. S. Abstracts of ARI research publications, FY 1972 and 1973. April 1978. (AD A057 524)

This volume of abstracts, continuing the series begun in 1957, summarizes ARI research publications for fiscal years 1972 and 1973 (July 1971 through June 1973). The report contains 24 abstracts of Technical Research Reports and Technical Research Notes, which include Defense Documentation Center accession numbers, and 11 abstracts of intra-agency Research Investigations, Research Studies, Research Problem Reviews, and Research Memorandums. The report describes Army research areas in the behavioral and social sciences and numerically keys them to the abstracts. A list of depository libraries containing Technical Research Reports and Technical Research Notes completes the volume.

TP 291. Eaton, N. K. Performance motivation in armor training. September 1978. (AD A064 247)

This report analyzes performance outcomes (consequences or rewards of performance) that motivate tank crews during training. Fifty-two Armor crewmen at Fort Hood, Tex., on a list of potentially useful recognition and tangible reward outcomes, how much they valued each one and what they felt was the probability of their getting it. Their answers were ranked by perceived value x frequency in four motivation source categories and were developed into a composite-source model. Answers to the same list from 112 crewmen at Fort Carson, Colo., confirmed and refined the outcome values and indicated constancy of outcome values across rank for grades E2 through E5. At Fort Carson, 108 Armor crewmen answered a second questionnaire based on the composite model.

Analysis of results showed that for tank commanders, drivers, and loaders, performance was positively related to recognition-based motivation and negatively related to tangible reward. For gunners, performance was negatively related to recognition-based motivation. The report recommends that the composite-source motivation model and test instrument be used for an experimental management program based on recognition.

TP 292. Shields, J. L. An empirical investigation of the effect of heteroscedasticity and heterogeneity of variance on the analysis of covariance and the Johnson-Newman technique. July 1978. (AD A058 205)

Monte Carlo computer procedures were used to test the robustness of the Johnson-Neyman technique and analysis of covariance (ANCOVA) to violations of assumptions of homoscedasticity and homogeneity of variance. The study simulated a one-way, fixed-effects analysis with two treatment groups, one criterion and one covariate. Five fixed values of the covariate were selected with zero mean and unit variance, while the values of Y were varied randomly with a constant regression coefficient of .75. Four combinations of group sizes, five combinations of group variances, and five forms of heteroscedasticity were studied. These conditions were combined to produce simulated experimental conditions. For each simulated condition, samples were generated and sampling distributions were compiled.

Results indicated that ANCOVA is robust to violations of assumptions of homoscedasticity and homogeneity of variance, both singly and in combination, when group sizes are equal. Cases combining different group sizes and variances showed biases. The Johnson-Neyman technique was sensitive to violation of the assumption of homoscedasticity for different group sizes. In general, as the variance for a fixed value of x increased, the probability of including that value of the covariate in a region of significance increased.

TP 293. Mohr, E. S., & Rowan, G. P. (ARI): Reidy, R. F. (U.S. Army). Women and ROTC Summer Camp, 1975. September 1978. (AD A064 553)

To determine whether evaluation procedures used in decisions concerning Regular Army and Reserve commissioning are fair to cadets of both sexes, this report analyzed peer ratings and nine performance measures of 392 male and 83 female cadets attending ROTC Advanced Summer Camp at Fort Bragg, N.C. Female cadets received lower scores than males on both performance ratings by platoon officer evaluators and on peer ratings. Leadership ratings by NCO evaluators showed no differences between men and women, and female cadets scored higher than males on measures of cognitive abilities and motivation.

The findings indicated that sex differences in training programs and peer rating instructions may have operated to the disdavantage of females. The report recommends removal of sex differences in Summer Camp training, improved peer rating instructions, and continued effort to identify and correct sex biases.

TP 294. Eastman, R. F. The assignment module: An element of an experimental computer-enhanced career counseling system for Army officers. June 1978. (AD A060 555)

As part of a program to improve the Army's career counseling and officer assignment system, this project tested the technical feasibility of (a) using a computer-assisted system to assign officers and (b) quantifying the assignment policies and practices of a career branch.

Three computer-assisted assignment methods used job utility scores, which are based on officers' backgrounds and reflect suitability for assignments, to simulate assignment of 160 infantry captains. These assignments were then compared with both actual and suitable alternate assignments recommended by experienced branch personnel.

The three computerized methods agreed well (80%-86%) with both the actual and alternate assignments. Using average utility scores as a measure of success in matching officers and jobs, the three computerized methods achieved a significantly better fit of officers to job categories than did the manual assignment method. Where the computerized methods were not acceptable to branch personnel, the two principal reasons were (a) inadequacy of input data from the officers' records and (b) overweighting the importance of officers' preferences in the computerized methods.

TP 295. Lambert, J. V., Shields, J. L., Gade, P. A., & Dressel, J. D. Comprehension of time-compressed speech as a function of training. June 1978. (AD A058 204)

This experiment studied five training methods for effective listening to time-compressed speech. Two methods offered the reward of leave time as an incentive; three methods did not. After training, all groups were tested for comprehension of five different passages of compressed speech. Each group heard the passages at five rates: 130 words per minute (wpm), 195 wpm, 241 wpm, 286 wpm, and 332 wpm. The performance of the participants who had received training was compared to that of a group that had listened to all five test passages at normal speed, 130 wpm.

Participants whose training included the incentive of leave time comprehended highly compressed speech significantly better than did participants trained without incentives.

TP 296. deHaan, H. J., & Schjelderup, J. R. Threshold of intelligibility/comprehensibility of rapid connected speech: Method and instrumentation. June 1978. (AD A060 556)

The technology of speech comprehension demands new methods for measuring the intelligibility and comprehensibility of compressed speech. This report describes a method that requires listeners to judge the comprehensibility of speech as the rate of speech varies. The method is similar to the Békésy method for the determination of pure-tone thresholds except that the rate of speech rather than the intensity of an auditory signal is varied. The result is a threshold value representing the maximum rate of speech judged comprehensible by a listener. Used as described in this report, the method developed appears to have considerable reliability.

This research also developed instrumentation that accelerates or decelerates speech rate with or without pitch changes.

TP 297. deHaan, H. J. A speech-rate intelligibility/comprehensibility threshold for speeded and time-compressed connected speech. June 1978. (AD A061 172)

Two experiments were conducted to determine whether the speech-rate threshold is related to intelligibility of speech or to speech comprehension. The first experiment compared thresholds for two types of time-compressed speech reportedly different in intelligibility: (a) simple speeded speech produced by increasing the playback speed of recorded speech and (b) compressed speech produced by the sampling method, which deletes minute sections of speech. The second experiment investigated the relationship of the threshold to comprehension by using traditional multiple-choice comprehension measures.

There were clear indications that compressed speech is more intelligible than speeded speech. Thresholds for speeded and compressed speech differed significantly--218 words per minute (wpm) vs. 266 wpm, respectively--

indicating that the threshold at least involves intelligibility. Correlations were low between thresholds and comprehension test scores. The threshold may reflect only the potential for comprehension rather than comprehension itself.

TP 298. Weitzman, D. O., & Fineberg, M. L. (ARI); Compton, G. L. (U.S. Army). Evaluation of a flight simulator (Device 2B24) for maintaining instrument proficiency among instrument-rated Army pilots. July 1978. (AD A060 557)

This research evaluated the operational suitability of Device 2B24, which simulates the UH-1H helicopter, for facilitating UH-1H instrument proficiency training and assessment among instrument-rated pilots.

Two groups of pilots, representing a broad range of instrument skills, were given instrument training over a 9-month period as follows: 12 hours in Device 2B24, 12 hours in the UH-1H, or a combination of 6 hours in Device 2B24 and 6 hours in the UH-1H.

Twelve hours of training in Device 2B24 produced better instrument performance than did 12 hours training in the helicopter. The training mode that used both the device and the helicopter produced intermediate results.

TP 299. Martinek, H., & Hilligoss, R. E. (ARI); Lavicka, F. (U.S. Army). Comparison of three display devices for unattended ground sensors. August 1978. (AD A060 558)

This report describes an experiment designed to determine the relative values of three devices for displaying activations of seismic unattended ground sensors (UGS): the operational RO 376 event recorder, a situation map display, and a time-compressed situation map display.

Three tape recordings, each 2 hours long, of the UGS activations were compiled from recordings taken during field tests. Twelve Naval personnel experienced in the use of the RO 376 were given 4 hours' training in the use of the situation map display and in the map display used with time compression. Each participant then interpreted each display using a different set of recorded activations each time, in counterbalanced order, and filled out a standard report form.

Use of the RO 376 resulted in higher accuracy and more complete reports than did use of the other displays. No differences were found between the two modes of situation map display.

TP 300. Martinek, H. (ARI); Pilette, S. S., & Biggs, B. E. (HRB-Singer, Inc.). The effects of work-rest, target activity, background noise, and string size on operator interpretation of unattended ground sensor records. June 1978. (AD A061 043)

This experiment was designed (a) to investigate the relationships between unattended ground sensor (UGS) operator performance and various

system-dependent and target-dependent parameters, including the work/rest cycle, number of sensors in a string, target activity level, and background noise; and (b) to identify sources of operator error that could be reduced through new interpretation techniques, procedures, and training.

Operators monitored UGS records for 8 hours of worktime under four different work/rest conditions: 2 hours' work, 1 hour's rest; 2 hours' work, 15 minutes' rest; 4 hours' work, 1 hour's rest; and 4 hours' work, 15 minutes' rest. The UGS records included counterbalanced variations of three string sizes (2, 3, and 4 sensors), 6 and 12 targets per hour, and high and low "battle" noise.

Results showed that for 8 hours of monitoring, 2-hour shifts interspersed with 1-hour or 15-minute rest periods are preferred over 4-hour work shifts interspersed with 1-hour or 15-minute rest periods. For heavy, short-term monitoring requirements (for example, enemy attack requiring periods of concentrated monitoring), an operator can perform satisfactorily for one 4-hour shift; however, performance deteriorates during a second 4-hour shift. Performance was equal using 2-, 3-, or 4-sensor strings in the low-target-activity condition. However, during the high-target-activity condition, the use of 3- or 4-sensor strings resulted in more target detections than use of 2-sensor strings. Operator performance during the high battlefield noise condition was equal to that during low noise. Operators detected more targets during high-target-activity conditions than during low-target-activity conditions. However, they detected a higher percentage of targets during the low-activity condition.

TP 301. Cockrell, J. T. (System Development Corporation). Evaluation of four target-identification training techniques. August 1978. (AD A061 175)

As part of a research program to seek more efficient methods of training image interpreters in target identification, four alternative experimental instruction techniques were evaluated. Eight recently trained image interpreters used each method. Two of the four methods used pictures instead of text, one in a random presentation and the other in a structured sequence of increasing difficulty. The third method used programed text to teach verbal identification cues, and the fourth method combined programed text in the first half and the structured pictorial method in the second half of training. In each method, half the students received feedback on both the correct answer and the reason a wrong answer was wrong, while the other half received only the correct answer.

Students were evenly divided across all conditions by their general technical (GT) aptitude score: high (at or above 124) and low (below 124). Posttests on visual target identification and verbal target cues evaluated the effectiveness of the methods and feedback conditions for each GT level.

Target identification performance was significantly poorer with the structured text method, but was about the same among the three methods using pictures. Recognition of target cues was significantly better when verbal instructions on target cues were given than when training was entirely pictorial. Type of feedback had no significant effect. Learning performance did not differ as a function of GT aptitude, but interpreters with lower aptitudes forgot their training more rapidly.

TP 302. Halpin, S. M., Moses, F. L., & Johnson, E. M. A validation of the structure of combat intelligence ratings. August 1978. (AD A061 568)

This research validated a multidimensional descriptive structure of the quality of intelligence data. It also evaluated four new scales for combat intelligence based on the terms: True, Predictable, Important, and Relevant.

Two groups, each consisting of 28 captains enrolled in the Intelligence Officers' Advanced Course, evaluated 40 messages; one group's messages were from the Battle of the Bulge, and the other group's messages were based on a hypothetical conflict. The evaluations were made using 50 descriptive scales. Used in an earlier study, the scales were the basis of the descriptive structure being validated. Subsets of 20 messages from each of the two message sets also were rated on four scales designed to represent the previously identified structures. The evaluations were analyzed to determine the implicit judgment structure underlying the officers' ratings and to evaluate the correspondence of the four new rating scales with this judgment structure.

There were no significant differences between judgments in the two scenarios. Two concepts, Truth and Relevance/Importance/Threat, were major factors in the evaluation of intelligence information in all cases.

TP 303. Cockrell, J. T. Television as stimulus input in synthetic performance testing. August 1978. (AD A061 266)

As part of an effort to provide more economical methods for job-skill evaluation in the Enlisted Personnel Management System, this study investigated the use of television as a way to present test items. The television scene provided the job setting for each item and then asked a question that required the examinee to respond within a specific time. All items were job connected and therefore represented simulated skill items. The examinee responded directly on the television screen by using an electronic stylus or gun reticle. The test was compared with a paper-and-pencil test that covered the same items and with a hands-on performance test that covered many of the same items.

The results indicated that television testing is feasible and acceptable to soldiers. The validity of the prototype test could not be determined precisely, however, because the criterion hands-on test was not usable.

TP 304. Pilette, S. S., & Biggs, B. E. (HRB-Singer, Inc.); Martinek, H. (ARI). The value of special training and job aids for improving unattended ground sensor operator performance. August 1978. (AD A061 046)

This research was conducted to determine (a) the value of special unattended ground sensor (UGS) operator training and job aids and (b) the effect on operator performance of target activity level and number of sensors used in a string.

Based on an analysis of operator errors made in a previous study, a training program and two job aids were developed. To test the value of the training and of one of the job aids (a measuring device), two 2-hour scenarios were constructed for pre- and posttraining evaluation. Typical target patterns at two levels of target activity and three levels of sensor string size were systematically varied within 30-minute segments. The second job aid, a nomograph, was evaluated using the pretest and posttest design. Operators detected and identified targets and estimated their speed and number.

The individualized training program significantly improved operator interpretation performance in correct target detection, correct identification, target speed estimation, and target quantity estimation. The use of the nomograph significantly improved performance in correct identification, target speed estimation, target quantity estimation, and reporting time. Student acceptance of the individualized training approach and both job aids was high. Operators performed on 3- and 4-sensor strings with 77% detection completeness and virtually no false alarms. Detection of targets was better during low target activity than during high target activity. Operator performance was the same with three or with four sensors.

TP 305. Cooper, G. E., & Moore, M. H. (Vector Research, Inc.); Halpin, S. M. (ARI). MOVANAID: An interactive aid for analysis of movement capabilities. August 1978. (AD A064 276)

This report describes a computerized interactive aid for movement analysis called MOVANAID. Designed to help personnel perform certain Army intelligence processing tasks in a tactical environment, MOVANAID can compute the fastest travel times and routes through road networks for various military units as well as the fastest completion times for certain simultaneous maneuvers.

The report also discusses the usefulness of MOVANAID for certain military situations and describes the way in which users interact with it. Also discussed are MOVANAID's analytic basis, the way it was computer-implemented, and possible extensions of its capabilities.

TP 306. Steinheiser, F. H., Jr., Epstein, K. I., & Mirabella, A. (ARI); Macready, G. B. (University of Maryland). Criterion-referenced testing: A critical analysis of selected models. August 1978. (AD A061 569)

This report reviews and compares several mathematical models for use in criterion-referenced testing. The models are evaluated on both formal analytic and empirical grounds.

Predictive models include probabilistic formulations, a binomial model, and a Bayesian model. Descriptive models include a categorization scheme, a one-parameter logistic model, and linear regression. An empirical method is described for relating mastery criteria to derived educational outcomes.

The problems inherent in each model or class of models include tenability of assumptions, ease of application, assessment of item characteristics, and assessment of how well the model fits the data. Each method or model appears to be appropriate for specific types of testing situations, although further development will depend on computer simulation and empirical research.

TP 307. Bleda, P. R. (ARI); Gitter, G. A., & D'Agostino, R. B. (Boston University). Perceptions of leader attributes and satisfaction with military life. August 1978. (AD A061 267)

This research investigated characteristics of Army leaders to identify the attributes most closely related to the satisfaction of first-term enlisted personnel with military life.

Analysis of 76 unstructured in-depth interviews with first-term enlisted personnel led to the development of a descriptive set of aspects significant to the quality of Army life. The resulting 16 attitudinal indicators formed the basis for a self-administered questionnaire.

Interviews were conducted with 130 lower ranking (E1-E4) soldiers. The questionnaire described above was administered first; then soldiers were asked questions pertaining to their perceptions of the attributes of superiors whom they viewed as either formulating daily orders (originators) or merely relaying orders (givers).

Regression analyses indicated that satisfaction with both quality of Army life in general and leadership in particular were related more closely to perceived attributes of originators than to attributes of givers. This finding is probably the result of the originator's greater hierarchical influence within the Army structure.

TP 308. Bleda, P. R., & Hayes, J. Impact of REALTRAIN and conventional combined arms exercises on participant morale. August 1978. (AD A060 559)

This research examined the immediate impact on the morale of combat units of two types of combined arms exercises. Armor and Infantry personnel undergoing 1 week of either platoon-level REALTRAIN or conventional field exercises in Germany filled out a questionnaire designed to assess nine specific components of morale. These components reflected respondents' motivation before and satisfaction after the exercises as well as general job satisfaction and unit cohesiveness. Half the respondents completed the questionnaire before training; the other half, after training.

The results indicated that respondents showed higher levels of exercise-specific motivation and satisfaction after completion of REALTRAIN than they had anticipated, whereas the reverse was found for conventional exercises. A similar pattern of findings emerged for certain job-satisfaction dimensions, but the pattern was not as pronounced as that related to the exercises. REALTRAIN had a significant positive influence on six of the nine morale components and no effect on three, whereas the conventional exercises

had a positive influence on only one component and a negative effect on six components.

TP 309. Borman, W. C. (Personnel Decisions, Inc.); Bleda, P. R. (ARI). Measuring motivation and job satisfaction in a military context. September 1978. (AD A060 879)

This investigation examined motivation, work-related satisfaction, and morale among Army enlisted personnel. A review of relevant literature helped delineate definitions of these constructs and identify tests to be administered in the field. A variety of civilian-oriented questionnaires and inventories was field tested, using 466 soldiers in one sample and 614 soldiers in another sample.

Analysis of the results showed six separate motivation/satisfaction constructs with acceptable convergent and discriminant validities. Composite measures of these six constructs correlated moderately with self-reports of plans to reenlist and pride in the Army but near zero with self-reported problem behavior. Advantages of such multimethod composite measures are discussed.

TP 310. Landis, D., Day, H. R., & McGrew, P. L. (University City Science Center); Thomas, J. A. (ARI); Miller, A. B. (Delaware State College). Use of a black "culture assimilator" to increase racial understanding. September 1978. (AD A060 560)

This report describes research to determine the feasibility of using a culture assimilator as a race-relations training technique. A culture assimilator provides background information to help individuals better understand the point of view of individuals of another culture. The culture assimilator used in this study was based on extensive taped interviews of black and white officers and enlisted personnel at several Army installations. Most items dealt with the cultural background and perspectives of black enlisted men. Four responses with feedback were prepared for each problem, with one response showing more insight into the black culture. This 100-item assimilator was field tested at four Army installations.

The results of the field test indicated that (a) the problems represented events far more familiar to black than to white officers; (b) blacks obtained higher scores than did whites; (c) white officers learned from assimilator training; and (d) the training may have changed both attitudes and knowledge somewhat.

TP 311. Smith, S. (ARI); Truesdale, A. J. (U.S. Army Operational Test and Evaluation Agency); Finley, D. L. (ARI). Human factors implications of MICV OT II for infantry fighting vehicle (IFV) development. August 1978. (AD A060 561)

An evaluation of the human factors aspects of the Mechanized Infantry Combat Vehicle (MICV) in comparison to the Standard Armored Personnel Carrier

(M113A1) was conducted as part of the MICV Operational Test (OT) II. Data were collected from 83 infantry personnel using detailed questionnaires, interviews, and field observations. These human factors instruments were designed to obtain comprehensive information from "user experts" to assist designers and decisionmakers. Test instruments covering vehicle and equipment problems and their possible solutions were used throughout the OT II.

Results showed the MICV (XM723) to be more desirable for combat use than the M113A1 based on speed, maneuverability, fire power, and armor protection. However, the MICV was rated deficient in several design-related areas. Data are presented for each duty position in both the MICV and the M113A1. Problems are identified and suggestions for solution are offered.

TP 312. Maier, M. H., & Fuchs, E. F. Differential validity of the Army aptitude areas for predicting Army job training performance of blacks and whites. September 1978. (AD A061 575)

This research was designed to determine whether scores on the Army's aptitude area battery introduced in 1973 provided an equitable basis for qualifying whites and blacks for training in major groups of Army jobs.

A step-by-step analysis to assess the validity of the aptitude area measures compared aptitude area scores and job training scores (final course grades) for 12,355 whites and 1,772 blacks.

Results showed that aptitude area scores correlated highly with training scores for both blacks and whites. For six of the eight major job areas for which black-white identification was available, both white and black trainees had been selected appropriately for their job categories.

TP 313. Schendel, J. D., Shields, J. L., & Katz, M. S. Retention of motor skills: Review. September 1978. (AD A061 338)

As part of a program to develop an information base for Army decisions necessary to insure soldiers' long-term skill proficiency, an extensive literature search was conducted to determine variables known or suspected to affect the retention of learned motor behaviors over lengthy no-practice intervals. These variables were divided into task variables and procedural variables.

Task variables that may underlie long-term retention of motor skill include (a) duration of the no-practice period or retention interval, (b) nature of the response required to accomplish a particular task, (c) degree to which the learner can organize or impose order on the elements that define the task, (d) structure of the training environment, and (e) initial or "natural" ability of the learner to perform a task without prior practice.

Procedural variables that may affect long-term retention include (a) degree of proficiency attained by the learner during initial training, (b) amount and kind of refresher training, (c) transfer of skills on one

task to performance on another task, (d) presence of interfering activities, (e) distribution of practice during training, (f) use of part-task versus whole-task training methods, and (g) introduction of extra test trials before final testing.

TP 314. Hart, R. J. (ARI); Day, H. R., Landis, D., & McGrew, P. L. (University City Science Center). Cultural assimilator for training Army personnel in racial understanding. September 1978. (AD A061 354)

A cultural assimilator, developed to teach white junior officers about black culture in the Army, presented scenarios involving common misunderstandings between blacks and whites in the Army; respondents were asked to identify the "correct" reasons for these misunderstandings. The effectiveness of this cultural assimilator as an Army race-relations training technique was evaluated in three field tests, with mixed results.

In the first evaluation, respondents showed evidence of learning from assimilator training; however, cultural sensitivity to black culture on a related measure did not increase, and stereotyping was not reduced. In the second evaluation, subordinates rated their company commanders as being more effective in race relations when the commanders demonstrated greater knowledge of black culture, as measured by assimilator performance. However, this was true only for white and Hispanic subordinates and not for black subordinates, as was expected. In the third evaluation, the assimilator was implemented as part of a 1-day race relations seminar for command personnel in an Army Reserve unit. Effectiveness of training was evaluated 2 months later by a survey. Neither self-reports nor reports of supervisors or subordinates provided evidence that trained personnel were seen as being more effective in race relations than untrained personnel.

TP 315. Knerr, B. W. Relationships between student attitudes toward computer-assisted instruction and training performance. August 1978. (AD A061 264)

The attitudes of 90 enlisted persons toward computer-assisted instruction (CAI) were measured before and after they received instruction administered by a computer. The training was divided into four segments, each followed by a review or test segment. Students who failed to reach a specified score on any review segment repeated the corresponding lesson segment.

Results showed that scores on the pretest were not related to scores on any of the lesson performance criteria. However, a significant relationship was obtained between attitude posttest and percentage of errors, indicating that students who made a lower percentage of errors during the lesson also had more positive end-of-lesson attitudes toward CAI. Change in attitude was related to total score, number of errors, and percentage of errors. Positive change in attitude was also related to "good" performance on these criterion measures. Scores on both attitude scales were independent of student ability as measured by standard military test scores.

TP 316. Oliver, L. W. Outcome measures for career counseling research. August 1978. (AD A062 483)

This report provides background for constructing outcome measures--measures of the effects of counseling--to evaluate a computer-based information and planning program for Army officers. Previously used career counseling methods (1950-76) are classified and reviewed, and the most frequently used measures are discussed. A set of recommendations for future career counseling outcome measures is offered.

A critique of previous research revealed the following: (a) use of inappropriate criteria; (b) preponderance of self-report measures, instead of measurement approaches such as cost-benefit analysis or behavioral observation; (c) relative infrequency of reporting reliability and validity data for the instruments used; and (d) methodological shortcomings concerning randomization of subjects, selection of appropriate comparison groups, and choice of type of statistical analysis.

TP 317. Farr, B. J. Army Research Institute evaluation of Automated Data on Instructional Technology (ADIT). August 1978. (AD A063 592)

Automated Data on Instructional Technology (ADIT) is a computerized file of technical information on instruction and learning. The data base consists of detailed evaluative abstracts of reports and articles related to training and instructional system development. This research assessed the usefulness of records obtained from the ADIT data base, the ease of on-line data retrieval, and the stand-alone quality of the ADIT "Guide to Use." Seven research psychologists read the guide, performed search strategy exercises, performed the operations test, and completed two questionnaires evaluating ADIT and the guide.

Attitudes toward ADIT were generally favorable. Participants thought that the system would be useful for educational researchers, administrators, planners, and developers. The information in ADIT files was found to be comprehensive and useful. Participants believed that data could be retrieved from ADIT more quickly than from either original sources or alternative data bases. Attitudes toward the ADIT guide were less favorable. Participants indicated that (a) the guide did not contain sufficient information, (b) the instructions were not clearly written, and (c) the questions in the exercises had limited usefulness.

TP 319. Matthews, J. L., Wright, C. E., & Yudowitch, K. L. (Operations Research Associates); Geddie, J., & Palmer, R. L. (ARI). The perceived favorableness of selected scale anchors and response alternatives. August 1978. (AD A061 755)

To improve methods of questionnaire construction, this research sought objective norms on the extent to which respondents perceive phrases describing degrees of acceptability, adequacy, or goodness as indicators of attitude.

Lists of descriptors denoting degrees of acceptability, adequacy, and goodness were distributed to a random selection of 51 Army officers and enlisted personnel, who rated each descriptor on an 11-point scale of "favorableness" and indicated whether or not the meaning of the term seemed ambiguous.

A majority of the raters considered most of the descriptors to be unambiguous. More than half the phrases considered ambiguous contained the adverb modifiers "pretty" and "rather." Also, the term "borderline" was recommended as a replacement for "neutral" in many applications. Tables present the mean, the standard deviation, and the range of responses computed for each term. This report also describes a technique for constructing scaled response alternative sets.

TP 320. Pilette, S. S., Biggs, B. E., & Edwards, L. R. (HRB-Singer, Inc.); Martinek, H. (ARI). Optimum patching technique for seismic sensors employed in a grid. September 1978. (AD A061 573)

This research determined the effect of (a) four patching techniques and associated job aids, (b) training, (c) sensor density, and (d) target activity on operator performance in detecting targets when using unattended ground sensors (UGS) employed in a grid configuration.

Trained operators interpreted tactical data recorder (RO 376) plots both before and after training using four patching techniques and associated job aids. The plots represented 9 or 24 sensors per square kilometer grid. Completeness of target detection, number of false alarms, speed, estimation error, and target detection deviation were measured.

Patching technique training and job aids increased detection completeness by 42%. The row patching technique was selected as the best. Use of the 9-sensor grid resulted in fewer false alarms and equal detection completeness than use of the 24-sensor grid.

TP 321. Edwards, L. R., Pilette, S. S., & Biggs, B. E. (HRB-Singer, Inc.); Martinek, H. (ARI). The effect of workload on performance of operators monitoring unattended ground sensors. September 1978. (AD A061 694)

This research investigated the effect on operator performance of workload as defined by target activity level and number of unattended ground sensors (UGS) used. Researchers measured operators' target detection ability, false-alarm rate, and direction and speed estimation accuracy to establish system capability.

Following an orientation session, experienced UGS operators monitored, in sequence, each of three event recorder displays showing activations of UGS used in grids. Periods of high and low target activity were of equal time duration. Operators reported each target detected and estimated its speed and direction of movement.

The number of sensors monitored and the target activity level significantly affected operator performance. The operators' ability to detect

targets decreased as either activity level or number of sensors increased. Their ability to estimate target direction also decreased as activity level increased. Although target speed was underestimated, no significant differences were found between any of the experimental conditions for this variable. The false-alarm rate was low.

TP 322. Steinheiser, F. H., Jr., & Epstein, K. I. An experimental investigation of the Military Police Firearms Qualification Course. September 1978. (AD A062 600)

The Military Police Firearms Qualification Course is a test of handgun marksmanship composed of eight "tables" or combinations of distance and position for firing at stationary targets. In this experiment, 237 male Military Police (MP) students fired three repetitions of the test over a 2-day period for a total of 240 trials per student. Analyses revealed that tables 1-4 and 5-8 comprised two different tests, the "difficult" and the "easy." Marginal students who failed the difficult tables nonetheless could pass the entire test by doing well on the easier tables. Classification errors of false positives and false negatives each averaged about 7%. False positives were perceived as being more serious than false negatives. This course works well as a training and testing instrument, but average scores must be interpreted with caution.

TP 323. Epstein, K. I., & Steinheiser, F. H., Jr. A Bayesian method for evaluating trainee proficiency. September 1978. (AD A062 245)

In any testing or evaluation program, a percentage of false positives and false negatives (misclassifications) will occur. Nevertheless, a decisionmaker needs to make a best estimate about the true level of an examinee's proficiency. This research developed a multiparameter, programable model to examine the influence of certain factors on the probability that an examinee had attained a certain level of mastery through a training program. The parameters included (a) the number of assumed mastery states (master, intermediate, nonmaster); (b) the prior distribution of scores from similar examinee groups; and (c) the number of test trials or items that could be given.

Results of several simulations showed that the degree of confidence that a decisionmaker can have in a decision (that is, "x%" certainty that an examinee is a master) is markedly affected by values for the parameters mentioned above. A key feature of a Bayesian model is that testing time, manpower, expense, and test length can be reduced if the "prior" information is accurate and valid for the particular tested group. If not, little can be gained from a Bayesian model. The results also showed that a test can be too short to be of any value to decisionmaking.

TP 324. Bersh, P. (Temple University); Moses, F. L., & Maisano, R. E. (ARI). Investigation of the strength of association between graphic symbology and military information. September 1978. (AD A064 260)

This research investigated the existence of "natural" associations between graphic symbology and military concepts. Each of 114 enlisted men in one group ranked battlefield information categories according to how well the categories were represented by symbols shown in a booklet. Participants in a second group of 137 enlisted men were given the reverse task: to rank-order symbol types according to how well they represented military concepts.

Results suggested that "natural" associations can be found between symbols and military concepts. Associations were categorized as high, medium, minimal, or insignificant, based on the statistical significance of differences among rankings and on the degree of reflexive association between symbols and concepts. About half the primary matches between tactical concepts and symbols fell into the high and moderate association categories. The remaining results fell into the minimal or insignificant categories. The data presented also identify symbol characteristics which might be considered in modifying current symbology.

TP 325. Vecchiotti, R. A., & Berrey, J. L. (McDonnell Douglas Corporation); Narva, M. A. (ARI). Training in utilization of surveillance and reconnaissance resources by combat arms officers. September 1978. (AD A061 577)

To improve aerial surveillance and reconnaissance (AS&R) resources used by combat commanders, this research analyzed training and field materials. AS&R lesson plans and instructions were obtained from three combat arms schools and the Command and General Staff College. These materials were analyzed for curriculum content and used to develop questionnaires on experience with, attitudes toward, and training received relative to AS&R.

Questionnaires were mailed to selected schools; 84%, or 1,765, questionnaires were returned. Analysis showed that combat arms students received limited AS&R training and wanted more training and more practical training and interaction with the system. The results of this report were used in the later development of a combat commander's guide and field aid to AS&R use.

TP 326. Nystrom, C. O., & Gividen, G. M. Ease of learning alternative TOS message reference codes. September 1978. (AD A061 697)

This research evaluated the relative ease or difficulty of learning two alternative message reference codes used to insert, edit, and extract information from an Army tactical operations system (TOS). Forty officers and 20 enlisted personnel were given 2 minutes to examine tabular information describing the message titles and action names in association with a message code, which consisted of either two letters and a number (22#) or four letters (LLLL). Each soldier, while seated at a computer terminal, typed and transmitted message reference codes in response to displays of message titles and action names. On the first pass, titles were displayed

in an orderly sequence; on later passes, titles were in random order. Participants had to make an error-free pass to complete their task.

The error rate associated with learning the four-letter codes was less than half that associated with learning the two-letter and one-number codes. Time required to meet the learning criterion for those learning the four-letter codes was about 60% of that required to learn the letters and number codes. Analysis of errors showed that the numeric character and arbitrary second letter of the letters and number codes were important sources of error.

TP 327. Fields, A. F., Maisano, R. E., & Marshall, C. F. A comparative analysis of methods for tactical data inputting. September 1978. (AD A060 562)

This research examined four formatting methods to improve speed and accuracy of inputting tactical messages on enemy activity into an Army computer. The methods were (a) typing--the user typed appropriate codes into a message format; (b) typing with an error corrector--the computer automatically tried to correct common spelling and typing errors; (c) menus--the user selected a legal entry from a list; and (d) typing with autocompletion and an English option--the user typed only sufficient characters to identify the item, using a code or its English definition.

Thirty-two enlisted personnel input one of four sets of nine messages using each inputting method. Results showed the use of menus was the most accurate method. For users with limited experience (e.g., 1 day), there were no differences in speed among the four methods.

TP 329. Bell, D. B. An evaluation of two systems for reducing discipline failure in BCT. September 1978. (AD A061 696)

This report describes research to determine (a) the usefulness of two test instruments in predicting discipline failure among enlisted personnel in basic combat training (BCT) and (b) the effectiveness of company-level leaders in reducing discipline failure among persons identified by the tests.

One-third of the trainees in the experiment were treated by an approach designed to help prevent AWOL and other discipline problems; one-third were treated by a similar strategy using an ARI-developed instrument; and the remainder were untreated controls. About 10% of each group was selected for company commander interviews. In the experimental groups, selection was based on test scores; in the control group, selection was random. Criteria of both test and intervention effectiveness were based on official discipline data and research ratings obtained at the end of training.

Although both instruments predicted discipline failure at a statistical level, the ARI instrument was markedly superior. However, neither instrument had sufficient predictive validity to be used operationally. Identifying potential discipline failures had the effect of increasing the

chances that trainees thus identified would experience failure, perhaps the result of scapegoating or self-fulfilling-prophecy mechanisms.

TP 330. Mohr, E. S., & Rumsey, M. G. Cadet Evaluation Battery: A comparison of 1975 male and female scores with one another and with 1971 male scores. September 1978. (AD A061 265)

This study compared male and female performance on the Cadet Evaluation Battery (CEB)--a measure of Army officer potential--and compared male scores achieved in two testing periods 4 years apart. The CEB was administered to 637 male cadets in the second year of the Army Reserve Officers' Training Corps (ROTC) program in 1971 and to 1,035 female and 926 male applicants in the third year of ROTC in 1975.

Cognitive scale scores from the 1971 sample were superior to the cognitive scores for both the male and female 1975 samples, while the noncognitive scores for the 1975 male group exceeded those for the 1971 group on three of the four scales. These results are discussed in terms of changes in the nature of the ROTC population following the end of the draft. Comparisons between male and female scores from the 1975 samples indicated that females tended to perform as competently as males on the cognitive scales; however, male performance was superior on all four noncognitive scales. Discussion of the observed sex differences focuses on the use of all-male samples in the development of the CEB.

TP 331. Rumsey, M. G., & Mohr, E. S. Male and female factors on the Cadet Evaluation Battery. September 1978. (AD A061 788)

To determine current factor structures of male and female responses on the Cadet Evaluation Battery (CEB)--a diagnostic measure of officer potential--the battery was administered to 1,035 females and 926 males applying for enrollment in the third year of the Army Reserve Officers' Training Corps (ROTC) program. Separate factor analyses were conducted on the two CEB tests--the Cadet Evaluation Test (CET) and the Cadet Evaluation Inventory (CEI)--for each sex.

CET male factors differed widely from both female factors and the original CET subscales, whereas CEI male factors were similar to both CEI female factors and the original CEI subscales.

TP 332. Moore, M. V., & Nawrocki, L. H. The educational effectiveness of graphic displays for computer-assisted instruction. September 1978. (AD A062 585)

This report reviews the literature on instructional graphics in terms of the usefulness of graphic displays for computer-assisted instruction. It was concluded that (a) assumptions about the inherent value of graphics for instructional purposes are unsubstantiated by empirical evidence, and (b) the conditions under which the use of graphics may increase instructional effectiveness remain to be determined. Comparisons between alphanumeric and graphic displays and between different graphic representations

suggest that future research should explore the use of graphics as a function of task requirements, subject matter content, and learner characteristics.

TP 333. Vecchiotti, R. A., & Berrey, J. L. (McDonnell Douglas Corporation); Bedarf, E. W. (ARI). Development of resource management materials for the G2 Air officer. September 1978. (AD A061 695)

This report describes the development of resource management materials for the G2 Air officer that could be used for on-the-job training and in intelligence school courses. A handbook was prepared and evaluated for this purpose. A limited evaluation showed that the handbook's features--including a functional task inventory, decision analyses for preplanned and immediate missions, management guidelines, and indexes of functional tasks and key words--were acceptable and usable.

TP 334. Martinek, H. (ARI); Pilette, S. S., & Biggs, B. E. (HRB-Singer, Inc.). Vehicle identification using the acoustic sensor: Training, sensing concepts, and bandwidth. September 1978. (AD A062 601)

Experiments were designed to (a) develop and validate a training program for using the acoustic sensor to identify vehicles in convoy, (b) estimate operator performance in identifying vehicles using the acoustic sensor, and (c) investigate the effect of using different sensing concepts and bandwidths on the operator's ability to identify vehicles.

Following orientation and procedure training, 18 school-trained unattended ground sensor (UGS) operators were tested on their ability to identify vehicles in convoys. Their training used immediate feedback, self-scoring, paired comparisons, and practice. Following this training, operators were retested.

The training package increased operator vehicle identification performance by 46% to 16%, depending on the level of target detail required.

TP 335. Lepkowski, J. R. (System Development Corporation). Image interpreter screening performance as affected by resolution, presentation rate, and scale. September 1978. (AD A064 262)

This study measured performance levels of image interpreters who used both direct and magnified viewing to screen 70mm photographic imagery moving at six rates and varying in scale and resolution. The resolution was varied to simulate imagery obtained with different transmission bandwidths.

Results showed that interpretation of moving 70mm positive photographic imagery for identification of wheeled or tracked vehicles became significantly less accurate with poorer image resolution, faster presentation rate, and reductions in image scale. In general, the poorer the resolution, the lower the screening accuracy scores. Accuracy scores were higher for larger scale imagery than for small-scale imagery of the same resolution. There was little loss of accuracy for presentation rates of 6.0 to 1.5 seconds

per frame for large-scale imagery at all levels of resolution and rates of 6.0 to 2.0 seconds per frame for small-scale imagery. At faster rates, accuracy decreased as rates increased. Doubling the size of the image without changing resolution or scale did not increase accuracy.

TP 336. Griffith, D., & Actkinson, T. R. Mnemonic enhancement and general technical ability. September 1978. (AD A061 314)

The experiment described in this report was the first of several studies to examine techniques to enhance human memory abilities. Researchers evaluated the usefulness of a simple pegword mnemonic for Army enlisted personnel representing three levels of general technical (GT) ability. Twenty-four persons were sampled from each group; half in each group were told how to use a rhyme pegword mnemonic. All persons learned three lists of digit-noun associations, and the digits 1 through 10 were used as the cues for all lists. One list had low imagery values, one had intermediate values, and one had high values.

At the end of the experiment, participants attempted to recall all three lists. It was found that initial acquisition of the lists was a positive function of the imagery level of the response items as well as a positive function of the GT level of the participants. Also, only the high GT group (GT ≥ 110) was able to use the mnemonic to advantage. The final recall test indicated a precipitous loss of information across lists for all conditions.

TP 337. Turney, J. R., & Cohen, S. L. Perceived work effort as time devoted to an activity. September 1978. (AD A062 411)

This research explored the extent to which self-estimates of effort expended on work activities are related to actual time spent. Self-estimates of time spent on specific activities were collected from 31 soldiers in an information processing facility. At the same time, a computer recorded the amount of time actually spent on each activity.

Analysis of the data revealed that the perceptual measures of effort correlated significantly with actual durations across different activities and different measures of time. On the average, time accounted for 25% of the variance in effort.

TP 338. Hiett, R. L., McBride, R. S., & Fiman, B. G. (Human Sciences Research, Inc.); Thomas, J. A., O'Mara, F. E., & Sevilla, E. (ARI). The Racial Attitudes and Perceptions Survey (RAPS). September 1978. (AD A064 263)

The Racial Attitudes and Perceptions Survey (RAPS) was developed to obtain information from black and white military personnel about their racial attitudes and perceptions. This instrument also obtained reports of the frequencies of specific discriminatory behaviors and associated tension levels. RAPS was evaluated in terms of its construct validity and reliability. Attitudes and perceptions were measured by four scales:

(a) Perceived Discrimination Against Blacks; (b) Attitude Toward Racial Interaction; (c) Feelings of Reverse Racism, and (d) Racial Climate.

Evidence indicated that the instrument provided valid measures; reliability estimates were satisfactory. Analysis across demographic variables showed several variables to be related to RAPS results, with race the most important. Results were that (a) blacks perceived more racial discrimination than whites, (b) both blacks and whites favored racial interactions, and (c) more whites than blacks felt the racial climate in the military was favorable.

TP 339. Hiett, R. L., Fiman, B. G., & McBride, R. S. (Human Sciences Research, Inc.); Thomas, J. A., & Sevilla, E. (ARI). The utility of the Racial Attitudes and Perceptions Survey (RAPS) for assessing impact of race relations training programs in the military. September 1978. (AD A062 246)

The Racial Attitudes and Perceptions Survey (RAPS) was administered to approximately 10,000 military personnel in the Army, Air Force, Navy, and Marine Corps in a variety of research designs to assess its utility for measuring the impact of race relations training.

The effect of training on RAPS scores varied considerably. Some courses showed no effects; others affected only one or two areas. Overall: (a) Race relations training had an impact on attitudes and perceptions as measured by the RAPS. (b) In general, this impact was very small when defined in terms of actual change on RAPS scale scores. (c) Changes resulting from training tended to be higher scores on the Perceived Discrimination Against Blacks scale, higher scores on the Attitude Toward Racial Interaction scale, and lower scores on the Feelings of Reverse Racism scale. There was no clearly defined direction for scores in the Racial Climate scale. (d) Trained respondents scored higher on content-type questions than did untrained respondents. (e) Those who received training said that it was valuable, that the quality of training was good, and that they were more highly motivated to eliminate discrimination. (f) Race relations course instructors appeared to have diverse goals and opinions about the best targets for training efforts.

TP 340. O'Mara, F. E., & Tierney, W. RAPS 2--An abridged version of the Racial Attitudes and Perceptions Survey. September 1978. (AD A064 256)

Efforts to make the Racial Attitudes and Perceptions Survey (RAPS) a more efficient and useful management tool for monitoring racial climate in Army units included an abridgment of the RAPS. The abridgment significantly reduced the time and manpower required to administer the RAPS and to analyze resultant data.

A subset of items was selected from the RAPS to minimize number of items used. The validity of the abridged scales was determined by calculating the correlation between subjects' scores on both scales for each of two samples drawn from different Army installations at different times.

The reliability of the abridged instrument was determined by calculating each subscale's coefficient alpha.

There was high agreement between the scores obtained with the abridged RAPS and those obtained with the original version. The internal consistency measures for the abridged scales were lower than those for the full scales. However, the pattern of results indicated that this result may be largely due to sample differences or to the "aging" of the RAPS rather than to any psychometric deficiency in the abridged scales.

TP 341. Duffy, P. J., Shiflett, S., & Downey, R. G. Replication and extension of Collins' locus of control scale. September 1978. (AD A062 449)

The research reported here investigated specific relationships of leadership style and group effectiveness with a person's beliefs about locus of control (that is, whether a person believes events and rewards are controlled primarily by external environmental factors or internal personal factors). Collins had adapted Rotter's Internal External (I-E) scale into a 46-item Likert-scale questionnaire. Then, from college students' responses, he distinguished four dimensions within the I-E scale: beliefs that the world is predictable or unpredictable, just or unjust, politically responsive or unresponsive, and easy or difficult. ARI research replicated Collins' work and investigated its applicability in a military setting. Data were collected from 275 Army reservists. Responses to the 46-item scale were factor analyzed and compared to Collins' results and to results of other measures.

Results strongly supported earlier research findings about the multidimensionality of locus of control beliefs. Also, correlations between these scales and other personality and work-related variables indicated that Collins' I-E scales and subscales are based on sound and useful concepts and can be moderately useful in understanding reward expectations of soldiers and in improving effectiveness of military units.

TP 350. Eaton, N. K., & Neff, J. P. The effects of tank crew turbulence on tank gunnery performance. September 1978. (AD A061 178)

This research sought specific data on the relationship of tank crew personnel turnover (i.e., turbulence) to performance. In Phase 1, a questionnaire developed to measure and evaluate existing crew turbulence was administered to crews of five armor battalions during tank gunnery training. Responses from 211 crews were correlated with gunnery qualification Table VIII scores to determine the relationship between various crew turbulence variables and gunnery performance. Phase II investigated, with four groups of 11 crews each, the effects of artificially created crew turbulence on Table VIII performance. Group 1 was the control group and consisted of complete crews who had just finished Table VIII for record. Group 2 comprised crewmen who were assigned to different crews and different tanks. In Group 3, gunners acted as tank commanders and aders acted as gunners, and they were assigned to different crews and different tanks. In the fourth group, nonarmor personnel who had received 3 days of special training acted as gunners and loaders.

In Phase I, results showed that the experience of both tank commanders and gunners in their positions was significantly related to gunnery performance. More experienced tank commanders had shorter opening times, and more experienced gunners had more main hits; the longer the two had trained together, the shorter their opening times. In Phase II, the first two groups performed equally well, indicating that unfamiliar crews did not make a difference. Group 3 performed more poorly than did Groups 1 or 2, indicating the importance of familiarity with duties. Groups 1 and 4 also performed equally well, indicating that nonarmor personnel who receive brief intensive training can perform successfully.

Research Problem Reviews

RPR 77-3. Bolin, S. F., & Cowings, J. S. (ARI); Johns, L. A. (U.S. Army Medical Command). Women soldiers in Korea: Command concerns about pregnancy, facilities, and other issues. November 1977. (AD A076 694)

Two questionnaire surveys on acceptance of women in the Eighth U.S. Army in Korea had revealed general satisfaction among troops and general acceptance of women soldiers by their commanders. This report examined one aspect of the surveys, the special priority concerns of commanders of units employing women soldiers.

Responses to the surveys included volunteered descriptions of problems encountered by commanders whose units included women soldiers. Mutually exclusive categories of command concerns were developed by sorting the comments of 108 commanders by successive priority. Priority one was pregnancy, two was facilities for women, three was any other problem. Almost half of the commanders did not mention problems. Priority concerns were analyzed as a joint function of the numbers and percentages of women in a commander's unit.

The commanders with the most women in their units were most often concerned about pregnancy, and commanders with fewest women were most often concerned about providing separate facilities. Commanders of units showing mixed numbers and percentages of women were most often concerned with other problems such as sick call, strength, isolated duty, dependents, and stereotyped sex-role behavior.

Results suggest that changing the pregnancy policy and keeping the percentage of women in a unit between 5% and 16% may alleviate the commanders' priority concerns.

RPR 77-9. Knerr, C. S., Barton, H. D., & Lombardo, J. F., Jr. Evaluation instruments for the Basic Noncommissioned Officer Course for combat arms soldiers. February 1978. (AD A076 700)

ARI prepared this evaluation program and questionnaire for a pilot Basic Noncommissioned Officer Course in the combat arms (BNCOC/CA). Tests identify tasks on which the soldier needs training, tasks on which the soldier qualifies to train peers, and task-performance score forms to

record MOS-specific training data. BNCOC/CA integrates programs of instruction from Infantry, Armor, Engineer, Field Artillery, and Air Defense service schools, teaches soldiers performance training, shows them their deficiencies in critical MOS tasks as squad leaders, and trains them in those tasks.

The pilot course ran at Fort Hood, Tex., in late 1976. The Army Training and Doctrine Command (TRADOC) and the service schools evaluated the program. The revised program was implemented worldwide in 1977.

RPR 77-10. Bynum, J. A. Suitability evaluation of the Fort Benning NOE trainer. February 1978. (AD A076 701)

To improve the teaching of nap-of-the-earth (NOE) navigation techniques in unit training, ARI evaluated a prototype NOE training device developed at Fort Benning, Ga., for possible use at the Army Aviation Center, Fort Rucker, Ala. At Fort Rucker, 44 NOE-qualified instructor pilots tried the device and evaluated its potential training effectiveness on a 24-item, 8-point scale. The scale covered familiarizing pilot and copilot with NOE procedures and techniques, preflight navigation, realism, minimizing flying hours, terrain interpretation, and intercrew coordination.

The pilots rated the training device low on each item of the scale and did not think the device could be used to teach map interpretation and terrain analysis. Cost-effective development of the device was not indicated by the findings.

RPR 77-11. Harris, W. A. Human factors aspects of the SB-3614 switchboard. December 1977. (AD A076 702)

This test evaluated the human engineering, training, and logistical support implications of the SB-3614 automatic switchboard on the division telephone communications system at different command levels and within the Corps Command Operation Center. Switchboard users were interviewed on five aspects of the SB-3614: switchboard and converter covers, switchboard and converter fronts, switchboard inside front, switchboard and converter backs, and switchboard operation. Respondents rated covers, controls, and operation favorably but noted many design failures and maintenance and operating procedure problems. The findings contributed to further development of the SB-3614.

RPR 77-12. Cory, B. H., Medland, F. F., Hicks, J. M., & Castelnovo, A. E. (ARI); Weldon, J. I., Jr. (U.S. Army); Hoffer, G. L. (Psychological Corporation); Myers, R. A. (Columbia University). Army officer career development. Proceedings of panel presented at the American Personnel and Guidance Association, Chicago, Ill., April 1976. December 1977. (AD A076 703)

An overview of Army research on career systems was followed by papers and discussion on career progression lattices, a career commitment model focusing on ROTC, the ROTC career orientation process itself, the theory

of career strategies, and concluding remarks on all of the topics. The review summarizes research in officer career counseling and career development.

RPR 77-13. Hughes, R. G. Factors affecting efficiency of boresighting and zeroing performances in the M60A1 tank. November 1977. (AD A076 704)

As part of the Armor School's training effectiveness analysis of the M60A1 tank, this report examined training efficiency of boresighting (visually aligning gun tube and sight) and zeroing (correcting the aiming point by observation of actual hits) by measuring the number of rounds used to zero the tank main gun. Thirty-four tank crews answered a gunnery knowledge and experience questionnaire and a performance outcome survey. Data collectors observed and recorded the boresighting and zeroing exercises and results.

The crews averaged 6.36 rounds to zero the gun, including the warm-up round. Fewer than 60% hit the target panel on the first round after warm-up, and only 75% of all rounds hit the panel. Data collectors noted few errors during the exercises, but reported that only about half of the commanders verified crewmen's boresighting alignments. Two-thirds of the crews did not know their tank's established zero, and none used it. Although they made no major procedural errors during the exercises, 70% of the crews missed over half of the knowledge items on the questionnaires. Responses showed failure to differentiate procedurally between boresighting and zeroing and their respective functions. Neither gun tube life nor crew experience was related to performance. The report recommends use of a larger target panel and training emphasis on the separate functions of boresighting and zeroing.

RPR 77-14. Oliver, L. W., & Day, R. W. Field tryout of the Army Officer Career Information & Planning System. December 1977. (AD A076 705)

The purpose of this field tryout was to assess operating difficulties of a computer-aided Officer Career Information and Planning System (OCIPS) in a realistic setting, and to obtain initial reactions on the system's acceptability and usefulness from a small sample of the officers for whom the system was designed.

Fifty-two lieutenants and captains answered a pretest questionnaire about their career goals, alternate specialty preferences, and sources of career information. Each officer then used three OCIPS modules at a computer terminal: FORESIGHT, principles of career planning; OVERVIEW, general information on the Army officer career structure; and ALTERNATE, a data bank of information on preferences, education, and other characteristics of officers in primary and alternate specialties. A posttest questionnaire recorded participants' reactions to the system.

In general, officers reported a strong need for career information; found the three modules interesting, useful, understandable, and accurate; and favored the use of the computer to present career information. Favorable results in the tryout encourage continuing research on other aspects of OCIPS.

RPR 77-15. Mietus, J. R., & Helme, W. H. An evaluation system for Army ROTC Advanced Summer Camp. March 1978. (AD A089 816)

The Army's Advanced ROTC Summer Camp evaluation system assesses a cadet's military skills, knowledge, and performance, providing data for Army selection and assignment. Decisions in cadet evaluation must consider what should be measured, and where and how to measure it. Research indicates that leadership performance can be measured as "hard skills" (cognitive performance) and "soft skills" (noncognitive performance). Hard skills such as reading a map have specific right or wrong responses. Soft skills involve value judgments and appropriate ways of acting, such as shouting an order or quietly making a request. Not only are an ROTC cadet's career intentions assessed in Advanced Camp, but a cadet's ability to cope with the stresses of the camp's military field environment is a good indicator of future success as an officer.

Appropriate evaluation methods are: (a) objective performance or performance-based tests to assess hard skills, (b) querying the cadet to learn career intentions, and (c) judgmental ratings by staff cadre and by fellow cadets to assess soft-skill leadership performance and to record inferences about leadership potential. Cadre ratings may be made on overall performance or specific situations. Peer ratings, properly guarded against bias, also provide valid measures of leadership effectiveness. Many of the specific evaluation measures suggested in this report have been incorporated into the ROTC Advanced Summer Camp evaluation system.

RPR 77-16. Harris, W. A. Human factors and training implications of advanced-concept cargo vehicles. February 1978. (AD A076 706)

This report describes human factors research and driver training implications of specific high mobility vehicles. ARI administered two questionnaires to drivers of three types of vehicles: the Lockheed Twister *Dragon Wagon*, the M813 5-ton truck, and the M520 GOER truck. Noise-level data for these trucks and for the M650 cargo truck were obtained by the MASSTER Engineering and Instrumentation Directorate.

The Dragon Wagon was significantly superior to the 5-ton and GOER on 16 of 26 human factors items, and markedly superior to these trucks and the M656 on noise-level tests. Dragon Wagon driver training was judged sufficient in 9 out of 14 areas by four or more of six drivers in the test. In five areas, three or more drivers felt additional training would be useful. The findings support MASSTER Test FM 265A and contribute to Army mobility programs.

RPR 77-17. Kristiansen, D. M. Attitudes toward the Army among basic trainees: 1970 versus 1974. March 1978. (AD A076 707)

This research assessed attitudes toward the Army held by all-volunteer basic trainees in 1974. It compared their attitudes to those of a mixed sample of volunteers and draftees in 1970, compared attitudes of both groups before and after Basic Combat Training (BCT), and assessed differences in attitudes held by cadre and enlisted trainees in 1974.

In 1974, a 53-item questionnaire was administered to trainees at Fort Knox, Ky., before and after BCT. Most of the attitude items had been used for a 1970 survey of basic trainees at Fort Knox. A parallel questionnaire was administered to BCT enlisted cadre in 1974. Pre- and post-BCT attitudes of trainees in the 1974 sample were compared to the 1970 results and to the cadre results.

The 1974 trainees held more favorable pre- and post-BCT attitudes than did the 1970 trainees toward military service, Army organizational efficiency, importance of the Army, military discipline, quality of training, leadership, and the Army's concern for the individual soldier. Morale was also higher in the 1974 sample. 1970 and 1974 samples did not differ in the amount of race prejudice trainees perceived in the Army. Neither group showed significant attitude changes from pre- to post-BCT. Most of the 1974 trainees had enlisted because they could not find good jobs or wanted job training or additional education. The 1974 trainees considered Army organizational efficiency and training quality better than did cadre. Overall, trainees held more positive attitudes than did cadre. The report discusses trainee characteristics that may explain the findings.

RPR 78-1. Palmer, R. L. Attitudes toward the Army's recently tested "direct logistic support" concept and the associated maxim "Tell it like it is!" August 1978. (AD A076 708)

This research assessed attitudes of Development and Readiness Command (DARCOM) Logistic Assistance Activity (DLAA) personnel and their customers, or users, toward aspects of the concept "Direct Logistic Support" (DLS) and the probable impact of these attitudes on implementing DLS concepts. Especially important was whether DLAA personnel could be frank about logistic deficiencies of user units (as prescribed by DLS) and still be able to maintain rapport and cooperation for delivering necessary support to the field.

A questionnaire was given to DLAA personnel and users in 1977 at Fort Hood, Tex. Questions covered training, communications, DLAA assessment, customer relations, job satisfaction and security, and unit readiness. Answers were analyzed separately for (a) Logistics Management Specialists (LMS), Logistics NCOs, and DLAA chiefs ("LMS group"); (b) personnel, primarily Field Maintenance Technicians, from DARCOM Material Readiness Commands ("MRC reps"); (c) a representative cross-section of DLAA users ("users"); (d) all DLAA personnel; and (e) the entire subject sample.

Results were as follows: LMS group responses and users' responses were about the same--45% were favorable to DLS, about 25% were neutral, and about 30% were negative; MRC reps' responses were 24% favorable, 30% neutral, and 46% negative. (Views of the first two groups were considered compatible with implementing DLS concepts, and views of the third group were considered incompatible.) Less than 10% of DLAA personnel believed that they could be frank about deficiencies and maintain satisfactory working relations with users. The LMS group and the MRC reps were somewhat unwilling to be frank. Users thought that working relations would not be seriously endangered by DLS concept implementation; however, users are less informed than DLAA personnel.

RPR 78-2. Bell, D. B. Characteristics of participants in the DOD Special Discharge Review Program. March 1978. (AD A076 709)

This study of the Department of Defense (DOD) Special Discharge Review Program (SDRP) analyzed characteristics of participants from the Vietnam Era. The eligibles, both General Discharge (GD) and Undesirable Discharge (UD) soldiers, were contrasted with soldiers who had received Honorable Discharges (HDs); program participants were contrasted with GDs and UDs who had not participated.

DOD loss files were searched to provide the sample. One limitation of the study was that only automated files, beginning in July 1970, could be searched; the sample is representative only to the extent that persons separated after July 1970 are representative of the era.

Analysis showed that eligibles were less educated, lower in mental ability, and younger than HDs. Of SDRP participants, GDs served longer, rose to higher grades, and were younger than eligibles in general. UD participants served longer, rose to higher grades, and were older than eligibles in general and participated at a much higher rate than GDs. On other measures, the participants were representative of the group from which they came. Thus SDRP seemed to attract the kinds of persons it was intended to serve.

RPR 78-3. Van Nostrand, S. J. (ARI); Wallis, M. R. (Richard A. Gibboney Associates, Inc.). General officers' views on continuing education/ updating program for general officers. April 1978. (AD A083 988)

This report is a nonevaluative summary of the comments of 50 general officers interviewed for their opinions on a continuing education/update training program for general officers.

The respondents said they needed additional training in specific areas such as resource, installation, and financial management, and needed updating in areas subject to rapid technology change or which require special skills. The generals preferred seminars or one-to-one sessions with subject experts to briefings and classrooms.

Generals also spoke about their concerns and problems, such as insufficient time to prepare for their work and poor assignment of persons to tasks. Several respondents thought training programs could be insulting or ego-damaging. All respondents wanted to be a part of the Chief of Staff's (GSA) management team. The generals also offered specific suggestions for improved program support from and communications with GSA.

RPR 78-4. Griffith, D. An overview of the One Station Unit Training (OSUT) attitudinal surveys. August 1978. (AD A076 710)

As part of the Training and Doctrine Command (TRADOC) test of the feasibility of replacing the 16- to 17-week Basic Combat Training (BCT)/ Advanced Individual Training (AIT) program with a 12- to 15-week One Station Unit Training (OSUT) program, ARI surveyed the attitudes of trainees graduating from both programs.

Six Military Occupational Specialties (MOS) were identified for testing at six sites. At each installation, trainees who had completed BCT, AIT, or OSUT were administered a 53-item questionnaire assessing attitudes in the following categories: background, training intensity, ancillary training, morale, reenlistment, and opinion of OSUT. Two comparisons were of primary interest: BCT versus AIT and AIT versus OSUT. Items were analyzed individually, chi-square tests were used to determine statistically significant response patterns, and subjective assessments were made of the significant differences.

Only two consistent findings emerged: BCT was uniformly perceived as more intense than AIT, and BCT respondents tended to perceive their cadre more favorably than did the AIT respondents. Although none of the data seem to suggest that OSUT should not be used, the lack of response commonality indicates that decisions on OSUT use should be made on an MOS-by-MOS basis.

RPR 78-5. Knerr, C. S., & Hamill, B. W. (ARI); Severino, A. A. (U.S. Army). Engagement simulation for armored cavalry: initial test. August 1978. (AD A076 711)

Engagement simulation (ES) training techniques provide realistic tactical training under conditions that simulate the complex modern battlefield. This paper reports the development of an ES training system for armored cavalry. The training builds on the successful techniques of SCOPES (Squad Combat Operations Exercise, Simulated) for infantry training and REALTRAIN for combined arms elements, but also simulates reconnaissance and includes mortar in the training.

Forms and note cards were used to record information during the exercises, and questionnaires recorded opinions on procedure, simulators, and training value. Results of the field tests showed that target reports and confirmations and reconnaissance reports had problems, and, in general, controllers were taxed by their combined command, administrative, and reporting requirements. Subjective reports on the exercises, however, showed favorable attitudes to the training and that some learning had occurred.

These initial tests revealed several modifications desirable for the controller optics, signature simulators, and mortar controller procedures. Further testing will emphasize reconnaissance, limited engagements, and performance measures appropriate for training effectiveness analysis.

RPR 78-6. Angle, D. C. The correlates of AWOL: 30 years of research into the problem of AWOL in the U.S. Army. August 1978. (AD A076 712)

This report summarizes a literature review on absence without official leave (AWOL) in the Army from 1941 to 1975. Sources were official military and government documents and data, military-sponsored research, and civilian psychological and sociological research.

The search showed deficiencies in many of the studies: lack of specification of the model to be tested, absence of an underlying theory, and

failure to include important variables. In addition, most studies examined AWOL from the criminological viewpoint, although AWOL is not a crime in any other segment of the national work force. Some studies correlated soldiers' personal characteristics and preservice background with AWOL behavior, but not consistently enough to predict delinquency. AWOL behavior appears to be a function of a person's response to given situations, not of military life itself, and is likely to be repeated in spite of punishment.

RPR 78-7. Tierney, T. J., Jr., & Cartner, J. A. Basic Rifle Marksmanship Test: Cadre pretest and posttest attitudes. August 1978. (AD A076 713)

The purpose of the study was to determine attitudes of a cadre toward each of four programs of instruction (POI) used in the Basic Rifle Marksmanship (BRM) Test.

Pretest and posttest questionnaires were given to 59 male officers and noncommissioned officers (NCOs) from the BRM committee group at Fort Jackson, S.C. The group was responsible for BRM training at the site. Items requested background information and asked about program effectiveness, the cadre's confidence in trainees' performance, and other training topics. Additionally, representatives of company cadres (male and female officers and drill sergeants) from each test company participated in structured group interviews at the end of the test.

The data showed that the cadre has a consistent pattern of strong feelings against reducing instructional hours or rounds of BRM training. The review also discusses instructional problems in marksmanship fundamentals and feedback procedures.

RPR 78-8. Harman, J. Evaluation of the Beseler Cue/See as a substitute for the L-W Analyst projector for MITAC II. August 1978. (AD A076 714)

This study evaluated an 8mm projector, the Beseler Cue/See, for use in the aviation training Map Interpretation and Terrain Analysis Course (MITAC).

Twenty-two student navigators traced filmed nap-of-the-earth (NOE) flight routes on corresponding tactical maps. Half the students viewed the films on the Beseler Cue/See and half viewed them on the 16mm projector used for MITAC training. The item measured for both groups was the total deviation in meters between their traced routes and the actual flight routes.

No significant difference in performance was found between the two groups. Therefore, the Beseler Cue/See would probably be as effective a training device as the 16mm projector. Because the Beseler Cue/See is convenient and is available in many installations where MITAC training is expected to start, this projector should be substituted for the 16mm projector for MITAC training.

RPR 78-9. Harris, W. A. Judgmental comparisons among cargo trucks and among tractor-trailers. August 1978. (AD A076 715)

This research assessed the comparative suitability of (a) four cargo trucks and (b) three tractor-trailers for selected uses, and suggested additional uses for both types of vehicles.

Judges were officers in the Modern Army Selected Systems Test Evaluation and Review (MASSTER) program, now called the Training and Doctrine Command (TRADOC) Combined Arms Test Activity (TCATA). The judges ranked each vehicle according to preference for use in accomplishing specific tasks and suggested possible additional tasks for the vehicles. The cargo trucks were the Lockheed Dragon Wagon (DW), the Caterpillar GOER, the M813 5-ton truck, and the M656 5-ton truck. The tractor-trailers were the DW in tractor-trailer configuration, the GOER Flatbed, and the M818 tractor with M127 semitrailer.

Judges ranked the DW and the M656 equally in 13 out of 20 tasks. Both were preferred to the M813 and the GOER, which were also equally ranked. The DW, M656, and M813 were equally ranked for the other 7 tasks. All three vehicles were preferred to the GOER. The judges suggested five additional uses for the cargo trucks. All three tractor-trailers were equally ranked in 9 out of 10 tasks. The judges suggest three additional uses for these vehicles.

RPR 78-10. Harris, W. A., & Palmer, R. L. Attitudes of gunners and team leaders toward the DRAGON weapon system. August 1978. (AD A076 716)

The purpose of this study was to conduct a field evaluation of the DRAGON weapon system and training through surveying user troops and their leaders, especially regarding what contributed to an alleged negative attitude toward the system on the part of previous users.

Attitude questionnaires were given to 39 gunners and 29 leaders participating in DRAGON Operational Test III. Questionnaires were administered to all subjects twice, after the field-training exercise subtest and after the live-fire subtest. Gunners' and leaders' responses were compared within and across the two tests, and the responses of two experimental groups and one control group of gunners with varying amounts of firing experience were compared.

Generally, gunners did not change their attitudes toward the DRAGON system after acquiring more experience in firing it. Gunners and leaders tended to agree about most of the system. The actual firing of inert rounds was considered the most beneficial part of the training. A majority of gunners and of leaders believed that leaders should be trained in simulated firing. Leaders suggested that platoons should have three DRAGON teams with two gunners and two assistant gunners each. Respondents had high confidence in the accuracy, reliability, and lethality of the system. However, DRAGON gunners may often be easily detected by the enemy because of the weight, bulkiness, and awkwardness of the round and tracker components and the firing signature. Finally, respondents thought that fire commands were not needed or were needed only occasionally.

RPR 78-11. Earl, W. K. (Operations Research Associates). Net assessment of tank crew training: An analysis of company tank crew gunnery scores. August 1978. (AD A077 560)

This research provided a data base on initial tank crew training and analyzed that data base for information on differences in gunnery performance as a function of company effects when training was held constant. This research was required as input to the Training and Doctrine Command report Net Assessment of U.S. and Soviet Tank Crew Training.

Tank crews of three companies received a standardized gunnery training program. Table VIII gunnery data for the crews were collected. Main-gun scores of the three companies were compared for day and night firings and for number of hits and firing times.

Companies differed significantly ($p < .01$) from each other in mean number of targets hit by tank crews on Table VIII qualification firings and differed significantly ($p < .001$) from each other in tank crew mean firing times on Table VIII qualification firings. Since training was standardized and held constant across companies, these significant differences in mean performance must be a function of company effects.

RPR 78-12. Earl, W. K. (Operations Research Associates). Net assessment of tank crew training: An analysis of key questions from the officer's survey, tank crew survey, and training subjects/facilities examination. August 1978. (AD A076 717)

This research analyzed tank crew training data from (a) an officers' questionnaire, (b) a tank crewmen's questionnaire, and (c) a review of training subjects and facilities in order to make comparisons across selected problem areas. The project was required for input into a Training and Doctrine Command report, Net Assessment of U.S. and Soviet Tank Crew Training.

The officers and tank crewmen of an M60A1 tank battalion were administered questionnaires about their training program. A review was then conducted of the battalion's training program and facilities. The data were tabulated and analyzed by subject, data source, and subject area.

The results showed three problem areas. First, turbulence within tank crews and special-duty assignments during training seriously degraded training proficiency. Second, tank maintenance and repair were made more difficult by a shortage of trained mechanics and difficulty in obtaining spare parts. Third, training facilities, especially maneuver ranges and gunnery ranges, could not meet the demands for use.

RPR 78-13. Earl, W. K. (Operations Research Associates). Tank gunnery analysis for developing a tank crew training data base. August 1978. (AD A 083 971)

The two purposes of this study were to (a) provide a tank crew training data base from at least 10 tank battalions and (b) analyze the data base and identify some variables affecting gunnery performance. The research

was required for input into a Training and Document Command report, Net Assessment of U.S. and Soviet Tank Crew Training.

Table VIII gunnery data were collected from 15 tank battalions, eight from the U.S. Army, Europe (USAREUR) and seven from the continental United States (CONUS). Main-gun scores were analyzed for both day and night firings and for number of hits and firing times.

The results showed that Table VIII data from USAREUR appeared both more valid and more reliable than the data from CONUS. Both crews fired more accurately at middle ranges (approximately 1,000 m to 1,800 m) than in first-round firing at short ranges (600 m to 1,000 m). There was no practical difference in main-gun accuracy between day and night firing. There was no difference in first-round accuracy between precision and battlesight engagement methods in the battlesight range (600 m to 1,800 m). Little difference occurred in first-round accuracy and firing time between stationary and moving targets. Finally, no strong linear correlation existed between first-round accuracy and firing time.

RPR 78-14. Smutz, E. R. Human factors evaluation of a heliborne electronic warfare system (AN/ALQ-151, QUICK FIX). August 1978. (AD A076 718)

The purpose of the research was to identify man-machine interface problems that pose possible hazards to system operators and reduce system effectiveness. This report suggests changes to alleviate these problems. It supplements the test report on the Training and Document Command (TRADOC) Combined Army Test Activity (TCATA) Operational Test 174.

Questionnaires and interviews, measurements of hardware, and experiments were used to collect data on hardware components, workspace and equipment configuration, environment, safety, operating procedures, and training. Data analysis determined whether operators had problems with the system and whether the hardware design met military specifications. Problems were analyzed and discussed with operators and pilots.

The report recommends modifications of some interface components to improve system effectiveness. First, the equipment configuration for the direction-finding and the countermeasures positions should be modified. Second, the equipment configuration for pilot positions should be modified to improve safety and system effectiveness. Third, environmental problems to be considered include aircraft ventilation and the degradation of night vision. Finally, several changes in system operating procedures and in training programs are recommended.

RPR 78-15. Actkinson, T. R. Problems in organizational level maintenance on the M60A1 and M48A5 tanks. August 1978. (AD A076 719)

This research identified problems in the maintenance of the M60A1 and M48A5 tanks.

Twelve organizational level mechanics who used the Baseline Armor Reliability Test (BART) were interviewed, using an open-ended questionnaire,

to identify possible problem areas for both types of tanks. Two further steps were taken to determine whether these data could be generalized to other units: organizational-level mechanics working on the M60A1 were individually interviewed; and a similar sample of mechanics working on the M48A5 were sent the same 9-item, open-ended questionnaire.

Items most difficult to maintain were thought to be the generator, the brake system, final drives, and add-on stabilization. Cannon plugs were hard to remove. M48A5 mechanics answering the questionnaire said rust caused sticky throttles. Procedural and administrative problems related to maintenance (discussed in the report) have caused large, unnecessary personnel and materiel costs.

RPR 78-16. Earl, W. K. Training evaluation of the Individual Staff User ADP Training Program in TCATA Test FM 222 Tactical Operations System (TOS) concept test. September 1978. (AD A076 650)

The Tactical Operations System (TOS) concept uses computers to improve the speed and accuracy of tactical command and control decisions. This test of the TOS concept compared a manual system and a computer system, the TOS Operable Segment (TOS^2), in a series of command post exercises designed to assess the training program.

Test participants from division, brigade, and battalion staffs participated in 4-hour daily exercises for 5 weeks. Measures of operator performance in processing intelligence data were obtained by tests at the end of training; demographic and opinion data were obtained throughout the program. Descriptive and inferential statistical tests were used to analyze the data.

The effectiveness of the training program was degraded by (a) insufficient total training hours, (b) the use of 4-hour rather than 8-hour daily training sessions, (c) the compressed training schedule, and (d) assignment of trainees to both classroom and unit duties. Analysis suggested that better results would be obtained from trainees with previous related experience and high aptitude scores in general technical, combat, and surveillance and communications areas, operating in a more intensive hands-on training program.

RPR 78-17. Tremble, T. R., Jr., & Finley, D. L. Task validation for the AN/TPQ-36 radar system. September 1978. (AD A076 720)

The U.S. Army Field Artillery School (USAFAS) had developed training programs for the operators and mechanics of the AN/TPQ-36 radar, a highly mobile radar for automatically locating mortar and other high-angle weapons and short-range rockets. This report presents findings on the accuracy and completeness of operations and maintenance personnel task descriptions and on the suitability of the 26B Military Occupational Specialty (MOS) for system maintenance.

The validation test consisted of analysis and revision of original task descriptions based on operator training course data, a maintenance demonstration, interviews with development test and training course

participants, and evaluation of revised descriptions through performance observation and personnel survey.

The revised task descriptions are not satisfactory, although operator task descriptions are more definitive than maintenance task descriptions. Evidence on the suitability of the 26B MOS for AN/TPQ-36 maintenance was limited and did not support a conclusion. The report specifies needed changes in the task descriptions.

RPR 78-18. Earl, W. K. Basic Initial Entry Training (BIET) test attitude survey. September 1978. (AD A076 651)

To determine the feasibility of administering basic training to men and women using the same course of instruction and performance standards, ARI surveyed male and female trainees and cadre at Fort Jackson, S.C., on their attitudes toward Basic Initial Entry Training (BIET). Test participants were administered pretest and posttest questionnaires assessing attitudes on the following topics: personal factors, differences between male and female respondents, ideas about the Army, female problems, mixed cadre, BIET subject difficulty, BIET testing criteria for male and female trainees, and quality of BIET conditions and topics. Nonparametric statistical tests were used to determine if differences in male versus female and pretest versus posttest responses were statistically significant.

The test showed that female trainees entered BIET in poorer physical condition than men, were not capable of passing the physical fitness test at the end of training, and needed more training time than men in five courses. Problems with training cycle length and test adequacy were reported by trainees and cadre. The findings support revision of BIET to improve female trainees' performance.

RPR 78-19. Thomas, J. A. (ARI); McNeill, J. L., Laszlo, J. P., et al. (Race Relations Consulting, Inc.). An approach to improving the effectiveness of Army commanders in multi-ethnic settings. September 1978. (AD A076 652)

ARI developed a 36-hour experimental training program, based on interviews with commanders and enlisted soldiers, to improve commanders' effectiveness in handling race-related problems. Field tryouts with groups of commanders at two locations used different teaching methods to present the curriculum. One tryout used persuasion, and the other used rational inquiry. The training curriculum was evaluated by classroom observation and analysis of questionnaire responses.

Neither teaching method was consistently superior across all instructional objectives and groups. Observation indicated that organizational constraints such as absence of incentives and weak command support will operate against race relations programs. The questionnaire responses showed 80% to 87% of the commanders found the program objectives relevant, and 61% felt they had learned or changed some opinions because of the course.

RPR 78-20. Laszlo, J. P., & McNeill, J. L. (Race Relations Consulting, Inc.); Hart, R. J., & Thomas, J. A. (ARI). Racial harmony training for company commanders: A preliminary evaluation. September 1978. (AD A076 653)

This report discusses the development and evaluation of a 3-day race relations training course for company commanders. Training was presented to 19 company commanders; 17 other commanders were assigned to a control group. Immediately after training, both groups completed tests measuring race relations knowledge and skills; 45 days later, enlisted soldiers, key subordinates, and the experimental and control groups completed surveys that evaluated the commander and the unit in race relations.

Analysis of results showed that commanders in the training program demonstrated greater knowledge of the facts, methods, and skills needed to work with interpersonal relations and interracial issues in a military unit than did commanders in the control group. Conclusions on the program from this test are limited because of nonrandom assignment of commanders to experimental and control groups, but further testing showed the program had a modest but positive effect on the enlisted soldier.

RPR 78-27. Macpherson, D. H., Eastman, R. F., & Yates, L. G. Career counseling attitudes and opinions of Army officers. September 1978. (AD A076 659)

This research asked Army officers for their opinions on existing and proposed career information and counseling systems. A questionnaire, supplemented by interviews, was given to 615 officers at four Army posts in 1972. Participants were chosen from a range of rank, branch, and type of assignment; 50% were from the combat arms.

Results were consistent with earlier Army investigations. Officers were critical of current counseling/assignment systems and generally wanted more counseling at critical career decision points. They preferred personal counseling but considered a computer-aided system acceptable for obtaining specific data on potential assignments. Interview responses showed that officers who received inadequate counseling were likely to consider the Army system arbitrary and irrational. This survey supports development of a computer-aided career counseling system reinforced by personal counseling.

RPR 78-28. Ozkaptan, H. Behavioral and functional requirements for a visual flight research facility. September 1978. (AD A076 660)

This report presents the behavioral and functional requirements of a visual flight research facility (VFRF) to conduct studies of nap-of-the-earth (NOE) helicopter flight. ARI conducted interviews and examined collateral systems before selecting the system. The selected VERF concept is a night visual display system with sensor aiding, with a windscreen display for a single operator and a secondary crew compartment with CRT monitors of the windscreen display for the crew. This facility would emphasize visual and motion simulation but would include performance assessment,

laboratory calibration, and control and test station requirements. The proposed facility would provide a cost-effective, versatile test bed that would contribute directly to the safety, survivability, and mission effectiveness of helicopters at NOE altitudes.

Research Memorandums

RM 77-1. Edwards, L., & Pilette, S. S. (HRB-Singer, Inc.); Martinek, H. (ARI). Error analysis of unattended ground sensor operators' reports. November 1977. (AD A077 921)

This analysis was done to locate the chief causes of the relatively frequent errors made by operators monitoring grid arrays of unattended ground sensors (UGS). Error analyses were made of UGS operator performance data from three previous studies. A table categorized the errors and showed dependent and independent variables considered as error-causing factors. Difficulty indexes and target profiles of the three projects were calculated to pinpoint error-causing factors. Observations and calculated trends identified highly probable error-causing situations.

The results showed greater errors occurring (a) during increased target activity and target load, (b) because of false alarms during low target activity and low target load, (c) because of the effects of single and multiple vehicle target patterns on speed and direction estimation, (d) in determining direct and indirect target trails, (e) because of operator inattention associated with sequence of presentation of the target, (f) during variations in certain X-T plot pattern features, and (g) because of combined errors in measurement, calculation, and response requirement management.

RM 77-5. Strasel, H. C., Ryan, T. G., & Word, L. E. The expert infantryman squad and platoon evaluation (EISPE) I concept: Evaluations and observations. December 1977. (AD A077 925)

This paper describes the ARI assessment of the field implementation of a new concept for training and testing, the Expert Infantryman, Squad, and Platoon Evaluation (EISPE). The concept is based on the Expert Infantryman Badge test (EIB).

The EISPE concept, tested by the 8th Infantry Division in Germany in 1975, used most aspects of the EIB tests in a 7-day field exercise with squad and platoon activities based on Army Training Tests (ATTs). The exercise had four phases: EIB test portions (I and II), squad test portion (III), and platoon evaluation (IV). Members of the tested battalion served as evaluators/controllers, using checklists of specific behaviors and individual judgment.

ARI evaluations were based on on-site observations, interviews and discussions, and questionnaires administered to 21 platoon members and 33 evaluators.

ARI researchers found the EISPE concept a basically sound extension of the EIB testing; with improvements, changes, and reservations, it could become a training/evaluation vehicle with high potential for providing and measuring realistic and effective training for infantrymen in Europe.

RM 77-7. Ryan, T. G., & Yates, L. G. Report of exercise observations: Operational Readiness Training Tests (ORTT). December 1977. (AD A077 927)

The ARI Field Unit in West Germany evaluated the battalion Operational Readiness Training Tests (ORTT) conducted in 1975 by the 8th Infantry Division (8ID).

The ORTT was a controlled real-time field exercise designed to provide realistic training and performance evaluation at task force level. On a 4-day maneuver, 11 maneuver battalions, task-organized into mech-armor task forces, participated in a tactical road march, defense, delay, passage of lines, and an attack and exploitation. Aggressor forces consisted of a reinforced armored cavalry troop. Commanders and their staffs decided the organization and operations of subordinate elements, weapons selection, use of terrain, and combat service support. Controllers and evaluators were employed down to platoon level.

Two questionnaires were developed, from evaluators' tape-recorded data, to learn how the exercises were perceived by the tested participants. A total of 110 officers and enlisted men completed the initial questionnaire; 493 completed the expanded questionnaire.

Data from the questionnaires indicated the following: (a) The major battalion weaknesses in combat readiness appeared to lie in staff coordination and reporting. (b) Annual testing on terrain similar to that on which they will probably fight is essential. (c) The ORTT provided commanders and staff opportunities not provided by other tests and exercises, tactical combined arms training and testing in a realistic setting, experience with interacting of organizational elements and levels of command during combat operations, and effective assessment of battalion combat readiness.

RM 77-9. Dressel, J. D., Kaplan, M., & Shields, J. L. Feasibility of using a measure of heart rate change in human adults to signal occurrence of tone. November 1977. (AD A077 929)

The feasibility of using a measure of heart rate response (HR-R) in a human subject to signal the occurrence of a tone is examined. This study examined measures of the HR-R in ten subjects. Two intensities of tone (15 db and 85 db) were presented either monaurally or binaurally. Subjects were either to listen for tone or to make a motor response when the tone stopped. Trial x trial results indicated great subject variability and the improbability of using HR-R to signal tone detection. Grouped data analyses indicated that measures of HR-R increased with increased tonal intensity, while response requirement and means of tone presentation were not critical.

RM 77-11. Miller, E. E. (General Research Corp.); Hayes, J. F. (ARI). Analysis of tank crew performance requirements for multiple-target engagements. December 1977. (AD A077 930)

A task analysis of the performances required of a tank crew in the revised Tank Crew Qualification Course was conducted to help develop a training program that produces high-level performance that can be conducted at a home station.

The performance requirements of the revised Table VIII were analyzed and broken down into the major engagements comprising Table VIII; standards were set for each engagement. A functional analysis of the tasks derived the components of each and the interactions among them. Finally, training standards for each component were derived.

This procedure provided a multiple dimensional analysis that supports training development and permits training to be organized along either functional or operational dimensions.

RM 77-15. Mietus, J. R., & R sey, M. G. Pilot evaluation of a tactical board game for training and assessing ROTC cadets. October 1977. (AD A077 934)

This report examines the effectiveness of a tactical board game in training and in assessing military knowledge and ability of ROTC cadets. The game's utility was measured by a pencil-and-paper test (Phase I) using the Infantry Tactics Knowledge Test and in ROTC Summer Camp, an experienced-based leadership training situation (Phase II).

In Phase I, all 66 cadets were pretested on the Infantry Tactics Knowledge Test, then rated by controllers, by the number of men remaining at the end of the game, and by peer ratings. They were then retested. There was a control sample of 15 cadets. In Phase II, 47 ROTC cadets were evaluated for generalized tactical knowledge and leadership using the standard ROTC measures of (a) Leadership Potential Index (LPI), (b) Land Navigation Orienteering, and (c) Military Stakes.

In general, (a) gaming experience helped train ROTC cadets in tactics so long as several games were played and the players began with a low level of tactical competence, and (b) when tested against the available ROTC measures of leadership competence, the game was not a practical device for assessing competence.

RM 77-16. Bolin, S. F., & Cowings, J. S. (ARI); Johns, L. A. (U.S. Army). Women soldiers in Korea: Troop viewpoints. December 1977. (AD A077 935)

This research identified problem areas associated with assigning women soldiers in increasing numbers to the Eighth U.S. Army in Korea, to help determine which problems could best be addressed by direct command action and which by long-term education.

Two survey questionnaires elicited the views of enlisted soldiers and of unit commanders. The troop questionnaire sampled attitudes and opinions on satisfaction with duty, chain of command relations, Korean-American relations, post exchange (PX) and commissary facilities, and expanding roles for women in the Army. Women were invited to write in suggestions for command action. This report compares the responses of 590 enlisted women with those of 332 enlisted men performing similar duties in the same units. Responses were also analyzed by whether the soldier's duty was traditional for women.

Women soldiers differed most strongly and consistently from men in favoring an expanded role for women in the Army. All groups were against a direct combat role for women. Generally, all soldiers were well satisfied with their experience in Korea.

Both sexes were satisfied generally with recreation/education services and rated their coworkers highly, although women were less favorable then men. Women soldiers were clearly less satisfied with Korean-American relations and with PX services. Male soldiers viewed indoor duties more favorably than women did.

RM 77-17. Cowings, J. S., & Bolin, S. F. (ARI); Johns, L. A. (U.S. Army). Women soldiers in Korea: Commanders' viewpoints. December 1977. (AD A077 936)

To identify problems associated with the increased numbers of women soldiers assigned to the Eighth U.S. Army in Korea, two survey questionnaires were developed, for enlisted soldiers and for unit commanders whose units included women. The commander's questionnaire focused on whether the assignment of women soldiers had influenced unit readiness. Questions also asked the commanders' opinions on using women soldiers in the unit in wartime and requested write-in comments on specific problem areas.

Of the 111 responding commanders, 64% favored having women soldiers in their units under both current and wartime conditions. Four primary problem areas were volunteered: (a) loss of duty time due to physical/medical conditions such as pregnancy and menstrual discomfort, mentioned by 26%; (b) requirement for separate billets and latrine facilities (22%); (c) sex-role behavior that undermines discipline (15%); and (d) inability of some women to do physically heavy work and local prohibitions on using women for guard/sentry duty (10%).

However, half to three-fourths of the commanders expressed the positive attitude that these problems did not impair unit readiness and were not sufficient to justify eliminating women from their units in time of war. These attitudes seem to suggest that acceptance of women soldiers will increase with time and experience.

RM 77-19. Finley, D. L., & Tremble, T. R., Jr. An analytic training effectiveness analysis for a CTEA update. November 1977. (AD A077 937)

Firefighter, a radar system under development, was the subject of an updated Cost and Training Effectiveness Analysis (CTEA) by the ARI Fort Benning Field Unit.

An analytical methodology was used because empirical data could not be obtained. The results compared relative training effectiveness values for two alternative training concepts: the proposed training devices (PDT) and actual equipment trainer (AET).

Five essential elements of analysis (EEA) were identified: (1) What are the advantages and effectiveness of training devices in general? (2) What alternative concepts satisfy the training requirements for the mortar locating radar (AN/TPQ-36)? (3) Does the Best Technical Approach (BTA) to training devices realize the general advantages of training devices? What are the advantages and disadvantages in using actual equipment for training? (4) What are the training equipment requirements per task? Do the PDT and/or AET appear to satisfy all requirements for training equipment? (5) Is the PDT alternative more effective than actual equipment training?

Results identified the training equipment requirements per task and indicated that: (a) The PTD and/or AET met requirements for all operator tasks and most of the maintenance tasks. (b) The PTD's instructional support capabilities were better than the AET's. (c) The judged overall relative training effectiveness (RE) of the operator PTD was 1.1, while the judged RE of the maintenance PTD was 1.2. (d) For a small cluster of computer maintenance tasks, the PTD will not provide training and the AET is not entirely effective.

In general, the PTD were judged more effective than the AET for the purposes for which they were intended, and an additional part-task trainer for computer maintenance training may be needed.

RM 77-20. Tremble, T. R., Jr., & Costner, R. S. Information flow in training exercises with the combined arms tactical training simulator (CATTS). November 1977. (AD A077 938)

In the Combined Arms Tactical Training Simulator (CATTS), training personnel and a computer complex could create a simulated tactical environment for officer training. The demonstration model of the CATTS was studied to define technical requirements and obtain user input for a follow-on version. This research studied the flow of information during CATTS training exercises among the mathematical model, the controllers, and the players--the three general components of the demonstration model. Realistic outputs of the math model needed to be communicated to players, and the model needed to be interactive with the players.

Controller-to-player communications were determined by observation of the controllers during training exercises, by content analysis of recorded

communications between controllers and players, and a controller questionnaire. Players' decisions were determined by the training exercises, by controller observation, and by content analysis.

In general, (a) CATTS training exercises were structured in terms of computer-generated information mediated by controllers. (b) CATTS has the potential to be an interactive system. This potential was not fully realized; that is, the math model appeared to have generated the tactical problems that the players dealt with. Developments within the model were probably more influenced by command and control inputs initiated by controllers than by player decisions. Also, player decisions did not consistently result in command and control inputs that would return feedback to the players.

RM 77-23. Fields, A. F. Data bases on alternate specialty selection for 7th-10th year officers (as of 1 July 1975). October 1977. (AD A077 940)

This paper describes two data bases that aid research on alternate specialty selection. The primary data base contains the raw data of civilian and military educational experience (amount of education and major subjects), military job experience (duty military occupational specialties), preference for alternate specialties, and actual specialty designations for the subject population. The secondary data base shows which educational and occupational experiences are associated with preferences for each of the specialties, and which experiences are related to the specialties actually assigned as alternates.

Officers with the least number of commissioned years were selected: all those in their seventh through tenth years for whom personnel records and preferences for alternate specialties could be obtained. A total of 12,597 officers were chosen; all were captains except for 812 majors.

Although these data bases were designed for use in career counseling experiments, their uses are not limited to that application. Some of the data have been used as source material for the Officer Development Study of the Professional Development Division of the Military Personnel Center.

RM 77-24. O'Mara, F. E. A longitudinal study of racial climate in an infantry division. December 1977. (AD A077 941)

This report describes the type of attitudinal and perceptual shifts that might be observed in typical data from the Racial Attitudes and Perceptions Survey (RAPS) and provides a working example of the types of analyses that might be applied to the data.

RAPS provides a way to survey a broad cross-section of a division's or an installation's personnel about racial conditions and to gather information about the racial climate of that unit.

The RAPS was administered twice, in 1975 and in 1976. Participants were randomly selected using a SPIDERS computer program. Each year the

samples underrepresented whites and increasingly overrepresented nonblack minorities. Overall, analysis of the RAPS data indicated that the division under investigation had as moderate a racial climate in 1976 as in 1975. Although the racial climate in the division appeared acceptable, the data indicated several problem areas that should receive attention. Attitudinal and perceptual shifts in the RAPS findings reflected a growing gulf between the orientations of blacks and whites. If the trends in racial attitudes and perceptions continued, deterioration in the racial climate could be expected.

RM 77-25. Barton, H. D., & Kinzer, N. S. Preliminary research on American soldiers of Spanish-ethnic origin and heritage. December 1977. (AD A077 942)

ARI research on soldiers of Spanish ethnic origin and heritage is reviewed and summarized. The research was exploratory, to provide preliminary information on the question: Who are the "Spanish" soldiers in the U.S. Army and how and where do they fit into the Army?

Data were collected by individual and small-group interviews at seven Army installations between January and July 1975. Interviewed were 320 soldiers, nearly 50 company commanders or first sergeants, and some 50 staff officials.

The interviews were culled for major themes, and the results are discussed under the headings of language, recreation and off-duty time, work and duty time, race relations and equal opportunity, identification and Army management issues.

Many "Spanish" soldiers who entered the Army intending to make it their career leave the Army at the end of their first enlistment, frustrated by language problems, lack of adequate language training, and the failure of their families to integrate into the Army community. Job misassignment and underuse also reduced the soldier's satisfaction with the Army. Therefore, many felt that their ethnic background and language difficulties prevented them from being good, successful soldiers. The researchers found no baseline against which to measure whether or not there is equal opportunity for "Spanish" soldiers. Most of these findings should apply to any soldiers who retain and use substantial minority language or culture, e.g., Blacks, Orientals, or Native Americans--perhaps one soldier of three in the Army.

RM 77-26. Jorgensen, C. C. A methodology and analysis for cost-effective training in the AN/TSQ-73 missile minder. February 1978. (AD A077 943)

This report describes the method used to perform a cost and operational effectiveness analysis (COEA) of training methods for the AN/TSQ-73 (Q-73) missile minder.

The method fell into six stages: (a) Limits on available transfer-of-learning technology were determined, and sources of information for the analytic steps were identified. (b) The task environment for Q-73 operators

was specified in terms of variables that could be systematically paired to training program elements whose cost could be determined. (c) For each Q-73 task, three alternate methods for training were determined. This required the creation of a decision matrix linking the 75 potential training methods to 55 psychological variables used to describe critical training characteristics of each task. (d) The large set of training device selections was condensed into a smaller set of training systems that took into account basic managerial and cost considerations not treated previously. (e) Each costable item was then described in dollar values along 37 variables representing seven general classes of cost information. (f) A Navy costing program was modified for an Army IBM system 360 DOS and was run. The output provided a large variety of calculated costing information that was used by decisionmakers in the training COEA.

The result was 219 sets of possible costing selections, which were reduced to 10 training concepts. From the 10, 3 were finally chosen: (a) microform with information mapping and adjunct equipment, (b) mock-ups, panels, and dynamic demonstrators, and (c) small-scale models and static mock-ups.

RM 77-27. Greenstein, R. B., & Hughes, R. G. The development of discriminators for predicting success in armor crew positions. December 1977. (AD A077 944)

This research attempted to develop discriminators for predicting success in armor crew positions. Between 46 and 91 armor crew personnel took part. The general procedure (a) administered a group of predictor tests to a representative training company during the first few weeks of training and later (b) administered the criterion tests for evaluation of driving, loading, and main gun firing performances. This testing was done during regular Advanced Individual Training (AIT).

Results showed a lack of any significant correlation between criterion performances, indicating that although some individuals may have consistently performed well or poorly in all three criterion areas (driving, loading, and firing), most individuals performed best in one area. It would be premature to associate criterion performances in driving, loading, and firing with particular "abilities" or combinations of predictor tests. Of the three criterion areas, the gunnery criterion remains the most poorly differentiated. In general, this research can be viewed as a screening process whereby the most promising tests are selected for further consideration and remaining tests are eliminated.

RM 77-28. Bloom, R. D. Enlisted ratings of possible incentives for skill acquisition. December 1977. (AD A077 945)

This research investigated the value of incentives that might be used to encourage enlisted men (EM) in acquiring individual skills as defined in the Soldier's Manuals.

A questionnaire describing 39 possible incentives was given to 218 EM who were in either MOS 11B or 11C. The soldiers were asked to rate each incentive for its value as a reward for skill proficiency.

Many incentives were identified as potential rewards because the soldiers rated them moderately or highly valuable. Some positively valued incentives--for example 1- to 3-day special passes, recognition awards such as Post Soldier of the Month, and awards facilitating promotion--appear managerially feasible. Such valued and practical incentives have value ratings roughly comparable to a $5 increase in monthly salary or a one-time bonus of $50. Financial awards and incentives that would give the soldier increased freedom were highly valued but were not judged to be currently practical.

Several incentives were identified that could be incorporated into a management system for training individual skills in unit settings (Individual Extension Training System).

RM 77-29. Hampton, G. (American Institutes for Research); Thomas, J. A., & Hart, R. J. (ARI). Race relations research in Korea. December 1977. (AD A077 946)

This paper describes research to determine the attitudes, perceptions, and behavior that American soldiers (majority and minority groups) and Korean host nationals manifested about each other.

Data came from several sources: (a) interviews with 260 American military men in Korea, (b) interviews with 155 Korean nationals, (c) an Army report on human relations in Korea, (d) Army analyses of critical incidents on cross-cultural issues in Korea, (e) research observations, and (f) information from PEACE, a cross-cultural group of Army personnel and Korean business owners at Yongsan Garrison.

At the time the data were collected, tensions were neither greater nor less among Koreans and Americans than they were among Americans themselves. Cross-cultural interaction varied significantly along racial lines. Race relations problems between majority and minority Americans hindered positive interactions between Americans and Koreans. Minority discontent was more evident off base than on. Racism was prevalent among officers as well as enlisted men. Koreans admitted prejudiced treatment of Blacks by themselves and by whites. Stereotypes of minority Americans' status in America may be responsible for the negative image of minority Americans in Korea. Korean communities adjacent to military bases were important factors in the overseas life of the American soldier. Although Americans quite often treated other Americans as equals, they seldom treated Koreans as equals. Education of military personnel of all ranks in race relations and cross-cultural problems is necessary.

RM 77-30. Hart, R. J. The relationship between perceived offense and actual discipline rates in the military. February 1978. (AD A077 947)

This report analyzes rates of punishment (Article 15), discharges, and perceived offenses among different racial groups in the Army. The analyses were made using Article 15 and discharge data from a 6-month period (August 1975 to January 1976) and data from the January 1976 survey that evaluated the Army RAP (race relations) seminars required for all enlisted men.

The findings showed a substantial level of polarization between Blacks and whites and between low-ranking enlisted men and their leaders. Actual administrative discharge rates did not differ between Blacks and whites, and the differences in Article 15 rates for Blacks and whites were not exceptionally large compared to the rank differences. Racial polarization may have been accentuated by each group's differing perceptions of who was breaking the rules the most frequently--each group felt the other was most culpable. The punishment rates were consistent with the white perception of offense rates, and thus whites felt these rates were fair. The punishment rates were inconsistent with the Black perception of offense rates, and therefore Blacks felt these rates were unfair.

RM 77-31. Raney, J. L., Duffy, P. J., & Gilbert, A. C. F. Relative merits of several missing data estimators in personnel selection procedures. February 1978. (AD A077 948)

One of the criteria in choosing recipients for Army ROTC scholarships is the Whole Man Score (WMS). Data are sometimes missing on the candidate's high school class standing, part of the WMS. This report documents the psychometric rationale underlying a method of computing high school class standing from existing data.

High school class standing was adjusted for class size by converting class rank to percentile rank. Percentile rank was then transformed to a corresponding normalized standard score under the traditional assumption of an underlying normal distribution of the latent trait measured by class standing. Several methods of estimating missing class standing scores were compared. A table of normalized standard score equivalents for various percentile rank ranges facilitated use of the preferred method. A plot of selected normalized standard score contours as a function of class rank and class size permitted the user to bypass computation of percentile rank. The appendix lists the FORTRAN computer program used to generate the contour points.

RM 77-32. Holman, G. L. The development of a composite score for evaluating nap-of-the-earth navigation. February 1978. (AD A077 949)

A rationale and a formula were developed to combine accuracy and speed into a single composite score so that nap-of-the-earth (NOE) navigators can be compared even when they navigate with different styles (slow and accurate vs. fast with course errors) over routes of different lengths. The object of this research was to find a score that was a quantifiable,

objective measure of the navigation performance of an aviator flying at very low (terrain flight) altitudes. This measure of terrain navigation is called TENAV.

Twelve pilots engaged in teaching NOE flight, navigation, and tactics participated in the research. Two magnitude-estimation tasks dealt with (a) the seriousness of various amounts of navigational error and (b) the relative value of various speeds in NOE navigation.

The resulting equation indicated that a superior navigation score would be 1.0 or less, and it included an assumption that every pilot makes a nominal error of 100 meters. This equation avoided problems found in other scoring formulas, in which pilots were achieving perfect navigation scores of zero error that could not reflect the speed at which this perfect score was achieved.

RM 78-1. Mohr, E. S. 1974 Fort Riley ROTC Advanced Summer Camp: Race of cadet by racial composition of school analysis. February 1978. (AD A077 950)

Data were collected at the Fort Riley, Kans., 1974 ROTC Advanced Summer Camp to determine possible differences between Black and white cadets as a function of the racial makeup of the student body of the college hosting the ROTC unit.

Of the 1,880 cadets attending the summer camp, 1,625 were white and 255 Black. The racial breakdown by school was as follows: 1,580 white cadets attended primarily white universities (W/W); 45 white cadets were at Black schools (W/B); 151 Black cadets were at white schools (B/W); and 104 Black cadets attended Black schools (B/B).

Performance variables included objective measures of specific performances and evaluations made by cadre (officers and NCOs) of overall performance of camp leadership activities.

Results indicated that race of cadets and the racial composition of the school accounted for significant variance in summer camp performance scores: Black cadets attending white schools and white cadets attending Black schools generally outscored cadets attending same-race schools. Black cadets scored lower than white cadets in cadre ratings and in performance measures, and Black cadets were peer-rated lower than their white colleagues. Cluster analysis of ratings and performance scores seemed to indicate that true performance differences, rather than bias, accounted for mean differences in scores.

RM 78-2. Eastman, R. F., & McMullen, R. L. The current predictive validity of the Flight Aptitude Selection Test. March 1978. (AD A077 951)

Because of changes in flight training programs and in the population of aviation trainees, the original Flight Aptitude Selection Test (FAST) needed revision. This report assesses the current predictive validity of the two operational batteries of the original FAST.

Two-thirds of the 50 classes from the Initial Entry Rotary Wing (IERW)--557 students--provided data on grades and training dispositions. In addition, a search of the FAST scores for 1971-74 from Army posts and Armed Forces Examination and Entrance Stations identified 264 matches with trainee grades.

FAST Officer Battery (OB) and Warrant Officer Candidate Battery (WOCB) composite scores were the predictor variables, and the IERW grades and course dispositions were the criterion measures.

Results showed that FAST scores obtained by current WOC trainees were higher than scores of trainees involved in the original validation studies. In general, officers achieved higher flight training grades than WOCs, even though the FAST OB cutting score was very low, at about the seventh percentile, while the FAST WOCB had a cutting score at about the 50th percentile. The predictive validity of the WOCB had attenuated somewhat when compared with findings from the original validation studies; however, validities obtained in this study indicated that the original battery continued to be a useful selection instrument until the revision became operational.

RM 78-3. Seeley, L. C., Matthews, W. T., & Fischl, M. A. Evaluation of alternative aptitude area conversion tables for use with ASVAB 6 and 7. March 1978. (AD A077 952)

This report compares the operational Armed Services Vocational Aptitude Battery (ASVAB) conversion tables with the experimental set proposed by the Marine Corps, to determine the impact of change in conversion tables upon Army enlistment screening and school assignment.

Sample 1 consisted of 386 Army applicants, who had completed sets of ASVAB 6/7 test scores in 1975 and the 1973 Army Classification Battery tests. Sample 2 consisted of 756 Army applicants who had complete sets of ASVAB 6/7 test scores in 1976. The scores in each sample were grouped into three subsamples: unquestionably not qualified, unquestionably qualified, and marginally qualified.

Results, based on these samples, showed that very few successful Army applicants qualify for enlistment with only one aptitude area (AA) score of 90 or higher. Even in the larger 1976 sample, too few such men were present for statistical analysis. Further, for men with two or more AA scores of at least 90, either set of conversions was found to qualify about the same percentage of Army applicants.

These results were not found for school eligibility because the ASVAB experimental conversion is harder and, on the average, 6% to 8% fewer men would qualify for each Advanced Individual Training school. Thus, Army acceptance of this experimental conversion to replace the current table would have a negative effect on the classification and school assignment of enlisted men.

RM 78-4. Eastman, R. F., & McMullen, R. L. Item analysis and revision of the Flight Aptitude Selection Tests. April 1978. (AD A077 953)

This report describes the analysis procedures used to select the component tests and test items to be retained in a single revised Flight Aptitude Selection Test (FAST) battery for officer and Warrant Officer candidates. Twelve tests comprising 536 items were analyzed using passing and failing subgroups of samples of 4,977 Warrant Officer candidates and 2,030 commissioned officers enrolled in flight training. The tests that were most predictive of success in IERW were subjected to item analysis, and the most effective items in each test were included in the revised battery. Several new items were added to round out the number of items and to make the magnitude of the standard deviations of component tests approximately equal.

Three factors accounted for examinee composite FAST scores: perceptual, information/knowledge, and personality/background factors, in that order. Test items selected for the revised battery were analyzed for validity, and the more predictive items were retained. The result was a single shorter test battery for all applicants, more easily administered and scored. Answer sheets can be scored by hand or machine.

RM 78-5. Jorgensen, C. C., & Jones, N. R. Helicopter pilot detection of two different camouflaged Hawk batteries. July 1978. (AD A077 954)

Data were collected to compare the camouflage effectiveness of the cage-supported light-weight camouflage screen (LCS) for the air defense Hawk battery and an experimental shape disrupter camouflage system produced by the Mobility Equipment Research and Development Command (MERADCOM). Two improved Hawk batteries were tactically deployed under one of three possible conditions: (a) without camouflage (clean site), (b) with LCS, and (c) with shape disrupters.

The participants were 20 helicopter pilots working in pairs to detect the batteries, and 160 ground troops in A Battery (serving as crew for the LCS deployments) and B Battery (in charge of the disrupter system). Severe personnel restraints, however, resulted in a marked loss of experimental test power.

A radio net was used to call in map coordinates; range and azimuth of the helicopter attempting to detect the batteries were provided sporadically by IPAR, IHIPIR, or IFF returns. Crews were debriefed by means of questionnaires and interviews.

Results showed, overall, a clear pattern of camouflage detectability. The LCS system was harder to detect and did a better job of masking critical areas, although on an absolute scale all three sites were easily detected. Sites were detected mainly from color, radar movement, generator smoke, and unnatural contour. In general, the LCS did a more effective job of masking smoke, radar movement, and contour. Color was poor for both sites.

Certain contaminations should be considered in evaluating results. Pilot familiarity with the terrain made detection more probable, and results pertain only to slow-speed helicopters.

RM 78-6. Eaton, N. K. Predicting tank gunnery performance. February 1978. (AD A077 955)

This research examined the relationships between selected aptitudes and tank gunnery performance for the proposed Armor selection/assignment systems. It extended the work in skill/aptitude measurement and Armor performance prediction reported in RM 77-27.

The research sought to evaluate the relationship for gunners and tank commanders between (a) their scores on a series of potentially predictive paper-and-pencil tests and their main-gun Tank Table performance; (b) intermediate tank gunnery training task performance and main-gun Tank Table performance; (c) their composite scores and their performance on the main-gun Tank Tables. The effort also evaluated the relationship between aptitude test scores and driver performance as measured by the driver's ranking within the platoon.

Participants were the tank commanders, gunners, and drivers in a standard Armor Battalion undergoing annual tank gunnery training and qualification--a total of 51 men. The research was conducted in two phases: paper-and-pencil aptitude tests and skills tests.

Results showed that six aptitude and skills measures had potential for predicting tank gunnery performance. However, because of the small numbers of personnel in each analysis compared with the relatively large number of predictor variables utilized, the research must be considered preliminary.

RM 78-7. Miron, M. S., & Patten, S. M. (Syracuse U. Research Corp.); Halpin, S. M. (ARI). Content analysis and the organization of combat intelligence data. February 1978. (AD A077 956)

This research examined and tested an application of a high-speed data processing technique designed to automatically provide organizational structure for incoming intelligence reports. A system of computer routines known as the General Inquirer was developed to analyze message content. The computer identifies and catalogs a set of previously selected words and phrases in the text of intelligence reports from the field.

The data base consisted of 33 intelligence reports recorded by the 28th Infantry Division just before the Battle of the Bulge and seven false reports designed to test the capabilities of the system.

The sample of 40 intelligence reports was keypunched on data entry cards, a dictionary of critical concepts was constructed, rules for identifying these concepts as they occurred in the text were developed, the occurrences of the identified concepts were tabulated for each message, and correlations and factor analyses were computed using these tabulations of identified concepts.

It was found that this logically coherent structure could aid intelligence analysts in organizing and analyzing the data in the message set. However, the content-analytic procedures need to be refined. Two inadequacies were the dictionary definition language and the fact that the entire General Inquirer System was programed only for the IBM S/360 or S/370 computer. Nonetheless, sufficient promise existed to warrant further investigation.

RM 78-8. Hicks, J. A., III. Skill Qualification Test (SQT) opinion survey: 11B's, 11C's, and 11E's. March 1978. (AD A077 957)

This research determined soldiers' opinions of the Skill Qualification Test (SQT) preparatory training that they had received and the SQT itself following the initial formal cycle of SQT testing.

A survey instrument was administered to 269 enlisted personnel in military occupational specialty (MOS) 11B, 69 in MOS 11C, and 224 in MOS 11E immediately after the soldiers completed the Hands-On Component and the Written Component of the SQT.

Overall, two-thirds of the soldiers expressed satisfaction with the Skill Qualification Testing system. Possible areas for improvement, based on soldiers' responses, are noted.

RM 78-9. O'Mara, F. E. Measuring racial and ethnic differences in the perception of military roles. February 1978. (AD A077 958)

This report outlines some preliminary research findings on the nature of cultural and subcultural differences in attitudes, values, and normative beliefs of recruits; and on the impact of these differences on the minority soldier's ultimate productivity. Three basic roles and their interrelationships were examined--the enlisted man, the NCO, and the officer.

A total of 3,647 male Army recruits in their first week of Basic Combat Training were given questionnaires and asked to indicate their racial or ethnic groups from 15 listed groups. The 15 groups were then collapsed into six categories: white, Black, Spanish-American, Pacific, Native American, and other.

The results showed two clusters of military role perceptions. The first cluster, the perceptions primarily of the Pacific and Black samples, clearly contrasted with the second cluster, the perceptions of the white and Native American samples. Men in the first cluster, and to a more limited extent the Spanish-Americans, saw relationships between officers, NCOs, and enlisted personnel as based more on solidarity and less on power and status than did men in the second cluster.

Given these perceptual differences, and assuming that the various cultural groups act according to these perceptions, minority enlisted personnel, especially Blacks and Polynesians, are likely to see white superiors as haughty and autocratic and as expecting more deference than their positions warrant. These minority soldiers, in turn, are likely to be viewed by their white peers and superiors as tending to be insubordinate and "pushy."

RM 78-10. Polit, D. F., Nuttall, R. L., & Weissbach, S. L. (Laboratory for Statistical and Policy Research, Boston College); Savell, J. M., & Woelfel, J. C. (ARI). Preliminary tabulation by rank and sex of selected responses in an attitude questionnaire. March 1978. (AD A077 959)

This report describes and discusses tabulations by rank and sex of a 134-item questionnaire given to approximately 1,100 soldiers--men and women, enlisted and officer--stationed in the Continental United States and in Europe. The research was undertaken to discover if the quality of data in a projected investigation of soldier attitudes were likely to be affected by certain variations in wording and formatting of questions, and to provide preliminary evidence about soldiers' attitudes on the use of women in a variety of specific combat-related roles. Half the questionnaires were designed using Likert items, and half were multiple-choice items.

The questionnaire was divided into sections to determine (a) what does happen and (b) what would happen when and if women were assigned to support and to combat companies.

The majority of soldiers thought that the presence of women in support companies has no adverse effects and may even have positive effects on company functioning. But when the questions referred to combat companies, opinions were considerably more negative, with men and women differing considerably, especially on women's abilities. Regardless, the majority of respondents thought that companies could do a better job when they were at full strength--with women--than when companies were below authorized strength without women.

RM 78-11. Kirk, R. J., Turney, J. R., & Cohen, S. L. Factor stability of the Work Environment Questionnaire. May 1978. (AD A077 960)

The factor stability of the Work Environment Questionnaire (WEQ) was examined across two samples of soldiers working in different types of work environment. The research was part of the initial diagnostic phase of an organizational effectiveness program in two Army commands. Questionnaires were completed in small groups during duty hours. All respondents were Army enlisted personnel.

Sample 1 consisted of 117 responses to the questionnaires by communications specialists. Sample 2 consisted of data from 535 questionnaires completed by members of the 32d Air Defense Command missile batteries.

The questionnaire included items on work group norms, task requirements, communication, and supervision. The data from the two samples were factor analyzed using the Statistical Package for the Social Sciences (SPSS) principal factor program with varimax rotation.

The results generally agree with results of other tests: The WEQ has been demonstrated to be a reliable, valid, and factor analytically stable instrument for assessing supervision, work group cohesion, job responsibility, and performance-reward contingencies in the work environment.

RM 78-12. Steinheiser, F. H., Jr. (ARI); Snyder, C. W., Jr. (American Institutes for Research). Score quality issues related to individual and weapon crew criterion-referenced performance tests. April 1978. (AD A077 961)

This paper describes three models to help a decisionmaker classify examinees into groups of masters and nonmasters as accurately as possible without requiring excessive numbers of test items or trials.

The binomial model provides the probability of an examinee obtaining a test score given his or her assumed true level of functioning. The Bayesian model provides a probabilistic estimate of an examinee's true level of functioning based on prior information. The Rasch model allows examinees of differing skill levels to be scaled on a common skill metric, even when they have not all taken the same set of test items.

ARI has used these models to analyze test data from individual pistol marksmanship (see TP 322) and tank crew gunnery skills.

RM 78-13. Van Nostrand, S. J. (ARI); Wyatt, T. C., & Hickey, A. A. (Empirical Research, Inc.). Content analysis: Volunteered comments on November 1977 officer education and training survey. July 1978. (AD A077 962)

This report describes the response to a free-comment section of a survey questionnaire given to 7,800 Army officers and warrant officers to determine their attitudes and perceptions on Army officer education and training policies. About 2,400 officers and 1,100 warrant officers responded to this section.

To interpret the results of the volunteered comments, the researchers developed seven broad subject categories: Satisfaction with and Commitment to the Army, Officer Personnel Management System (OPMS), Career Progression Inequities, Assignment/Counseling, Training, Alternate Specialty, and Civilian Education. The researchers tabulated the frequency of comments in these categories and reported the interpretation of results.

The majority of the comments could be classified as critical of some aspect of the Army system of education and training, but less than 20% expressed overall dissatisfaction with the Army. The areas mentioned most frequently were OPMS and the Assignment/Counseling system. Many officers and warrant officers said that more training is desirable. Civilian education was considered valuable, but the officers felt that civilian education should not be emphasized quite as much and the warrant officers felt that they needed more education than the system allows for.

RM 78-15. Eaton, N. K. Tank crew stability and tank gunnery performance. July 1978. (AD A077 963)

This research was undertaken (a) to determine the degree of tank crew stability in five armor battalions in the U.S. Army, Europe (USAREUR), and (b) to determine the relationship between tank crew stability and tank gunnery performance on the Tank Crew Qualification Course, Table VIII, at

Grafenwoehr, Germany. The participants, crewmen from 255 tank crews, completed a Tank Crew Stability Questionnaire made up of 22 questions concerning duration of time spent in training, current assignment, etc. Criterion data for tank gunnery measures were obtained from battalion records, information collected by ARI teams during debriefing after Table VIII, and tape recordings of each Table VIII run.

There was considerable turbulence--personnel turnover--in the battalions observed. There was also wide variation in experience levels. The longer a tank commander and gunner had trained together, the more rapidly they opened fire; the more training a commander had, the more quickly the crew opened fire; and the more training a gunner had, the more targets his tank hit. These findings underscore the need for emphasizing the training and retention of tank commanders and gunners in their respective positions.

RM 78-16. Cohen, S. L., & Turney, J. R. Impact of an organizational development program in an Army field facility. June 1978. (AD A077 964)

This report briefly describes a pilot program to evaluate the impact of various organizational effectiveness (OE) strategies on soldier performance, motivation, and job satisfaction. The first phase identified organizational problem areas: (a) suboptimal supervision by NCOs, (b) inadequate intergroup communications, (c) role ambiguity and conflict, (d) insufficient performance feedback, and (e) lack of peer group norms encouraging good performance. The second phase implemented OE strategies such as team building, leadership coaching, and job enrichment. The third phase evaluated OE strategy effectiveness in terms of performance criteria and attitude data.

Participants were four work groups at an Army communications processing field station. They responded to questionnaires, and the responses were analyzed to determine changes in perceptions of both participants and nonparticipants after the OE program. Significant positive changes were shown for the participants, whereas no significant changes were shown for the nonparticipants. The evaluation supports the hypothesis that OE programs offer viable approaches to organizational improvements in Army work environments.

RM 78-17. Steinheiser, F. H., Jr., & Epstein, K. I. Analysis of variance: Selection of a model and summary statistics. August 1978. (AD A077 965)

This research examined models for the analysis of variance (ANOVA) (fixed, random, or mixed models), and the subsequent summary statistics (F ratio, quasi-F ratio, and magnitude of treatment effect) that may be computed following the ANOVA. The report presents comparisons between models and between summary statistics, and it clarifies specific issues concerning the interpretation of results obtained when various models and summary statistics are used on the same set of data. The discussion is statistically complex. In sum, the wise use of an ANOVA model involves determination of fixed versus random factors, computation of complete sets of summary statistics, and interpretation of the statistics.

RM 78-18. Knerr, B. W., & Nawrocki, L. H. The measurement of military student attitudes toward computer-assisted instruction. August 1978. (AD A077 966)

A study was performed to extend to military training situations the existing research on attitudes toward computer-assisted instruction (CAI). The necessary attitude scales were developed and revised from existing scales to be suitable for use with military training programs, using enlisted military personnel.

Students from the enlisted Machinist Course (MOS 44E20) comprised the sample. The 320 students were from the Regular Army, Army Reserve, Air Force, and Marine Corps and were divided into five independent samples: Preliminary, CAI Pretest Only, Non-CAI Pretest Only, CAI Pre-Posttest, and CAI Posttest Only. The subjective attitude tests administered to the students were scored on a 5-point scale, with 5 representing the most positive response toward CAI and 1 the least positive. Test results were analyzed to increase internal consistency of the scales, and to determine the validity of the scales. The internal consistency of the scales compared favorably with those developed previously. Results indicated that students' attitudes toward CAI change over time.

RM 78-19. Steinheiser, F. H., Jr., & Hirshfeld, S. F. Using Stein's estimator to predict universe scores from obtained scores. August 1978. (AD A077 967)

This report introduces and applies a recently developed statistical method for estimating true (population) scores from observed (sample) scores. The theoretical and practical implications of the method extend beyond psychological measurement to the very foundations of statistical inference. A statistically complex example (predicting batting averages) of using the Stein method is given, and a discussion of the importance of this method to behavioral and social science research appears in the summary.

RM 78-21. Mirabella, A. Criterion-referenced system approach to evaluation of combat units. September 1978. (AD A077 968)

This report briefly describes the development of a supporting evaluation system for tactical engagement simulation (ES) techniques; it does not reveal the scope of effort involved in this complex research program. It explains the engagement simulation (ES) test bed, outlines a possible adequate system of evaluation, and mentions some past research on parts of the system.

To proceed logically and efficiently to develop an ES-relevant evaluation system, these steps are necessary: (a) define a model or models to define measurement concepts, data processing concepts, and data interpretation concepts; (b) define data requirements and develop processing methods; (c) define and develop data collection methods; and (d) define and develop performance benchmarking techniques (performance standards).

In experimental tests, NCOs acting as squad leaders seemed able to discriminate expected tactical performance across assumed training levels.

RM 78-22. Bolin, S. F. Some effects of Korean service and special training on Korean-American relations. September 1978. (AD A077 969)

Research was designed to find out whether training in Korean-American relations, given to enlisted men at entry for duty in Korea, had an impact on the amount and quality of soldier relations with Korean civilians. The research also attempted to define how much is enough in improving Korean-American relations; the goal of "better behavior" is an infinite one that may not be reasonable. Questionnaires were administered to 382 men of differing grades, experience, cultural identity, and special training. Data analyses showed that length of service in Korea made a substantial difference in amount of contact, with a higher percentage of returnees and extendees claiming to know many Korean civilians. In addition, among first-tour soldiers, a higher percentage of trained men reported knowing many civilian Koreans than did untrained men.

It is believed that the results show the overriding impact of length of experience in Korea, and that the positively oriented questionnaire has validity and yields sensible results.

RM 78-23. Hart, R. J. Generalized packages for analysis of variance and categorical data. September 1978. (AD A077 970)

This report groups analysis-of-variance data problems and categorical data problems into several classes and describes general software packages that can analyze all classes of the problems that have been defined. It compares strengths and weaknesses of software packages in terms of the classes of problems they can handle and the ease with which they can be used. The discussion also describes a method for analyzing unbalanced split-plot designs with currently available software; unbalanced designs result from unequal sample sizes and can lead to complications that include threats to validity of results. The generalized software packages described are claimed to be able to handle many of the analysis requirements for these types of data.

Research and Development Utilization Report

R&D UR 78-1. Knerr, B. W., & Nawrocki, L. H. Development and evaluation of an adaptive computerized training system (ACTS). September 1978. (AD A065 839)

This report summarizes the development of a computer-based system--the Adaptive Computerized Training System (ACTS)--designed to train students in electronic troubleshooting procedures. Detailed accounts of ACTS development are given in TR-77-A20, TR-77-A26, TR-78-A3, and TR 78-A6.

The ACTS uses artificial intelligence techniques to develop models of student and expert troubleshooting behavior as the students solve a series of troubleshooting problems on the ACTS. Comparisons of the student and expert models provide the basis for the instructional feedback the student receives. The ACTS also simulates the circuit on which the student is being trained and the process of taking test measurements, so that no actual equipment is required.

Although the ACTS is still not complete--the major difficulty has been the development of the mechanism by which the training is to be adapted to individual performance--it appears to have the potential, as it currently exists, to improve Army troubleshooting training.

Technical Reports

(A Series)

TR 77-A15. Miller, E. E. (General Research Corporation). Tank crew training program outline for USAREUR units. December 1977. (AD A067 126)

This report outlines a program of tank crew gunnery training for experienced crews in U.S. Army, Europe (USAREUR), at local training areas. The training plan takes into account a change in the Table VIII criterion of tank gunner performance and incorporates requirements of multitarget engagements. The training is meant to sustain skill at a consistently high level rather than to achieve a limited period of peak performance.

The projected program is in line with the Army's comprehensive shift to decentralized performance-oriented training and evaluation procedures to assure acceptable skill at successive levels. Each crew and crew member must meet set standards at every practice station. In USAREUR installations, however, skills must be integrated into effective team performance on a continuing basis.

TR 77-A17. Boldovici, J. A., Harris, J. H., Osborn, W. C., & Heinecke, C. L. (Human Resources Research Organization). Criticality and cluster analyses of tasks for the M48A5, M60A1, and M60A3 tanks. November 1977. (AD A048 607)

An analysis of armor crewman job tasks was part of a project to design training for U.S. Army Reserve components that use the M48A5 tank. Task data were generated and organized for each tank crew position in a form that shows which tasks are common and unique to M48A5, M60A1, and M60A3 tanks. Task criticality was estimated using a paired comparison rating technique in which raters selected hypothetical crewmen for a combat mission, based on which tasks the crewmen could and could not perform. Rating reliability averaged .68.

Cluster analysis was used to group tasks by crew position according to similarities among task descriptors. Eight task clusters or skills were identified: 21 for the driver, 19 for the loader, 20 for the gunner, and 20 for the tank commander.

The task analyses and criticality studies yielded useful results for assigning training priorities. The cluster analyses produced task groups that seem reasonable but need further testing.

TR 77-A18. Orend, R. J., Gaines, R. N., & Michaels, M. J. (Human Resources Research Organization). Reserve enlistment motivation. October 1977. (AD A046 270)

This research identified enlistment motivation and incentive patterns among new U.S. Army Reserve (USAR) enlistees. A 90-item questionnaire was administered to 455 non-prior-service males who enlisted in the second half of 1976.

Data analysis considered positive and negative motivation factors, the relationship between motivation and the socioeconomic and demographic characteristics of respondents, and a comparison of Regular Army and Reserve enlistees. The results showed that opportunities to learn new skills, earn extra money, and expand career opportunities were the predominant reasons given for joining the Reserves. The most negative aspects reported of Reserve enlistment were length of obligation and physical appearance requirements. Socioeconomic and demographic characteristics were not indicative of motivation and incentive patterns. Almost two-thirds of the Reserve enlistees had also considered Regular Army enlistment. The results offer practical implications for Reserve recruitment policy.

TR 77-A19. Hadley, H. I., Marsh, C. N., & Korotkin, A. L. (Richard A. Gibboney Associates, Inc.). Standards for establishing grades of Army assignments and for conversion of officer positions/duties to enlisted positions/duties. December 1977. (AD A050 886)

The duty module concept is a system for grouping job tasks. It is based on logical and occupational task clustering to represent jobs more specifically than the Military Occupational Specialty (MOS) system and more simply than the task description system. This report considers methods of converting officer positions to enlisted positions.

Using a duty module and decision logic tree model, quantitative evaluations of the tasks comprising position assignments indicated that there were no significant relationships between grade and number of tasks in a duty module, number of duty modules in a position, or criticality of the duty modules. Level of performance is significantly related to grade but has many exceptions that inhibit practical use.

In general, duty modules need modification to be used for specifying proper position grades, but they may be used in their present form for reengineering officer positions and for converting positions from officer to enlisted status.

TR 77-A20. Hoyt, W. G., Bennik, F. D., & Butler, A. K. (System Development Corporation). The effectiveness of alternative media in conjunction with TEC for improving performance in MOS related tasks. December 1977. (AD A047 103)

This research investigated whether computer-assisted instruction (CAI) is an acceptable medium for individual Training Extension Course (TEC) lessons in Army field units, and whether Army lesson developers can feasibly

be trained to convert self-paced, audiovisual materials into CAI format and to easily update such materials.

At the U.S. Army Field Artillery School, four course developers converted six TEC audiovisual Observed Fire lessons to four CAI lessons at an average cost of 128 man-hours and $681 in hardware and software per CAI lesson, including pretests and posttests. The same Observed Fire lessons were converted to a paper-and-pencil format and to module pretests and posttests for on-line computer administration.

The results showed that CAI development costs are low, development and evaluation lead time is short, and Army lesson developers can be trained quickly.

TR 77-A21. Saalberg, J. J., Miller, J. R. Friesz, T. L., & Keegan, C. A. (Science Applications, Inc.). Exploratory examination of purge techniques. November 1977. (AD A047 354)

Tactical information system overload can be reduced by purging--freeing the data base of useless, redundant, outdated, and incorrect information. Technological changes in ground combat and in information acquisition and handling have created the need for an automated Tactical Operations System (TOS) and for purging. This report analyzes the role of information in decisionmaking and examines techniques for identifying a decisionmaker's information needs.

Current purging procedures and division-level information needs for land combat are reviewed, and criteria are developed for identifying information essential for task performance in the Division Tactical Operations Center. Rules, techniques, and operative procedures to manage and control TOS data are suggested.

Manual file and written record purging procedures are not directly adaptable to automated systems, although such procedures provide helpful precedents. Although innovative methods are needed for managing combat information, available computer science techniques can help meet purging needs, and existing quantitative methods can be used to evaluate purge technology innovations. Of the purge methods examined in the report, multiobjective analysis is the most promising.

TR 77-A22. Siegel, A. I., Leahy, W. R., & Wolf, J. J. (Applied Psychological Services, Inc.). A computer model for simulation of message processing in military exercise control and evaluation systems. October 1977. (AD A045 832)

This report describes a digital computer model, NETMAN, and its implementation for simulating the information-processing actions of Army personnel using a computer-based message handling system during field exercises. NETMAN was designed to simulate message processing in a system composed of up to three networks. Each network may be composed of up to nine referees, nine radio operators, and one controller.

The model allows simulation and test of the system effectiveness effects of varying the number of referees, number of networks, task procedures, message arrival rate, message length, and operator skill. Simulation results are interpretable by formal effectiveness measures such as accuracy, thoroughness, responsiveness, completeness, and an overall effectiveness index; and by model results such as work time, stress imposed, message processing time, errors, number of messages processed, and fatigue.

The appendixes contain a user's manual with flowcharts, data item information, individual definitions for each model subroutine, and input-output formats.

TR 77-A23. Siegel, A. I., Wolf, J. J., & Leahy, W. R. (Applied Psychological Services, Inc.). A digital simulation model of message handling in the Tactical Operations System. I. The model, its sensitivity, and user's manual. October 1977. (AD A047 104)

This report, originally printed in 1973 as ARI Research Memorandum 73-5, presents results of research on implementation of a quantitative model of human performance in information systems. The principal efforts were to (a) define the most influential psychosocial variables inherent in the mission of interest, (b) incorporate these into a logic for a digital simulation model, and (c) develop a computer program reflecting this model. The Tactical Operations System (TOS), for which the model was developed, includes model features involving predictive capability and system effectiveness measures. Results of a series of model sensitivity tests under a variety of parametric input conditions are reported. The information required for model application is provided as a user's manual.

TR 77-A24. Siegel, A. I., Wolf, J. J., Leahy, W. R., & Bearde, J. L. (Applied Psychological Services, Inc.). A digital simulation model of message handling in the Tactical Operations System. II. Extensions of the model for interactivity with subjects and experimenters. October 1977. (AD A046 407)

This report, originally printed in 1973 as ARI Research Memorandum 73-6, describes extensions and improvements to a digital computer model previously developed to simulate the actions of operational field Army personnel in processing messages during a Tactical Operations System (TOS) mission (Research Memorandum 73-5). The computer model was made interactive by means of cathode ray tube displays to enable an experimenter to initiate and control computer simulation runs and to allow TOS operators at a computer terminal to perform selected tasks during the simulation. A revised version of the earlier user's manual is presented along with the Interactive Model User's Manual.

TR 77-A25. Leahy, W. R., Lautman, M. R., Bearde, J. L., & Siegel, A. I. (Applied Psychological Services, Inc.). A digital simulation model of message handling in the Tactical Operations System. III. Further extensions of the model for increased interaction. October 1977. (AD A047 105)

This report, originally printed in 1974 as ARI Research Memorandum 74-11, is the third of three describing MANMODEL, a simulator yielding measures of system performance under different mixes of equipment, personnel, and procedures. Modifications to increase its fidelity and utility included incorporating "interrupt" data and the ability to collect data in an interactive mode, using any combination of real and simulated subjects, and then immediately to simulate the entire interactive process.

A preface by James D. Baker, Supervisory Project Director, discusses the ARI effort generally, traces the history of MANMODEL, and projects further work toward validating the simulator and the challenges to psychological research posed by the expanded techniques envisaged.

TR 77-A26. May, D. M., Crooks, W. H., Purcell, D. D., Lucaccini, L. F., Freedy, A., & Weltman, G. (Perceptronics, Inc.). Application of adaptive decision aiding systems to computer-assisted instruction. October 1977. (AD A055 657)

This research is the first phase in developing an adaptive computerized training system to further individualize computer-assisted instruction by using artificial intelligence techniques.

Instructional materials were developed to apply the system to an electronic troubleshooting task. The system incorporated an adaptive computer program that learned the student's diagnostic and decision value structure, compared this structure to that of an expert, and changed the instructional sequence (by providing feedback and new problems) to modify the student's values until they matched the expert's.

Limited evaluation of the initial training system found that student value structures converged quickly under different student strategies, and that the model was consequently able to predict student behavior. The current system was judged easy to use by naive participants; both experienced and naive personnel stated that the system captured the "feel" of an actual troubleshooting task.

TR 77-A27. Frye, C. H. (Northwest Regional Educational Laboratory). The feasibility of adding graphics and team training support to PLANIT. December 1977. (AD A052 147)

This report discusses the feasibility of adding a graphics and team training capability to the Programming Language for Interactive Teaching (PLANIT) system, a machine-transportable instructional software system.

Graphic capabilities suitable for PLANIT were considered on three levels: (a) simple line and curve plotting using a newly added function;

(b) line and curve plotting with magnification and limited animation using a new set of language directives that could be added; and (c) line and curve plotting, animation, magnification, positioned text, and positional (e.g., light pen) response.

The first level is available now, subject to some added installation work. The second level would require only modest modification to PLANIT. The third level would require extensive modification efforts. Similarly, the team training modifications depend on the amount of system capability provided. Additional levels of team training support are not as well defined as for graphics and would depend on a further needs study.

TR 78-A1. Thurmond, P., & Kribs, H. (Sensors, Data, Decisions, Inc.). Computerized collective training for teams: Final report. February 1978. (AD A050 890)

This research demonstrated and evaluated a computer-assisted instruction (CAI) system for groups instead of individuals--the computerized collective training for teams ($COLT^2$). The demonstration/evaluation was to (a) conduct a state-of-the-art assessment of instructional strategies appropriate for $COLT^2$, (b) derive a conceptual framework for $COLT^2$ instructional strategies, (c) conduct a team job/task and training analysis for $COLT^2$ on the Army computerized artillery fire control system (TACFIRE), and (d) develop TACFIRE team training scenarios to assess instructional strategy.

A team model of instructional systems development (ISD) was designed to develop sample training materials, which were adapted to the team training version of the PLANIT language CAI system.

The results indicated that many of the components of this team ISD model would be adequate for a generic team ISD model. Deficient areas included preparation of team learning objectives and evaluation of interactive team skills. PLANIT met the basic team CAI requirements. However, the team training directives should be improved to (a) broaden the CAI base for instructional strategies, and (b) facilitate authoring procedures. Demonstration/evaluation subjects, trained on the sample material either in terms or as individuals, demonstrated different types of learned behavior depending on whether they had received team or individual instruction.

TR 78-A2. Olmstead, J. A., & Elder, B. L. (Human Resources Research Organization). The use of management games for developing Army officers in administrative and staff jobs. February 1978. (AD A054 994)

Developmental games can simulate the interpersonal relationships and the decisionmaking and problem-solving processes of junior company-grade officers working in administrative and staff jobs. This report identifies 52 appropriate games and presents a framework and guidance for constructing games and simulations for training and assessment purposes.

A brief survey of a small sample of officers in first-tour, entry-level jobs in Finance, Adjutant General, and Quartermaster Corps identified major problem analysis, decisionmaking, and interpersonal tasks and problems.

A comprehensive review of literature and state of the art of simulation was conducted; 351 games and simulations were surveyed for relevance for junior officers in the focal jobs. Of these, 183 were intensively analyzed, and, from these, a descriptive model was made delineating the processes and attributes the simulations evoked. An evaluation methodology was then developed and applied to the 183 games and simulations, to identify 52 as appropriate for the focal officers. A catalog of these 52 games with descriptions and evaluations is bound with the report, as A catalogue of business games for use in developing and assessing junior company grade officers, by J. A. Olmstead and B. L. Elder, October 1977.

TR 78-A3. Bennik, F. D., Hoyt, W. G., & Butler, A. K. (System Development Corporation). Determining TEC media alternatives for field artillery individual-collective training in the FY 78-83 period. February 1978. (AD A053 528)

This report is one of several that explore alternative methods of delivering training extension course (TEC) instruction to soldiers in the field, either as individuals or in teams. This report focuses on the projected needs of the U.S. Army Field Artillery School for FY 1979-83, in presenting a methodology for selecting the optimum mix of delivery systems for specific circumstances.

A need exists for closer attention to the characteristics of soldiers, increased realism of delivery system components, selection of techniques less demanding of costly resources, and closer integration of training delivery systems with job evaluation systems. Life cycle management should integrate training with man-machine interface, personnel selection or job assignment criteria, and job specialty and skill level structure.

Choices among the training delivery systems potentially available in FY 1978-83 should consider exportable training systems that can be embedded in a fielded weapon system or that can be accessed from a remote site.

Course designers must possess the skills needed to select, develop, and update courseware and media for a variety of alternate delivery systems. School system managers should be able to specify procurement requirements as well as monitor and evaluate contractor plans and products. Finally, data on training cost effectiveness should be collected and summarized, and should consider user acceptance throughout the life cycle of a system.

TR 78-A4. May, D. M., Crooks, W. H., & Freedy, A. (Perceptronics). Application of adaptive decision aiding systems to computer-assisted instruction: Experimental studies. February 1978. (AD A050 887)

This report describes a system for Computerized Decision Training (CDT) that focuses on improving and sharpening higher order cognitive skills in judgmental decisionmaking.

The CDT system incorporates an adaptive computer program that learns the student's value structure, and uses this structure to train the student in practical decisionmaking. This report describes the application of decision models in training and presents the features of the CDT system as it is applied in electronic troubleshooting. Experimental evaluations have demonstrated that the adaptive decision model accurately models the student's performance and that the adaptively selected instructions sometimes improve troubleshooting performance.

TR 78-A5. O'Heeron, M. K., Jr., Howell, W. Y., & Frazier, T. W. (Behavioral Technology Consultants, Inc.); Johnson, E., III (ARI). Field measurement and data collection system for engagement simulation field exercises. February 1978. (AD A056 339)

This study evaluates six systems for locating vehicle positions in terms of requirements for engagement simulation data analysis and in terms of usefulness at a specific site. The research included studies of optical ranging, optical triangulation, radio-based ranging, laser ranging, unattended ground sensors, and benchmark-aided systems.

Two low-cost ratio ranging systems (pulsed radar and Loran) provided the most precise location data, and are operationally available. A separate field study of optical ranging and triangulation methods showed that such methods were also suitable, but at the cost of increased manpower, staff training, and time.

TR 78-A6. Crooks, W. H., Kuppin, M. A., & Freedy, A. (Perceptronics). Application of adaptive decision aiding systems to computer-assisted instruction: Adaptive Computerized Training Systems (ACTS). June 1978. (AD A056 900)

The Adaptive Computerized Training System (ACTS) combines circuit simulation, artificial intelligence, decision modeling, and adaptive computer-assisted instruction to provide training in decisionmaking. The ACTS incorporates an adaptive computer program that learns a student's value structure and uses this structure to train the student in practical decisionmaking.

This report describes the development and operation of the ACTS as it is applied to training electronics troubleshooting. An experimental study evaluated the effectiveness of decision aiding (providing the student with an expert's three best choices before the student is required to select an action) and feedback (showing the student the action that the expert would have taken after the student has selected an action).

Experimental evaluations demonstrated that the adaptive decision model accurately models a student's performance and that adaptively selected instructions and decision feedback can improve troubleshooting performance.

TR 78-A7. Hanson, V. L., Purifoy, G. R., Jr. (Applied Science Associates, Inc.). TSM guide to training development and acquisition for major systems. March 1978. (AD A053 489)

This guidebook describes and illustrates how training development and acquisition activities fit into the Life Cycle System Management Model (LCSMM) for total system development. Because of cost and time constraints in developing subsystems, the system acquisition process is being modified: the LCSMM is being modified, developmental progression criteria are being enforced, and training and other support subsystems are being integrated into a total system developmental effort. These modifications should result in early involvement in system design, integrated technical documentation and training (ITDT), and development of a master training plan.

Section 1 of this guidebook discusses the need for integrated subsystem development and identifies the main elements of the systems approach. Section 2 presents a generalized training developments model, based on instructional systems development (ISD). Section 3 outlines the LCSMM and discusses major milestones and activities. Section 4 integrates training development activities with the total system acquisition process and sketches the role of the TRADOC (Training and Development Command) System Manager (TSM) for the conduct and coordination of these activities.

TR 78-A8. Kaplow, R. (Battelle Columbus Laboratories). A description of basic author aids in an organized system for computer assisted instruction. September 1978. (AD A070 189)

This is the first of several papers dealing with the authoring process and related problems in Computer-Based Instruction. A 3-day conference was conducted on research relevant to improving the interface between computer-based instructional systems and instructional developers (authors). Participants presented summaries of key issues and approaches to authoring systems, which are discussed in this report.

A programing system should provide a structural basis capable of helping authors organize their concepts. This structural basis should possess a multidimensional addressing scheme that facilitates "moving around" in the program as the author works on it and should permit easy reference to specific items that need examination or change. While using only the minimum fundamental constructs, an ideal system would allow a virtually infinite variety of effective program structures to be created.

The conferees suggested that although the structure of a computer program is determined principally by what the program is designed to accomplish, it should also make allowances for the author's personal style (within the constraints imposed by the programing language used).

An author language in the type of system this report describes must be designed so that the actions of the language are reflected in operations on the on-line data base. It should be possible to make extensive dynamic modifications to the system with minimal author interactions, since required changes in the structure and content of existing data bases can often be done automatically.

TR 78-A9. Zinn, L., & Bork, A. (Battelle Columbus Laboratories). Aspects of effective authoring systems and assistance: Recommendations for research and development. September 1978. (AD A071 114)

This is one of a series of reports dealing with the authoring process and related problems in computer-based instruction (CBI). It provides a brief background of CBI authoring systems, describes contributions of the computer in developing effective teaching materials, outlines the authoring process, and recommends areas for future research.

Effective authoring is a function of many factors, of which one of the most notable is the language in which the instructional material is programed; ease of entry is important. Early author langugaes did little more than adapt programed instruction text for computer presentation.

A significant portion of future development in computer-based instruction is likely to be in the areas of generative systems and specially designed simulated environments for skill learning. This will increase the demand for systematic pedagogy and instructional language development; software design will also need to reflect these special needs.

The areas needing particular attention include (a) human factors considerations in designing appropriate keyboards and effective visual displays, (b) possibilities for voice input in authoring systems, (c) progress in natural language processing, and (d) increasing authoring capabilities via extensible languages.

TR 78-A10. Bunderson, C. V. (Battelle Columbus Laboratories). Authoring systems vs. authoring languages for instructional systems development: Implications for Department of Defense. September 1978. (AD A071 082)

This is one of a series of reports dealing with the authoring process in computer-based instruction (CBI) and artificial intelligence. This report distinguishes between authoring systems and authoring languages and describes major goals for effective authoring.

Authoring systems differ from authoring languages in that the latter deal primarily with the mechanical boundary conditions that permit packaged courseware to run on a particular computer. Such conditions include the language requirements for (a) display creation, (b) response acceptance, (c) analysis of constructed response, and (d) conditional branching. Authoring systems deal with broader concerns, namely, the critical concepts and variables involved in the process of courseware development as a whole--including curriculum design, authoring, production, and revision.

From the requirements articulated by user organizations, two major goals for acceptable authoring systems have been inferred, along with a related set of constraints. The critical goals are the need to (a) reduce the costs for authoring and producing computer-based instruction materials, and (b) maintain or increase the quality of these materials. Primary constraints are the high turnover of authoring personnel and the need for authoring systems (for military purposes) to fit within the framework of the current Instructional System Development (ISD) model.

TR 78-A11. Frank, B. A., & Erwin, F. W. (Richardson, Bellows, Henry and Co., Inc.). The predictors of early Army attrition through the use of autobiographical information questionnaires. July 1978. (AD A059 237)

This research examined the feasibility of using autobiographical questionnaires to identify persons who, because of failure to adapt to Army life, are not likely to complete their first 180 days of service. The questions included items validated in previous research and new items suggested by that research.

Two questionnaires were administered to approximately 4,500 incoming male enlistees at Fort Dix, N.J., and Fort Sill, Okla., from November 1976 to February 1977. After 180 days, status information on all participants was obtained from Army records. The final analysis sample of 4,282 included 3,660 persons who had completed 180 days of service and 622 persons who were separated during that period for failure to adapt to the Army.

Questionnaire results were item analyzed using attrition criteria. Cross validities were computed for all items. Results confirmed substantially the earlier research outcomes and indicated that autobiographical information could help identify enlistees not likely to complete 180 days of service. The questionnaires are now in operational use as the Military Aptitude Predictor (MAP).

TR 78-A12. Borman, W. C., Hough, L. M., & Dunnette, M. D. (Personnel Decisions, Inc.). Performance ratings: An investigation of reliability, accuracy, and relationships between individual differences and rater error. July 1978. (AD A061 149)

To better understand the performance rating process, this research sought to (a) discover the consistency (reliability) of a rater's performance in making accurate, error-free evaluations of performance effectiveness; (b) identify individual-differences correlates of performance rating accuracy and of the ability to avoid halo, leniency, and restriction of range errors; and (c) explore relationships between the number of raters and their agreement and accuracy in making performance judgments.

Behaviorally anchored performance rating scales were developed for two jobs, campus recruiter and office manager. Actors were used to role-play these two jobs in 16 different performances based on these scales. Videotapes of these performances were shown to 14 expert judges, who evaluated the actors using the performance rating scales. Agreement with the preset performance levels, reliability, and convergent and divergent validity of the expert ratings were very high, suggesting that the mean expert judgments could be used as criterion scores defining exactly the level of competence portrayed in each videotaped scene.

Next, the videotapes were shown to a carefully stratified subsample of 146 students who had taken the Minnesota Person Perception Battery (MPPB). These participants rated the actors' effectiveness on the behavioral performance dimensions.

Analysis of the students' ratings showed that accuracy, halo, leniency, and restriction of range were consistent within situation or job. Results of correlational analysis relating MPPB variates with accuracy and the two types of error (halo and restriction of range) showed that the individual differences measured accounted for about 16% of the variance in accuracy scores and about 7% of restriction of range scores. The largest correlates of accuracy (all positive) were verbal reasoning ability, personal adjustment, and detail orientation.

Monte Carlo studies suggested that (a) pooling the ratings increased their accuracy at a diminishing rate, so that pooling more than four adds little accuracy; and (b) to some extent interrater consistency does imply accuracy.

TR 78-A13. Jennings, D. D., Jr., Kendall, A. W., & Robinson, M. A. (Data-Design Laboratories). Development and evaluation of a videotape simulation performance test. May 1978. (AD A057 507)

This study examined the feasibility of using videotape to present a simulation performance test of certain tasks in the Army's carpentry and masonry Military Occupational Specialties (MOS).

Two sets of procedures were developed, for task selection and simulation. A prototype videotape simulation test was developed and validated against general performance ratings and a similar paper-and-pencil test.

Application of the procedures permitted the more appropriate tasks and task elements to be selected but required more human resources than may be available in Army test development activities. The fundamental question of whether audiovisual simulation can usefully test perceptual content was not conclusively answered. Also, the use of television strictly for testing the perceptual content of lower skill level motor tasks appears somewhat limited; however, the test takers decidedly favored television testing.

TR 78-A14. Whitmore, P. G. (Human Resources Research Organization). Analysis of human relations problem situations: The group process approach. July 1978. (AD A036 130)

The objectives of this research were to identify and analyze human relations problem situations of senior noncommissioned officers (NCOs) and to develop performance exercises based on these analyses for senior NCO training programs.

Senior NCOs from the Sergeants Major Academy participated in group discussion sessions to identify potential human relations problem situations. They considered job functions, job tasks, and broad social issues. Individual interviews with senior NCOs at Fort Bliss, Tex., were concerned with performance management and counseling problems. Problem situations were analyzed using the group process approach, which brings job and subject matter experts together to analyze problem situations in structured group problem-solving sessions.

An analysis summary was prepared for each problem situation based on the information generated by the groups, and candidate performance exercises were developed for each problem statement. These summaries and exercises were then arranged in an indexed Problem Situation Catalog for Senior NCOs, which was intended as a basic resource for training specialists who must develop instructional materials on human relations for senior NCO training programs.

TR 78-A15. Modisette, B. R., Michel, R. R., & Stevens, G. W. (System Development Corporation). Initial strategies for the Tactical Operations System (TOS) support of the command and control process. Volume I: Overview of TOS operations. July 1978. (AD A058 324)

This report is the first in a series describing research on the effects of the Tactical Operations System (TOS) (an automated data processing system) on procedures, personnel, and skill requirements at Army division, brigade, and battalion command posts. The project also identified areas in current TOS design needing improvement. The research results provided basic source material to determine TOS training requirements and to provide the rationale for detailed investigation of the feasibility and utility of proposed system enhancements. This volume summarizes the project, explains procedures and the approach; describes TOS hardware and software; and outlines operational and functional concepts used.

Data collection forms were used to interview 38 personnel to identify manual functions and tasks performed. These requirements were then compared with TOS capabilities, and a description was developed of projected operation under TOS for each staff element studied.

Findings showed that the major impact of TOS will be in the areas of intelligence and operations; lesser impact will occur in personnel and logistics functions. The analysis support function appeared to be the weakest TOS capability. TOS should enhance the data handling, processing, and decisionmaking of the division as a whole. Improvements are expected after the system has been tested in an operational environment.

TR 78-A16. Modisette, B. R., Michel, R. R., & Stevens, G. W. (System Development Corporation). Initial strategies for the Tactical Operations System (TOS) support of the command and control process. Volume 2: Description of TOS functions for division elements. June 1978. (AD A061 155)

This report, the second in a series, describes the impact of the Tactical Operations System (TOS) on the procedures and skill requirements at the division level. The report explains how each of 16 division-level elements will operate when equipped with TOS, an automated data processing system. Each element description contains (a) a general statement describing the element, (b) a statement of its mission, (c) an overview of the projected effects of TOS on element's functions and tasks, (d) a list of the element's functions and tasks, (e) suggestions for use of personnel, and (f) recommendations for developing TOS in each element.

TR 78-A17. Modisette, B. R., Michel, R. R., & Stevens, G. W. (System Development Corporation). Initial strategies for the Tactical Operations System (TOS) support of the command and control process. Volume 3: Description of TOS functions at brigade and battalion. June 1978. (AD A061 103)

This report, the third in a series, describes the impact of the Tactical Operations System (TOS) on the procedures, personnel, and skill requirements for the four intelligence and operations elements at Army brigade and battalion command posts. For each element, information is given on the following topics: a description of the element, the element's mission, use of TOS, functions and tasks performed, personnel utilization, and recommendations for improving or adding TOS capabilities.

TR 78-A18. Olmstead, J. A., Baranick, M. J., & Elder, B. L. (Human Resources Research Organization). Research on training for brigade command groups: Factors contributing to unit combat effectiveness. June 1978. (AD A056 054)

This research examined the relationship between brigade command group effectiveness during Computer-Assisted Map Maneuver System (CAMMS) exercises and the quality of the brigade's performance of certain organizational processes previously found to be related to combat effectiveness.

Data were collected on 11 brigades. Seven of nine process dimensions were found to be highly correlated with brigade command group effectiveness, as evaluated by exercise controllers. No significant correlations were found bewteen the organizational process dimensions and brigade combat effectiveness. No relationships were found between any supervision and control dimensions and brigade combat effectiveness; however, large significant correlations were found between brigade group effectiveness and five of the six supervision and control dimensions. Correlations were computed between all process and supervision and control dimensions. High correlations were found between each process dimension and several supervision and control dimensions, indicating strong relationships between the type of supervision and control and the quality of organizational processes that occur.

TR 78-A19. Olmstead, J. A., Baranick, M. J., & Elder, B. L. (Human Resources Research Organization). A training feedback system for brigade command groups. June 1978. (AD A056 342)

This report describes a system for analyzing the performance of a brigade command group during Computer Assisted Map Maneuver (CAMMS) exercises and for providing systematic feedback to participants. Detailed descriptions are provided on how to analyze performance during and after the exercises, and how to record, format, and conduct a training feedback conference.

TR 78-A20. Shelnutt, J. B., Smillie, R. J., & Bercos, J. (Litton Mellonics). A consideration of Army training device proficiency assessment capabilities. June 1978. (AD A056 191)

The use of training devices instead of operational equipment to assess proficiency in the Army is examined, based on a literature review and an informal survey of personnel in other agencies. Information gathered was used to (a) review the use of training devices in proficiency assessment programs outside the Army, (b) summarize aspects of proficiency test programs in the Army that are relevant to the present problem, and (c) discuss the use of training devices for proficiency assessment.

Systematic development of training device measurement systems would have four steps: (a) information needs analysis, (b) initial measurement analysis, (c) pilot testing and selection of final measure sets, and (d) measurement systems effectiveness training. The literature review and agency survey suggested that training device measurement systems are infrequently developed in a systematic way--a limiting factor in the use of devices for assessment purposes.

TR 78-A21. Atwood, M. E., & Ramsey, H. R. (Science Applications, Inc.). Cognitive structures in the comprehension and memory of computer programs: An investigation of computer programming debugging. August 1978. (AD A060 522)

A theoretical framework, based on recent studies in cognitive psychology on memory for text, was developed to explain certain aspects of human behavior during computer program comprehension and debugging. A central concept of this framework is that the information contained in a program is represented in a programmer's memory as a connected, partially ordered list (hierarchy) of "propositions" (units of information with properties similar to those observed in research on text memory). An experiment was performed to test the hypothesis that the difficulty in finding a program bug is a function of the bug's location in this hierarchy. This experiment compared the effects of bug location, bug type (array, iteration, assignment), and specific program. Each of 48 participants debugged two separate programs, with one type of bug at two different hierarchical levels in each program.

A preliminary analysis suggested that all three factors--program, bug type, and bug location--significantly affected the time required to locate program bugs. Detailed analyses, however, suggested that the program and bug type variables could be explained in terms of the bug location variable and that a bug's location in a program's underlying propositional hierarchy is a principal factor affecting performance in a comprehension and debugging task.

TR 78-A22. Ramsey, H. R., & Atwood, M. E. (Science Applications, Inc.); Van Doren, J. R. (Oklahoma State University). A comparative study of flowcharts and program design languages for the detailed procedural specification of computer programs. September 1978. (AD A069 604)

An experiment assessed the relative merits of Program Design Languages (PDLs) and flowcharts as techniques for developing and documenting detailed designs for computer programs.

Twenty students in a computer science graduate course participated. Working individually, the students designed a two-pass assembler for a simple minicomputer. Half the students expressed their design for pass one of the assembler in the form of a flowchart and in a PDL for pass two. The other students used a PDL for pass one and a flowchart for pass two. Flowcharts and PDLs were compared on various measures of overall design quality, design errors, level of detail of designs, time expended in developing designs, and subjective preferences.

In the context of this study, the use of PDLs produced better results than did the use of flowcharts. The designs appeared to be of significantly better quality, involving more algorithmic or procedural detail, than those produced using flowcharts. Overall, the results suggest that software design performance and designer-programmer communication might be improved by adopting informal PDLs as a standard documentation method for detailed computer program designs.

TR 78-A23. Spencer, L. M., Jr., & Cullen, B. J. (McBer & Co.). Taxonomies of organizational change: Literature review and analysis. September 1978. (AD A064 486)

This report presents a taxonomy and data collection methodology for assessing Army organizational effectiveness (OE) interventions. The authors reviewed the literature on organizational development classificatory schema and identified four variable dimensions that can be used to summarize this literature: change agent characteristics, competencies, and roles; client characteristics and problems; intervention methods and processes; and outcome objectives and results.

Most descriptions of intervention methods were found to be too vague to permit an exact determination of which change agents produce outcome results. Research to identify the competencies of effective change agents and the design elements of successful interventions is likely to advance knowledge in this field.

TR 78-A24. Wheaton, G. R., & Fingerman, P. W. (American Institutes for Research); Boycan, G. G. (ARI). Development of a model tank gunnery test. August 1978. (AD A061 153)

An exemplar live firing test was developed to evaluate tank crew proficiency in gunnery. The test considered different types of target engagements, necessary crew behaviors, and practical constraints of using main gun ammunition for testing.

Existing descriptions of M60A1A0S gunnery test objectives were updated to reflect current Army Armor school doctrine. To help select objectives for exercises that would constitute the test, (a) all objectives were examined to identify those that involved similar underlying crew behaviors, and (b) these families of similar objectives were then analyzed to generate estimates of how well performance on one gunnery objective would predict others in the same group. Four test purposes were identified: crew qualification, prediction of combat effectiveness, skill diagnosis, and crew motivation. For each purpose, alternate scoring strategies were examined and appropriate procedures were defined. The sample test developed contained at least one highly representative exercise from each major family, thereby providing a basis for inferring the quality of performance in each family, and by extension, the entire gunnery domain. The exercises covered the range of tactical and environmental conditions under which engagements may occur. The test exercises required the crew to perform most of the 112 crew behaviors associated with gunnery; of the 10 behaviors not included, nine rarely occur in the domain of 266 objectives.

The test thus developed has since been adopted by the Army as the final tank crew gunnery qualification test in armor training.

TR 78-A25. Operating Systems, Inc. MIQSTURE: An experimental online language for Army tactical intelligence processing. July 1978. (AD A064 323)

This report presents an analysis and specifications for applying a mixed-initiative query system to intelligence data processing. The project had four steps: (a) development of a statement of requirements for interactive data processing in tactical intelligence analysis; (b) extension and application to these requirements a concept of mixed-initiative system, focused on task requirements and user needs; (c) development of detailed design specifications for six selected subsets of MIQSTURE (Mixed Initiative Query System with Task and User Related Elements); and (d) preliminary evaluation of MIQSTURE.

The six subsets developed in detail were (a) normal querying of message records, (b) automatic alerting and input-driven querying, (c) normal tabular data-base querying and calculation, (d) aids for representing the tasks that form the context of MIQSTURE, (e) procedures for cross-referencing graphic symbols and data-base elements; and (f) defining and maintaining data file structures. An analytic evaluation of MIQSTURE indicated high potential for applications to tactical intelligence processing and other data-processing situations involving a relatively restricted range of well-defined tasks.

TR 78-A29. O'Brien, R. E., Crum, W. J., Healy, R. D., Harris, J. H., & Osborn, W. C. (Human Resources Research Organization). Trial implementation of the Tank Crewman Skills Training Program (TCST). September 1978. (AD A061 226)

This report describes the adaptation of a modular, performance-based, individually paced tank crewman skills training (TCST) program for trial

implementation in five different tank crew training situations: (a) mobilization train-up of active and Reserve crewmen in a training center environment, (b) mobilization train-up of training center crews, (c) individual readiness training of armor crewmen preparing for unit gunnery training, (d) accelerated training of tank crew replacements, and (e) accelerated refresher training of experienced crews deprived of regular gunnery training.

Two of the five studies produced positive results. In the training center active and Reserve mobilization train-up, TCST produced trainee skill levels and opinions superior to those from two alternative programs. In the accelerated tank crew replacement training, TCST was successful in rapidly preparing non-11E soldiers to fill in as gunners and loaders on a gunnery qualification test. Results of the other three trial implementations were inconclusive.

TR 78-A31. Pearlstein, R. B., & Swezey, R. W. (Applied Science Associates, Inc.). Criterion-referenced measurement in the Army: Development of a research-based, practical test construction manual. September 1978. (AD A066 916)

This report summarizes activities conducted to develop a criterion-referenced test (CRT) construction manual. Major steps were the preparation of a written review of the literature on criterion-referenced testing, identification of needed research to help achieve a more consistent, unified criterion-referenced test model, and development of an easy-to-use instruction manual to help Army test developers construct CRTs.

(B Series)

TR 77-B2. Orend, R. J., Stroad, K. W., Jr., & Rosen, T. H. (Human Resources Research Organization). Selection of qualified Army enlistees: Analysis of characteristics of soldiers separated under TRADOC Regulation 635-1. December 1977. (AD A077 986)

The Trainee Discharge Program set forth in TRADOC Regulation 635-1 enables the Army to discharge clearly unsuccessful trainees before they complete Basic Combat Training (BCT). To obtain data on their characteristics, 238 dischargees and 63 trainees who had successfully completed the 180-day BCT course were administered questionnaires and were interviewed. The two subgroups comprising dischargees (128 Regular Army (RA) and 110 Reserve) were also compared with the successful group. The research focused on two questions: (a) Are there distinguishing differences between individual soldiers who fail and those from an individual who succeeds? (b) What effect is there on an individual's lifestyle of returning home after having been in the Army less than 180 days?

Results showed that the discharged soldiers differed from the successful soldiers in that they reported more difficulty in school, were more bored by their civilian jobs, and were more likely to have been dissatisfied with civilian life.

Comparisons between the discharged Reservists and the discharged RA soldiers indicated that the Reservists were more family-oriented, more satisfied with civilian life, had more difficulty in school, and were more concerned with personal injuries during training. Reservists were more likely to be discharged for lack of aptitude, whereas RA soldiers were discharged more frequently for lack of self-discipline or for attitude.

No significant change appeared in lifestyles of individuals who spent fewer than 180 days in the Army. However, 46% of dischargees reported more arrests after discharge than before enlistment, and 41% reported fewer arrests.

TR 77-B3. Brown, D. K., & Nordlie, P. G. (Human Sciences Research, Inc.); Thomas, J. A. (ARI). Changes in Black and white perceptions of the Army's race relations/equal opportunity programs--1972 to 1974. December 1977. (AD A077 987)

A survey conducted in 1972 was repeated in 1974 to determine changes in Army enlisted perceptions of Army race problems and of the Equal Opportunity and Treatment Program (EOT). A slightly modified version of the Enlisted Personnel Questionnaire that had been administered in 1972 to sample personnel in eight Army installations in the continental United States was administered to 2,246 white and 1,943 Black enlisted personnel at the same locations.

The results showed that Blacks and whites in 1974 still perceived race relations and equal opportunity in the Army in sharply differing ways, and that perceptive changes that did occur were chiefly in reducing those differences. Blacks continued to see much racial discrimination, but they viewed the state of race relations in the Army as more favorable than in 1972.

Although large numbers of both Blacks and whites reported personal benefit from the Army race relations training program, there was no widespread opinion that such programs would achieve their objectives. The level of satisfaction among EOT program users was lower than in 1972.

This report was used to update training programs and to revise EOT program guidelines to improve perceived deficiencies.

TR 77-B4. Frye, C. H. (Northwest Regional Educational Laboratory). Research in adaptable programming to achieve computer independence. December 1977. (AD A077 988)

Four research and development efforts are related to earlier work with the PLANIT computer-aided instructional system. The first part of the report discusses the successful installation of PLANIT on a PDP 11 minicomputer; this feasibility study included some less costly, though less efficient, aspects of installation. Suggestions for improving the installation, which now has been proved feasible, are included. The second part describes the use of the PLANIT method for transportable coding on a new application--an on-line query and retrieval system--and discusses various aspects of

this demonstration system. The third part describes a program developed for converting PLANIT student records to a format that the Query system can use, as an application for demonstrating the Query system. The last part of the report describes development of a test program that interactively checks out the MIOP subroutine, which must be written locally in the process of installing a portable computer system (either PLANIT or Query). This test program makes checkout fast, easy, and comprehensive. Using PLANIT to perform these same tests is probably beyond the capabilities of most local personnel who are new to the system. Appendixes contain language specifications, users' manuals, and a demonstration data base.

TR 77-B5. Moon, H. L., Buxton, W. A., & Manthey, G. E. (General Research Corporation). The status of infantry TOW, LAW, and Dragon training in USAREUR. November 1977. (AD A082 983)

This study was performed to determine the status of training for antiarmor infantry weapons TOW, LAW, and Dragon, and to recommend changes that would improve training effectiveness. Questionnaires and follow-up interviews were administered in infantry battalions (9 for TOW, 11 for LAW). For Dragon, which had been recently introduced in U.S. Army, Europe, two battalions were surveyed. For each of the weapons under study, findings were reported in five categories, cited below.

Attitudes Concerning Effectiveness: TOW was considered the most effective because of its long range, LAW was viewed skeptically because of its limited range and lethality, and Dragon was perceived as enhancing combat effectiveness without requiring changes in tactics.

Personnel Problems: For TOW, personnel turbulence was high, with median annual turnover estimates ranging from 40% for drivers to 100% for squad leaders. On any given day, an estimated one-third of personnel were unavailable for TOW training, and an estimated one-fifth were unavailable for LAW training. For Dragon, no personnel problems were evidenced.

Training Constraints: Deficiencies in training time, target-related equipment, instructor skills, and training equipment were apparent for all three weapons.

Training Program Development: For TOW and LAW, few respondents said they had lesson plans, and even fewer were in accordance with FM 21-6. For Dragon, respondents said they used available training materials.

Conduct of Training, Evaluation: For TOW and LAW, training was short of conditions and standards set forth in Draft TC 23-20. For Dragon, manual specifications were not followed. Respondents expressed dissatisfaction with several aspects of training.

General needs for all weapons under study included development of training programs for users, their superiors, and instructors; regular scheduling of training; setting of standards; availability of sufficient training equipment and sites (ammunition, battery chargers, firing ranges, etc.); improved maintenance capabilities; use of REALTRAIN exercises for trainees; and evaluation. Specific recommendations for each weapon are given in detail.

TR 78-B1. Bialek, H. M., Taylor, J. E., & Melching, W. H. (Human Resources Research Organization); Hiller, J. H., & Bloom, R. D. (ARI). Continuation of development of an individual extension training system for managing and conducting training in the Army unit. January 1978. (AD A077 989)

This report describes the continuation of a project to develop a performance-based training and evaluation system for individual skill development in unit settings, the Individual Extension Training System (IETS) model.

A feasibility tryout of prototype components in the field was performed with three rifle companies from an infantry battalion being reactivated. This field tryout showed encouraging results. Data were obtained from interviews with participants and by records of trained observers. Application guidelines were prepared, including an outline specifying systematic procedures to be followed by those persons developing task lessons and associated training materials. Finally, a large-scale study was designed to assess the operational effectiveness of the BTMS/IETS. The study has 15 subobjectives, which are delineated. Another study for skill maintenance was designed and planned. This study categorized all Skill Level 1 and 2 job tasks for MOS 11B and 11C.

TR 78-B2. Klein, R. D. (Litton Mellonics); Tierney, T. J., Jr. (ARI). Analysis of factors affecting the development of threat oriented small arms training facilities. February 1978. (AD B026 375)

To identify critical gaps between combat requirements and current infantry soldier training in required skills so that rifle marksmanship training can be improved, two sources of information were reviewed: (a) test procedures and techniques currently used in the instrumented small arms test facilities of various agencies, and test performance data; and (b) available combat data from sources such as films, interviews, and questionnaires.

It was found that current rifle marksmanship training lacked sufficient combat realism. However, the data indicated that much of the technology and measurement methodology associated with threat-oriented small arms testing can be applied directly to rifle marksmanship training. In addition, the data provided detailed guidance for developing realistic simulated combat target scenarios. Recommendations focused on performance standards and measurements and on training conditions such as terrain selection, firing team configuration, and firing positions. These recommendations were given to the Training Effectiveness Analysis Program of the U.S. Army Infantry School for use in design and evaluation of combat referenced rifle marksmanship training programs.

TR 78-B3. Goodman, B., Fischhoff, B., Lichtenstein, S., & Slovic, P. (Oregon Research Institute). The training of decision makers. March 1978. (AD A077 990)

This report presents the proceedings of a conference held at the Oregon Research Institute 8-9 July 1976, under ARI auspices. The conference

dealt with the lack of attention that had been paid to training decision-makers. The locus of decisionmaking was defined as including military leaders making tactical decisions on the basis of inadequate information. General and specific training regimens were discussed, and the current state of training programs for decisionmakers presented. A list of important research questions was compiled, with recommendations. Some key aspects of the training problem recommended for immediate attention were (a) training specific skills (research skills in experimental and applied psychology); (b) evaluating the quality of decisions, including assessment of the sensitivity of decisions to bias, and decisionmakers' assessments of their own decisions; and (c) implementing present knowledge, so that decisionmakers can learn to supplement "intuitive" judgments and quick decisions with knowledge gained from prior decision research.

TR 78-B4. Pask, G. Current approaches to decision making in complex systems: II. (Conference held at Richmond, Surrey, England, May 1976). March 1978. (AD A077 991)

This report compiles the papers presented at the Second Richmond Conference and should be considered in conjunction with #YR-76-81 on the First Richmond Conference. Representatives from the international business and university communities and from ARI attended. Training and learning were discussed under the following classifications: (a) cognitive operations in decisionmaking, (b) gaming and simulation and games as training systems, (c) application of specific decision theoretic methods, and (d) logics of action for command the control systems.

The following conclusions were reached: (a) Some individuals at least can be trained as decisionmakers, but this training should not be equated with training in probability assessment, simple laboratory choice selection, judgment, or the like. (b) There is no uniquely "best" decision training method but many techniques that do not work on their own (though they may contribute to a training process). (c) Decisionmaking is probably a collection of skills integrated in the framework of adequately generalized tasks. (d) In specific situations decision skill can be improved. Probably there is sufficient task generalization and transfer of learning for the decisionmaker to comprehend classes of skills. (e) Decisionmakers must learn (preferably in context) concepts, facts, principles, attitudes, procedures, and heuristics; some of these are usefully taught. (f) "Learning to Learn" applies to a decision situation (or class of situations) and involves formulating task representations and problems. (g) The optimum balance of aiding against training appears to be task dependent and dependent upon idiosyncracies of decision style. (h) Several coherent structuring schemes exist. The environment may also be personally structured by individuals who have "learned to learn."

TR 78-B5. Fingerman, P. W. (American Institutes for Research). A preliminary investigation of weapon-system dispersion and crew marksmanship. July 1978. (AD A077 992)

Since normal main gun round-to-round dispersion may cause inaccuracies in tank crew scores during crew gunnery qualification, the degree to which such dispersion can influence performance tests needed to be determined.

Data from the Armor Engineer Board, U.S. Army Armor School, were analyzed. These data consisted of 126 main gun rounds fired from an instrumented tank under varying conditions of motion, speed, terrain, and distance. All rounds were fired at stationary targets. Video recording provided both sight-picture and strike data.

The sight-picture and strike data for each round were statistically correlated and tested for significant differences. Tank crew performance scores were statistically factored out in order to focus exclusively on the dispersion inherent in the weapon system. Tables were developed to indicate maximum ranges at which a gunner could be expected to hit the target 95% or more of the time.

Results indicated that in using the weapons system for testing, steps must be taken to ensure accurate indications of gunner performance that might not be available from strike data. A larger scale study was recommended to verify these findings.

TR 78-B6. Brown, G. H., Wood, M. D., & Harris, J. D. (Human Resources Research Organization). Army recruiters: Criterion development and preliminary validation of a selection procedure. May 1978. (AD A077 993)

Research supporting the Army's recruiting activities was conducted to (a) develop a valid criterion of recruiter effectiveness and (b) develop and evaluate a recruiter selection test battery. Data were collected from a sample of 400 recruiters, and statistical analyses were performed to determine the theoretical yield to be expected from each recruiter's territory, on the basis of a multiple correlation between territorial characteristics and production records. A formula was developed to express each recruiter's effectiveness, comparing actual production with predicted production. Tests were assembled to measure recruiter characteristics considered likely to be associated with recruiting effectiveness; verbal fluency, sociability, achievement motivation, empathy, maturity/responsibility, and certain background characteristics.

The tests were administered to 45 very successful and 43 very unsuccessful recruiters. None of the individual test scores discriminated significantly between good and poor recruiters. One performance measure of verbal fluency and about 20 background-information items did discriminate significantly. However, these variables have not been cross-validated.

Three conclusions were drawn: (a) Production scores of recruiters are strongly influenced by the District Recruiting Command to which they are assigned. Of the variance in production scores, 50% derives from factors unrelated to the recruiter's individual characteristics. (b) Simple Achievement Scores appear to be a more equitable measure of a recruiter's effectiveness than other, more traditional measures. (c) Twenty background items that may be of value in selecting recruiters were identified, but their true value cannot be assessed without cross-validation.

TR 78-B7. Smith, D. E., & Gardner, R. L. (Desmatics, Inc.). An approach for providing more accurate probability assessments. May 1978. (AD A077 994)

This report describes a possible approach for providing more accurate probability assessments in real-world decisionmaking situations for which relative frequency information generally does not exist. In this approach, an estimated functional relationship is obtained from a comparison, in relative-frequency-base problems, of a person's posterior probability assessments with the true posterior probabilities. Then the functional relationship is used as a model to provide probability predictions for new problems by adjusting the person's corresponding probability assessments. Experimental evidence indicates that the resulting models can provide satisfactory probability predictions for problems having identical structure to those used in model construction.

At present, some obstacles prevent immediate use of these models for predicting probability in non-relative-frequency-base problems. But it may be feasible in future to develop a practical relative-frequency-base model for adjusting real-world probability estimates; this approach could be tested with participants and problems in a field of common expertise (for example, intelligence analysis or weather forecasting) where more uniformity of background and experience exists.

TR 78-B8. Nordlie, P. G. (Human Sciences Research, Inc.); Thomas, J. A. (ARI). Analysis and assessment of the Army Race Relations/Equal Opportunity Training Program: Summary report. July 1978. (AD A077 995)

This report summarizes six separate reports analyzing Race Relations/Equal Opportunity (RR/EO) training in the Army and assessing its impact. Research teams visited 18 installations in the United States and overseas in 1976, collecting data by survey questionnaires, individual and group interviews, and observation from military and civilian personnel of many different ranks and occupations.

Some measures of discrimination showed marked reductions in institutional racial discrimination (e.g., relative speed of promotion of white and nonwhite enlisted personnel). These positive trends appeared to be continuing. However, the trend toward improved racial attitudes and perceptions that appeared in 1972-74 had stopped by 1976. Race-related tensions persisted and appeared to be increasing, as increasing numbers of whites perceived themselves as victims of "reverse discrimination."

Two major problems with RR/EO unit training were documented: (a) not more than half the training required by regulations was actually given, and (b) the training itself was frequently of low quality, with subject matter not specifically race related. In addition, RR/EO instruction was considered a low-priority subject and was not taught by qualified instructors.

The report concluded that a more comprehensive, coherent, and articulated statement of EO doctrine was needed. The EO training program needed

to be made an integral part of all procedures through which the Army makes decisions about personnel.

TR 78-B9. Hiett, R. L., & Nordlie, P. G. (Human Sciences Research, Inc.). An analysis of the unit race relations training program in the U.S. Army. July 1978. (AD A077 996)

This report presents the results of surveys conducted to evaluate the Army Racial Awareness Program (RAP). First, 4,340 personnel were surveyed in 108 companies at posts in the continental United States and the Pacific.

In general, progress in the Racial Relations/Equal Opportunity (RR/EO) area had occurred, but racial tensions persisted and may have been growing. Fewer than half of all companies were conducting the required monthly RR/EO training. Training was given a low priority and focused on lower rank enlisted personnel. There was widespread dissatisfaction with the training program as it was then conducted. There was also confusion as to the objectives of the program.

Despite the problems, the results suggested that training, when conducted, was related to small but statistically significant changes in racial attitudes, perceptions, behaviors, and knowledge levels.

TR 78-B9A. Hiett, R. L., Gilbert, M., & Brown, D. K. (Human Sciences Research, Inc.). An analysis of the unit race relations training program in the U.S. Army (Technical Appendix). July 1978. (AD A077 997)

This report presents detailed technical discussion and documents as appendixes to a report (TR 78-B9) analyzing the unit race relations program in the U.S. Army. Appendix A discusses the methods used in selecting the companies for inclusion in the surveys and in identifying the particular individuals requested for the sample. Appendix B discusses in detail each interview form and questionnaire used, particularly the Race Relations/Equal Opportunity (RR/OE) Program Survey. Appendix C describes data processing procedures such as standards for exclusion of questionnaires and the effects of deleted respondents. Appendix D discusses in detail the relationship between various demographic variables and attitudes, perceptions, behavior, and knowledge levels. Appendix E describes the selection of units with higher and lower quality training programs and the effects of training on personnel in these units. Appendix F contains results of statistical tests for tables in the report.

TR 78-B10. Gilbert, M. A., & Nordlie, P. G. (Human Sciences Research, Inc.). An analysis of Race Relations/Equal Opportunity training in USAREUR. July 1978. (AD A077 998)

This report, one of a series about Army race relations and equal opportunity (RR/EO) training, describes and analyzes RR/EO training in U.S. Army, Europe (USAREUR) in 1976. Data were collected from a variety of personnel in seven installations in West Germany through questionnaire surveys, individual interviews, and group interviews.

Topics included are (a) Racial Climate in USAREUR, (b) Attitudes Toward and Perceptions of RR/EO Programs, (c) Conduct of RR/EO Training, (d) Changes in Attitudes and Perceptions, and (e) USAREUR Race Relations School. Conclusions were: (a) The racial climate in USAREUR was not improving; a surface calm could obscure underlying tensions. (b) More RR/EO training was being given in USAREUR than anywhere else in the Army. (c) The general consensus indicated a need for RR/EO training, although RR/EO programs have a fairly negative image. (d) A striking finding was the lack of change in perceptions and attitudes, for both Blacks and whites. The opinions held by both groups were stable and resistant to change in spite of the training program. (e) The USAREUR Race Relations School was doing a good job.

Despite the high emphasis placed on RR/EO training by the USAREUR command, the program suffered from lack of credibility. The chain-of-command personnel apparently had not been trained themselves so that they understood and accepted the RR/EO program goals.

TR 78-B12. Miller, E. E., & Bachta, J. M. (General Research Corporation). An experimental evaluation of a tactical game for company level training. July 1978. (AD A075 464)

As part of an effort to relate and use effectively new unit training concepts in U.S. Army, Europe (USAREUR), research investigated the potential of the Dunn-Kempf game. This highly adaptable board game uses miniaturized pieces to represent company and platoon level combined arms combat; various weapons systems and rules can be used to exercise command level skills for almost all Army Training and Evaluation Program (ARTEP) missions. In the experimental training reported here, seven company teams played the game for 4 days, one battle per day, using active defense scenarios. All groups received performance critiques after each battle.

All groups improved markedly, especially in battle conduct. Most striking improvement appeared in (a) relative priority assigned to high-threat targets, (b) coordination among team members, and (c) shifting of forces as the battle developed. The significance of effects from using different methods of conducting the game is uncertain.

The Dunn-Kempf game is useful in training company leaders in command and control functions. For effective implementation, a team should be sent to conduct a training workshop for teams from each division who would in turn train personnel at the brigade level. Game resources should be consolidated at the brigade level.

TR 78-B13. Nordlie, P. G., & Edmonds, W. S. (Human Sciences Research, Inc.); Goehring, D. J. (ARI). Commanders' handbook for assessing institutional discrimination in their units. July 1978. (AD A078 000)

This handbook is a management tool designed to aid commanders in carrying out their Equal Opportunity responsibilities in units of brigade and larger size. It is intended to provide the means for assessing and monitoring

equal opportunity status, with specific reference to the identification and eradication of institutional discrimination.

The book contains a review of chain-of-command responsibilities. It differentiates between institutional and personal discrimination and suggests how to determine whether institutional discrimination is present in the command and if so how to ameliorate the effects. The handbook recommends monitoring 27 areas involving local personnel decision processes. It explains how to use the Difference Indicator System and gives information on finding appropriate data. Hypothetical examples clarify the concepts and illustrate actions that commanders can take to bring about desired changes. Forms, ready for duplication, provide a convenient way to make calculations.

(TH Series)

TR 77-TH1. Phillips, J. R., & Berkhout, J. (University of South Dakota). Uses of computer-assisted instruction in developing psychomotor skills related to heavy machine operation. December 1977. (AD A050 888)

To determine the relative effectiveness of different formats of computer-assisted instruction (CAI) in teaching a motor skill, 60 male and female volunteers of similar age and experience in driving manual-transmission vehicles, participated in an experiment in which heavy-transmission gears had to be shifted to reach a predetermined speed in a specified time. Control group participants were given preliminary study in written manuals, quizzes, and machine practice time. Under control conditions, no significant differences between male and female performance patterns and learning abilities were found. Two additional all-male groups were trained under similar practice conditions with the addition of two types of computer monitoring of performance and feedback. One group received terminal feedback of numerical performance quality scores following each trial; the other group received continuous feedback of an analytic display (nominal road-speed against elapsed time as an X-Y plot) concurrent with each trial. Both experimental groups were tested for retention of skills after transition to a nonfeedback performance environment. Both forms of computer-assisted instruction proved significantly superior to the control procedure.

TR 77-TH2. Worchel, P., Sgro, J. A., & Cravens, R. W. (Virginia Polytechnic Institute and State University). Unit effectiveness and leadership in a changing society. November 1977. (AD A046 955)

A program of field and laboratory research with college-military students from three schools in the South and Southwest was directed at examining the differential reactions of individuals to varying patterns of leadership behavior and social dynamics of groups. The research focused on the personality and situational factors felt to be related to attractiveness of a group and willingness of group members to cooperate in attaining objectives. Personality variables that were manipulated included Rotter's "locus-of-control" and "interpersonal trust," Kohlberg's "level of moral development" and Marcia's "ego identity status." Primary situational variables were the forms of influence by the leaders (coercive and persuasive), the differential patterns of reward allocation, and intragroup conflict and cooperation.

Six major areas were investigated: (a) coercive and persuasive power: determinants and reactions; (b) self- vs. group-oriented leadership; (c) interpersonal trust and the delegation of authority; (d) the attractiveness of the military organization; (e) intra-group conflict: individual vs. unit objectives; and (f) value conflict and the legitimacy of authority.

This report presents a delineation of each area as well as the rationale, methodology, results, discussion, and conclusions for each.

TR 77-TH3. Fiedler, F. E., Mahar, L., & Chemers, M. M. (University of Washington). LEADER MATCH IV--Programmed instruction for the U.S. Army. November 1977. (AD A049 090)

This report is a programed instruction manual for the LEADER MATCH training program. The program is based on the Contingency Model of Leadership Effectiveness, a theory that the performance and success of a group or organization depends, not only on the leader's personality but also on the situation in which he or she must operate.

The manual's 12 chapters each begin with a brief discussion of the principles necessary to apply the leadership theory. The discussions are followed by exercises or "probes" to test the understanding of the chapter. Each probe is a short case study presenting a problem in leadership, and the user is asked to choose the best of several answers. Using the feedback from the answers, the user is informed if he or she made the best choice. Chapter summaries, review sections, self-tests, a bibliography, and a final exam are included.

When the LEADER MATCH training program was tested in four civilian organizations and four military settings with leaders trained by this method and with leaders not trained, the LEADER MATCH trained group was rated as performing more effectively than the nontrained group.

TR 78-TH1. Kagitcibasi, C. (Bogazici University, Istanbul, Turkey). Problems of adjustment and change through sojourn. February 1978. (AD A056 754)

This report presents information on various aspects of sojourn experience such as cultural factors (e.g., how one perceives his or her nation in relationship to the country of sojourn); attitudinal changes over time and the positive or negative effects of these changes; personality factors (e.g., motivation and prejudice, self-confidence, self-perception); and the overall quality of the sojourn experience. An earlier study that assessed the effects of sojourn experience on a group of Turkish students, who participated in the American Field Service Exchange Program, appears in shortened form. Studies of Americans abroad (both servicemen and civilians) point out some vital differences between the overseas sojourns of American military men and their families and those of persons sojourning in a nonisolated manner without the status of national representation. The recommendations concluding the report are intended to help American military personnel in Europe to better adjust to their new environment.

TR 78-TH2. Fiedler, F. E., & Mahar, L. (University of Washington); Carroll, R. M. (ARI). ROTC validation study of LEADER MATCH IV, programmed instruction in leadership for the U.S. Army. May 1978. (AD A056 108)

A self-paced leadership training program, LEADER MATCH IV (see TR 77-TH3), was tested in the ROTC Advanced Summer Camp for cadets at the end of their junior year of college. Of 18 schools having ROTC programs, 9 were randomly selected for the control condition. In the other nine schools, ROTC cadets were instructed to read the LEADER MATCH manuals carefully. At camp all cadets were randomly assigned to platoons, and each held four or five different leadership positions for 1 day each. Their leadership performances were evaluated by trained officer and NCO advisers as well as by peer ratings. Male and female cadets in the LEADER MATCH program performed significantly better on all leadership measures but no better on other performance measures than did cadets in the control condition.

(P Series)

TR P-77-5. Osborn, W. C., Campbell, R. C., & Ford, J. P. (Human Resources Research Organization); Hirshfeld, S. F., & Maier, M. H. (ARI). Handbook for the development of Skill Qualification Tests. November 1977. (AD A055 632)

Skill Qualification Tests (SQT) are the quality control instruments for the Army's Enlisted Personnel Management System. The tests, used to evaluate soldier's job mastery, are developed by personnel in Army agencies responsible for the various job specialties. Since the SQT entails a performance-oriented approach to proficiency testing, agency personnel must be trained in the techniques of SQT development. The present handbook was prepared for use by SQT developers in the Army. The handbook covers the technical and administrative procedures to follow in preparing a field-tested SQT. Included are techniques and procedures pertaining to (a) which job tasks to test, (b) what method of testing to use, (c) how to develop a hands-on test, (d) how to develop a performance-oriented written test, (e) how to validate tests, and (f) how to prepare guidance for test administration.

The Army Training and Doctrine Command (TRADOC) has distributed the handbook for use by Test Development Activities.

TR P-77-6. Human Factors Society. Training: Technology to policy. Proceedings of the May 1976 Symposium of the Potomac Chapter. December 1977. (AD A049 629)

This symposium examined the interrelationship between training technology, policy problems, and policy planning. Training was traced from the inception, development, test, and evaluation stages through the translation into policy and the implementation of that policy within selected groups within the Department of Defense, the Federal Communications Commission, the Office of Naval Research, Honeywell Corporation, Giant Foods, and the University of Maryland.

TR P-78-1. Abrams, A. J., & Kendall, A. W. (Data-Design Laboratories). Guidelines for the developers of videotape simulation performance tests. May 1978. (AD A059 123)

This handbook is intended for use by Army test developers who are considering audiovisual alternatives to the hands-on, written, and performance certification components of the Skill Qualification Test (SQT). It shows how to use audiovisual media in various combinations for simulated performance tests; some of these combinations are slide/sound, written tests accompanied by audio recordings, and videotapes. Videotapes are emphasized. Test development procedures presented in algorithmic form lead the reader step by step through the process of developing and constructing simulated performance tests. The guidelines cover ranking the list of critical tasks proposed for the SQT (prioritization), task allocation through logical analysis of task behavioral elements, test item formulation for maximum advantage in test media selected, and objective evaluation of the test.

TR-78-A13, a companion volume to this handbook, details the development and evaluation of a prototype videotape simulated performance test.

TR P-78-2. Horabin, I. (Technology for Learning); Katz, M. S., & Shields, J. L. (ARI). Maintenance of performance effectiveness. February 1978. (AD A056 813)

A workshop conducted by ARI explored whether the civilian sector uses successful techniques that are applicable or adaptable to the Army. Representatives from industry, a power utility, two government agencies, and Army research and operations participated. The workshop consisted of discussions based on position papers of interviews with nonmilitary participants and on problem case studies prepared by the Army.

The workshop addressed the following questions: What are the most efficient procedures for acquiring and maintaining proficiency? How often do tasks have to be performed, evaluated, or trained to ensure perfect performance when required? If a task is performed infrequently and not evaluated in regular activities, how should the Army supervisor or commander intervene?

The following key points were emphasized: (a) Performance problems must be dealt with at the level of specific problems. They are not amenable to general solutions. (b) Training is often not the only solution, or even a suitable solution to performance problems. (c) Solutions to performance problems must include the supervisors of the employees. The supervisor's performance is crucial to the maintenance of effectiveness. (d) While technology can provide valuable assistance to the supervisor in the development and maintenance of effectiveness, technological solutions, by themselves, do not work. (e) Normative models such as retention curves are not used by the civilian performance problem solvers to set individual training or practice schedules.

TR P-78-6. Hirshfeld, S. F. (ARI); Bart, W. M. (University of Minnesota). Algebraic systems: Applications in the behavioral and social sciences. February 1978. (AD A070 103)

This book provides an introduction to the use of algebra in the behavioral and social sciences and describes several algebraic systems. It is intended to be a sourcebook for theoretical conceptualizations for both students and professionals.

Algebra has the following qualities that make it useful to the behavioral sciences: (a) it is natural, a rigorous articulation and logical extension of patterns of reasoning common to people; (b) it has a precise language; and (c) it has a decisively synthesizing effect on mathematics, an effect it would also have on behavioral sciences.

The eight chapters cover set theory, relations, mappings, groups, the application of groups to psychology, rings and fields, vector spaces and linear transformations, and matrices and their applications. The book includes a bibliography and general references.

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