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Technical Report 862

Improving the Selection, Classification, and Utilization of Army Enlisted Personnel: Annual Report, 1987 Fiscal Year

John P. Campbell, Editor
Human Resources Research Organization

October 1989

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This report describes research during the fifth year (FY87) of Project A, the Army's long-term program to develop a complete system for selecting and classifying entry-level enlisted personnel. During the fifth year, data obtained from administering experimental predictor and criterion measures to 9,500 soldiers in the project's concurrent validation stage was used to consider alternatives to the current Aptitude Area composites, evaluate methods for weighting criterion components in a composite index, and estimate the utility of various MOS/performance level combinations. Job analysis of second-tour performance was begun in preparation for future second-tour testing. Beginning the longitudinal validation stage, predictor tests were administered to approximately 48,000 1986/87 accessions in 21 MOS; samples from each MOS will subsequently be tested on first-tour and second-tour performance. This report is supplemented by a U.S. Army Research Institute Research Note (in preparation), which contains technical papers prepared during the year on specialized aspects of the project.

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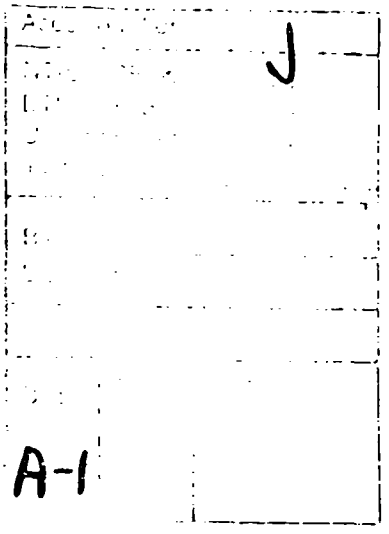
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Improving the Selection, Classification, and Utilization of Army Enlisted Personnel: Annual Report, 1987 Fiscal Year

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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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FOREWORD

This document is a description of the research effort of the fifth year (Fiscal Year 1987) of the Army's current, large-scale manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. The thrust for the project came from the practical, professional, and legal need to validate the Armed Services Vocational Aptitude Battery (ASVAB--the current U.S. military selection/classification test battery) and other selection variables as predictors of training and performance.

The portion of the effort described herein is devoted to the development and validation of Army Selection and Classification measures, referred to as "Project A." Project A is being conducted under contract to the Selection and Classification Technical Area (SCTA) of the Manpower and Personnel Research Laboratory (MPRL) at the U.S. Army Research Institute for the Behavioral and Social Sciences. This research supports the MPRL and SCTA mission to improve the Army's capability to select and classify its applicants for enlistment or reenlistment by ensuring that fair and valid measures are developed for evaluating applicant potential based on expected job performance and usefulness to the Army.

Project A was authorized through a letter, Deputy Chief of Staff for Operations, "Army Research Project to Validate the Predictive Value of the Armed Services Vocational Aptitude Battery," effective 19 November 1980; and a Memorandum, Assistant Secretary of Defense, Manpower Reserve Affairs & Logistics (MRA&L), "Enlistment Standards," effective 11 September 1980.

In order to ensure that Project A research achieves its full scientific potential and will be useful to the Army, a governance advisory group comprised of Army general officers, interservice scientists, and experts in personnel measurement, selection, and classification was established. Members of the expert component provide guidance on technical aspects of the research, while general officer and interservice components oversee the entire research effort, provide military judgment, provide periodic reviews of the project's progress, results, and plans, and coordinate within their commands. Members of General Officers' Advisory Group during the period covered by this report included MG W. G. O'Leksy (DMPM) (Chair), MG J. B. Allen, Jr. (DCSOPS), MG T.J.P. Jones (FORSCOM, DCSPER), MG G. Mallory (TRADOC, DCS-T), and BG P. M. Mallory (USAREUR, ADCSOPS). This group was briefed in May 1987 on the results of the concurrent validation, the preliminary results of the second-tour job analysis, and the plans for the longitudinal validation data collection. Members of Project A's Scientific Advisory Group guide the technical quality of the research. During the period covered by this report, they included Drs. Philip Bobko, Thomas Cook, Milton Hakel (Chair), Lloyd Humphreys, Lawrence Johnson, Robert Linn, Mary Tenopyr, and Jay Uhlaner. This group was briefed in March 1987 on the status of the second-tour job analysis, the final resolution of utility measurement issues, and the reanalysis of the aptitude area composites. They were briefed in September 1987 on the results of the utility and construct weighting research and the plans for second-tour criterion measurement.

A comprehensive set of new selection/classification tests and job performance/training criteria has been developed and field tested, and the revised tests have been administered in a large-scale concurrent validation data collection effort. The present report on FY87 work includes a reanalysis of ASVAB aptitude area composites using Project A criterion measures, a complete account of the work done to estimate performance component weights for the Batch A and Batch Z military occupational specialties (MOS) tested during the concurrent validation, an estimate of MOS-by-performance-level utility values, description of the job analysis procedures developed for second-tour job incumbents in the Batch A MOS, and the procedures being used to administer the Experimental Predictor Battery to the longitudinal validation sample. Results will be used to link enlistment standards to required job performance standards and to more accurately assign soldiers to Army jobs.



EDGAR M. JOHNSON
Technical Director,

PREFACE

At the end of the 1987 fiscal year the U.S. Army project for Improving the Selection, Classification, and Utilization of Army Enlisted Personnel (Project A) was still on schedule and had continued to meet all its major milestones. The level of commitment to a totally successful project remains extremely high. This state of affairs is especially gratifying given that FY87 was the fifth year of an intense effort that has continually placed very high demands on the staffs of the contractor consortium and the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). The principal scientist again wishes to thank all the people who work on Project A for high marks on both the "can do" and "will do" components of performance. We wish also to express our continued appreciation to the Army and to ARI for their continued support and for their collegial associations, which we hope have been mutually beneficial.

Fiscal year 1987 was something of a transition year between the completion and basic analysis of the results of the 1985 Concurrent Validation (CV) and the Longitudinal Validation (LV) followup. The basic CV validity analyses, performance utility scaling, and performance components (criterion composite) weighting efforts were completed. The administration of the Experimental Battery to the new 1986/1987 accessions in the LV sample was also virtually completed, but some individuals still had to complete Advanced Individual Training, at which time the training performance measures were administered. Finally, planning was well under way for the 1988 LV collection of data from criterion measures. This part of the effort included the design of job performance measures for the noncommissioned officers in their second tour who were part of the Project A 1983/1984 cohort.

The Annual Report for Fiscal Year 1987 summarizes the work done on the major components of this transition phase. In Chapter 2 the Project A analysis group reports on their efforts to use the Concurrent Validation sample results to design optimal ASVAB Aptitude Area composites. Chapter 3 describes the method and results of our effort to capture the MOS-specific importance weights for the individual components of total performance. Chapter 4 reports the results of the Project A procedure for generating utility values for different levels of performance within each entry-level MOS. The second-tour NCOs will be included in the LV followup sample and Chapter 5 reports the method and results of the job analyses of second-tour positions, in preparation for the development of NCO criterion performance measures. Finally, the procedure for administering the Experimental Battery of selection/classification tests to new accessions as part of the Longitudinal Validation is outlined in Chapter 6.

This annual report was generated by asking the individual project members responsible for a particular effort to summarize their work during 1987. These drafts were then edited to a common format and combined with earlier material if that was necessary to complete the story. For example, the work on composite weighting and utility scaling began before FY87 and the entire account is summarized here. We felt it was better, if possible, to give an inclusive description of a major project activity rather than report only what actually

transpired during 1987. Authorship of the draft version for each chapter is given in a footnote on the chapter title page. The editor wishes to thank the contributoprs for their valuable materials and to apologize for any injustices that may have been done during the final editing.

In sum, FY87 laid the foundation for the vitally important longitudinal followup and the future analytic work that will be necessary to build an optimal system for selection/classification decision making. The future of Project A promises to be even more intense than its past.

John P. Campbell
Editor

IMPROVING THE SELECTION, CLASSIFICATION, AND UTILIZATION OF ARMY ENLISTED PERSONNEL: ANNUAL REPORT, 1987 FISCAL YEAR

EXECUTIVE SUMMARY

Requirement:

Project A is a comprehensive U.S. Army program to develop an improved system to select and classify enlisted personnel. The system encompasses 675,000 persons and several hundred military occupational specialties (MOS). The objectives are to (a) validate existing selection measures against both existing and project-developed criteria and develop new measures, and (b) validate early criteria (e.g., performance in training) as predictors of later criteria (e.g., job performance) to improve assignment and promotion decisions.

Procedure:

With the Deputy Chief of Staff for Personnel (DCSPER) as sponsor, work on the long-term project was begun in 1982. In the first stage, relationships between the scores applicants made on the Armed Services Vocational Aptitude Battery (ASVAB) and their later performance in training and first-tour skill tests were explored using file data for FY81/82 Army accessions.

The second stage was executed with FY83/84 accessions in 19 MOS, selected as representative of the Army's 250+ entry-level MOS and accounting for 45 percent of Army accessions. A preliminary battery of predictor measures (perceptual, spatial, temperament, interest, and biodata) was tested with several thousand soldiers as they entered four MOS; revised versions were field tested with nine MOS. The resulting predictor battery and a comprehensive set of job knowledge tests, hands-on job tests, and performance ratings were administered in 1985 to 9,500 soldiers in 19 MOS in the "Concurrent Validation." The results were used to analyze the components of first-tour performance on the job (General Soldiering Skills, MOS-Specific Skills, Leadership/Effort, Personal Discipline, Military Bearing/Physical Fitness), and to compare the validities of the current ASVAB composites and the added predictor measures for predicting job performance.

In the third stage, known as the "Longitudinal Validation," the revised predictor measures were used to test more than 49,000 recruits at the time they entered 21 MOS in FY86/87. Soldiers from this sample are being tested on their performance during training and during their first tour on the job. Soldiers from the 83/84 and 86/87 sample will also be tested on their second-tour performance.

Findings:

The effectiveness of current ASVAB Aptitude Area composites for predicting successful Army performance was analyzed on the basis of Concurrent Validation test data, and modifications in composites and in the assignment of MOS to Aptitude Areas were proposed.

Methods were developed and are available for weighting the various components of the criterion tests to provide composite scores of job performance that could be used for classification/selection purposes.

Methods were developed and are available for estimating the utility of various combinations of MOS and performance level as a selection tool. Utility values at five performance levels were calculated for 273 entry-level MOS.

The predictor and criterion tests developed during the earlier stages are now being used to measure the performance of a large sample of soldiers during their first tour.

Utilization of Findings:

The Project A tests for predicting and measuring training and job performance are being used in both current and long-range research programs that are expected to make the Army more effective in matching the requirements for first-tour enlisted manpower with the personnel resources that are available to the Army.

IMPROVING THE SELECTION, CLASSIFICATION, AND UTILIZATION OF ARMY ENLISTED PERSONNEL: ANNUAL REPORT, 1987 FISCAL YEAR

OVERVIEW OF PROJECT A

Project A is a comprehensive long-range research and development program the U.S. Army has undertaken to develop an improved system for selecting and classifying enlisted personnel. The Army's goal is to increase its effectiveness in matching first-tour enlisted manpower requirements with available personnel resources through use of new and improved selection/classification tests that will validly predict carefully developed measures of job performance. The project addresses the Army's 675,000-person enlisted personnel system encompassing several hundred military occupations.

The program began in 1980, when the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) started planning the extensive research needed to develop the desired system. In 1982 ARI selected a consortium, led by Human Resources Research Organization (HumRRO) and including American Institutes for Research (AIR) and Personnel Decisions Research Institute (PDRI), to undertake the 9-year project. It is utilizing the services of 40 to 50 ARI and consortium researchers working collegially in a variety of professional specialties. The Project A objectives are to

- Validate existing selection measures against both existing and project-developed criteria (including both Army-wide job performance measures based on rating scales and direct hands-on measures of MOS-specific task performance).
- Develop and validate new selection and classification measures of other human attributes that underlie success on the job.
- Determine the relative utility to the Army of different performance levels across MOS.

The research design incorporates three main stages of data collection and analysis in an iterative progression of development, testing, evaluation, and further development of selection/classification instruments (predictors) and measures of job performance (criteria). In the first iteration, file data from fiscal years (FY) 1981/1982 were evaluated to explore relationships between scores of applicants on the Armed Services Vocational Aptitude Battery (ASVAB) and their later performance in training and their scores on first-tour Skill Qualification Tests (SQT).

For the ensuing research, 19 Military Occupational Specialties (MOS) were selected as a representative sample of the Army's 250+ entry-level MOS. The selection was based on an initial clustering of MOS derived from rated similarities of job content. These MOS account for about 45 percent of Army accessions and provide sample sizes large enough so that race and sex fairness can be empirically evaluated in most MOS.

In the second iteration, a Concurrent Validation design was executed with FY83/84 accessions. A "Preliminary Battery" of perceptual, spatial, temperament, interest, and biodata predictor measures was developed and tested with several thousand soldiers as they entered four MOS. The data from this sample were then used to refine the measures, with further exploration of content and format. The revised set of measures was field tested to assess reliabilities, "fakability," practice effects, and other factors. The resulting predictor battery, the "Trial Battery," was administered together with a comprehensive set of job performance indexes based on job knowledge tests, hands-on job samples, and performance rating measures, in the Concurrent Validation during the summer and fall of 1985. The results of the Concurrent Validation were used to form five "constructs" of the components of performance and to report to the Army the validity of the ASVAB for predicting job performance as well as the incremental validities of the Trial Battery components over ASVAB predictors.

On the basis of this experience, the "Trial Battery" was revised as the "Experimental Predictor Battery," which in turn is being administered in the third iteration, the Longitudinal Validation stage, which began in the late summer of 1986. All measures are being administered in a true predictive validity design. About 50,000 soldiers across 21 MOS are included in the FY86-87 initial administration and the subsequent measurement of first-tour performance. About 3,500 of these soldiers are expected to be available for second-tour performance measurement in FY91. Three MOS (19K, 29E, and 96B) were added to the original 19, and one of the original MOS (76W) was dropped.

For administrative purposes, Project A is divided into five research tasks: Task 1, Validity Analyses and Data Base Management; Task 2, Developing Predictors of Job Performance; Task 3, Developing Measures of School/Training Success; Task 4, Developing Measures of Army-Wide Performance; Task 5, Developing MOS-Specific Performance Measures.

Activities during the first four years of Project A were reported as follows: FY83, ARI Research Report 1347 and its Technical Appendix, ARI Research Note 83-37; FY84, ARI Research Report 1393 and two related reports, ARI Technical Report 660 and ARI Research Note 85-14; FY85, ARI Technical Report 746 and ARI Research Note 87-54; FY86, ARI Technical Report 792 and ARI Research Note 88-36. The present FY87 report is supplemented by ARI Research Note (in preparation). These reports list other publications on specific Project A activities.

IMPROVING THE SELECTION, CLASSIFICATION, AND UTILIZATION OF ARMY ENLISTED PERSONNEL: ANNUAL REPORT, 1987 FISCAL YEAR

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IMPROVING THE SELECTION, CLASSIFICATION, AND UTILIZATION OF ARMY ENLISTED PERSONNEL: ANNUAL REPORT, 1987 FISCAL YEAR

Chapter 1

HIGHLIGHTS OF FISCAL YEAR 1987 AND OBJECTIVES OF THIS REPORT

This report is intended to be a summary of the major activities in the research program of the Army Selection and Classification Project (Project A) during fiscal year 1987 (FY87). Project A Annual Reports for the four preceding years concentrated respectively on a description of research planning and basic preparation (FY83), the initial stages of the development of new predictor and criterion tests (FY84), a comprehensive summary of the process and products of predictor/criterion development and field testing (FY85), and the basic analysis and results of the Concurrent Validation tests (FY86).

Briefly restated, the operational objectives of Project A are to

- Develop new measures of job performance that the Army can use as criteria against which to validate selection/classification measures.
- Validate existing selection measures against both existing and project-developed criteria.
- Develop and validate new selection and classification measures of other human attributes that underlie success on the job.
- Develop a utility scale for different performance levels across military occupational specialties (MOS).

In addition, a number of related and derivative research objectives have been addressed in the overall research program.

STATE OF PROJECT A AS OF 30 SEPTEMBER 1987

In FY87 the Army Selection and Classification Project entered a critical period. As shown in Figure 1.1, which is a summary of the original research design schedule, the project should be (a) in the midst of finishing the administration of the Experimental Predictor Battery to more than 50,000 new accessions in 21 MOS (the 86/87 cohort); (b) planning for the longitudinal followup and performance assessment of soldiers from this

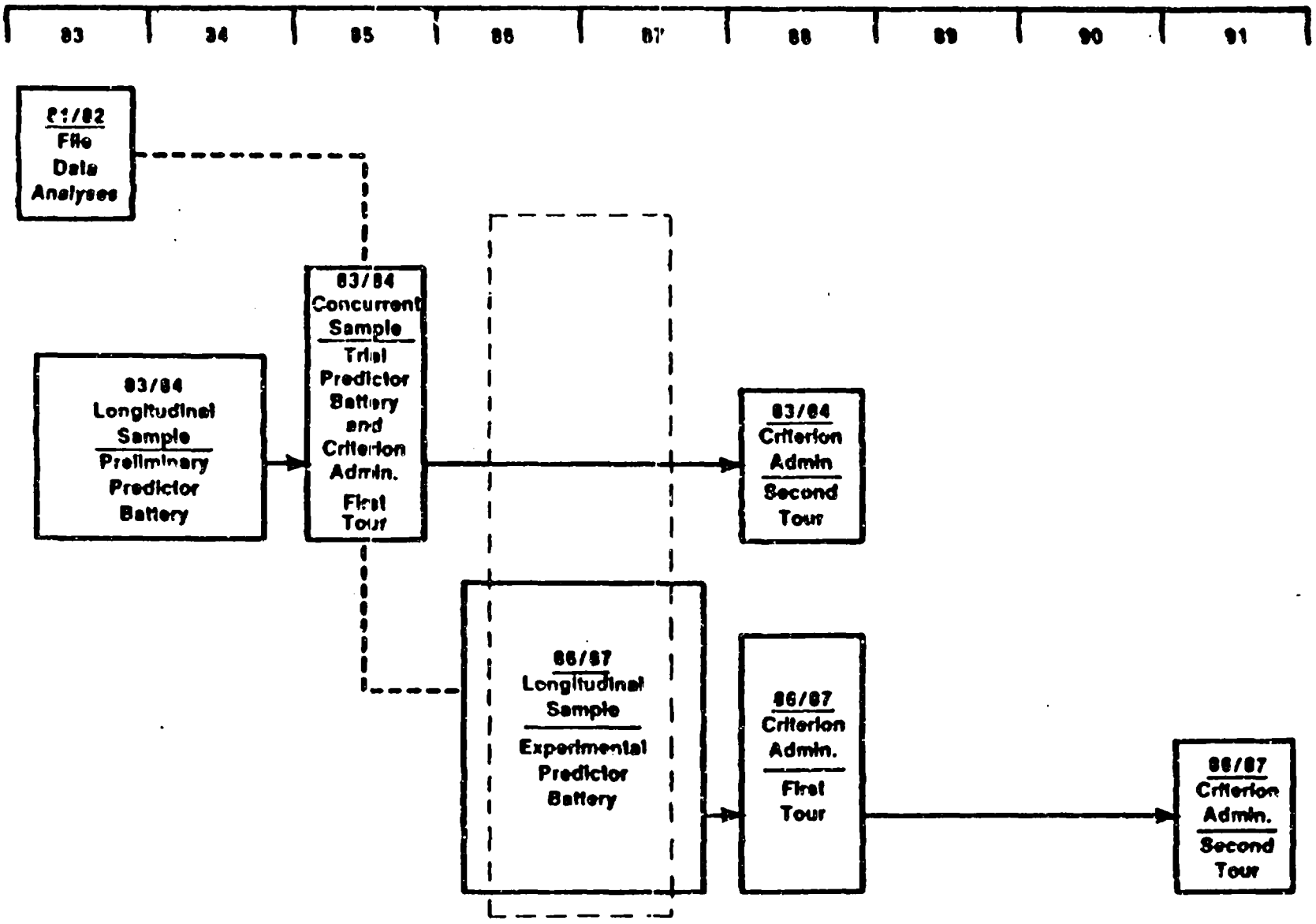


Figure 1.1. The overall research design for Project A.

sample in 1988/89; (c) planning for the second-tour followup of the Concurrent Validation (CV) sample (i.e., the 83/84 cohort); and (d) continuing the analysis of the CV sample data. At the close of FY87, five years after it began, Project A was still on its original schedule.

By virtue of being on schedule, the following major objectives of the project have been accomplished:

- A 4-hour prediction battery of new experimental selection/classification tests has been developed and validated on a concurrent sample of 9,450 incumbents drawn from 19 MOS.

- To provide criteria for validation purposes, a 12-hour performance assessment battery has been developed, field tested, and administered to the CV sample.

- Results from the CV administration have been used to formulate a five-factor model of first-tour performance for enlisted personnel. The differential prediction across criterion factors and across jobs has been analyzed and parameter estimates are available for use in simulation runs of the enlisted personnel allocation system (EPAS).

- Finally, for purposes of developing a complete selection/classification prediction system, criterion component weights and MOS-by-performance-level utility values have been estimated, using expert judgment scaling techniques.

Detailed information concerning the development of the predictor battery and the first-tour job and training performance measures is given in the Annual Report for FY85 (Campbell, 1985). Results from the Concurrent Validation are presented in the Annual Report for FY86 (Campbell, 1986a). Work accomplished during FY87 is described in this report, as outlined below.

CONTENT OF THIS REPORT

The work summarized in this report was performed in several different parts of the Project A organization. Consequently, the chapters cover a series of more discrete topics than was the case in the reports for FY85 and FY86.

The significant organizational events that occurred during FY87 are summarized in this chapter (Chapter 1). A reanalysis of the current Aptitude Area composites based on the Armed Services Vocational Aptitude Battery (ASVAB), using Project A criterion measures, will be described and the results reported, in Chapter 2.

Chapter 3 is a complete account of the work done to estimate weights for the various components of performance for the MOS tested in the Concurrent Validation phase. Both the weights and a procedure for using them to estimate composite criterion scores are now available.

A similar report for estimating MOS-by-performance-level utility values is given in Chapter 4. A two-step procedure was used to estimate a ratio scale utility value for five levels of performance in each of 273 Army entry-level MOS.

Chapter 5 describes the job analysis procedures and initial results for second-tour job incumbents in the nine MOS (Batch A) used in Project A's initial test development and field tests with soldiers of the 83/84 sample. These job analyses are the basic preparation for the development of MCO job performance measures that will be carried out in FY88.

Finally, Chapter 6 outlines the procedures being used to administer the Experimental Predictor Battery to the Longitudinal Validation sample of 21 MOS. As of the end of FY87, the predictor battery had been administered to approximately 48,000 new 86/87 accessions being processed at reception centers.

In sum, Chapters 2, 3, and 4 address issues that are relevant for the operational use of a modified selection/classification system by the Army. Chapters 5 and 6 pertain to the second major data collection, the Longitudinal Validation and second-tour follow-up. Chapter 7 provides a brief description of what remains to be done.

ORGANIZATIONAL EVENTS IN FY87

The composition of the Project A governance groups and the organization of the research and oversight staff at the end of FY87 are shown in Figures 1.2 and 1.3.

Among the significant organizational events for Project A during FY87 were the following:

- Dr. Marvin H. Goer retired from HumRRO in February 1987. His position as Project Director was filled by Mr. James H. Harris.
- Two of the original Project A tasks -- Developing Predictors of Job Performance (Task 2) and Developing Measures of School/Training Success (Task 3) -- ended as of 30 September 1987. The respective staffs for each task prepared final reports of Task activities.
- Administration of the Experimental Predictor Battery to a sample of approximately 50,000 recruits in 21 MOS was virtually completed. Results from these tests provide the basic data for use in the Longitudinal Validation process, through measurement of first- and second-tour performance of soldiers from this sample.

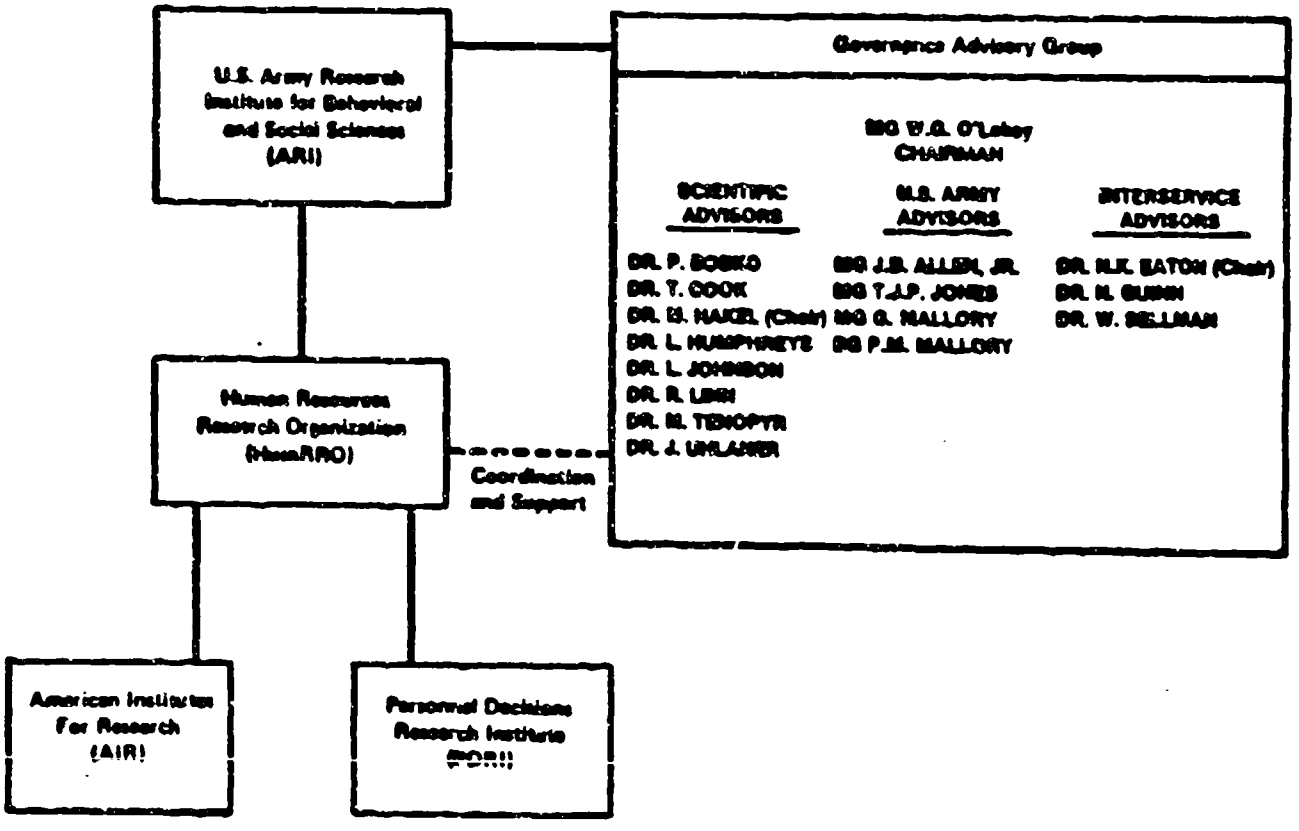


Figure 1.2. Project A organization as of 30 September 1987.

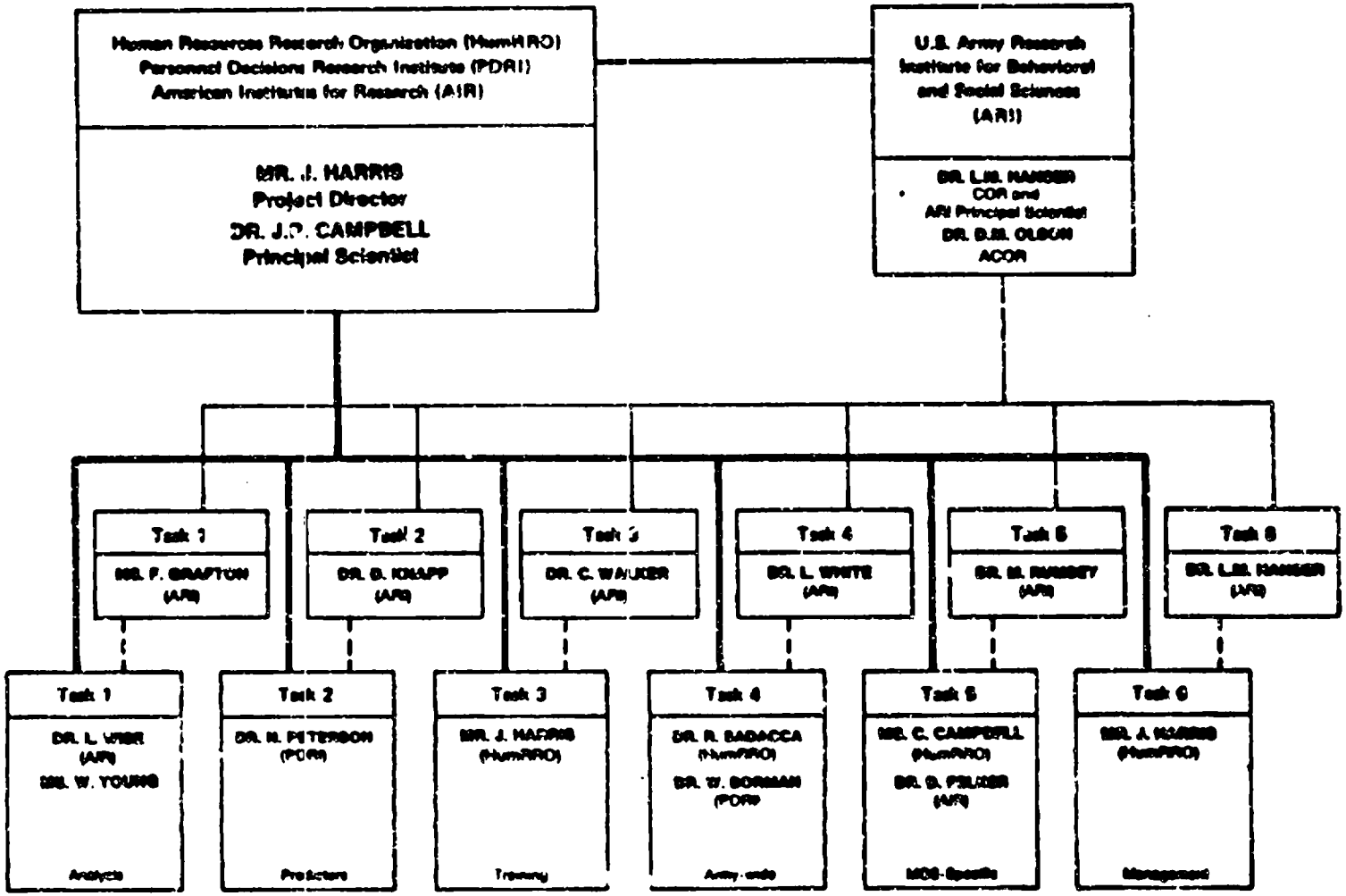


Figure 1.3. Project A management group as of 30 September 1987.

- Work was completed on two aspects of the process of selecting and classifying personnel -- a system for weighting various criterion components, and a set of estimated values for MOS-by-performance-level utility.

- The Scientific Advisory Group and the General Officers' Advisory Group each independently endorsed the second-tour criterion measurement plan. That plan calls for the development of second-tour measures for <u>all</u> Batch A MOS.

- Work was completed on an extensive analysis of data generated from Project A and Skill Qualification Tests (SQT) to estimate potential benefits from possible realignment of Aptitude Area composites or reassignment of MOS to different composites.

Chapter 2

PROJECT A ANALYSIS OF ASVAB APTITUDE AREA COMPOSITES [1]

During FY87 the Project A staff completed an extensive analysis of file data and project-generated data for the purpose of recommending possible changes in the ASVAB Aptitude Area composites. Current Army enlistment policies require an applicant to pass two separate cognitive abilities screens based on ASVAB subtests. There are 10 subtests:

- Word Knowledge (WK)
- Paragraph Comprehension (PC)
- Arithmetic Reasoning (AR)
- Mathematical Knowledge (MK)
- Mechanical Comprehension (MC)
- Coding Speed (CS)
- Numerical Operations (NO)
- General Science Information (GS)
- Auto/Shop Information (AS)
- Electronics Information (EI)

In practice, the first two subtests are combined into a single Verbal (VE) score, leading to a total of nine subtests.

One composite of these subtests, known as the Armed Forces Qualification Test (AFQT), is used by all Services as a general measure of trainability. To qualify for enlistment into the Army, an applicant must achieve at least a minimum-level AFQT score. To qualify for enlistment bonuses, an applicant must score in the upper 50th percentile range (based on norms for the 1980 youth population).

In addition to the AFQT, the Army uses nine other composites of ASVAB subtests, called Aptitude Area (AA) composites, to assess applicant qualification for enlistment into particular MOS. Nearly all enlisted MOS are associated with one of these nine composites, and an applicant must achieve a specified minimum score on the associated composite to qualify for enlistment into the MOS. These nine AA composites are unique to the Army. The other Services use a similar, but separate, system of composites to qualify applicants for particular specialties. The nine Army composites are:

- Clerical (CL)
- Combat (CO)

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[1] This chapter is based on an initial draft by Lauress L. Wise of the American Institutes for Research. Material was also drawn from Wise, McHenry, Rossmeissl, and Oppler (1986).

- Electronics (EL)
- Field Artillery (FA)
- General Maintenance (GM)
- Mechanical Maintenance (MM)
- Operators/Food (OF)
- Surveillance/Communication (SC)
- Skilled Technical (ST)

As one of the first research efforts under Project A, in FY84, the staff conducted analyses of ASVAB validities, using a combination of training measures and scores from the Skill Qualification Tests. Two of the AA composites (Clerical and Surveillance/Communication) were modified by the Army as a result of these analyses (McLaughlin, Rossmeissl, Wise, Brandt, & Wang, 1984).

In FY87, Project A staff conducted new analyses of the validities of the current AA composites and various alternatives for predicting performance in enlisted MOS. The three phases to these analyses were

- Consideration of redefining the current AA composites, based primarily on analyses of 19 Project A MOS and using Project A criterion measures.

- Evaluation of options for significantly reducing the number of composites, based on both Project A and SQT criteria.

- Identification of optimal reassignments of MOS to current or slightly modified AA composites, based primarily on SQT criteria.

These three phases were chronological as well as logical steps in the analyses. The procedures and results of each phase will be discussed in turn. Results will then be summarized and conclusions stated.

CONSIDERATION OF REDEFINING THE CURRENT AA COMPOSITES

This part of the analysis began with the use of Project A data as criteria for evaluating alternative definitions for each of the current AA composites. The results were presented to the Military Testing Association in November 1986 (Wise et al., 1986).

AA composites are defined as unweighted sums of four or fewer of the standardized subtest scores. There are 255 such possible composites (126 using four subtests, 84 using three, 36 using two, and 9 using a single subtest). All of them were evaluated using data from the Project A Concurrent Validation.

The CV data included the new Project A job performance measures applied to more than 9,000 soldiers in 19 different MOS. The MOS used in the CV phase were:

11B	Infantryman	63B	Light Wheel Vehicle Mechanic
12B	Combat Eng'neer	64C	Motor Transport Operator
13B	Cannon Crewman	67N	Utility Helicopter Repairer
16S	MANPADS Crewman	71L	Administrative Specialist
19E	Armor Crewman	76W	Petroleum Supply Specialist
27E	TOW/Dragon Repairer	76Y	Unit Supply Specialist
31C	Single Channel Radio Operator	91A	Medical Specialist
51B	Carpentry/Masonry Specialist	94B	Food Service Specialist
54E	Chemical Operations Specialist	95B	Military Police
55B	Ammunition Specialist		

Project A performance measures have been organized into five "constructs," reflecting dimensions of soldier performance (Campbell, 1986a). Four of these constructs (General Soldiering Proficiency, Effort and Leadership, Personal Discipline, and Physical Fitness and Military Bearing) are the same for all MOS. The fifth construct, Core Technical Proficiency (CTP), covers aspects of job performance unique to each MOS and is appropriate for validating AA scores, which are used as job-specific selection criteria.

Table 2.1 shows CV sample sizes by MOS, race, and gender and presents the mean scores and standard deviations for the ASVAB subtests and the CTP criterion.

Criteria Used to Evaluate Composites

Four separate criteria were used in evaluating current and alternative composites: (a) predictive validity, (b) fairness to blacks and females, (c) classification efficiency, and (d) face validity. Each criterion is described briefly before the results are discussed.

Predictive Validity. The correlation of each composite with the CTP score was adjusted for restriction of range due to explicit selection. A multivariate correction from Lawley (Lord & Novick, 1968, p. 146) was used with each of the ASVAB subtests treated as a separate selection variable. The result was used as the measure of predictive validity.

No adjustment was made for "shrinkage" in cross-validation since separate regression coefficients were not estimated. For evaluation of the current composites, this is entirely appropriate. Because we did pick among a large number of alternative composites on the basis of the data at hand, some shrinkage should be expected for the alternatives that appear most extreme. Conventional shrinkage formulas do not handle this situation, so our best approach is to be somewhat conservative in adopting new alternatives to the existing composites.

Table 2.1

Descriptive Statistics From Initial ASVAB Analysis Of Concurrent Validation Sample

MOS[a]	COMP	GROUP	N	MEAN										STANDARD DEVIATION									
				CTP	GS	AR	WK	EI	MC	AS	MK	MC	AI	CTP	GS	AR	WK	EI	MC	AS	MK	MC	AI
*11B: INFANTRY	CO	ALL	4491	514	529	539	519	525	515	557	515	551	533	80	80	75	83	84	83	76	78	75	75
*12B: COMBAT ENG	CO	ALL	944	509	506	527	496	510	499	535	502	539	522	96	86	78	71	86	80	81	77	83	76
		BLACK	108	453	433	482	440	495	480	479	460	478	473	78	66	67	58	85	54	65	67	58	57
		WHITE	385	529	533	542	519	514	501	584	513	559	539	84	77	78	62	86	61	85	83	81	73
*13B: CANNON CREW	FA	ALL	484	510	487	519	488	514	497	514	495	509	502	85	87	89	78	81	85	91	86	85	78
		BLACK	146	485	438	491	456	516	495	458	478	486	487	86	76	80	68	99	88	71	85	78	67
		WHITE	250	528	528	544	518	513	501	563	507	546	535	82	75	85	57	81	83	76	71	76	69
*14S: PWRPAD CREW	OF	ALL	338	516	509	519	505	527	498	548	495	531	527	94	81	79	86	84	75	81	77	86	76
		BLACK	89	494	449	489	460	549	489	481	464	477	486	78	77	87	82	89	75	87	85	87	80
		WHITE	232	526	554	541	526	522	500	578	510	553	546	99	71	77	82	85	76	88	81	79	74
*19E: ARMOR CREW	CO	ALL	394	514	527	536	513	515	506	567	515	549	535	75	84	73	69	86	87	79	77	78	80
		BLACK	71	469	459	497	465	499	483	497	477	488	474	89	77	96	84	85	87	86	83	83	83
		WHITE	297	524	548	547	530	517	511	588	523	568	553	75	75	74	60	85	86	78	76	73	76
27E: TOM/ORG REP	EL	ALL	123	505	540	552	526	518	506	561	532	548	540	101	86	82	98	89	90	75	89	72	79
31C: RADIO/TTY	SC	ALL	289	508	518	540	521	554	547	547	521	527	514	88	76	72	99	94	90	80	79	86	79
		BLACK	74	488	461	496	494	564	557	498	493	479	482	89	88	71	80	94	94	78	83	77	84
		WHITE	204	513	538	555	532	550	542	585	529	543	525	89	68	86	96	96	96	77	82	86	82
51B: CRPNT/MASNRY	CN	ALL	69	513	508	510	497	505	481	595	491	526	533	101	72	72	80	78	86	78	87	76	84
54E: NBC SPEC	ST	ALL	340	507	540	543	529	517	503	543	533	543	531	99	71	73	97	78	89	82	76	72	78
		BLACK	84	466	505	516	515	508	482	485	516	500	495	93	66	89	96	78	72	83	84	85	88
		WHITE	223	521	558	554	541	520	511	571	538	562	549	95	64	76	92	71	87	76	76	78	71
55B: AMMO SPEC	MN	ALL	203	507	497	495	475	491	476	526	481	490	525	97	64	85	82	84	88	89	88	78	97
		BLACK	75	472	477	469	458	492	475	486	470	451	516	99	68	96	93	81	89	92	83	96	84
		WHITE	112	531	513	513	486	491	475	556	486	519	527	89	69	83	85	88	78	86	78	78	84
63B: VEHICLE MECH	MN	ALL	478	513	506	528	496	520	509	579	501	543	536	78	78	77	82	83	89	78	89	79	85
		BLACK	78	466	443	478	456	520	491	510	476	479	503	72	64	99	84	81	83	78	94	87	92
		WHITE	375	524	525	541	507	519	513	590	508	559	546	72	72	89	87	88	89	88	91	85	88
64C: MOTOR TRANS	OP	ALL	567	510	486	498	481	513	499	548	483	522	509	72	75	76	83	85	87	75	88	76	71
		BLACK	121	487	444	456	450	523	492	498	456	471	471	73	65	80	94	81	89	70	94	85	76
		WHITE	358	520	502	513	493	508	501	568	493	541	523	66	71	77	82	86	85	68	89	72	66
		FEMALE	52	495	485	503	520	534	559	466	490	480	454	71	73	78	95	85	87	85	81	92	94
		MALE	455	512	486	498	477	509	492	558	483	526	515	72	75	76	83	83	84	78	89	75	78
67N: HELICPTR REP	MN	ALL	238	510	567	567	546	530	531	613	530	607	92	95	60	99	67	95	83	94	87	96	97
71L: ADMIN CLERK	CL	ALL	427	506	495	528	514	562	552	478	515	484	481	87	82	72	99	89	81	79	75	79	89
		BLACK	159	491	446	499	495	563	535	444	498	454	464	81	74	85	99	85	83	81	89	71	95
		WHITE	235	516	518	548	531	560	560	502	528	502	494	89	79	78	91	92	98	86	75	79	76
		FEMALE	237	526	486	519	522	566	561	447	506	461	465	72	73	87	89	90	83	84	86	88	92
		MALE	190	485	502	539	505	538	540	514	526	512	501	98	91	74	88	88	97	82	86	83	82
76A: PETRO SPPLY	CL	ALL	339	519	479	511	494	536	512	502	491	500	498	95	90	76	89	96	85	89	72	91	81
		BLACK	139	476	430	472	463	539	500	447	461	444	461	80	73	83	85	92	84	75	80	86	87
		WHITE	176	551	521	539	522	535	518	560	514	548	530	88	85	89	80	95	84	90	73	84	76
76Y: UNIT SUPPLY	CL	ALL	444	516	489	518	500	550	531	496	507	496	496	92	85	76	87	91	98	86	75	86	78
		BLACK	169	487	442	479	473	553	518	455	473	453	463	90	89	82	80	96	94	71	80	85	83
		WHITE	231	536	528	547	526	547	538	532	530	530	526	95	76	71	80	96	91	83	78	83	78
		FEMALE	75	519	463	501	492	569	551	429	496	448	453	86	73	82	99	98	91	87	71	92	82
		MALE	369	516	496	522	501	546	527	510	509	506	506	95	87	76	88	91	97	86	78	85	78
91A: MEDIC SPEC	ST	ALL	392	514	547	544	540	525	520	528	525	543	526	79	82	86	86	89	90	82	71	90	88
		BLACK	91	486	519	512	521	519	508	486	511	495	496	72	90	98	92	96	92	90	85	94	96
		WHITE	260	525	562	555	550	527	526	548	538	560	534	80	81	84	82	88	91	80	72	88	90
		FEMALE	116	513	532	545	542	550	549	488	543	504	475	81	99	99	88	98	85	86	86	84	92
		MALE	276	515	534	544	539	514	508	555	525	559	544	79	83	86	86	91	88	93	92	87	83
94B: FOOD SERVCE	OP	ALL	368	526	496	515	503	533	510	516	495	510	503	90	80	77	83	83	89	82	72	86	75
		BLACK	126	495	449	466	471	534	501	469	463	464	471	77	70	98	96	80	72	83	91	96	86
		WHITE	222	546	526	543	526	532	517	546	515	536	526	96	74	73	98	86	86	79	73	75	74
		FEMALE	78	533	474	499	513	562	546	448	489	467	446	79	80	85	93	97	82	84	84	84	89
		MALE	290	519	502	519	501	526	501	534	497	522	518	92	79	80	85	83	82	77	76	77	72
95B: MIL POLICE	ST	ALL	597	504	562	554	542	530	519	573	537	571	550	74	93	80	92	92	92	88	81	96	92

CTP - Core Technical Proficiency

ASVAB Subtests
- AR - Arithmetic Reasoning
- AS - Auto/Shop Information
- CS - Coding Speed
- EI - Electronics Information
- GS - General Science Information
- MC - Mechanical Comprehension
- MK - Mathematical Knowledge
- NO - Numerical Operations
- VE - Verbal

Aptitude Area Composites
- CL - Clerical
- CO - Combat
- EL - Electronic Maintenance
- FA - Field Artillery
- GM - General Maintenance
- MM - Mechanical Maintenance
- OF - Operators/Food
- SC - Surveillance and Communications
- ST - Skilled Technical

* - Indicates MOS that are closed to women.

Fairness to Blacks and Females. Separate regression equations were computed by race and gender where there were at least 50 examinees in each subgroup. (For example, for MOS 11B, 90 blacks were among those tested but data were complete for fewer than 50 so the regression equation for race was not computed.) Both slope and intercept differences were identified. A single overall measure of the difference between the separate equations was defined as the difference in predicted values for an AA score of 100 (the estimated mean for the 1980 norm population). Since selection cutoffs ranged between 85 and 110 for the MOS in question, a score of 100 was selected as being in the heart of the critical region for evaluating the selection fairness of alternative composites. Differences in the prediction equations at points significantly below or above this value would have little impact on determining applicant qualification. The difference in predicted values was converted to a t score by dividing by the standard error of the estimate of the difference (Pothoff, 1964).

Classification Efficiency. The Brogden index (defined as the square root of the average validity times the square root of one minus the average of the intercorrelations among the composites) was used as a measure of classification efficiency (Brogden, 1946). This statistic is an indicator of the predictions of differences in an individual's expected performance across jobs.

Face Validity. Face validity is not easily quantifiable, but is more appropriately used as a check of the "reasonableness" of the results. It is our attempt to check purely empirical results against some conception of theory. We would be uncomfortable, for example, with results indicating that Auto/Shop Information (AS) is an important predictor for clerical jobs, but quite comfortable with AS as an important predictor for vehicle mechanics.

Results From Evaluation of Composites

Table 2.2 shows validities, Brogden indexes of classification efficiency, and, where appropriate, race and gender t statistics for each contending AA composite. Separate statistics are shown for each applicable MOS, and unweighted averages of the validities and t statistics are shown for the MOS cluster as a whole. Each row corresponds to a different composite. The first row is for the current composite. Rows with data on alternative composites are labeled A1 through A9. Data are also shown (labeled PR) for the CL and SC composites replaced in 1984 after our earlier analyses (McLaughlin, et. al., 1984). In some cases where another current composite has a higher average validity than the operational composite for the cluster, data are shown in rows labeled according to the other composite (this occurs in the CO and OF composites). The results presented in Table 2.2 are discussed separately for each of the current AA composites.

Clerical (CL). The current CL composite has an average validity that is as high or higher than any other alternative. It does, however, underpredict female performance in the two clerical specialties (MOS 71L and 76Y) where separate predictions were generated. The addition of either the MO or the CS subtest significantly reduces the underprediction for females

Table 2.2. Validity, Cultural Fairness, and Classification Efficiency Indicators for Current and Other ASVAB Composites

Current/Other Composites	Avg Val	Avg $ Race	Avg $ Sex	Claims Eff.	Val	$ by Race	$ by Sex	Val	$ by Race	$ by Sex	Val	$ by Race	$ by Sex
CL: CLERICAL					**71A: ADMIN SPEC**			**76Y: PETRO SPEC**			**76Y: UNIT SUPPLY**		
CL: AR+VE+MK	.661	-2.2	16.1	.251	.66	.6	20.6	.67	-3.8		.67	-1.4	11.8
PR: VE+MO+CS	.678	-3.7	3.1	.246	.59	-.2	5.6	.55	-12.8		.66	-4.5	.5
A1: AR+VE+MO+MK	.656	-3.1	6.7	.252	.65	.4	10.6	.65	-7.8		.67	-2.8	2.9
A2: AR+VE+CS+MK	.656	-2.2	8.1	.253	.4	1.6	11.4	.65	-7.8		.67	-1.1	4.9
A3: AR+VE+AS+MK	.655	-.5	22.2	.222	.66	1.8	22.2	.76	-2.8		.67	-.4	12.3
CO: COMBAT					**11B: INFANTRYMAN**			**12B: COMBAT ENG**			**19E: ARMOR CREW**		
CO: AR+CS+AS+MC	.617	-3.2		.251	.66	-		.64	-3.5		.55	-3.0	
A1: CS+AS+MC+MC	.648	-1.9		.229	.67	-		.67	-2.9		.60	-1.8	
CM: CS+AS+MC+EI	.641	-2.5		.250	.67	-		.67	-3.5		.56	-1.5	
A2: CS+MC+AS	.643	-2.4		.230	.67	-		.67	-3.3		.59	-1.4	
EL: ELECTRONIC					**27E: TOW/DRAG MEC**								
EL: CS+AR+MC+EI	.779	-	-	.251	.72	-	-						
A1: CS+MO+EI	.791	-	-	.255	.79	-	-						
A2: CS+MO+MC+EI	.791	-	-	.252	.79	-	-						
FA: FIELD ARTILLERY					**13B: CANNON CREW**								
FA: AR+CS+MC+MC	.641	-8.6		.251	.54	-8.6							
A1: CS+MO+AS+MC	.583	-3.1		.227	.58	-3.1							
A2: AR+MO+AS+MC	.581	-3.8		.227	.58	-3.8							
GM: GENERAL MAINTENANCE					**51B: CARPS/MASONRY**			**75B: ADMIN SPEC**					
GM: CS+AS+MC+EI	.785	-5.0	-	.251	.61	-	-	.76	-5.0	-			
A1: CS+VE+AS+MK	.790	-6.3	-	.259	.64	-	-	.75	-6.3	-			
A2: CS+AS+MK	.791	-6.4	-	.250	.64	-	-	.76	-6.4	-			
A3: CS+AR+VE+AS	.789	-4.5	-	.228	.62	-	-	.76	-4.5	-			
A4: CS+CS+AS+MK	.789	-10.0	-	.229	.64	-	-	.72	-10.0	-			
MM: MECHANICAL MAINTENANCE					**63B: VEHICLE MECH**			**67N: MED OPTR REP**					
MM: MO+AS+MC+EI	.729	-4.7	-	.231	.66	-4.7	-	.80	-	-			
A1: AS+MC+EI	.745	-4.5	-	.260	.69	-4.5	-	.80	-	-			
A2: [illegible]	.[illegible]	[illegible]	-	.[illegible]	.68	-4.4	-	.81	-	-			
A3: AS+MK+MC+EI	.739	-5.4	-	.229	.67	-5.6	-	.81	-	-			
A4: AR+MC+AS+EI	.739	-4.3	-	.230	.67	-4.3	-	.81	-	-			
A5: CS+AS+MC	.738	-3.9	-	.234	.67	-3.9	-	.81	-	-			
A6: AS+MC	.733	-3.5	-	.244	.68	-3.5	-	.79	-	-			
OF: OPERATORS/FOOD					**26Y: RANFAD CREW**			**64C: MOTOR TRANS**			**94B: FOOD SERVICE**		
OF: VE+MO+AS+MC	.538	-1.0	8.6	.251	.44	.9		.52	-1.6	-6.6	.65	-2.5	21.3
A1: AR+VE+AS+MC	.571	.8	9.0	.228	.51	3.0		.53	-.5	-14.1	.68	-.2	32.1
A2: CS+AR+AS+MK	.568	.5	10.7	.228	.50	2.9		.54	-.1	-6.8	.67	-1.5	26.2
A3: AR+AS+MK	.567	-.2	12.3	.230	.49	2.1		.54	-1.1	-2.3	.66	-1.4	24.9
A4: CS+AR+MK	.561	-1.1	10.0	.232	.52	2.2		.49	-3.6	-15.5	.68	-1.9	35.5
A5: CS+AR+VE+MK	.561	-.8	13.3	.231	.52	2.7		.48	-3.7	-17.6	.69	-1.5	44.1
A6: AR+VE+MK	.558	-1.4	13.2	.228	.52	2.0		.46	-5.2	-19.0	.69	-1.2	43.4
A7: AR+VE+MK+MC	.566	-.4	6.6	.234	.50	1.7		.51	-2.6	-24.7	.69	-.6	37.6
A8: AR+VE+MO+MK	.548	-4.8	-1.8	.234	.51	-.1		.44	-10.8	-16.5	.70	-3.6	13.0
A9: AR+VE+CS+MK	.546	-3.2	2.3	.236	.51	.2		.44	-6.9	-14.7	.70	-2.9	19.3
EL: CS+AR+MK+EI	.538	-.8	9.6	.228	.50	2.1		.51	-2.0	-7.1	.66	-2.6	25.8
ST: CS+VE+MK+MC	.557	.6	7.1	.228	.50	-1.4		.51	1.9	-16.9	.66	-5.0	31.1
FA: AR+CS+MK+EI	.535	-2.9	6.3	.230	.49	-.7		.49	-5.1	-22.6	.69	-3.0	35.3
SC: SURVEILLANCE & COMMUNICATION					**31C: RADIO/TTY OP**								
SC: AR+VE+AS+MC	.693	1.9	-	.231	.60	1.9	-						
PR: VE+MO+CS+AS	.701	.5	-	.232	.70	.5	-						
A1: AR+VE+MO+AS	.729	2.4	-	.233	.73	2.4	-						
A2: VE+MO+AS+MK	.729	.9	-	.233	.73	.9	-						
A3: AR+VE+MO+EI	.728	1.2	-	.234	.73	1.2	-						
A4: CS+AR+MC+EI	.727	2.0	-	.232	.73	2.0	-						
ST: SKILLED TECHNICAL					**94E: MEC SPEC**			**92A: MEDIC SPEC**			**95B: MIL POLICE**		
ST: CS+VE+MK+MC	.683	-1.5	.1	.231	.69	-1.6	-	.75	-1.3	.1	.63	-	-
A1: CS+CS+AS+MK	.679	-1.1	.5	.231	.67	-1.5	-	.75	-1.5	.5	.62	-	-

Code: ASVAB Subtests

AR - Arithmetic Reasoning
AS - Auto/Shop Information
EI - Electronics Information
GS - General Science Information
MC - Mechanical Comprehension
MK - Mathematical Knowledge
MO - Numerical Operations
VE - Verbal

without significantly reducing validity. Adding NO (Numerical Operations) reduces underprediction the most, while adding CS (Coding Speed) has the greatest face validity and results in slightly greater classification efficiency. A slightly different pattern was found for MOS 76W; the addition of AS increases validity for predicting 76W performance, while decreasing validity for predicting MOS 71L and 76Y performances. Notwithstanding these differences, the current and primary alternative CL composites predict performance in all three clerical MOS quite well.

Combat (CO). The current CO has high validity for each of the three MOS examined. Some gain in validity would be realized by substituting GS (General Science Information) for CS and, perhaps, also exchanging MK (Mathematical Knowledge) for AR (Arithmetic Reasoning). The inclusion of GS would improve prediction in all three MOS. The greater contribution of GS also is rational in light of the increasing technical sophistication in the systems used in combat specialties. Adding GS would also reduce the small degree of overprediction of the performance of blacks.

Electronics (EL). The current EL composite does quite well for the one EL specialty examined. Substitution of NO for one or both of the quantitative subtests would increase both predictive validity and classification efficiency, but not to any practical extent.

Field Artillery (FA). Neither the current FA nor any alternative composite appears to have a very high validity for predicting MOS 13B performance. The fact that several other current composites have slightly higher validities for predicting 13B performance than does the current FA composite encourages consideration of alternative composites. Substitution of NO and AS (Auto/Shop Information) for CS and MK would yield the most significant gains. Such substitution also significantly reduces overprediction for blacks.

General Maintenance (GM). Very high validities were found for the current GM composite for both MOS 51B and 55B. Very slight gains might result from substituting VE (Verbal) for EI (Electronics Information) or from simply dropping EI, but these gains would be offset by small increases in overprediction of blacks' performance and slightly lower classification efficiency estimates.

Mechanical Maintenance (MM). High validities were found for the current MM composite in predicting both MOS 63B and 67N performance. Small gains in the prediction of 63B performance and increased classification efficiency would result from dropping the NO subtest.

Operators/Food (OF). The OF results closely parallel the CL results. Female performance is significantly underpredicted for MOS 94B. Another specialty, MOS 64C, shows a somewhat different pattern of validities, with AS again (and not surprisingly) adding significantly to the predictive validity of this one specialty. In fact, the same composites appear optimal for both the CL and the OF MOS -- AR+VE+MK+NO for MOS 16S and 94B (as for MOS 71L and 76Y) and AR+VE+MK+AS for MOS 64C (as for 76W). Substituting AR

and MK for AS and MC (Mechanical Comprehension) would significantly reduce underprediction of female performance for MOS 94B while increasing overall validity.

Surveillance/Communication (SC). A high predictive validity was found for the current SC composite. Some gain in validity, along with a slight increase in classificatior efficiency, would result if MC were replaced by MO. This would lead to a small increase in the underprediction of performance for blacks. If MK were also substituted for AR, the same gains in validity and classification efficiency could be obtained along with a decrease in underprediction of blacks' performance.

Skilled Technical (ST). The current ST is a true Army composite -- it is all that it can be. It has a higher average validity than any possible alternative, and it shows no significant differences in the prediction of performance for blacks and females.

Conclusions

The main findings from these analyses were as follows:

- The current AA composites had generally high validities for predicting technical proficiency in enlisted MOS.
- Some changes were identified that might lead to small increases in validity or small reductions in over- or underprediction for particular subgroups of applicants.
- For two of the AA composites, CL and OF, different predictor composites appeared optimal for predicting performance in different MOS currently assigned to the same composite.

The last finding suggested the need to consider reassigning MOS to different current AA composites, and perhaps changing the number of different composites. Since analyses of possible reassignments would have to include all entry-level MOS, not just the Project A MOS, additional data were needed to continue exploration of possible modifications of composites.

Earlier research had demonstrated a reasonable correlation between results from Project A criterion measures and SQT scores (Arabian & Mason, 1986). Therefore, the Project A staff analyzed SQT scores for 1983 and 1984 as a cross-check and extension of the validities obtained with Project A criteria. Table 2.3 shows the adjusted (for range restriction) validities for predicting SQT scores for each of the MOS for which SQT data were available. Validities were estimated for each of the current AA scores, including the GT composite that is not currently used for MOS-specific selection, and for a specific set of alternatives to each of the current AA scores. Composites used by the other Services are also included, to see whether any greater consistency across Services could be achieved.

Table 2.3

[illegible] for Current Aptitude Area Composites and Selected Entry-Level MOS.
Based on [illegible] Qualification Test Data

CURRENT CLERICAL (CL) AREA (CL)

MOS	N	CL ARMY FK	AA ARMY ENVY	AO ARMY CSMX	AS ARMY ASVX	AM GSAM ASVX	AR ARMS FK	CO ARCS ASVC	EL GSAM MECH	FA ARCS MMMC	GM GSAS (ME)	GT ARMY	MM EMMS MECH	MC VEMM ASMC	OC ARMY ASMC	ST GSMC MMMC	SC VEMM CS	SR VEMM CSAS	AR GSAS ASMC	MM ARMY FC	EC VECS FK
71L	6488	82	81	83	80	80	95	90	80	89	90	81	60	94	84	80	80	85	85	80	81
710	824	84	89	69	82	91	80	67	81	69	69	82	67	80	81	82	84	80	85	84	68
710	373	82	82	83	80	90	69	82	81	83	67	90	66	68	68	84	68	89	83	84	84
73C	781	65	65	65	61	60	61	60	60	62	36	60	34	38	37	38	37	38	38	38	60
75B	804	87	87	68	88	83	82	83	84	86	80	68	88	80	80	83	84	83	81	83	86
75C	894	83	83	83	81	80	80	81	81	83	85	84	83	88	88	80	85	88	48	80	80
75B	1330	84	80	82	80	80	87	88	88	80	84	80	81	84	85	88	84	86	87	88	88
75E	822	87	86	88	84	81	84	80	83	84	87	88	83	87	80	83	87	88	88	82	84
75F	383	83	86	84	82	80	80	83	81	33	86	83	84	80	80	82	80	80	81	82	82
75C	5888	46	42	43	44	44	45	48	44	44	41	43	48	38	41	42	33	36	38	43	48
75P	3488	48	48	48	47	46	46	46	48	48	42	47	38	43	43	48	44	44	38	48	48
75W	2178	48	47	47	48	48	48	46	49	48	47	47	46	48	47	38	41	44	45	48	45
75W	3896	83	81	88	88	88	88	81	88	86	88	84	82	87	84	87	38	46	88	88	48
75X	241	88	88	87	84	81	84	84	82	85	87	88	88	88	88	92	88	84	84	84	84
76Y	6321	82	82	82	81	80	88	80	88	81	86	84	83	87	87	88	87	88	88	88	84
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	Mean	86	86	88	88	84	84	83	85	88	88	88	88	83	82	84	88	83	88	84	84

(Continued)

Codes:

Current Army Aptitude Area Composites
- CL - Clerical
- CO - Combat
- EL - Electronics
- FA - Field Artillery
- GM - General Maintenance
- MM - Mechanical Maintenance
- OF - Operators/Food
- SC - Surveillance and Communications
- ST - Skilled Technical
- GT - General/Technical

Previous Army Aptitude Area Composites
- MC - Old Clerical
- MS - Old Surveillance and Communications

Marine Corps Composites
- MM - General/Technical
- MC - Clerical (Admin)
- GT - General (Same as Army GT)
- EL - Electronic (Same as Army EL)

Air Force Composites
- MM - Mechanical
- MC - Administrative (Same as Marine Clerical)
- GT - General (Same as Army GT)
- EL - Electronic (Same as Army EL)

New Alternative Composites
- A0 - A0 - Alternatives for CL
- C3 - C9 - Alternatives for CO
- E3 - E2 - Alternatives for EL
- F3 - F2 - Alternatives for FA
- M3 - M3 - Alternatives for GM
- F8 - M8 - Alternatives for MM

- A2 - A7, A8 - Alternatives for GT (A2-A8 same as for CL)
- S1 - S4 - Alternatives for SC
- T1 - - Alternatives for ST

ASVAB Subtests
- AR - Arithmetic Reasoning
- AI - Auto/Shop Information
- CS - Coding Speed
- EI - Electronics Information
- GS - General Science Information
- MC - Mechanical Comprehension
- MK - Mathematical Knowledge
- NO - Numerical Operations
- VE - Verbal

Table 2.3 (Cont'd)

[illegible] for Current Metropolitan Area Comparisons and Selected Entry-Level Jobs,
Based on [illegible] Quarterly Cost-of-Living Index Data

CHICAGO, IL-NW IN CMSA (CB)

MSA	B	CA ARMY HI	CB ARCS ASPC	CC USAR HHFC	CD CMAC AS	CE USAR ASPC	CF USAR MOS I	CG ARCS MOSC	CH USAG MOS I	CI ARMY	CJ MOS MOS I	CK VETO ASPC	CL ARMY ASPC	CM USAC MOSC	CN VETO CS	CO VETO CSAS	CP USAG ASPC	CQ ARMY HC	CR VECS HX
100	17702	96	92	97	97	97	97	94	97	96	96	96	97	97	93	91	95	97	99
11C	3006	93	94	94	96	94	95	92	94	94	93	96	96	96	90	92	92	95	99
11R	2730	94	90	95	96	96	94	91	95	91	94	94	96	94	91	93	94	93	97
12D	4000	91	90	92	94	95	94	92	94	90	94	93	94	93	90	97	93	94	98
12C	1052	90	89	89	88	88	95	93	93	90	90	97	90	96	90	90	90	88	96
12F	309	88	87	89	97	90	94	90	90	90	89	94	97	93	97	96	90	93	92
190	3510	92	90	96	98	96	96	91	96	92	96	93	96	96	99	97	94	96	98
19C	4051	96	93	99	98	99	97	96	99	96	99	99	99	98	96	94	97	99	94
19R	1496	96	93	98	93	96	98	96	98	96	96	97	96	98	97	93	96	98	93
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	Mean	90	90	96	94	96	93	90	94	90	94	93	96	95	90	90	93	93	96

CHICAGO, IL-NW IN CMSA (IL)

MSA	B	CA ARMY HC	CB ARCS ASPC	CC USAR MOS I	CD USAG E1	CE USAR MOSC	CF ARCS MOSC	CG USAG MOS I	CH ARMY	CI MOS MOS I	CJ VETO ASPC	CK ARMY ASPC	CL USAC MOSC	CM VETO CS	CN VETO CSAS	CO USAG ASPC	CP ARMY HC	CQ VECS HX
21L	106	93	90	98	90	91	97	96	93	90	90	96	94	93	93	97	99	98
24C	129	94	92	99	96	97	96	99	94	99	96	99	97	99	97	99	99	96
24R	101	91	92	93	91	99	96	99	91	79	92	95	99	90	93	99	99	94
28L	259	96	96	96	94	96	97	94	93	93	96	96	96	96	94	91	99	96
29Q	997	91	90	94	90	91	92	93	99	90	91	94	92	96	92	91	94	92
29V	499	79	96	79	97	99	99	97	79	96	99	99	71	93	99	93	71	99
27Z	359	93	96	94	96	96	94	92	96	92	96	94	94	99	93	93	95	91
31C	351	92	92	99	98	99	93	97	93	97	99	91	99	99	92	92	92	92
31J	493	79	72	79	79	77	73	72	79	97	73	73	79	79	79	94	73	79
31K	3129	99	94	94	99	99	99	99	99	97	92	99	93	93	95	95	99	91
31R	3999	93	99	97	94	96	93	99	93	99	99	97	97	91	99	96	99	99
31U	252	99	99	99	97	99	93	97	94	91	99	92	97	99	95	99	93	96
31Y	3997	99	99	94	93	93	99	96	99	94	99	94	94	91	99	93	93	92
33D	599	92	99	92	97	99	99	99	91	99	99	99	94	99	93	93	99	97
35E	112	92	99	93	91	93	91	94	99	97	99	99	99	94	99	94	99	99
35H	210	99	94	93	93	93	94	93	99	96	96	96	92	99	92	99	94	97
35C	1029	99	99	94	92	92	91	99	99	99	99	99	94	99	99	99	96	99
35D	229	71	72	99	79	71	79	96	72	63	71	99	99	79	73	99	79	79
35R	399	93	94	97	96	96	96	99	93	93	99	91	99	96	99	93	99	99
46Z	116	96	99	94	92	94	92	92	96	97	99	91	96	96	92	97	92	96
52D	296	99	99	91	99	99	93	94	99	98	94	99	92	92	99	94	93	99
55B	172	91	94	91	99	99	94	96	92	92	99	96	99	93	92	99	99	99
99K	475	96	93	99	97	97	96	71	97	71	71	73	99	99	96	99	79	99
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	Mean	95	93	97	95	96	96	96	96	96	96	96	96	97	97	93	96	97	97

(Continued)

Table 2-3 (Continued)

Validation for Current Aptitude Area Composites and Selected Entry-Level MOS, Based on FY80-81 Skill Qualification Test Data

CURRENT COMPOSITE 1: FIELD ARTILLERY (FA)

MOS	N	CL ARMY MR	CO ARCS ASVAB	CL GSAR MOS1	FA ARCS MOMC	FA GSMO ASVAB	FX ARMD ASVAB	GS GSAS MOS1	GT ARMY	GS ARMS MOS1	HC VEMO ASVAB	HC ARMY ASVAB	IT CSMC MOMC	MC VEMO CS	MX VEMO CSAS	MX GSAS ASVAB	MA ARMY MC	MC VECS MR
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13B	16076	93	91	96	94	96	96	96	93	96	96	97	98	93	90	96	98	90
13F	1493	87	84	88	87	86	88	87	86	86	86	87	88	88	81	83	88	82
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	Mean	96	93	97	96	96	97	98	94	96	96	97	97	94	90	94	97	90

CURRENT COMPOSITE 2: GENERAL MAINTENANCE (GM)

MOS	N	CL ARMY MR	CO ARCS ASVAB	CL GSAR MOS1	FA ARCS MOMC	GS GSAS MOS1	GT ARMY	GS GSMC ASVAB	GS GSAS MR	GS GSAR VEAS	HC EDAS MOS1	HC VEMO ASVAB	HC ARMY ASVAB	IT GSMC MOMC	MC VEMO CS	MX VEMO CSAS	MX GSAS ASVAB	MA ARMY MC	MC VECS MR
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43C	921	87	84	90	86	90	88	88	89	90	88	89	88	88	89	88	88	87	83
43D	132	68	67	63	66	64	68	58	55	58	58	58	66	68	61	58	66	66	58
43E	613	56	53	53	54	52	53	54	53	53	58	53	53	54	54	53	59	53	54
43H	867	62	58	66	62	68	61	67	68	67	68	66	68	66	59	58	67	66	58
44B	302	84	81	88	84	71	86	78	78	71	71	78	72	78	83	83	78	88	88
44E	243	88	88	88	86	72	88	78	73	89	78	88	72	88	63	88	71	88	83
45B	801	66	53	82	66	86	63	81	84	81	87	66	84	88	69	58	86	88	*
45D	151	68	68	87	81	88	68	81	83	81	88	86	88	88	58	88	78	88	68
45E	336	83	88	87	83	88	83	88	78	89	78	88	71	88	68	88	88	88	84
45L	148	87	87	86	88	88	87	88	88	88	88	84	82	88	88	68	88	81	88
51B	947	83	88	86	84	86	82	87	87	87	86	86	86	87	69	88	86	87	87
51C	294	87	81	81	86	88	86	88	88	89	88	88	88	88	61	68	87	81	88
51D	399	88	82	88	88	88	88	88	88	88	86	86	86	83	68	81	83	88	86
52D	2033	87	83	72	87	73	86	72	72	71	78	88	71	71	84	83	88	88	82
54C	388	86	86	88	81	88	84	87	88	87	88	86	88	88	82	88	87	88	88
54B	1133	86	82	88	84	83	88	88	84	86	81	84	86	86	88	82	88	88	83
56B	119	88	88	84	88	84	88	84	83	86	84	88	88	83	84	88	83	84	88
57E	370	19	21	26	23	28	19	28	28	27	33	27	38	24	12	21	33	26	19
57H	837	46	43	47	46	48	44	48	46	44	48	48	47	47	38	48	46	47	48
62E	990	88	88	84	83	88	88	84	88	86	87	86	87	84	88	88	86	86	86
62F	388	81	82	88	84	88	81	87	88	88	71	78	71	86	88	81	78	88	84
62J	572	82	88	88	84	71	82	88	78	88	71	88	78	88	48	88	78	87	82
88M	288	47	47	56	48	61	48	59	59	58	88	88	88	88	48	81	83	86	48
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	Mean	83	81	87	84	88	83	86	86	88	88	87	88	87	82	88	87	87	88

(Continued)

Table B.3 (Continued)

Weights for Current Apt Maids Area Composites and Selected Entry-Level MOS,
Based on 1979-81 Skill Qualification Test Data

CURRENT CREW (TE): MECHANICAL MAINTENANCE (MM)

MOS	N	11B ARMY INF	13B ARCS ARMY	19E ICAR ARMY	19A ARCS ARMY	19D CSAS ARMY	31C ARMY	44B ADMS ARMY	51B ADMIN ARMY	63B ICAS ARMY	64B ASVAB ARMY	67N AVNS ARMY	71B ASVAB ARMY	76Y VETAB ARMY	91A ARMY ARMY	91B ARMY ARMY	91C VETAB ARMY	94B VETAB ARMY	95B ICAS ARMY	96B ICAS ARMY	98C ARMY ARMY	98G VOCS ARMY
11B	3209	69	69	73	72	74	69	73	70	72	70	75	66	73	74	73	61	69	71	73	67
13B	3002	69	69	69	69	69	69	72	73	72	71	72	73	69	67	69	53	69	71	69	69
19E	6029	66	66	66	61	62	60	64	64	64	64	64	63	66	64	66	58	60	63	66	61
19A	869	62	69	61	64	66	64	72	73	73	71	72	71	64	69	61	58	61	70	69	63
19D	258	69	67	74	69	70	71	77	76	79	77	77	72	76	79	76	61	72	79	79	69
31C	1451	64	64	70	66	74	64	70	74	75	76	76	73	73	76	70	62	60	76	70	66
44B	388	61	64	66	64	69	61	62	61	61	62	62	64	69	62	67	59	66	62	66	66
51B	980	67	67	66	66	65	69	69	70	69	67	66	70	62	66	67	59	69	69	66	59
63B	617	66	66	69	63	74	62	76	76	77	76	76	74	72	74	69	66	62	76	69	64
64B	1370	66	66	66	66	66	66	69	70	69	69	69	69	61	66	67	59	69	69	66	59
67N	1367	66	61	69	64	69	62	71	72	71	70	71	72	66	66	66	59	63	71	61	63
71B	602	61	66	66	63	73	62	76	74	74	74	76	73	71	74	69	66	62	74	66	64
76Y	994	67	66	64	62	66	67	63	63	61	63	63	64	67	69	62	59	66	64	66	59
91A	948	64	67	66	64	69	62	61	69	61	61	61	66	66	64	66	59	69	61	66	65
91B	719	61	64	64	64	63	66	63	66	61	63	63	67	64	63	63	66	61	63	63	66
91C	697	66	63	67	66	63	62	64	66	66	66	64	66	62	64	66	59	64	66	66	59
94B	714	61	62	66	64	72	62	74	73	74	73	74	71	71	73	66	66	63	73	69	66
95B	882	63	66	62	66	67	64	66	66	70	66	66	66	64	67	62	61	64	70	62	66
96B	226	66	67	69	66	73	67	73	70	71	73	73	69	73	74	71	59	62	71	73	62
98C	294	66	66	66	64	64	67	66	67	66	66	66	64	66	66	62	66	66	66	66	66
98G	948	64	67	70	70	70	63	70	66	66	71	70	64	66	70	66	59	66	67	66	63
99B	388	71	66	72	70	70	70	66	62	66	66	66	66	66	70	71	66	66	64	71	67
99Z	353	69	69	70	66	74	64	70	77	77	77	76	76	76	76	69	66	66	70	72	67
	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Mean	66	66	63	66	67	67	66	66	66	66	66	66	66	67	63	60	67	66	63	66

CURRENT CREW (TE): [illegible]

MOS	N	11B ARMY INF	13B ARCS ARMY	19E ICAR ARMY	19A ARCS ARMY	19D CSAS ARMY	31C ARMY	44B ADMS ARMY	45E VETAB ARMY	46C ARMY CSMC	62B ARMY ASVAB	63B ICAR ASVAB	64B ASVAB MK	67N AVNS MK	68A ICAR ASVAB	71B ARMY ASVAB	76Y ARMY ASVAB	91A ICAR ARMY	91B VETAB CS	91C VETAB CSMS	94B ICAS ASVAB	96B ARMY AC	98G VOCS AO
19D	993	61	66	63	61	63	61	63	64	69	66	66	64	66	61	62	63	66	63	62	69	64	63	67
19E	306	39	39	44	43	47	38	47	44	38	44	46	46	42	41	43	46	43	38	38	47	43	39
31C	453	69	66	62	66	61	66	66	66	66	62	62	61	66	66	61	61	62	62	66	66	61	66
44B	159	66	66	62	62	66	66	66	63	62	62	64	64	66	62	66	66	66	66	66	62	66	66
45E	137	36	33	39	39	36	33	46	32	31	36	46	41	39	36	39	39	36	37	33	37	36	34
46C	382	43	39	46	43	51	46	52	47	36	42	46	46	44	43	46	46	46	39	39	51	46	36
62B	738	46	46	54	66	51	46	66	54	46	54	66	56	61	51	63	57	54	36	46	52	66	46
63B	1370	47	46	46	46	46	46	50	46	46	51	61	52	46	46	66	61	46	36	44	46	46	46
64B	61	71	66	76	76	76	66	76	76	66	73	76	72	76	73	73	76	76	66	66	66	71	66
67N	7476	66	64	66	66	66	66	61	66	61	63	66	66	56	66	66	67	66	46	64	66	66	66
71B	6907	66	63	66	66	66	66	66	67	63	66	66	66	66	66	66	67	66	67	66	66	66	66
76Y	102	77	76	76	76	76	77	76	76	76	76	76	76	76	76	76	76	76	76	76	67	77	76
	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Mean	52	50	56	53	56	51	57	56	50	56	52	52	54	53	55	57	56	41	46	56	56	47

(Continued)

Table 2.3 (Continued)

Distribution for Current Aptitude Area Composites and Selected Entry-Level MOS,
Based on [illegible] Qualification Test Data

CURRENT COMPOSITE: SURVEILLANCE AND COMMUNICATIONS (SC)

CAT	N	SC ARVE PR	CO ARCS ASVC	EL GSVR MXE1	FA ARCS MXVC	GM GSAS MXE1	GT ARVE	EL GSAS MXE1	EC WCOM ASVC	SC ARVE ASVC	SI GSVR MXVC	SA ARVE MSVS	SX WCOM ASTM	SY ARVE .ODE1	SW GSAS MXE1	SC WCOM CS	SS WCOM CS	AR GSAS ASVC	AS ARVE MC	AX WCCS MC
1SC	[illegible]	60	62	62	61	57	60	59	56	62	63	66	62	65	63	60	65	59	62	64
3SC	3877	64	59	64	62	64	62	63	63	66	65	63	62	63	63	61	60	57	64	57
7SE	2984	53	48	53	52	51	53	50	50	54	53	51	52	54	51	47	47	47	52	49
79S	988	61	57	60	59	56	[illegible]	53	56	56	60	58	60	59	60	52	56	51	50	57
99S	179	57	57	60	58	56	57	58	60	62	60	60	65	60	60	60	56	55	60	63
	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Mean	60	60	61	61	60	60	58	59	61	62	61	60	61	61	59	59	56	61	60

CURRENT COMPOSITE: SKILLED WORKER (SW)

MOS	N	SA ARVE MK	CO ARCS ASVC	EL GSVR MXE1	FA ARCS MTVC	GM GSAS MXE1	GT ARVE	GS GSAS MXE1	EC WCOM ASVC	SC ARVE ASVC	SI GSVR MXVC	SA ARCS ASVH	SX WCOM CS	SY WCOM CSMS	SW GSAS ASVC	AR ARVE MC	AS WCCS MC
03C	188	80	84	82	86	87	80	83	80	80	83	84	87	80	80	84	81
08B	148	73	71	73	73	73	73	70	73	76	74	73	84	78	80	74	80
08H	837	84	81	82	82	87	83	85	80	80	84	80	80	85	81	81	83
13C	148	73	80	72	72	73	73	80	73	73	70	75	80	73	80	73	72
88M	190	80	80	80	82	83	82	87	84	83	84	80	80	80	85	80	80
71Q	180	85	70	73	73	80	81	84	72	73	70	73	71	72	82	70	70
74B	326	72	71	70	72	86	78	82	80	80	72	71	73	72	87	72	70
74F	180	71	84	80	80	84	70	80	83	80	80	80	82	85	76	87	71
88C	186	82	82	82	84	87	89	84	85	80	89	81	80	87	80	80	82
88E	154	85	82	80	82	83	83	81	81	83	80	80	80	80	90	86	83
88C	767	86	83	80	86	83	82	82	80	83	83	80	81	87	87	83	80
88F	114	80	84	80	80	80	84	80	85	87	80	80	80	83	85	87	80
88B	144	71	80	71	70	80	80	84	87	87	72	72	84	87	82	80	71
91C	862	84	81	83	82	87	86	86	80	85	83	81	80	80	82	85	83
91Q	273	80	83	80	87	80	82	87	87	80	86	82	80	80	84	83	82
91R	320	87	83	80	84	84	80	81	87	80	87	80	81	80	80	87	84
91S	390	80	84	86	87	83	87	83	86	87	87	84	80	83	81	80	84
91T	288	80	82	85	85	82	80	80	84	80	80	83	80	81	80	80	80
92B	686	24	23	24	25	21	23	20	20	21	22	25	19	20	18	22	22
93H	394	40	40	40	40	45	40	44	40	47	40	40	46	47	41	40	40
93J	254	74	80	73	70	71	75	80	72	71	74	73	80	73	83	72	74
93P	420	75	72	72	73	80	77	87	72	72	74	72	80	71	83	76	73
94B	9851	80	83	80	84	84	80	85	87	80	76	87	80	84	83	78	84
94C	819	95	86	84	85	81	84	80	83	83	84	84	80	83	87	85	75
97B	410	74	87	72	70	80	74	84	70	70	73	71	84	80	82	73	70
98C	120	70	86	80	80	87	72	80	80	71	72	80	80	86	83	73	87
98C	817	80	83	86	87	84	87	81	84	85	89	87	80	82	80	80	86
98G	230	80	82	86	83	84	87	82	80	87	70	80	80	86	82	80	86
	[illegible]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Mean	61	59	61	61	60	62	56	60	59	62	61	60	60	63	62	61

Tables 2.4 and 2.5 show the degree to which subgroups (females and blacks, respectively) are underpredicted by a common regression line. Entries in these tables are the difference between the subgroup and common regression lines at an AA score of 100. These differences are in SQT score units--a percentage-correct metric running from zero to 100. Analyses are reported only for MOS for which SQT data were available for at least 50 members of each subgroup. Analyses by gender were necessarily omitted for MOS that were closed to women. Only differences that are significant at the .05 level are shown. Very few of the differences shown are of any practical significance (i.e., more than a few percentage points).

The following conclusions were drawn from the above results:

- Alternative strategies for reducing the number of different composites should be evaluated.
- SQT data should be analyzed further to evaluate potential gains from reassigning MOS to different AA composites.

EVALUATION OF OPTIONS FOR A REDUCED NUMBER OF AA COMPOSITES

Identification of options for reducing the number of AA composites began with an examination of the dimensions of predicted performance scores for the 19 Project A MOS in the Concurrent Validation stage. For each MOS, optimal predictor weights were identified for predicting job performance from the nine ASVAB subtests. Predicted performance scales were calculated both for the Core Technical Proficiency (CTP) factor based on Project A data, and for the SQT. For each of these two criteria, the matrix of intercorrelations among the predicted scores for the different MOS was factor analyzed.

The predicted scores for the different MOS were all highly correlated, leading to a large first factor in the matrix of correlations among these scores. There was some evidence for a second factor, but no support for any further factors. Figures 2.1 and 2.2 show a plot of the loadings of the prediction equations for each MOS on the first two factors after rotation. The vertical factor consists almost exclusively of the MC, AS, and EI composites and has been labeled "technical." The second factor consists of both verbal and quantitative subtests and has been labled "academic."

Both figures show a continuum running from MOS 63B at one end to MOS 71L at the other. Table 2.6 shows the optimal regression coefficients for predicting the CTP score in each of these MOS when the nine ASVAB subtests are clustered into four relatively distinct composites. (Reducing the colinearity among the predictors in this way leads to greater stability in regression coefficient estimates.) These are the same four composite scores used as predictors in the basic Concurrent Validation analysis (cf. Campbell, 1987). As the table shows, the clearest difference between jobs

Table 3.4

Underprediction of Female Skill Qualification Test Performance for Each MOS[a] and Composite, Based on 1981-84 SQT Data[b]

CURRENT COMPOSITE: CLERICAL (CL)

MOS	N	CL ARVE MC	A1 ARVE MCMK	A2 ARVE CSMK	A3 ARVE ASMK	A4 GSAR ASMK	A5 ARES MK	CO ARCS ASMC	EL GSAR MKEI	FA ARCS MKMC	GM GSAS MKEI	GT ARVE	MM MOAS MCEI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	XC VEMO CS	XS VEMO CSAS	AM GSAS ASMC	MA ARVE MC	MC VECS MK
71L	6059	5.6	5.8	5.4	7.0	7.4	7.7	6.7	7.0	6.7	7.7	5.2	8.1	7.3	7.5	6.3	5.4	6.3	7.8	6.5	5.0
71N	524	.	.	.	1.2	1.5	1.4	.	1.3	.	1.9	.	2.3	1.7	1.7	1.0	.	.	1.9	1.9	.
71W	373	2.0	1.8	1.4	3.0	3.3	3.4	2.1	2.6	2.4	3.3	1.6	3.7	3.5	3.5	3.2	.	3.1	3.8	2.8	1.2
73C	761	1.3	1.3	1.1	2.2	2.6	2.9	1.6	2.1	1.7	2.6	1.1	2.7	2.2	2.6	1.6	.	1.4	2.9	1.8	0.8
75B	994	0.5	.	.	2.2	2.9	3.1	.	2.7	1.5	4.0	.	3.8	2.3	2.9	2.0	.	.	3.9	1.6	.
75C	696	0.9	0.9	0.6	2.1	2.7	2.9	1.6	2.4	1.5	3.2	0.5	3.3	2.5	2.3	1.7	.	1.8	2.6	1.6	.
75D	1339	.	0.7	0.2	1.6	2.2	2.5	1.9	1.8	1.5	2.4	.	2.6	1.8	2.0	1.1	.	1.4	2.5	1.2	.
75E	422	.	.	.	.	.	1.5	.	.	.	.	.	2.0	1.1	1.5	.	.	.	.	.	.
75F	283	2.8	.	.	4.1	4.8	5.0	.	4.8	2.9	4.6	2.1	4.9	4.1	4.0	3.4	.	.	3.3	3.1	.
76C	2888	0.6	0.8	0.7	1.2	1.4	1.6	1.6	1.2	1.3	1.5	0.5	1.8	1.5	1.6	0.9	0.9	1.6	1.7	1.0	0.6
76P	1600	1.6	1.7	1.4	2.6	2.9	3.3	2.2	2.5	2.2	3.1	1.3	3.4	2.5	2.7	1.8	1.6	2.0	3.4	1.9	1.0
76Y	2170	1.1	0.7	.	2.4	2.7	3.0	1.1	2.3	1.4	3.2	0.8	3.5	2.5	3.1	1.5	.	1.6	3.6	2.0	.
76W	2035	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76X	241	3.3	3.2	.	4.7	5.6	5.4	3.6	4.9	.	7.0	3.6	6.1	4.9	5.8	4.7	.	.	7.2	4.2	.
76Y	5321	2.5	2.2	2.0	3.7	4.0	4.2	2.9	3.7	3.1	4.4	2.2	4.3	3.7	4.0	3.3	1.7	2.8	4.3	3.2	1.6

Note: All . indicate nonsignificant means (N ≥ 50).

(Continued)

[a] MOS for which females are not eligible are omitted.
[b] These differences are in SQT score units (a percent-correct metric running from zero to 100).

Codes:

Current Army Aptitude Area Composites
- CL - Clerical
- CO - Combat
- EL - Electronics
- FA - Field Artillery
- GM - General Maintenance
- MM - Mechanical Maintenance
- OF - Operators/Food
- SC - Surveillance and Communication
- ST - Skilled Technical
- GT - General/Technical

Previous Army Aptitude Area Composites
- XC - Old Clerical
- XS - Old Surveillance and Communication

Marine Corps Composites
- MA - General/Technical
- MC - Clerical (Admin)
- GT - General (Same as Army GT)
- EL - Electronic (Same as Army EL)

Air Force Composites
- AM - Mechanical
- MC - Administrative (Same as Marine Clerical)
- GT - General (Same as Army GT)
- EL - Electronic (Same as Army EL)

New Alternative Composites
- A1 - A5 - Alternatives for CL
- C1 - C3 - Alternatives for CO
- E1 - E2 - Alternatives for EL
- F1 - F2 - Alternatives for FA
- G1 - G3 - Alternatives for GM
- M1 - M5 - Alternatives for MM
- A2 - A7, A9 - Alternatives for OF (A1-A5 same as for CL)
- S1 - S6 - Alternatives for SC
- T1 - - Alternatives for ST

ASVAB Subtests
- AR - Arithmetic Reasoning
- AS - Auto/Shop Information
- CS - Coding Speed
- EI - Electronics Information
- GS - General Science Information
- MC - Mechanical Comprehension
- MK - Mathematical Knowledge
- NO - Numerical Operations
- VE - Verbal

Table 2.4 (Continued)

Underprediction of Female Skill Qualification Test Performance for Each MOS* and Composite, Based on 1983-84 SQT Data[b]

MOS	N	CURRENT COMPOSITE: ELECTRONICS (EL)																	
		CL ARVE MX	CO ARCS ASMC	EL GSAR MKEI	GT GSMO SI	GS GSMO MXEI	FA ARCS MKMC	GM GSAS MKSI	GT ARVE	MM MOAS MCEI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	EC VEMO CS	SE VEMO CSAS	AM GSAS ASMC	MA ARVS MC	MC VRCS MM
21L	105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24C	124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24M	101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26L	259	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26Q	507*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26Y	469	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27E	399*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31E	351	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31J	493*	.	.	.	5.2	6.6	.	6.7	.	5.7	6.7	6.6	.	.	.	5.8	.	.	.
31K	3120*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31M	2819*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33M	252	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31Y	1047	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32D	565*	.	.	.	.	.	.	.	.	1.6	.	.	.	.	.	1.7	.	.	.
35E	112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35H	218	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36C	3529*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36U	229	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36M	358*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46M	116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51E	295	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55G	172*	.	.	3.8	4.0	4.1	.	4.4	.	.	.	.	.	.	.	.	.	.	.
96R	475	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

(Continued)

Table 3.4 (Continued)

Underprediction of Female Skill Qualification Test Performance for Each MOS[a] and Composite, Based on 1983-84 SQT Data[b]

CURRENT COMPOSITE: GENERAL MAINTENANCE (GM)

MOS	N	CM ARVE MK	CQ ARCS ASMC	EL GSAR MKEI	FA ARCS MKMC	GM GSAJ MKEI	GT ARVE	GI GSVE ASMX	GJ GSAS MK	GJ GSAR VEAS	HM MQAS MCEI	OF VEMO ASMC	RC ARVE ASMC	ST GSVE MKMC	SC VEMO CS	ZJ VEMO CSAS	AM GSAS ASMC	GA ARVE MC	MC VECS MK
41C	221*	.	.	.	.	1.0	.	.	.	.	.	.	.	.	.	.	1.7	.	.
42D	132*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43E	613*	3.5	4.8	5.2	4.7	6.4	3.8	5.0	5.9	5.3	6.9	5.5	5.5	4.9	4.0	4.6	7.1	5.0	3.2
43M	167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44B	392	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46E	243	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45B	181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45D	151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45E	356	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45L	140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51B	547	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51E	294	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51M	209	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52D	2033*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.9	.	.
54C	108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55B	1133*	1.1	2.0	2.6	2.0	4.0	1.4	2.7	3.5	2.9	4.3	3.1	3.4	2.2	1.5	2.2	4.4	2.4	.
55D	119	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57E	328*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57M	637*	.	.	.	.	1.9	.	.	1.6	.	1.2	.	1.0	.	.	.	2.0	.	.
62E	970	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62F	382	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62J	572	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68M	208	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

(Continued)

Table 3.6 (Continued)

Underprediction of Female Skill Qualification Test Performance for Each MOS[a] and Composite, Based on 1983-84 AQT Data[b]

CURRENT COMPOSITE: MECHANICAL MAINTENANCE (MM)

MOS	N	CL ARVE MK	CO ARCS ASMC	GS GSAR MKSI	PA ARCS MKMC	GM GSAS MKSI	GT ARVE	MK MOAS MCPI	M1 ASMC GI	M2 GSAS MCRI	M3 ASMK MCSI	M4 ARAS MCRI	M5 ASMC	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	ZC VEMO CS	ZS VEMO CSAS	AM GSAS ASMC	RA ARVE MC	MC VECS MK
45N	320	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62B	1092	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63B	6929[a]	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63D	590	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63G	238	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63H	1651	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63J	358	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63M	980	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63S	617	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63T	1370	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63W	1367[a]	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63Y	492	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67G	194	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67M	948	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67T	219	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67U	497	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67V	714	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67Y	562	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68B	225	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68D	194	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68F	166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68G	328	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68H	153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with [a], . indicates means were nonsignificant. Otherwise, . indicates insufficient n.

(Continued)

Table 3.4 (Continued)

Underprediction of Female Skill Qualification Test Performance for Each MOS[a] and Composite, Based on 1983-84 DQT Data[b]

CURRENT COMPOSITE: OPERATORS/FOOD (OF)

MOS	N	CL ARVE MK	CO ARCS ASMC	EL GSAR MKEI	FA ARCS MKMC	GM GSAS MKEI	GT ARVE	HM MOMS MCKI	OF VEMO ASMC	AZ ARVE CSMK	AJ ARVE ASMK	AA GSAR ASMK	AL ARJS MK	AS GSAR MK	AT GSAR VEMK	AP ARVE MKMC	BC ARVE ASMC	GT GSVE MKMC	KC VEMO CS	KR VEMO CSAS	AM GSAS ASMC	MA ARVE MC	MC VECS MK
15D	993	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16D	390	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16E	453	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16H	159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16J	137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16P	962	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R	738	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16S	1270	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16T	61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64C	7478*	.	.	.	.	0.5	.	0.8	.	.	.	.	.	.	.	.	1.7	0.3	.	.	1.6	.	.
94B	6007*	.	.	6.8	.	3.2	.	2.4	0.9	.	0.6	1.2	1.3	.	.	.	1.7	0.3	.	.	3.0	0.2	.
94F	182*	.	.	2.6	1.3	3.9	.	4.5	3.9	.	2.2	2.7	3.1	1.2	.	1.9	3.8	2.8	.	4.1	4.3	2.4	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

CURRENT COMPOSITE: SURVEIL/ARCS AND COMMUNICATION (SC)

MOS	N	CL ARVE MK	CO ARCS ASMC	EL GSAR MKEI	FA ARCS MKMC	GM GSAS MKEI	GT ARVE	HM MOAS MCKI	OF VEMO ASMC	SC ARVE ASMC	AJ ARVE MCAS	AZ VEMO ASMK	AJ ARVE MCKI	AA GSAR MCKI	GT GSVE MKMC	KC VEMO CS	KR VEMO CSAS	AM GSAS ASMC	MA ARVE MC	MC VECS MK
13R	197	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31C	3677*	.	.	.	.	.	.	0.9	.	.	.	.	.	.	.	.	1.0	.	.	.
72E	2554*	.	.	1.7	0.4	3.0	.	1.2	2.1	2.3	1.0	1.3	.	1.3	1.4	.	.	3.4	1.0	.
72G	958*	.	.	1.9	.	3.3	.	1.1	2.0	2.3	.	.	.	1.3	1.4	.	.	3.5	1.0	.
97G	179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

(Continued)

Table 3.6 (Continued)

Underprediction of Female Skill Qualification Test Performance for Each MOS* and Composite, Based on 1981-84 AQE Data*

CURRENT COMPOSITE: SKILLED TECHNICAL (ST)

MOS	N	CU ARVB MK	CO ARCB ASMC	GM GSAB MKEI	EB ARCB MKMC	GS GSAB MKEI	GT ARVB	HM MCRB MCEI	OF VSCO ASMC	SC ARVB ASMC	ST GSVB MKMC	TI GSCB ASMK	AS VEMO CS	EO VEMO CSAB	GH GSAB ASMC	GA ARVB MC	MC VSCB MK
03C	116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
05B	148*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
05R	637	.	.	3.1	2.8	4.0	.	4.2	4.1	4.3	5.1	2.0	.	3.6	3.7	.	.
13C	165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55B	110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71Q	159*	.	.	.	.	.	.	.	.	.	.	.	.	.	4.4	.	.
74D	326*	6.3	6.6	6.5	7.7	8.2	7.0	7.3	7.4	8.6	8.1	6.0	.	5.0	6.2	9.0	5.9
74F	188	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81C	166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81E	154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
82C	757	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83F	116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84D	140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91E	552*	3.1	2.3	4.7	3.1	5.5	2.6	5.0	4.1	5.1	3.6	3.6	.	2.0	5.0	3.9	.
91Q	273*	.	.	.	.	3.5	.	3.3	.	3.0	.	.	.	.	3.0	.	.
91R	326*	.	2.0	.	3.2	3.0	.	4.3	3.4	3.9	.	3.2	.	2.3	3.7	3.8	.
91S	190*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91Y	108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92D	666*	.	.	4.1	.	3.4	.	2.4	.	.	.	.	.	.	2.4	.	.
93E	344	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93J	256	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93P	420	.	.	4.1	2.3	5.5	.	6.2	4.7	5.8	3.3	2.9	.	.	5.7	3.7	.
95B	9051*	.	.	.	.	0.8	.	0.8	.	0.6	.	.	.	.	0.9	.	.
95C	419	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96B	410*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96C	120*	.	.	.	.	.	.	6.6	.	.	.	.	.	.	.	.	.
98C	617*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98G	238*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

Table 2.5

Underprediction of Black 32(?) Qualification Test Performance for Each MOS and Composite, Based on 1983-84 SQT Data*

CURRENT COMPOSITE: CLERICAL (CL)

MOS	N	CL ARVE MC	A1 ARVE MCMK	A2 ARVE CSMK	A3 ARVE ASMK	A4 GSAR ASMK	A5 ARAS MK	C0 ARCS ASMC	E1 GSAS MKEI	FA ARCS MKMC	GM GSAS MEMI	GT ARVE	MM MOAS MCEI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	XC VEMO CS	XS VEMO CSAS	AM GSAS ASMC	MA ARVE MC	MC VECS MK
71L	6059	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71M	524	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71N	373	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
73C	761	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75B	994	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75C	694	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75D	1339	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75E	423	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75F	283	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76C	2898	.	.	.	0.8	0.8	0.7	.	.	.	.	.	.	.	0.7	.	.	.	.	.	.
76P	1600	1.6	1.7	2.0	2.2	1.9	2.0	1.3	1.6	2.0	.	1.3	.	1.1	1.9	.	.	1.2	.	1.7	1.3
76V	2170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76W	2035	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76X	241	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76Y	5321	0.7	.	0.6	1.3	1.1	0.9	.	.	.	.	0.7	.	.	1.0	.	.	.	.	0.8	.

Note: All . indicate nonsignificant means ($p > .50$).

(Continued)

* These differences are in SQT score units (a percent-correct metric running from zero to 100).

Codes:

Current Army Aptitude Area Composites
- CL - Clerical
- CO - Combat
- EL - Electronics
- FA - Field Artillery
- GM - General Maintenance
- MM - Mechanical Maintenance
- OF - Operators/Food
- SC - Surveillance and Communication
- ST - Skilled Technical
- GT - General/Technical

Previous Army Aptitude Area Composites
- XC - Old Clerical
- XS - Old Surveillance and Communication

Marine Corps Composites
- MA - General/Technical
- MC - Clerical (Admin)
- EL - Electronic (Same as Army EL)

Air Force Composites
- AM - Mechanical
- MK - Administrative (Same as Mdrine Clerical)
- GT - General (Same as Army GT)
- EL - Electronic (Same as Army EL)

New Alternative Composites
- A1 - A5 - Alternatives for CL
- C1 - C3 - Alternatives for CO
- E1 - E2 - Alternatives for EL
- F1 - F2 - Alternatives for FA
- G1 - G3 - Alternatives for GM
- M1 - M5 - Alternatives for MM
- A1 - A7, A9 - Alternatives for OF (A2-A5 same as for CL)
- S1 - S4 - Alternatives for SC
- T1 - - Alternatives for ST

ASVAB Subtests
- AR - Arithmetic Reasoning
- AS - Auto/Shop Information
- CS - Coding Speed
- EI - Electronics Information
- GS - General Science Information
- MC - Mechanical Comprehension
- MK - Mathematical Knowledge
- NO - Numerical Operations
- VE - Verbal

Table 2.5 (Continued)

Underprediction of Black Skill Qualification Test Performance for Each MOS and Composite, Based on 1983-84 SQT Data*

CURRENT COMPOSITE: COMBAT (CO)

MOS	N	CL ARVE MK	CO ARCS ASMC	CL GSAS MKMC	CL GSMC AS	CL GSAP ASMC	GS GSAR MKEI	PA ARCS MKMC	GN GSAS MKEI	GT ARVE	MM MOAS MCEI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	XC VEMO CS	XB VEMO CSAS	AM GSAS ASMC	HA ARVE MC	MC VECS MK
11B	17787	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11C	3965	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11H	2730	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12B	4508	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12C	1052	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12F	389	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19D	3315	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19E	4061	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19K	1496	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: All . indicate nonsignificant means.

CURRENT COMPOSITE: ELECTRONICS (EW)

MOS	N	CL ARVE MK	CO ARCS ASMC	GS GSAR MKEI	EI GSMO EI	EI GSMO MKEI	PA ARCS MKMC	GN GSAS MKEI	GT ARVE	MM MOAS MCEI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	XC VEMO CS	XB VEMO CSAS	AM GSAS ASMC	HA ARVE MC	MC VECS MK
21L	105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24C	126	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26M	101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26L	259	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26Q	507*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26Y	469*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27E	399*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31E	351	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31J	491*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31K	3120*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31M	2819*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31N	252*	.	.	.	.	.	.	2.7	.	2.4	3.6.	.	3.1	.	.	.	.	.
31V	1067*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32D	549*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35E	112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35N	218	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36C	1829*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36H	229	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36M	358*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46N	116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51R	295	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55G	172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96R	475*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

(Continued)

Table 1.5 (Continued)

Underprediction of Black Skill Qualification Test Performance for Each MOS and Composite, Based on 1983-84 SQT Data[a]

CURRENT COMPOSITE: FIELD ARTILLERY (FA)

MOS	N	C1a ARVE MK	C2 ARCS ASMC	E4a GSAR MKEI	FA ARCS MKMC	F1 GSMO ASMC	F2 ARMO ASMC	G4 GSAS MKII	GT ARVE	H4 MOAS MCKI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	VC VEMO CS	VS VEMO CSAS	AM GSAS ASMC	MA ARVE MC	MC VRCS MK
13B	10675	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13F	1893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: All . indicate nonsignificant means.

CURRENT COMPOSITE: GENERAL MAINTENANCE (GM)

MOS	N	C1a ARVE MK	C2 ARCS ASMC	E4a GSAR MKEI	FA ARCS MKMC	G4 GSAS MK[illegible]	GT ARVE	G1 GSVE ASMC	G2 GSAS MK	G3 GSAR MEAS	H4 MOAS MCKI	OF VEMO ASMC	SC ARVE ASMC	ST GSVE MKMC	VC VEMO CS	VS VEMO CSAS	AM GSAS ASMC	MA ARVE MC	MC VRCS MK
41C	221*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42D	132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63E	613*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63H	167*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64B	392*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64E	243	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65B	181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65D	151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65K	356*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65L	140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51B	547*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51E	294*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51H	209*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52D	2033*	.	.	.	.	.	.	.	.	0.7	0.9	0.7	1.1	.	.	.	1.3	.	.
54C	108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55B	1133*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55D	119	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57E	328*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57H	637*	.	.	.	.	2.4	.	2.4	2.2	2.2	1.8	2.9	3.3	2.9	.	.	2.3	2.4	.
63E	970*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62F	382*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62J	572*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68H	208	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

(Continued)

Based on 1983-84 Syr data

CURRENT COMPOSITE: MECHANICAL MAINTENANCE (MM)

MOS	N	C1 ARVE MK	CQ ARCS ASMC	E1 GSAR MKEI	FA ARCS MKMC	GH GSAS MKEI	GT ARVE	MM MOAS MCEI	M1 ASMC EI	M2 GSAS MCEI	M3 ASME MCEI	M4 ARAS MCEI	M5 ASMC	OF VEMO ASMC	QC ARVE ASMC	QT GSVE MKMC	RC VEMO CS	RO VEMO CSAS	AH GSAS ASMC	HA ARVE MC	HC VECS MK
45N	320*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62B	1092*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63B	6929*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63D	590	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63G	238	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63H	1451*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63J	358*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63M	980*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63S	617	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63T	1370*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63W	1367*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63Y	492	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67G	194	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67H	948	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67T	219	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67U	497	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67V	716	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67Y	562	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68B	225	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68D	194	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68F	146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68G	328	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68H	153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

CURRENT COMPOSITE: OPERATORS/FOOD (OF)

MOS	N	C1 ARVE MK	CQ ARCS ASMC	E1 GSAR MKEI	FA ARCS MKMC	GH GSAS MKEI	GT ARVE	MM MOAS MCEI	OF VEMO ASMC	A2 ARVE CSMK	A3 ARVE ASMK	A4 GSAR ASMK	A5 ARAS MK	A6 GSAR MK	A7 GSAR VEMK	A9 ARVE MKMC	RC ARVE MKMC	QT GSVE CS	RC VEMO CS	RR VEMO CSAS	AH GSAS ASMC	HA ARVE MC	HC VECS MK
15D	993*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16D	390*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16E	453*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16H	159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16J	137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16P	962*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R	738*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16S	1270*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16T	61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64C	7478*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94B	6007*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94F	182*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

(Continued)

Underprediction of Female Skill Qualification Test Performance --- ---- --- --- ---
Based on 1983-84 SQT Data*

CURRENT COMPOSITE: SURVEILLANCE AND COMMUNICATION (EC)

MOS	N	C1 ARVE MK	CQ ARCS ASMC	E1 GSAR MKEI	FA ARCS MKMC	GM GSAS MKEI	QT ARVE	MM MOAS MCEI	OF VEMO ASMC	QC ARVE ASMC	S1 ARVE MOAS	S2 VEMO ASMK	S3 ARVE MOEI	S4 GSAR MOEI	ST GSVE MKMC	TC VEMO CS	TH VEMO CSAS	AH GSAS ASMC	HA ARVE MC	HC VECS MK
13R	197	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31C	3677*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72E	2554*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72Q	958*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97Q	179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Note: For MOS marked with *, . indicates means were nonsignificant.
Otherwise, . indicates insufficient n.

CURRENT COMPOSITE: SKILLED TECHNICAL (ST)

MOS	N	C1 ARVE MK	CQ ARCS ASMC	E1 GSAR MKEI	FA ARCS MKMC	GM GSAS MKEI	QT ARVE	MOAS MCEI	MM VEMO ASMC	OF ARVE ASMC	QC GSVE MKMC	ST GSCS ASMK	T1 VEMO CS	TC VEMO CSAS	TH GSAS ASMC	AH ARVE MC	HA VECS MK	HC
03C	116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
05D	148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
05H	637*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
13C	146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
55R	110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
71Q	159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
74D	326*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
74F	188	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
81C	166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
81E	154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
82C	757*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
83F	114	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
84B	146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
91E	552*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
91Q	273*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
91R	326*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
91S	190*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
91Y	108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
92B	666*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
93H	344	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
93J	254	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
93P	420*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
95B	9051*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
95C	419*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
96B	410	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
96C	120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
98C	617	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
98G	238	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	

Note: For MOS marked with *, . indicates means were nonsignificant. Otherwise, . indicates insufficient n.

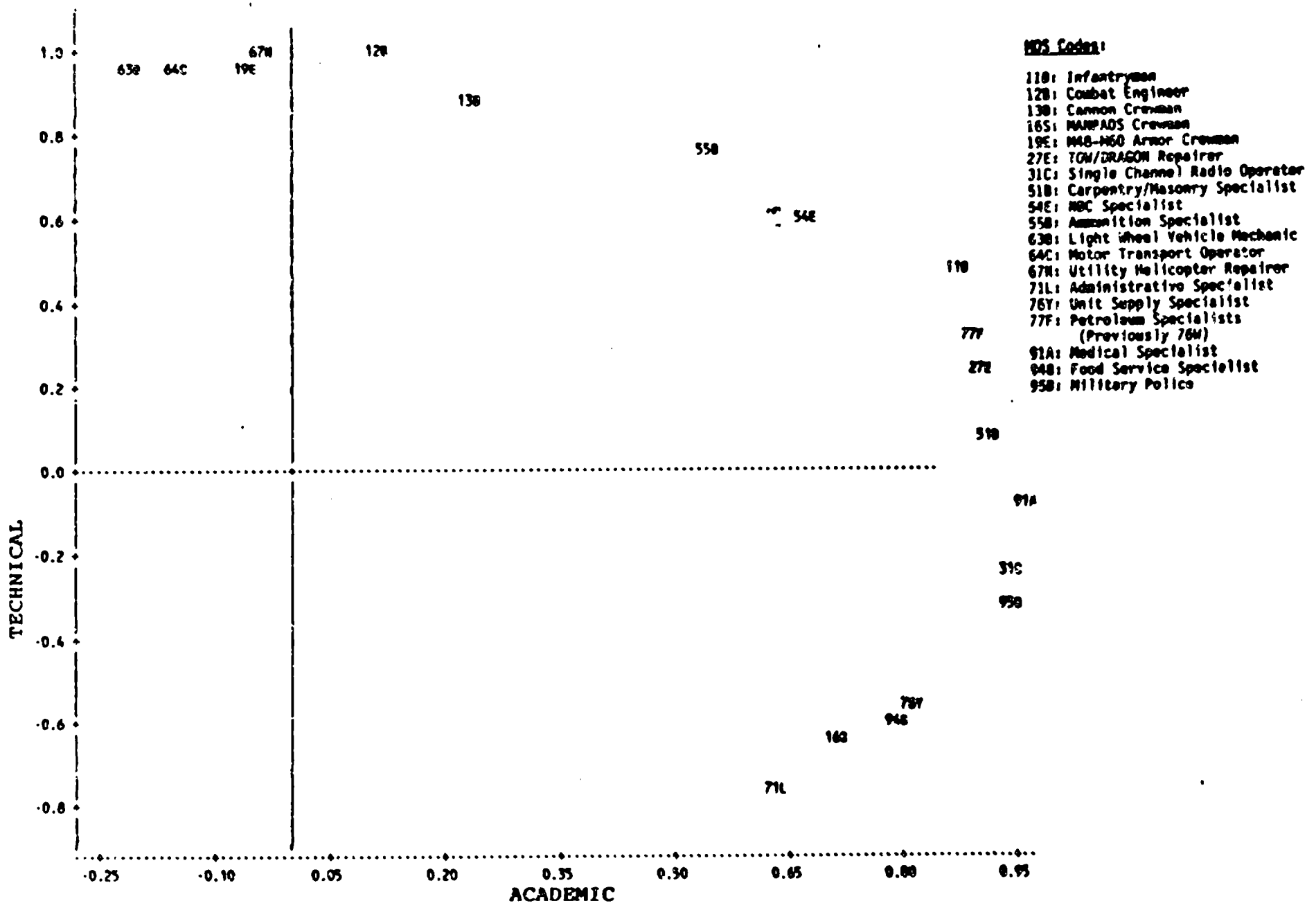


Figure 2.1. Plot of loadings on factors underlying correlations among predicted scores: Project A Core Technical Proficiency

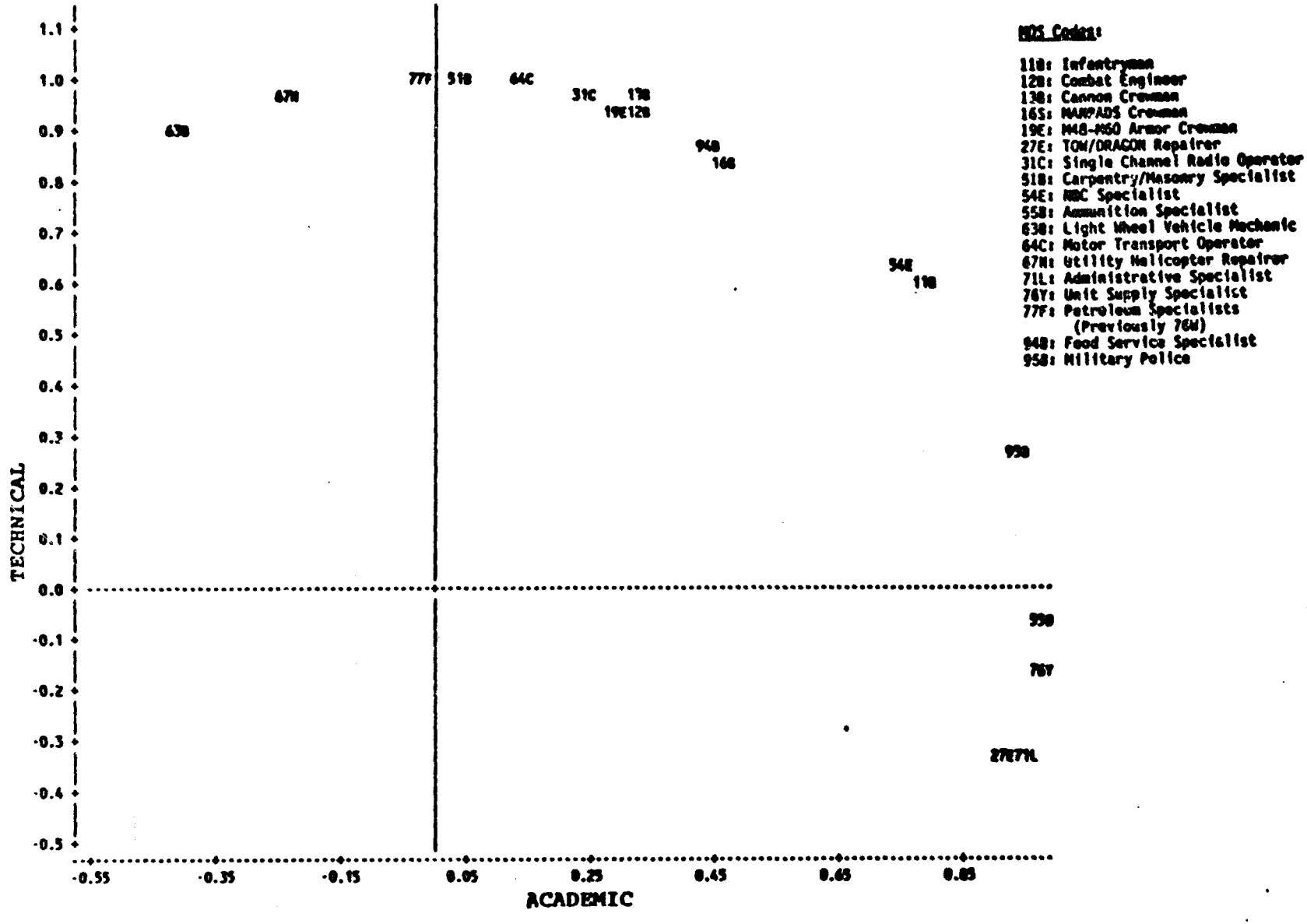


Figure 2.2. Plot of loadings on factors underlying correlations among predicted scores: Project A Core Technical Proficiency.

Table 2.6

Regression Coefficients for Predicting Core Technical Proficiency (CTP) From ASVAB Construct Scores

Composite/ MOS	N	R^2	Clusters: Technical AS,EI,MC	Quantitative MK,AR	Verbal GS,VE	Speed CS,NO	Integer Weights: T	Q	V	S
CL: Clerical										
71L	427	.421	-.146	.461	.208	.152	0	2	1	1
76W	339	.479	.265	.283	.206	.032	1	1	1	0
76Y	444	.453	.070	.374	.183	.137	0	2	1	1
CO: Combat										
11B	491	.464	.285	.166	.216	.128	2	1	1	0
12B	544	.449	.422	.192	.149	-.032	2	1	1	0
19E	394	.331	.393	.199	.078	-.047	2	1	0	0
EL: Electronics										
27E	123	.505	.245	.161	.362	.132	2	1	2	1
FA: Field Artillery										
13B	464	.132	.248	.060	.053	.082	3	1	1	1
GM: General Maintenance										
51B	69	.672	.268	.198	.318	.192	2	1	2	1
55B	203	.572	.332	.085	.419	-.004	2	0	2	0
MM: Mechanical Maintenance										
63B	478	.466	.700	-.010	-.032	.045	4	0	0	0
67N	238	.658	.641	.117	.094	.039	4	0	0	0
OF: Operators/Food										
16S	338	.262	.061	.391	.208	-.001	0	2	1	0
64C	507	.313	.453	.223	-.056	-.020	2	1	0	0
94B	368	.485	.091	.343	.170	.201	0	2	1	1
SC: Surveillance/Communications										
31C	289	.527	.206	.244	.205	.202	1	1	1	1
ST: Skilled Technical										
54E	340	.489	.247	.326	.265	-.087	1	1	1	0
91A	392	.544	.207	.105	.349	.200	1	0	2	1
95B	597	.399	.147	.233	.226	.126	1	1	1	1

ASAB Subtests
- AR - Arithmetic Reasoning
- AS - Auto/Shop Information
- CS - Coding Speed
- EI - Electronics Information
- GS - General Science Information
- MC - Mechanical Comprehension
- MK - Mathematical Knowledge
- NO - Numerical Operations
- VE - Verbal

is in the degree of inclusion of the "technical" subtests of the ASVAB (e.g., MC, AS, and EI). For MOS 63B and 67N (which currently use the MM composite), only technical subtests receive significant weight. For clerical/administrative jobs (e.g., MOS 71L and 76Y), the technical subtests receive virtually no weight.

When SQT scores rather than Project A measures of technical proficiency are used as the criterion for prediction equations, the results are substantially the same. MOS 63B and 71L still anchor the extremes. The loadings for MOS 11B are midway between these two extremes, with other combat MOS (13B, 16S, and 19E) loading somewhat more with the technical than with the administrative MOS. (No SQT data were available for MOS 91A/B.) There were a few notable differences, but these primarily concerned MOS (e.g., 16S or 27E) with relatively small sample sizes for one or the other of the types of criteria.

Even though there appeared to be only two relevant predictor dimensions, the array of jobs was fairly continuous in terms of their relative emphasis on these two dimensions. Balancing all considerations, six clusters of jobs were chosen as the primary alternative to the current nine. Figure 2.3 shows the current and proposed predictor composites.

In addition to the mechanical and administrative clusters at the extremes, analysts identified a "general" cluster of jobs for which approximately equal weight on the two types of predictors was optimal, and a "technical support" cluster of jobs for which somewhat more weight for the general cognitive predictors in comparison to the technical predictors was optimal.

Two other clusters of jobs in this middle range were also identified and kept separate. First, jobs emphasizing electronics were separated because there was only weak evidence that the EI subtest had any greater validity alone. Second, combat jobs were kept in a separate cluster. Here too, there was not strong evidence for different patterns of validity among the current ASVAB subtests. However, the introduction of measures being developed in Project A (including Combat Interest in particular) should provide a basis for differential prediction for this important group of jobs.

Next, the Project A MOS were grouped into the six clusters of jobs and an optimal predictor composite was determined for each cluster. Table 2.7 shows validity and subgroup (race and gender) fairness analyses for the current (old) and alternative (new) composites, using Project A CV data as criteria.

One conclusion from the analyses of the Project A data was, again, that the evidence for generalizing from the current set of MOS clusters was not at all convincing. Therefore, SQT data were again used as a basis for analyzing an expanded set of MOS. For these analyses, the 1985 SQT scores were merged with the scores from 1983 and 1984 used in the earlier SQT analyses, permitting analyses of some additional MOS and increasing the accuracy of

Composite	Technical: AS, MC, EE	General Cognitive: AR, MK, GS, VE	Speed: NO, CS
Current Composite:			
MM: Mechanical Maintenance	AS,MC,EI		NO
GM: General Maintenance		AS, EI	MK,GS
OF: Operators/Food	AS,MC	VE	NO
SC: Surveillance & Communication	AS,MC	AR,VE	
CO: Combat	AS,MC	AR	CS
FA: Field Artillery	MC	AR,MK	CS
EL: Electronic Maintenance	EI	AR,MK,GS	
ST: Skilled Technical	MC	MK,GS,VE	
CL: Clerical			AR,MK,VE
Proposed Composites:			
MM: Mechanical Maintenance	2AS,MC,EI		
MG: General Support	AS,MC	AR,MK	
MC: Combat	AS,MC	AR,GS	
ME: Electronic Maintenance	AS,EI	MK,GS	
MT: Technical Support	MC	AR,VE	
MA: Administrative Support		AR,MK,VE	.5CS

NOTE: 2 = double value for this subtest;
.5 = only half value for this subtest.

Figure 2.3. Definition of current and proposed Aptitude Area composites in terms of ASVAB standardized subtests.

Table 2.7

Comparison of Validity and Subgroup Statistics for Current and Proposed Aptitude Area Composites, Based on Project A Concurrent Validation Data

MOS		AA Composite: New	Old	CMT	AA CMT	Total N	Estimated Validity: New[a]	Old[a]	Diff.	Overprediction[b] of Common Regression Equation: Blacks N	New	Old	Diff.[c]	Females N	New	Old	Diff.[c]
11B:	Infantryman	MC	CO	11	90	491	.66	.66	.00	65	.21	.29	-.00				
12B:	Combat Engineer	MC	CO	12	90	544	.67	.64	.03	108	.01	.02	.01				
13B:	Cannon Crewman	FA	FA	13	85	464	.39	.36	.04	169	.19	.14	.04				
16S:	Manpads Crewman	MG	OF	16	90	338	.67	.64	.03	89	-.06	-.07	.01				
19E:	Armor Crewman	MC	CO	19	90	394	.59	.55	.04	71	.21	.39	.18				
27E:	Tow/Dragon Repairer	MT	EL	27	95	123	.76	.78	-.04	.	.	.	.	.	.	.	.
31C:	Single Channel Radio Op	MX	SC	31	100	289	.69	.69	.00	74	-.05	-.06	.00	65	-.26	-.21	-.05
51B:	Carpentry/Masonry Sp	MG	CM	51	90	69	.80	.81	-.01	.	.	.	.	.	.	.	.
54E:	NBC Specialist	MT	ST	54	95	340	.68	.69	-.01	84	.04	.02	-.02	.	.	.	.
55B:	Ammunition Specialist	MT	CM	55	95	203	.72	.76	-.03	75	.27	.11	-.16	.	.	.	.
63B:	Lt Wheel Veh Mech	MM	MM	63	90	478	.69	.66	.03	78	.17	.23	.06	.	.	.	.
64C:	Motor Transport Op	MG	OF	64	90	507	.56	.52	.04	121	.04	.09	.05	52	.01	.19	.19
67N:	Utility Hel Repairer	MX	MM	67	105	238	.79	.80	-.01	.	.	.	.	.	.	.	.
71L:	Administrative Spec	MA	CL	71	95	427	.65	.64	.01	159	-.01	.01	.00	237	-.21	-.21	.00
76Y:	Petroleum Supply Sp	MG	CL	77	90	339	.69	.67	.02	139	.05	.12	.07	.	.	.	.
76Y:	Unit Supply Sp	MA	CL	76	95	646	.67	.67	.00	169	.04	.06	.01	75	-.12	-.13	.01
91A:	Medical Specialist	MT	ST	91	95	392	.70	.73	-.03	91	.10	.09	-.02	116	.06	.07	.01
94B:	Food Service Sp	MT	OF	94	90	368	.67	.65	.02	126	.03	.01	-.01	78	-.32	-.38	.06
95B:	Military Police	MT	ST	95	100	597	.61	.63	-.01	.	.	.	.	47	.07	-.01	-.06

Code: Aptitude Area Composites

Old (Current)

- CL - Clerical
- CO - Combat
- EL - Electronics
- FA - Field Artillery
- GM - General Maintenance
- MM - Mechanical Maintenance
- OF - Operators/Food
- SC - Surveillance and Communication
- ST - Skilled Technical

New (Proposed)

- MM - Mechanical Maintenance
- MG - General Support
- MC - Combat
- ME - Electronic Maintenance
- MT - Technical Support
- MA - Administrative Support

[a] Corrected for range restriction.
[b] In standard deviation units.
[c] A positive value means that the proposed composite predicts more accurately than the current composite.

results for other MOS. Appendix B shows the validities and subgroup differences for the current and alternative composites for each MOS. (Entries in this appendix are grouped within CMF by the proposed new composite.)

In addition to differences in validity and fairness, classification efficiency was also considered. Table 2.8 shows the intercorrelations for the current AA composites and alternative AA composites, and also shows the Brogden index values of classification efficiency. The new composites did have noticeably higher classification efficiency values. This increase was due in part to small gains in average validity (.61 to .63) and in part to a reduction in the average correlation among composites (from .92 to .89). The reduction in the average correlation among composites was not due simply to a reduction in the number of composites. For the current composites, the minimum correlation (between the CL and MM composites) is .80; for the alternative composites, the minimum correlation (between MM and MA) is .65.

In sum, the results of the second phase of AA validity analyses supported the following conclusions:

- There was little evidence for any significant benefit from increased validity or fairness associated with the new composites.
- Changing to an entirely new set of Aptitude Area composites would entail major Army actions that do not appear to be justified on the basis of the modest estimates of benefit.
- Most of the increase in classification efficiency recorded for the new composites (e.g., increased validity and decreased correlation among composites) could be realized by changing the subtests used in the existing Mechanical Maintenance (MM) composite.
- Most of the rest of the benefit from the new composites could be realized by reassigning some MOS to a different one of the current composites without reducing the number of different composites used.

IDENTIFICATION OF OPTIMAL REASSIGNMENTS OF MOS TO AA COMPOSITES

In accordance with recommendations from the Project A Scientific Advisory Group, the project staff reanalyzed the SQT data to identify MOS for which reassignment to a different composite from among the current composites (or the proposed new MM composite) appeared indicated. Table 2.9 summarizes these results by MOS within career management field (CMF). A complete listing of the separate sample estimates for each MOS is shown as Appendix C.

A list of specific changes was prepared and briefed, along with the proposed change in MM (Figure 2.4), to the Project A General Officers' Advisory Group on 1 May 1987. A few further changes were proposed to cover reserve component MOS and MOS for which no data were available (on the basis of similarity to other MOS). The final results of these analyses were

Table 2.8

Classification Efficiency: Correlations for Current and Proposed Composites, Estimated for 1980 Youth Population

CURRENT COMPOSITES

	CL	ST	EL	MM	CO	SC	FA	GM	OF
CL	1.000								
ST	.947	1.000							
EL	.951	.965	1.000						
MM	.796	.886	.886	1.000					
CO	.861	.907	.899	.944	1.000				
SC	.892	.948	.928	.951	.963	1.000			
FA	.944	.929	.928	.851	.945	.901	1.000		
GM	.865	.942	.962	.942	.908	.945	.860	1.000	
OF	.866	.931	.891	.969	.951	.968	.891	.919	1.000

Average R = .918
Average Validity = .607
Brogden Index = .174

NEW COMPOSITES

	MM	MG	MC	ME	MT	MA
MM	1.000					
MG	.891	1.000				
MC	.932	.974	1.000			
ME	.916	.946	.962	1.000		
MT	.814	.954	.946	.904	1.000	
MA	.648	.885	.836	.848	.935	1.000

Average R = .892
Average Validity = .627
Brogden Index = .205

Table 2.9

Mean Validities for AA Composites by MOS Within Career Management Fields

CMF	MOS	N	MAX	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST
11		42715	.61	.58	.58	.60	.58	.59	.57	.52	.59	.60	.60
	11B	31283	.62	.59	.58	.60	.58	.59	.57	.53	.59	.60	.61
	11C	6837	.60	.57	.56	.58	.56	.57	.55	.50	.57	.58	.59
	11H	4595	.61	.56	.58	.59	.56	.59	.57	.54	.58	.60	.59
12		10303	.52	.46	.50	.49	.48	.50	.49	.46	.48	.50	.49
	12B	8143	.52	.47	.50	.59	.49	.50	.48	.46	.49	.51	.50
	12C	1553	.56	.45	.53	.50	.48	.53	.53	.52	.51	.53	.51
	12E	218	.47	.41	.45	.42	.44	.43	.42	.40	.43	.44	.43
	12F	389	.42	.28	.35	.34	.30	.38	.37	.40	.34	.37	.33
	13	30067	.54	.50	.51	.52	.50	.52	.50	.47	.51	.52	.52
	13B	20619	.50	.46	.48	.49	.47	.49	.48	.45	.48	.49	.48
	13C	268	.74	.69	.64	.67	.67	.64	.61	.52	.65	.65	.68
	13E	1260	.64	.63	.58	.62	.61	.59	.55	.48	.57	.59	.61
	13F	3311	.68	.65	.64	.67	.66	.65	.62	.55	.64	.65	.67
	13M	1963	.53	.48	.51	.50	.48	.51	.50	.48	.51	.52	.50
	13R	537	.53	.38	.40	.41	.39	.41	.39	.37	.39	.41	.42
	15E	420	.68	.51	.63	.59	.55	.64	.66	.67	.63	.64	.59
	15J	125	.52	.16	.27	.27	.21	.33	.31	.34	.26	.25	.24
	82C	1329	.66	.62	.61	.64	.63	.62	.59	.54	.59	.61	.61
	93F	235	.58	.48	.47	.48	.49	.46	.42	.40	.43	.48	.48
16		6498	.53	.45	.48	.48	.46	.49	.48	.47	.47	.50	.48
	16D	570	.50	.37	.41	.41	.39	.42	.40	.40	.39	.41	.40
	16E	663	.62	.57	.58	.59	.58	.58	.56	.52	.56	.59	.59
	16H	159	.59	.44	.54	.52	.47	.56	.57	.57	.53	.55	.50
	16J	268	.39	.27	.27	.29	.28	.26	.24	.23	.23	.27	.25
	16P	1275	.52	.41	.47	.47	.43	.50	.49	.50	.46	.49	.46
	16R	1354	.55	.46	.52	.51	.48	.53	.52	.52	.50	.54	.51
	16S	2049	.51	.47	.48	.48	.48	.48	.47	.44	.47	.49	.48
	16T	160	.64	.48	.53	.51	.51	.53	.55	.53	.54	.55	.52
19		14750	.61	.56	.59	.58	.56	.59	.58	.55	.59	.60	.59
	19D	4883	.58	.54	.55	.56	.54	.56	.54	.51	.55	.57	.56
	19F	8371	.63	.57	.61	.60	.58	.61	60	.57	.61	.62	.61
	19K	1496	.59	.55	.56	.58	.55	.58	.56	.52	.57	.58	.58

(Continued)

Table 2.9 (Continued)

Mean Validities for AA Composites by MOS Within Career Management Fields

CMF	MOS	N	MAX	CL	CO	EL	FA	GM	MM	NM	OF	SC	ST
23		786	.59	.45	.50	.49	.47	.52	.51	.51	.49	.52	.49
	24C	190	.63	.50	.54	.56	.51	.57	.55	.55	.53	.57	.54
	24G	80	.50	.36	.44	.40	.39	.44	.45	.46	.41	.43	.37
	24M	201	.65	.47	.59	.56	.52	.60	.60	.61	.56	.58	.54
	24N	197	.48	.26	.33	.29	.29	.34	.35	.39	.34	.36	.34
	25L	118	.70	.68	.61	.66	.65	.62	.57	.50	.63	.64	.68
25		444	.69	.62	.62	.64	.63	.62	.59	.54	.61	.62	.64
	26T	76	.71	.55	.65	.57	.57	.59	.64	.59	.67	.64	.57
	81E	154	.68	.65	.64	.66	.66	.63	.59	.53	.61	.63	.66
	84B	144	.74	.71	.67	.71	.70	.69	.64	.57	.67	.68	.72
	84F	70	.58	.43	.45	.50	.45	.52	.43	.44	.40	.45	.49
27		2077	.61	.55	.53	.54	.54	.52	.51	.44	.54	.53	.55
	21G	68	.77	.66	.71	.69	.64	.73	.71	.71	.73	.74	.71
	21L	105	.70	.63	.53	.58	.57	.55	.51	.41	.59	.55	.61
	24J	70	.84	.79	.78	.78	.80	.76	.74	.68	.78	.80	.82
	24K	83	.87	.83	.83	.82	.85	.77	.77	.65	.80	.80	.80
	24L	85	.76	.75	.68	.73	.72	.67	.63	.53	.66	.67	.69
	27B	208	.71	.62	.66	.65	.63	.65	.63	.60	.64	.67	.64
	27E	969	.52	.49	.45	.47	.47	.45	.44	.36	.47	.46	.47
	27F	124	.63	.55	.47	.53	.52	.47	.44	.38	.46	.50	.52
	27M	50	.89	.80	.67	.70	.75	.63	.63	.45	.74	.68	.74
	27N	199	.58	.39	.49	.44	.45	.47	.48	.46	.48	.47	.47
	46N	116	.49	.45	.39	.44	.42	.42	.36	.32	.40	.40	.45
28		69	.71	.64	.65	.65	.63	.65	.64	.59	.65	.66	.64
	35K	69	.71	.64	.65	.65	.63	.65	.64	.59	.65	.66	.64
29		2977	.72	.67	.66	.67	.67	.64	.63	.54	.66	.66	.67
	29E	576	.68	.63	.62	.61	.63	.58	.57	.48	.61	.61	.61
	29F	87	.84	.76	.78	.79	.76	.78	.77	.68	.81	.79	.81
	29J	853	.75	.72	.67	.72	.70	.68	.64	.55	.69	.68	.72
	29M	433	.70	.63	.66	.64	.66	.62	.63	.54	.65	.64	.66
	29N	229	.76	.71	.70	.68	.70	.65	.66	.55	.71	.69	.69
	29V	469	.72	.70	.67	.70	.68	.67	.64	.57	.68	.69	.71
	35E	112	.55	.52	.48	.53	.51	.51	.48	.41	.48	.48	.50
	35H	218	.70	.60	.66	.62	.64	.63	.67	.61	.66	.65	.62

(Continued)

Table 2.9 (Continued)

Mean Validities for AA Composites by MOS Within Career Management Fields

CME	MOS	N	MAX	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST
31		30356	.61	.55	.57	.58	.55	.59	.57	.55	.57	.59	.58
	26Q	878	.58	.52	.51	.55	.52	.53	.50	.47	.49	.53	.53
	31C	7262	.65	.59	.62	.63	.59	.63	.61	.59	.62	.64	.62
	31K	5229	.57	.48	.53	.53	.50	.55	.53	.53	.52	.55	.53
	31M	6120	.70	.63	.66	.67	.63	.68	.66	.63	.66	.68	.67
	31N	509	.55	.50	.46	.52	.49	.51	.48	.41	.48	.47	.51
	31V	1869	.57	.52	.52	.55	.50	.55	.53	.50	.54	.54	.54
	32D	995	.67	.65	.60	.64	.63	.61	.56	.49	.60	.61	.64
	36C	2907	.56	.46	.52	.51	.48	.53	.54	.53	.52	.54	.51
	36M	358	.35	.23	.30	.27	.25	.30	.32	.33	.30	.31	.28
	72E	3271	.55	.52	.51	.53	.51	.53	.50	.47	.51	.53	.53
	72G	958	.62	.61	.56	.60	.59	.56	.53	.44	.56	.56	.60
46		242	.83	.79	.68	.73	.72	.68	.63	.53	.72	.72	.77
	71Q	159	.84	.80	.68	.73	.73	.68	.63	.53	.72	.73	.78
	71R	83	.82	.76	.67	.73	.68	.69	.64	.54	.72	.71	.75
51		4443	.66	.55	.62	.60	.58	.62	.61	.60	.61	.63	.60
	51B	1132	.65	.57	.62	.60	.58	.62	.61	.60	.62	.64	.62
	51C	135	.66	.49	.57	.53	.54	.53	.54	.50	.54	.55	.54
	51K	346	.64	.50	.53	.54	.50	.54	.54	.52	.53	.57	.54
	51M	72	.77	.70	.73	.72	.72	.72	.71	.66	.72	.73	.72
	51R	381	.57	.45	.53	.49	.48	.52	.51	.52	.50	.52	.49
	62E	1203	.67	.56	.65	.62	.61	.64	.64	.62	.62	.65	.62
	62F	382	.72	.61	.69	.66	.64	.68	.71	.68	.70	.71	.66
	62J	705	.67	.57	.64	.63	.59	.65	.64	.63	.63	.65	.63
	82B	87	.53	.50	.42	.51	.48	.47	.42	.35	.43	.44	.49
54		898	.71	.62	.65	.67	.63	.67	.65	.62	.64	.67	.66
	54C	423	.67	.54	.61	.60	.57	.63	.61	.61	.58	.62	.59
	54E	475	.74	.70	.69	.72	.69	.70	.68	.62	.69	.72	.72
55		2805	.57	.53	.51	.52	.53	.50	.48	.42	.52	.52	.53
	55B	2176	.55	.52	.50	.51	.52	.49	.48	.42	.51	.51	.52
	55D	119	.67	.58	.64	.61	.59	.64	.65	.62	.66	.66	.63
	55G	400	.64	.57	.55	.58	.57	.54	.49	.43	.51	.54	.55
	55R	110	.58	.55	.44	.49	.52	.43	.38	.28	.44	.43	.51

(Continued)

Table 2.9 (Continued)

Mean Validities for AA Composites by MOS Within Career Management Fields

CMF	MOS	N	MAX	CL	CO	EL	FA	GM	MM	NM	OF	SC	ST
63		34271	.67	.53	.61	.59	.55	.64	.64	.64	.61	.64	.59
	41C	451	.62	.56	.56	.58	.55	.58	.55	.52	.56	.58	.57
	44B	680	.72	.61	.68	.66	.62	.70	.69	.68	.69	.70	.68
	44E	456	.76	.60	.68	.68	.64	.72	.70	.70	.67	.70	.68
	45B	181	.64	.44	.49	.52	.45	.55	.49	.55	.45	.54	.50
	45D	524	.60	.46	.48	.46	.45	.47	.49	.46	.51	.51	.48
	45E	60	.84	.74	.71	.77	.70	.75	.73	.69	.74	.79	.77
	45K	700	.69	.58	.60	.62	.57	.64	.62	.61	.62	.65	.62
	45L	304	.69	.53	.60	.56	.54	.59	.59	.59	.59	.61	.57
	45M	580	.60	.49	.53	.52	.51	.52	.51	.47	.51	.52	.52
	45T	79	.76	.64	.70	.69	.65	.71	.66	.67	.66	.72	.69
	52D	2491	.72	.66	.67	.71	.66	.72	.68	.65	.67	.70	.69
	62B	1550	.77	.53	.68	.64	.58	.71	.72	.76	.67	.71	.62
	63B	12311	.64	.49	.59	.56	.52	.61	.61	.63	.58	.61	.55
	63D	1282	.68	.53	.61	.60	.54	.65	.64	.66	.61	.65	.59
	63G	472	.67	.54	.61	.60	.55	.63	.63	.61	.62	.62	.61
	63H	3075	.73	.62	.70	.67	.64	.71	.71	.70	.70	.71	.67
	63J	551	.63	.50	.58	.56	.53	.59	.59	.59	.57	.60	.55
	63N	2030	.59	.42	.52	.49	.43	.54	.55	.58	.53	.55	.49
	63S	941	.75	.57	.68	.65	.59	.71	.71	.72	.68	.71	.65
	63T	2308	.71	.49	.62	.59	.51	.66	.66	.70	.62	.65	.58
	63W	2296	.69	.52	.63	.59	.54	.65	.66	.67	.63	.65	.59
	63Y	949	.66	.52	.60	.57	.54	.62	.61	.62	.60	.63	.58
64		16854	.56	.50	.53	.53	.51	.53	.53	.50	.53	.55	.53
	57H	1228	.44	.35	.37	.38	.36	.37	.37	.35	.36	.38	.37
	64C	14917	.57	.51	.55	.54	.52	.55	.55	.52	.55	.56	.54
	71N	709	.56	.53	.49	.52	.53	.46	.44	.36	.46	.47	.50

Aptitude Area Composites

CL - Clerical
CO - Combat
EL - Electronics
FA - Field Artillery
GM - General Maintenance
MM - Mechanical Maintenance
NM - Mechanical Maintenance (New)
OF - Operators/Food
SC - Surveillance and Communication
ST - Skilled Technical

Mechanical Maintenance Aptitude Area Composite

Current (MM):	.AS	(Auto/Shop Information)	
	+		
	MC		(Mechanical Comprehension)
	+		
	EI		(Electronics Information)
	+		
	NO		(Numerical Operations)
Proposed (MM):		2	AS (Auto/Shop Information)
	+		
	MC		(Mechanical Comprehension)
	+		
	EI		(Electronics Information)

Figure 2.4. Proposed change in the Mechanical Maintenance Composite.

briefed once more at the Project A Analysis Group In-Progress Review (IPR) meeting in July 1987. Table 2.10 shows the specific changes that were proposed. Subsequent to this meeting, briefings on the proposed changes were prepared for each of the proponent schools. ARI staff have presented these briefings where they were requested.

SUMMARY AND CONCLUSIONS

The most significant finding from this research was that the existing AA composites do a reasonably good job of predicting subsequent job performance. In the end, only relatively minor changes to the existing set of composites were proposed. These included a change in the formula for computing the Mechanical Maintenance composite and the reassignment of several MOS to different composites for classification purposes.

A second finding was that the relevant dimensionality of the current predictors is small. Only two relevant dimensions were found. This leaves a great deal of room for additional predictors (e.g., spatial, psychomotor, or interest measures) that might be of significant benefit in increasing classification efficiency.

Table 2.10

Proposed Changes in Assignment of MOS to Aptitude Area Composites

MOS		CMF	AA New	AA Old
	To Improve Overall Validity			
03C	Physical Activities Specialist	71	CL	ST
05H	EW/SIGINT Inter-IMC	98	CL	ST
15E	PERSHING Missile Crewmember	13	CO	OF
16D	HAWK Missile Crewmember	16	CO	OF
16E	HAWK FC Crewmember	16	CO	OF
16H	ADA Op-Intel Asst	16	CO	OF
16J	Def Acq Radar Operator	16	CO	OF
16P	ADA Short RG Missile Crewmember	16	CO	OF
16R	ADA Short RG Gunnery Crewmember	16	CO	OF
16S	MANPADS Crewmember	16	CO	OF
24M	VULCAN System Mech	23	MM	EL
24N	CHAPARRAL System Mech	23	MM	EL
25L	ADA CMD/Cont System Operator/Repairer	23	CL	EL
26T	RDO/TV System Specialist	25	OF	EL
36C	Wire System Inst/Operator	31	SC	EL
36M	Wire System Operator	31	SC	EL
42D	Dental Lab Specialist	91	CL	GM
51R	Interior Electrician	51	GM	EL
55B	Ammunition Specialist	55	CL	GM
55R	Ammunition Stk Con & Act	55	CL	ST
57F	Graves Reg Specialist	76	CL	GM
68D	ACFT Powertrain Repairer	67	EL	MM
68G	Aircraft Structural Repairer	67	ST	MM
71R	Broadcast Journalist	46	CL	ST
72G	Auto Data Telecom Cen Operator	31	CL	SC
73D	Accounting Specialist	71	CL	ST
74D	Computer/Tape Writer	74	CL	ST
74F	Programmer/Analyst	74	CL	ST
77F	Petroleum Supply Specialist	77	GM	CL
82C	FA Surveyor	13	FA	ST
91E	Dental Specialist	91	CL	ST
91P	X-Ray Specialist	91	CL	ST
91Y	Eye Specialist	91	CL	ST
92B	Medical Lab Specialist	91	CL	ST
93F	FA Met Crewmember	13	FA	EL
96D	Image Interpreter	96	GM	ST
96R	Gnd Surv1 System Of	96	SC	EL
97B	CI Agent	96	GM	ST

(Continued)

Table 2.10 (Continued)

Proposed Changes in Assignment of MOS to Aptitude Area Composites

MOS		CMF	AA New	AA Old
	To Improve Accuracy of Prediction for Women or Blacks			
05D	EW/SIGINT Ident/Loc	98	CL	ST
05K	EW/SIGINT N-M Intep	98	CL	ST
12C	Bridge Crewmember	12	CO	MM
98C	EW/SIGINT Analyst	98	CL	ST
	To Improve Conceptual Match of Composite and Job			
19E	Cannon FD Specialist	13	FA	ST
16T	PATRIOT Missile Crewmember	16	CO	OF
16F	Light Air Def Artillery Crew (RC)	16	CO	OF
16G	ROLAND System Crew (RC)	16	CO	OF
24S	ROLAND System Mechanic	16	MM	SC
27C	ROLAND System Repairer	16	MM	SC

Aptitude Area Composites

CL - Clerical
CO - Combat
EL - Electronics
FA - Field Artillery
GM - General Maintenance
MM - Mechanical Maintenance
OF - Operators/Food
SC - Surveillance and Communication
ST - Skilled Technical

A third finding was the importance of SQT data for monitoring the appropriateness of different predictors for different MOS. Given the changing nature of many MOS, it would seem prudent to plan for periodic reanalyses as new SQT data become available.

Finally, development of estimates of the potential benefit of AA changes that go beyond indexes of validity or classification efficiency would be desirable. Given the constraints on assigning applicants to MOS and the uncertain influence of applicant choice, an accurate overall index seems unlikely. It might be preferable to develop indirect indicators of the adequacy of the AA composites. The number of recruits who do not have enough ability to complete training or the number who do not achieve adequate job proficiency might be of particular interest. The Project A longitudinal data should provide a much stronger basis for describing the impact of alternative selection composites.

Chapter 3

WEIGHTING CRITERION COMPONENTS FOR A COMPOSITE INDEX[1]

The data from the Concurrent Validation sample have been used to revise and develop more completely a model of job performance for entry-level performance in terms of five basic components (General Soldiering Skills, MOS-Specific Technical Skills, Leadership/Effort, Personal Discipline, Military Bearing/Physical Fitness). This process was described in the Project A Annual Report for FY 1986 (Campbell, 1986a; also Campbell, 1986b, and Wise, Campbell, McHenry, & Hanser, 1986).

Results have shown that each of the components can be predicted with considerable validity and that the validity of the different predictor domains varies systematically across criterion components. Yet to be determined is how a composite index of performance can be formed and what the validity of the Trial Battery is for each job, when just one composite indicator of performance is used.

This chapter describes research conducted to determine the best method to weight the importance of the job performance components in an overall composite index of performance. Weighting judgments for each Project A MOS were then gathered from noncommissioned officers (NCOs) and officers familiar with each MOS. Analyses of these data are presented in the final sections of the chapter.

BACKGROUND

Several methods are available for assigning weights to dimensions of performance in such a way that they reflect the dimensions' relative importance to overall performance. Four procedures that have been emphasized in the literature are (a) the Two-Factor-at-a-Time conjoint procedure; (b) the Full-Profile conjoint procedure; (c) the Kelly Bids system; and (d) the Kane method.

In a conjoint procedure the respondents are asked to rank order, rate, or otherwise choose among two or more sets of profile descriptions that vary along the dimensions of interest. The relative weights for the dimensions can be inferred from the relationships between the dimension values built into the descriptions and the rank orders or ratings (the dependent variable) of the profiles. The Two-Factor-at-a-Time and the Full-Profile approaches have been generally used in conjoint procedures.

The Two-Factor-at-a-Time is also referred to as the Trade-off procedure (Johnson, 1974). In this procedure the performance factors are evaluated on a two-at-a-time basis. The evaluators are usually asked to rank the various combinations of each pair from most preferred to least preferred (Green &

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[1]This chapter is based on Sadacca, deVera, DiFazio, and White (1986) and Sadacca, Campbell, White, and DiFazio (1988).

Srinivasan, 1978). The advantages of using this procedure are that it is simple, reduces information overload, and lends itself to mail questionnaire administration. It does, however, have some limitations. It has been criticized as being unrealistic because there are other factors that must also be considered in the overall evaluation. Some researchers (Green, 1974; Johnson & VanDyk, 1975) have pointed out that the total number of required evaluations is quite large when there are multiple levels within the dimensions; in these circumstances the respondents may attend to one dimension first before considering the other (Johnson, 1974).

The Full-Profile approach attempts to address some of the limitations of the Two-Factor-at-a-Time procedure, following the same procedure but utilizing the complete set of factors in the descriptions. It gives a more realistic description of the stimuli being judged by defining the levels on all of the factors, and possibly taking into account the potential environmental correlations between the factors in real stimuli (Green & Srinivasan, 1978). It is, however, not devoid of limitations. Information overload is highly likely as the number of factors in the profile increases. Furthermore, the respondents may simplify the task by ignoring variations in the less important factors or by simplifying the factor levels themselves (Green & Srinivasan, 1978). For these reasons, use of this procedure is generally limited to five or six factors.

The measurement scale used for these conjoint procedures is either non-metric (paired comparisons, rank order) or metric (rating scales assuming interval scales, ratio scales obtained by constant-sum paired comparisons). For the Two-Factor, the non-metric scale is more appropriate because the rank order of the cells in a trade-off table need not depend on the levels of the missing factors, except if the attributes are correlated (Green & Srinivasan, 1978).

The effectiveness of these two procedures has been evaluated by several researchers. Montgomery, Wittink, and Glaze (1977) reported that the Two-Factor procedure yielded higher predictive validity. Their research focused on job choices made by business graduates and used a total of eight attributes. In a study of commuters' choice of transportation modes that varied along nine attributes, Alpert, Betak, and Golden (1978) reported better goodness-of-fit for the Two-Factor procedure. Jain, Acito, Malhotra, and Mahajan (1978), on the other hand, reported that the two methods yielded approximately the same level of cross-validity in the context of choosing checking accounts offered by various banks when the accounts were described via five attributes. Oppedijk van Veen and Beazley (1977) found that the utilities determined by the two methods were roughly similar in the context of a durable goods product class when using three attributes.

In the Kelly Bids system for weighting purposes, the respondents are asked to allocate 100 points across the criterion dimensions on the basis of their relative importance. Schmidt (1977) found this procedure better than others because the focus is on the hypothetical "true" criterion.

Kane (1980) maintained that observability and uncertainty should also be considered critical in all appraisal situations. He therefore proposed the Kane method for assigning weights to performance factors. An important aspect to this procedure is the designation of a level of specificity for assigning importance weights (e.g., task level) prior to any activity. The respondents are then asked to identify the component having the least importance for measuring overall effectiveness; this component is assigned a weight of 1.0. The respondents are then asked to compare the remaining factors to the least important component, assigning weights to reflect how many times more important each factor is in comparison to the least important factor.

All four procedures for assigning weights to performance factors have been shown to work well in a variety of settings. The appropriateness of the methodology depends to a great extent on the purposes and the type of factors and variables of the research endeavor. Consequently, before proceeding to the actual determination of MOS weights, the Project A staff conducted a series of exploratory studies with the various procedures to determine which methods would be most suitable for this project.

PILOT TESTS OF METHODS FOR WEIGHTING CRITERION COMPONENTS

Three pilot experiments were conducted to select the procedures to be used in weighting performance constructs (components) for Project A. The primary focus in these experiments was on the weighting procedures themselves, not on the weights of the constructs for a given MOS. Our interest in conducting the experiments was in selecting one or more procedures for weighting the components of performance that would be acceptable to the Army and would yield a reliable, valid set of weights for each of the sampled MOS when the procedures were applied by the appropriate subject matter experts (SMEs). The three pilot experiments were related in the sense that the weighting procedure selected as a result of the first experiment was also used in the second and third experiments to further evaluate that and other procedures. The experiments and their results will be described briefly prior to describing the actual component weighting procedure.

Experiment 1: Procedure and Results

Sixteen Army officers stationed at Fort Meade, Maryland, and Fort Monroe, Virginia, participated in the first experiment. Their task was to assign relative weights to six performance constructs for three MOS -- Infantryman (11B), Light Wheel Vehicle Mechanic (63B), and Administrative Specialist (71L).

At the time the experiment was conducted in the summer of 1985, the Project A performance constructs for a job performance model had not yet been selected. Therefore, a plausible set of six constructs whose weights might be expected to vary considerably was used for the experiment. The six performance constructs were (a) dependability, (b) MOS-specific task performance, (c) MOS knowledge, (d) military bearing, (e) performance under adverse conditions, and (f) performance on common, general soldiering tasks

(e.g., putting on a gas mask). The construct weights for the three MOS were assigned by the officers under a replicated 3 x 3 Graeco-Latin square design (Figure 3.1) in which three weighting procedures were used under three different military scenarios.

All three procedures involved direct judgments of the relative weight that each performance construct should receive in forming an overall composite performance score. In procedure A, the officers were first asked to rank order the six constructs, and then to assign 100 points to the first-ranked construct and scale the other constructs accordingly (this is a variant of the Kane method). In procedure B, the officers were instructed to divide 100 points among the six constructs in a manner that reflected the relative weight that should be given the constructs. In procedure C, 15 pairs of the six constructs were presented in a paired-comparison protocol; the order of presentation followed the optimization procedure worked out by Ross (1934). The officers' task was to divide 100 points between the two constructs being judged in any given pair.

The judgments were made in the context of three different scenarios (Figure 3.2). The scenarios described respectively a peacetime condition, a period of heightened tensions, and a wartime setting in which hostilities had just broken out. The site (i.e., Europe) of the three scenarios was the same.

After completing the construct weighting judgments, each officer used four 7-point scales to evaluate the weighting methods on the following dimensions:

(1) Acceptability to the Army.

(2) Ease of making the judgments called for by the method.

(3) Their confidence in the validity of the judgments made.

(4) The amount of agreement with other workshop participants that could be expected.

The relevant mean ratings across the four dimensions are shown in Table 3.1. After the officers completed rating the methods, an informal discussion was held to solicit their opinions about the methods.

The design permitted testing for the significance of differences in mean ratings on the four dimensions for procedures and for scenarios, and for any Procedure by Scenario interactions. None of the main effects due to the scaling procedure or scenario were significant. However, significant ($p<.05$) Procedure by Scenario interactions were obtained for the scales showing acceptability to the Army and the raters' confidence in their judgment, and for the average of the four scales. Procedure A (in which 100 points were assigned to the first-ranked construct) had particularly low

Scaling Methods: Maximum 100 points (A), divide 100 points (B), paired comparison (C).

Military Scenario: Wartime (a), period of heightened tensions (b), peacetime (c).

Number of Subjects	MOS 11B	MOS 63W	MOS 71L
2	Aa	Bb	Cc
1	Bc	Ca	Ab
1	Cb	Ac	Ba
	MOS 63W	**MOS 71L**	**MOS 11B**
2	Aa	Bb	Cc
2	Bc	Ca	Ab
2	Cb	Ac	Ba
	MOS 71L	**MOS 11B**	**MOS 63W**
2	Aa	Bb	Cc
2	Bc	Ca	Ab
2	Cb	Ac	Ba

Figure 3.1. Replicated Graeco-Latin Square design.

PEACETIME SCENARIO

Europe is in the peacetime condition currently prevailing there. Your Corps' mission is to defend and maintain the host country's border should war break out. The potential enemy approximates a combined arms Army and has nuclear and chemical capability. Air parity does exist. The Corps has personnel and equipment sufficient to make it mission capable for training and evaluation. The training cycle includes periodic field exercises, command and maintenance inspections, ARTEP evaluations, and individual soldier training/SQT testing.

HEIGHTENED TENSIONS SCENARIO

Europe is in a period of heightened tensions. There is an increasing probability that hostilities will break out in the next several months. Your Corps' mission is to defend and maintain the host country's border should war break out. The potential enemy approximates a combined arms Army and has nuclear and chemical capability. Air parity does exist. The Corps' training and other preparatory activities have been substantially increased. Most combat and associated support units are participating in frequent field exercises. Most units are being actively resupplied.

WARTIME SCENARIO

Hostilities have broken out in Europe and your Corps' combat units are engaged. Your Corps' mission is to defend, then reestablish, the host country's border. Pockets of enemy airborne/heliborne and guerilla elements are operating throughout the Corps sector area. Limited initial and reactive chemical strikes have been employed but nuclear strikes have not been initiated. Air parity does exist.

Figure 3.2. Three different military scenarios.

Table 3.1

Experiment 1: Mean[a] Ratings[b] of Nine Weighting Procedure/Scenario Combinations

Procedure	Scenario		
	Peacetime	Heightened Tensions	Wartime
A. Maximum = 100 points	2.85	4.75	4.79
B. Divide 100 points	4.95	5.12	4.20
C. Paired Comparison	4.62	4.60	4.35

[a] Separate means based on ratings of five or six officers.
[b] Seven-point rating scales in which 1 = Low and 7 = High.

ratings when combined with the peacetime scenario, but had relatively high ratings when combined with the wartime and heightened tensions scenarios.

The officers generally expressed preference for procedures A and C over procedure B, and thought that the time they spent in Procedure B in making sure that the sum of their weights equaled 100 detracted from their ability to judge the relative importance of the performance factors. It was also evident that if a larger number of constructs were ultimately identified, procedures B and C could become fairly onerous.

The officers also expressed a general preference for the heightened tensions and wartime scenarios over the peacetime scenario as the setting for the judgments. From the discussion, it also seemed that a heightened tensions scenario would evoke a more uniform frame of reference across the many different kinds of subject matter experts providing the MOS construct weights than a wartime scenario would, unless the wartime scenario was made quite specific. However, specificity in the scenario could produce unwanted dependency of the construct weights on particular elements in the scenario, which could detract from the validity of the weighted composite as an overall, general measure of MOS performance.

Experiment 2: Procedure and Results

The second pilot experiment was conducted in the winter of 1985 at Fort Bragg, North Carolina, using two 4-hour workshops. One workshop was attended by 15 officers, the other by 15 NCOs. The workshop participants were asked to weight five performance constructs for the Infantry MOS: (a) demonstrating commitment to the Army, (b) technical proficiency and knowledge, (c) physical fitness and military bearing, (d) performance under adverse conditions, and (e) maintaining and servicing weapons and equipment.

Each participant used the three different weighting methods described in the following instructions:

(1) Rank order the five constructs, assign 100 points to the first-ranked construct, and then scale the other constructs accordingly (same as procedure A in Experiment 1).

(2) Based upon their scores on the separate constructs, rank order 25 infantrymen in order of their overall performance. For each infantryman, a different set of performance scores on the five constructs was given on 7-point scales that range from the lowest level of performance to the highest. A sample profile is shown in Figure 3.3.

(3) Based upon their scores on two constructs, rank order 10 sets of 13 infantrymen in order of their overall performance. In each set, the performance scores on two constructs are given on the same 7-point scales used in the second method above. A set of 13 infantrymen is given for each of the 10 possible pairs of the five constructs. (See Figure 3.4.)

The second and third methods are variants of the conjoint approach to scaling in which, instead of obtaining the relative importance of the performance constructs directly, the judges' weights for the performance constructs are inferred from the rank order they give sets of hypothetical soldiers whose performance on the constructs has been systematically varied. Multiple regression weights are calculated from the interrelationships between the rank orders provided by the judges and the performance construct levels given in the performance descriptions. In the paired-comparison method, these regression weights are then used to derive the construct weights, using a ratio scaling procedure described by Torgerson (1958, pp. 105-112). This procedure results in a set of scale values or weights for the constructs whose geometric mean is equal to 1.0.

The judgments were made in the context of a worldwide increase in tensions (Figure 3.5). The weighting methods were applied in counterbalanced order by the 15 participants in each workshop. After completing each method, the participants rated the method on the four 7-point scales used in the first experiment.

Table 3.2 presents the mean ratings given the three weighting methods by the 30 workshop participants, along with the results of analysis of variance tests of the significance of the method mean differences. The ratings clearly favored the direct estimation method, while the full-profile conjoint method, which involved rank ordering the descriptions of 25 hypothetical infantrymen, generally received the lowest ratings. A breakout of these ratings by type of judge indicated that both the officers and the NCOs generally preferred the direct estimation method most and the full-profile conjoint method least.

Soldier ____ Rank Order _____

Overall Score _____

MOS: Infantryman (11B)

A. DEMONSTRATING COMMITMENT TO THE ARMY
Maintaining Army traditions, spirit and fellowship.

Shows lack of dedication to Army traditions and values.			Generally supports Army traditions and values.			Shows constant devotion to Army tradition and values.
1	2	3	(4)	5	6	7

B. PHYSICAL FITNESS AND MILITARY APPEARANCE
Maintaining military standards of physical fitness; maintaining proper military appearance and standards of cleanliness and grooming.

Maintains self in poor physical condition. Fails to meet military standards for dress and personal hygiene.			Meets Army standards of physical fitness. Dresses neatly and meets Army standards of personal hygiene.			Exceeds Army standards and expectations set for physical fitness. Maintains excellent personal hygiene and proper appearance.
1	2	(3)	4	5	6	7

C. MAINTAINING AND SERVICING WEAPONS AND EQUIPMENT
Keeping weapons and equipment clean and serviced and prepared for the field.

Fails to perform or improperly performs checks and preventive maintenance on weapons and equipment.			Performs routine checks and preventive maintenance on weapons and equipment.			Always keeps assigned weapons and equipment in ready-for-inspection condition.
1	2	3	(4)	5	6	7

D. TECHNICAL PROFICIENCY AND KNOWLEDGE
Effectiveness in applying technical knowledge and proficiency in carrying out MOS tasks.

Does not display the knowledge/skill required to perform many job assignments and tasks.			Displays the knowledge/ skill required to perform most job assignments and tasks properly, but may need help for harder tasks			Displays the knowledge/ skill to perform all job assignments and tasks properly.
1	2	3	4	(5)	6	7

E. PERFORMANCE UNDER ADVERSE CONDITIONS
Continuing to execute appropriate soldier skills under combat conditions or under hardship, stressful or otherwise difficult circumstances.

Makes frequent mistakes in combat situations or otherwise stressful situations.			Makes mistakes infrequently in combat or otherwise stressful situations.			Almost never makes mistakes in combat or otherwise stressful situations.
1	2	3	4	(5)	6	7

Judge No._____

Figure 3.3. Sample MOS 11B profile form

Name _____ Sheet No. 01

OVERALL PERFORMANCE SCORE SHEET

Soldier No.	Performance Level: Demonstrating Commitment to the Army	Performance Level: Technical Proficiency and Knowledge	Rank Order	Overall Score
1	5	5		
2	1	4		
3	2	6		
4	4	7		
5	4	4		
6	6	5		
7	6	2		
8	3	2		
9	4	1		
10	5	6		
11	2	3		
12	3	3		
13	7	4		

Performance Scales:

DEMONSTRATING COMMITMENT TO THE ARMY
Maintaining Army traditions, spirit and fellowship.

Shows lack of dedication to Army traditions and values.		Generally supports Army traditions and values.		Shows constant cevotion to Army tradition and values.		
1	2	3	4	5	6	7

TECHNICAL PROFICIENCY AND KNOWLEDGE
Effectiveness in applying technical knowledge and proficiency in carrying out MOS tasks.

Does not display the knowledge/skill required to perform many job assignments and tasks.		Displays the knowledge/ skill required to perform most job assignments and tasks properly, but may need help for harder tasks		Displays the knowledge/ skill to perform all job assignments and tasks properly.		
1	2	3	4	5	6	7

Figure 3.4. Example of Overall Performance Score Sheets.

The world is in a period of heightened tensions. There is an increasing probability that hostilities will break out in Europe, Asia, the Caribbean, Latin America, and Africa. The Army's mission is to support U.S. treaty obligations and to help defend the borders of allied and friendly nations. Some of the potential enemies have nuclear and chemical capability. Air parity does exist between allied forces and potential hostile nations. U.S. Army training and other preparatory activities have been substantially increased. Most combat and associated support units are participating in frequent field exercises. Most units are being actively resupplied.

Figure 3.5. Worldwide increase in tensions scenario.

The methods were also compared on three other dimensions: judge reliability (intraclass correlation), correlation between mean weights assigned by the officers and NCOs, and the intercorrelations among the sets of mean weights obtained by the three methods for all participants. These statistics are shown in Table 3.3.

In general, the conjoint paired-comparison method yielded the highest intraclass correlations for both officers and NCOs while the conjoint full-profile method had the lowest values. The correlation between the mean officer and NCO weights obtained from the conjoint paired-comparisons method also was the highest (r = .91), while the conjoint full-profile officer/NCO correlation was the lowest (r = .60). The mean weights obtained from the direct estimation and the conjoint paired comparisons were highly correlated (r = .93) while the correlations of these weights with those obtained from the conjoint full-profile method were quite low. On the basis of these results and the participant method evaluations described earlier, it was decided to drop the conjoint full-profile method from further consideration.

Experiment 3: Procedure and Results

The third experiment was also conducted in the winter of 1985, at Fort Bragg, using two 4-hour workshops. One workshop was attended by seven officers, the other by eight NCOs. The workshop participants were asked to weight seven performance constructs for the infantry MOS. The seven constructs included the five used in the second weighting method experiment plus two additional ones--avoiding serious disciplinary problems and providing peer leadership and support.

Table 3.2

Experiment 2: Mean Ratings[a] of Weighting Methods
(n = 15 officers, 15 NCOs)

Weighting Method	Acceptability	Ease	Validity	Agreement	Average Rating
Direct estimation	4.30	5.13	5.80	4.77	5.00
Conjoint paired-comparison	4.23	4.13	5.17	4.50	4.51
Conjoint full-profile	4.27	3.87	5.10	4.23	4.37
Significance	.020	.002	.048	NS	.04

[a] Seven-point scales in which 1 = Low and 7 = High.

Table 3.3

Experiment 2: Agreement Indexes for Weighting Methods

Weighting Method	One-Rater Reliability			Correlation Off/NCO Means	Intercorrelation	
	Officer	NCO	All		Full Profile	Paired Comp
Direct estimation	.27	.24	.25	.81	.17	.93
Conjoint full-profile	.23	.01	.11	.60		.15
Conjoint paired-comparison	.54	.32	.42	.91		

Each participant used the three different weighting methods described below and in the following order:

(1) Based on scores on two constructs, participants were asked to rank order 21 sets of 13 infantrymen in order of their overall performance. This is the same basic conjoint paired-comparison procedure used in the second experiment. In this case, however, in addition to rank ordering the 13 infantrymen, the judges assigned performance scores that reflected the soldiers' relative overall performance.

(2) The participants were then asked to rank order the seven constructs, assign 100 points to the first-ranked construct, and then scale the other constructs accordingly (the direct estimation procedure used in Experiments 1 and 2).

(3) The third method was a variant of the second and incorporated a Delphi procedure. Participants first indicated why they had ranked and weighted performance factors as they had in method 2 above. These reasons were passed around to the other workshop participants; also passed around were the average and range of the weights given each performance factor by the workshop participants in method 2. After considering this feedback information, the participants reassigned weights to the performance factors using method 2 above. The Delphi procedure was then repeated once more.

The above judgments were made in the same context of a worldwide increase in tensions that was used in Experiment 2. After completing each method, the participants rated the method on the same four 7-point scales used in the first and second experiments.

Table 3.4 presents the mean ratings given the three weighting methods by the 15 workshop participants, along with the results of analysis of variance tests of the significance of the mean differences between methods. The ratings for the direct estimation and modified Delphi methods were generally higher than those given the conjoint paired-comparison method.

It is interesting to note that while the mean ratings given the direct estimation method in Experiments 2 and 3 (see Tables 3.2 and 3.3) were generally quite similar, the conjoint paired-comparison method generally received lower ratings in Experiment 3 than in Experiment 2. However, only the mean acceptability ratings for this conjoint method were significantly different across the two experiments (4.23 vs. 3.43).

The weighting methods used in Experiment 3 were also compared on inter-judge reliability (intraclass correlation), correlation between mean weights assigned by officers and NCOs, and intercorrelations among the sets of mean weights obtained by the three methods. For the conjoint paired-comparison method, weights could be derived by using only the rank orders provided by the judges, or by using the overall performance scores assigned the sets of 13 infantrymen. Similarly, for the modified Delphi method, weights could be obtained from the participants' judgments after the first round of feedback or after the second and final round of feedback.

Table 3.4

Experiment 3: Mean Ratings[a] of Weighting Methods
(n = 7 Officers, 8 NCOs)

Weighting Method	Acceptability	Ease	Validity	Agreement	Average Rating
Conjoint paired comparison (PC)	3.43	4.20	4.60	3.86	4.02
Direct estimation	4.21	5.27	5.80	4.57	4.95
Modified Delphi	4.46	5.43	5.93	4.62	5.09
Significance	NS	.049	.010	NS	.002

[a] Seven-point scales in which 1 = Low and 7 = High.

One-rater reliabilities were therefore calculated for five different procedures of obtaining weights from the judgments provided by the workshop participants. These reliabilities, along with the correlations of the mean weights of the officer and NCO participants, are shown in Table 3.5. The correlations obtained between the five sets of mean weights are shown in Table 3.6. Also shown in Table 3.6 are the intercorrelations across weights of the five common constructs used in Experiments 2 and 3 for all the methods used in the two experiments.

Several inferences can be drawn from the data presented in Tables 3.5 and 3.6. First, there is no evidence that the one-rater reliabilities or the correlations obtained from the officers and the NCOs are improved substantially by adding the requirement to provide overall performance scores as well as rankings in the conjoint paired-comparison method. Nor are these agreement indexes improved by adding one or two rounds of Delphi feedback to the direct estimation method. Moreover, the correlations between weights obtained through the two basic methods (conjoint paired-comparisons ranking and direct estimation) and the weights obtained through their respective extensions (conjoint paired-comparison scores and Delphi rounds 1 and 2) ranged from .96 to .99.

Two other considerations led us to decide that in any future application of the conjoint paired-comparison method the judges would not be required to assign overall performance scores in addition to rank ordering the sets of soldiers. First, from a practical point of view, the requirement to assign performance scores added about two minutes, on the average, to the amount of time a judge takes to complete the judgment for one set of 13 hypothetical soldiers.

Table 3.5

Experiment 3: Agreement Indexes for Weighting Methods

Weighting Method	One-Rater Reliability: Officer	One-Rater Reliability: NCO	One-Rater Reliability: All	Correlation Off/NCO Means
Conjoint PC Ranking	.43	.27	.35	.84
Conjoint PC Scores	.32	.20	.27	.87
Direct Estimation	.28	.20	.25	.84
Delphi Round 1	.26	.18	.22	.75
Delphi Round 2	.32	.18	.24	.77

Table 3.6

Experiments 2 and 3: Intercorrelations of Mean Weights Obtained From the Weighting Methods Used in Both Experiments

Weighting Method	No. of Constructs	Conjoint PC Ranking	PC Scores	Direct Est	Delphi Round 1	Delphi Round 2	Direct Est	Conjoint Full Profile
Conjoint PC Ranking	7	-						
Conjoint PC Scores	7	.96	-					
Direct Estimation	7	.73	.86	-				
Delphi Round 1	7	.65	.80	.96	-			
Delphi Round 2	7	.64	.80	.99	.97	-		
Direct Est (Exp 2)	5	.82	.91	.96	.93	.93	-	
Conj Full-Prof (Exp 2)	5	.12	.19	.36	.44	.44	.17	-
Conj PC (Exp 2)	5	.97	.98	.87	.37	.31	.93	.15

The second consideration has to do with the assumption one makes about the soldiers' scores on the constructs that are not being immediately compared in the paired-comparison protocol. If one assumes that these other construct scores are all high, the overall performance scores assigned the set of soldiers for the pair of constructs being judged might be different than if one assumes that these scores are low, average, or mixed. The rank orders, on the other hand, should not be so influenced.

Similar considerations led us to decide not to use the modified Delphi method in addition to the direct estimation method.

The choice between the direct estimation method and the conjoint paired-comparison ranking method was not an easy one. The direct estimation method generally received higher evaluation ratings in both Experiment 2 and 3 and would obviously take less time to administer than the conjoint method. On the other hand, the officer and NCO one-rater reliabilities obtained for the conjoint method were higher than for direct estimation in both of the experiments. However, for both the direct estimation and paired-comparison methods the correlations between the officer and NCO mean weights were above .80 in both experiments. The correlations between the mean weights obtained in Experiment 2 and those obtained in Experiment 3 were very high for both methods (.96 for the direct estimation and .97 for the conjoint method).

In short, although each method might have some advantages over the other, both appeared to be sound methods of obtaining performance construct weights. We therefore decided to use both methods to weight the performance constructs for MOS in the Project A sample.

OBTAINING PERFORMANCE CONSTRUCT WEIGHTS FOR PROJECT A MOS

Procedure

The component weighting judgments for Project A MOS were collected in a series of 2-hour workshops. Separate workshops were held for NCOs and officers at each of two posts for each of 20 MOS. One of these posts housed the proponent school for the MOS and the other housed field units having officers and NCOs with expert knowledge of the MOS.

At each workshop, after a briefing on Project A, the participants were first given general instructions which covered the background and purpose of the workshop, and descriptions of the performance components (constructs) and the two methods (direct estimation and conjoint paired-comparison ranking) that would be used to obtain weights for the components. The two scaling methods were then administered, always in the same order. The participants were given a short break between methods.

The components to be weighted were the five job performance criterion factors that had been developed as part of Project A's performance modeling effort (Campbell, 1986a, chapter 7). The components were:

(1) Task proficiency: MOS-specific technical skills.

(2) Task proficiency: General soldiering skills.

(3) Exercise of leadership, effort, and self-development.

(4) Maintaining personal discipline.

(5) Military bearing/appearance and physical fitness.

Sample of Judges

The sample plan called for a total of 36 judges for each MOS, half coming from field units (FORSCOM and USAREUR) and half from proponent posts (TRADOC). The judges were to be evenly divided among NCOs, company grade officers, and field grade officers. However, the target sample composition was not attained for every MOS. In some cases where sufficient numbers of officers and/or NCOs were not available, warrant officers who knew the jobs well were used in lieu of company or field grade officers. Table 3.7 shows the total sample of 712 judges identified by MOS, type of post, and grade level. Although some individual MOS proportions did not meet the target, overall the proportions of officers to NCOs and of judges from field units to proponent MOS posts were quite close to the desired composition.

The Scaling Methods

On the basis of the results of the earlier exploratory experiments, two methods were used to obtain importance weights for the five performance constructs.

Direct Estimation. The judges first rank ordered the five constructs in terms of their relative importance for deriving an overall performance measure in the given MOS. After assigning 100 points to the most important performance construct, the judges scaled the other four constructs by assigning values that reflected the importance they felt each construct should have in the total effectiveness score. The judges were allowed to give any relative weight from 0 to 100 to the other constructs. After they initially assigned points to the constructs, the judges were told to review the weights they had assigned and make sure that they were in correct proportion to one another.

Conjoint Paired Comparison. The judges were given performance profiles on 10 sets of 15 hypothetical soldiers in the MOS. The 15 soldiers in any one set had different scores on two of the constructs. The judgmental task was to rank the 15 soldiers in order of their overall performance. When the judges were satisfied with their ranking on one set, they proceeded to the next set of 15 soldiers, who had different scores on two other constructs

Table 3.7

Composition of Judging Sample[a] for Weighting Project A MOS

MOS		Type of Unit: Field Officer	Field NCO	Proponent Officer	Proponent NCO	Total Officer	Total NCO
11B	Infantryman	17	6	19	6	36	12
12B	Combat Engineer	17	4	12	6	29	10
13B	Cannon Crewman	6	6	21	6	27	12
16S	MANPADS Crewman	11	6	11	5	22	11
19E	Armor Crewman	11	5	14	6	25	11
27E	TOW/Dragon Repairer		6	16	5	16	11
31C	Single Channel Radio Operator	13	6	12	6	25	12
51B	Carpentry/Masonry Specialist	4	6	27	6	31	12
54E	Chemical Operations Specialist	20	14			20	14
55B	Ammunition Specialist	4	3	24	9	28	12
63B	Light Wheel Vehicle Mechanic	7	2	20	11	27	13
64C	Motor Transport Operator	10	5	12	6	22	11
67N	Utility Helicopter Repairer	12	1	17	12	29	13
71L	Administrative Specialist	13	6	9	7	22	13
76W	Petroleum Supply Specialist	10	11			10	11
76Y	Unit Supply Specialist	15	5	8	5	23	10
91A	Medical Specialist	25	13			25	13
94B	Food Service Specialist	12	7	8	4	20	11
95B	Military Police	23	13			23	13
96B	Intelligence Analyst			11	6	11	6
	Total	230	125	241	106	471	231

[a] In addition to the 702 officers and NCOs listed in this table, there were 10 judges whose grades were unknown, making the total sample 712.

The order of presentation of the 10 pairs of five constructs was governed by the optimization procedure worked out by Ross (1934). The order of presentation of the 15 soldiers on the score sheets was originally randomized, but for ease in making the judgments and processing the data the order remained the same for all 10 sets of soldiers for all MOS. However, the order of presentation of the 10 pairs of constructs was randomized across MOS.

In the conjoint method, the weights assigned by the judges must be inferred from their rank ordering of the 15 hypothetical soldiers. Presumably, if a judge consistently gave a higher rank to soldiers with high

performance scores on one construct than to soldiers high on the other construct, then the judge considers the first construct more important in overall MOS performance than the second construct.

The judges accomplished the two methods in the order listed above. The full set of instructions and materials used to collect the weighting judgments for the Infantryman MOS (11B) is given in Appendix D. The judges were given definitions of the performance constructs to study before they made their judgments. They were asked to assume that performance scores for the given MOS were available only on the constructs given.

The judges were further asked to assume that the military context or scenario in which the soldiers' performance was being evaluated was the following:

> The world is in a period of heightened tensions. There is an increasing probability that hostilities will break out in Europe, Asia, the Caribbean, Latin America, and Africa. The Army's mission is to support U.S. treaty obligations and to help defend the borders of allied and friendly nations. Some of the potential enemies have nuclear and chemical capability. Air parity does exist between allied forces and potential hostile nations. U.S. Army training and other preparatory activities have been substantially increased. Most combat and associated support units are participating in frequent field exercises. Most units are being actively resupplied.

ANALYSIS OF CRITERION WEIGHTING DATA

Data Transformation

The direct estimation scaling method yielded weights on a scale ranging from 0 to 100. The range and distribution of direct estimation weights varied considerably among the judges. To better reflect the combined judgments of the construct weights across the judges for each MOS, the data from each judge were standardized prior to averaging--a procedure that would tend to equalize the judges' contributions to the MOS mean even though they may have assigned rather disparate sets of weights to the constructs.

To preserve the relative size of the weights that each judge had assigned the constructs, each judge's weights were transformed by multiplying them by a constant (the ratio, 100/sum of the judge's weights). This caused the five construct weights of each judge to sum to 100, but did not change the relative values of the judge's weights. Consequently, the average of the five construct weights of all judges was set at 20.0, and the average of the five weights for any group of judges within and across MOS was also set at 20.0. The mean weight of a given construct obtained by averaging the judges' individual weights could, of course, be different from 20.

For the conjoint method, the data from each judge were scaled using a method developed by Comrey (1950) which is described in Torgerson (1958).

Essentially, the multiple regression equation predicting the judge's rank orders of the two performance construct scores of the 15 hypothetical soldiers was first obtained for each of the 10 sets of soldiers. The ratio of the two regression weights for each pair of constructs then became the basic data entering into the scaling procedure. Since the correlation between the two construct scores of the 15 hypothetical soldiers on each performance rating sheet was specified to be zero, the ratio of the regression weights is directly proportional to the correlation of each set of construct scores with the judge's rank order of the soldiers. (The means and standard deviations of the construct scores were equal for all constructs.)

The scaling procedure employs a least squares solution to obtain a set of weights that best fit the observed ratios. The resultant weights are so scaled that their geometric mean is 1.0. To facilitate comparing the conjoint weights with those obtained by the direct estimation method, the conjoint weights for each judge were also linearly transformed so that their sum was equal to 100 and their average equal to 20.0.

One reason for effecting the transformation concerned the practical application of the weights to the construct scores. The final intent is to apply a set of weights to the construct variance/covariance matrix such that the covariance of each construct with the composite total score is equivalent to the construct weight obtained from the judges. In other words, the contribution to the total MOS performance variance of each construct would be directly proportional to its weight. A separate algorithm will be used to calculate the weights that, when applied to the variance/covariance matrix, yield the desired (the obtained scaled) weights or contributions to the total composite variance.

Examination of Missing Data

For the conjoint scaling method, 73 of the judges either had failed to complete the entire judgmental sequence or had recorded judgments that were inconsistent with the assumptions of the scaling method involved. For example, a judge may have completed all the performance score sheets, but one or more of the 10 resultant regression equations had constructs with a positive weight. This would mean that the higher a judge rank ordered the 15 hypothetical soldiers on the given score sheet, the lower were the soldiers' scores on one of the constructs. However, the scaling method employed (see Torgerson, op. cit.) required that both weights have the same sign and that a full set of weight ratios be available. Consequently, either the conjoint protocols with missing or positive weights could be eliminated or the missing weight ratios could be imputed by an appropriate estimation technique. As can be seen in Table 3.8, proportionately more MCOs than officers had one or more problems of this nature in their conjoint protocols.

In order to keep at least some of these judges, the missing weight ratios for those judges who had only one conjoint performance score sheet uncompleted or who had only one pair of weights of opposite sign were

Table 3.8

Conjoint Method Missing or Invalid Data by Grade

	Grade			
Amount of Missing Data	NCO[a]	Officers	Unknown	Total
1 data element missing or invalid	16	19	0	35
2 or more data elements missing or invalid	22	16	0	38
No data missing	193	436	10	639
Total	231	471	10	712

[a] Proportion of NCOs having missing data is higher than officers ($\chi^2 = 13.53$, df = 2, significant at .01 level).

estimated by the technique described below. Judges with two or more problems in their conjoint data (38) were dropped from the conjoint data set.

The imputed estimates of the weight ratios were obtained by first correlating the judge's nonmissing ratios with the ratios of other judges within the MOS who had no missing data, and then computing a stepwise multiple regression equation to predict the missing ratios. No equation could be computed for seven of the 35 judges with one key data element missing because no other judge had values sufficiently correlated with these judges' ratios; these seven were dropped from the analysis.

The 28 judges for whom we imputed the missing regression weight ratios were then compared with the remaining judges on two indexes:

(1) The correlation between each judge's set of weights produced by the direct estimation and the conjoint scaling methods.

(2) The consistency with which a judge rank ordered the 15 hypothetical soldiers on the basis of their construct scores. For example, if a judge ranked a hypothetical soldier with scores of "5" and "3" on two performance scales lower than another soldier with scores of "3" and "3", the judge would be giving a higher rank to a poorer performing soldier. In the set of 10 conjoint performance score sheets, a maximum of 630 such rank order inversions was possible.

The judges with imputed conjoint scale values had somewhat lower direct estimation/conjoint correlations between their scale values than did judges with complete data and also had more inversions in the rank orders they assigned to hypothetical soldiers listed on the conjoint performance score sheets (see Table 3.9). Consequently, these judges were also dropped from the analyses of the conjoint data.

Analyses of Outliers

As was seen in Table 3.9, a number of the remaining 639 judges had a large number of inversions in the rank orders they assigned the 15 hypothetical soldiers. A within-MOS analysis was conducted in which judges with the highest number of inversions were progressively dropped from the sample. After each successive judge was dropped, the average 1-rater and n-rater intraclass correlations or reliability coefficients for the remaining pool of judges were calculated. The average n-rater reliabilities across the 20 MOS proved to be highest when the two judges with the largest number of inversions were eliminated.

Consequently, the two judges in each MOS who had the highest number of inversions were dropped, provided that they had at least 30 inversions in their protocol. In addition, any judge with 90 or more inversions was dropped even if this meant that more than two judges were eliminated for a given MOS. Altogether, 40 judges were dropped. The average 1-rater and n-rater reliabilities across the 20 MOS were .221 and .879, respectively, before the 40 judges were dropped, and .236 and .881 after they were eliminated.

Table 3.9

Frequency Distribution of Inversions Made by Judges With Imputed and Not-Imputed Conjoint Ratios[a]

No. of Inversions	Imputed	Not Imputed	All Judges
0	4	75	75
1-19	7	412	416
20-39	8	98	105
40-59	3	29	37
60-79	3	10	13
80-99	1	7	10
100-119		2	3
120-139		3	3
140-159	2		2
160-179		2	2
180-199	—	1	1
Total	28	639	667

[a] Median test results: $\chi^2 = 25.28$ (significant at .001 level).

While these gains in reliability for the conjoint judgments were not large, direct estimation reliabilities also improved with use of the reduced sample. The 1-rater and n-rater reliabilities for the direct estimation method averaged .186 and .854 when all the 712 judges were used but rose to .223 and .863 with the reduced sample of 599. Dropping judges who apparently had not accomplished the conjoint procedure carefully helped improve the reliability of the weights assigned the constructs under both methods. All remaining analyses were carried out on the reduced sample of 599 judges.

RESULTS

Interjudge Reliability and Intermethod Agreement

The intraclass reliabilities of the direct estimation and conjoint weights are shown in Table 3.10 by grade and MOS. The average NCO 1-rater and n-rater reliabilities for the direct estimation and conjoint scaling methods were .132/.425 and .153/.509 respectively. The corresponding values for officers were .278/.864 and .287/.867.

As shown in Table 3.11, for officer judgments the correlations across the 20 MOS of the average weights derived from the direct estimation and conjoint scaling methods ranged from .836 to .996; the average intermethod agreement was .951. The corresponding range for the NCOs was .017 to .922 and their average MOS intermethod agreement was .653. These intermethod results in part reflect that lower 1-rater reliabilities were obtained for the NCOs under both methods and also that there were fewer NCO judges.

Another factor that may have had some effect was the greater homogeneity of the weights that the NCOs assigned the five constructs. The average of the standard deviations of the weights assigned by the individual NCOs across both methods was 6.43, while the corresponding officer average standard deviation was 7.69 (see Table 3.12). The difference between these means was statistically significant ($p > .001$).

Comparison of Direct Estimation and Conjoint Scaling Methods

To decide whether the final set of weights should be obtained from the direct estimation or the conjoint method, the two sets of weights were compared on several indexes. Though in general the differences were slight, they all favored the conjoint method. The 1-rater and n-rater intraclass reliabilities for the combined group of officers and NCOs tended to be slightly higher for the conjoint method across the 20 MOS (see Table 3.13). While the differences between the reliabilities for the two scaling methods were slightly greater for the NCOs than for the officers, the difference favored the conjoint method in each case.

In general, the weights assigned the constructs by the NCOs correlated higher with those assigned by the officers when the conjoint scaling method was used (Table 3.11). Across the 20 MOS, the correlations between the NCO/

Table 3.10

Intraclass Reliabilities of Direct Estimation and Conjoint Weights by Grade and MOS

	NCOs					Officers				
		Direct Estimation		Conjoint			Direct Estimation		Conjoint	
MOS	n	1-rater	n-rater	1-rater	n-rater	n	1-rater	n-rater	1-rater	n-rater
11B	9	.006	.070	-	-	28	.346	.937	.317	.929
12B	8	.337	.802	.171	.623	27	.259	.904	.398	.947
13B	8	-	-	.209	.679	26	.331	.928	.481	.960
16S	7	.160	.572	.154	.561	21	.437	.942	.358	.921
19E	9	.267	.784	.401	.858	21	.347	.918	.350	.919
27E	6	-	-	.114	.435	15	.253	.835	.252	.835
31C	7	.308	.757	.299	.749	24	.207	.862	.257	.893
51B	10	-	-	-	-	27	.184	.859	.215	.881
54E	11	.070	.454	.151	.662	20	.201	.835	.183	.818
55B	8	-	-	.218	.691	25	.369	.936	.312	.919
63B	10	-	-	.078	.459	22	.430	.943	.327	.915
64C	9	.184	.669	.023	.173	20	.224	.852	.185	.819
67N	10	.211	.728	.201	.715	27	.362	.939	.332	.931
71L	9	.015	.117	.031	.223	20	.239	.863	.229	.856
76W	5	.113	.389	.022	.103	9	.123	.558	.125	.561
76Y	6	.240	.654	.319	.737	20	.236	.861	.118	.727
91A	12	.112	.603	.158	.693	24	.352	.929	.386	.938
94B	9	.115	.539	.133	.581	18	.285	.878	.216	.833
95B	10	.247	.766	.188	.699	21	.188	.829	.347	.918
96B	5	.231	.600	.193	.545	9	.192	.682	.344	.825
Average		.132	.425	.153	.509		.278	.864	.287	.867

NOTE: Intraclass reliabilities that were negative are indicated in the table with -.
In arriving at the average reliability across MOS, these values were treated as zeros.

Table 3.11

Correlations Between Construct Weights by Method, Grade, and MOS

	Direct Estimation With Conjoint			NCOs With Officers	
MOS	NCOs	Officers	Total	Direct Estimation	Conjoint
11B	.211	.963	.931	.590	.546
12B	.897	.973	.973	.865	.631
13B	.858	.980	.983	.607	.648
16S	.571	.957	.932	.707	.776
19E	.891	.935	.944	.695	.888
27E	.691	.836	.783	.820	.908
31C	.822	.989	.986	.649	.857
51B	.085	.983	.955	.515	.719
54E	.921	.965	.980	.563	.670
55B	.737	.866	.939	-.107	.100
63B	.551	.968	.987	.615	.837
64C	.017	.985	.961	.796	.364
67N	.922	.996	.991	.819	.965
71L	.772	.966	.962	.919	.968
76W	.575	.946	.956	-.379	.451
76Y	.780	.919	.942	.677	.965
91A	.805	.975	.964	.696	.940
94B	.685	.984	.981	.556	.810
95B	.731	.884	.918	.773	.737
96B	.542	.947	.924	.958	.329
Average	.653	.951	.950	.617	.705

Table 3.12

Average Standard Deviation of the Construct Weights Assigned by the Judges

Grade	n	Direct Estimation	Conjoint	Total
NCO	168	4.53	8.33	6.43
Officer	424	5.83	9.54	7.69
Total	592	5.46	9.20	7.33

Table 3.13

Intraclass Reliabilities of Direct Estimation and Conjoint Weights by MOS (Officers and NCOs Combined)

MOS	n	Direct Estimation 1-rater	Direct Estimation n-rater	Conjoint 1-rater	Conjoint n-rater
11B	37	.261	.929	.236	.920
12B	35	.273	.929	.324	.944
13B	34	.249	.918	.356	.949
16S	28	.359	.940	.307	.925
19E	30	.310	.928	.362	.944
27E	21	.164	.804	.237	.867
31C	31	.202	.887	.262	.917
51B	37	.136	.853	.157	.873
54E	31	.147	.842	.160	.855
55B	33	.247	.915	.188	.884
63B	33	.270	.924	.261	.921
64C	29	.208	.884	.123	.803
67N	37	.315	.945	.302	.941
71L	31	.205	.889	.207	.890
76W	14	.027	.283	.096	.597
76Y	29	.233	.898	.173	.858
91A	36	.247	.922	.295	.938
94B	28	.187	.865	.191	.869
95B	31	.194	.882	.256	.914
96B	14	.242	.818	.234	.801
Average		.233	.863	.236	.881

officer mean conjoint weights ranged from .100 to .968 with an average of .705. The corresponding range for the direct estimation weights was -.379 to .958, with an average of .617.

The slight overall psychometric superiority of the conjoint weights may be due in part to the larger discriminability of the weights obtained from the conjoint method. The average standard deviation across all judges of the weights assigned by the conjoint method was 9.20; the corresponding average was 5.46 for the direct estimation method (Table 3.12).

Considering the above findings, the decision was made to favor the weights derived from the conjoint scaling method in combining the individual construct scores into an overall composite measure of performance.

Comparison of Mean Conjoint Weights by Construct, Grade, and MOS

The mean weights obtained through the conjoint scaling method are shown in Table 3.14 broken down by construct, grade, and MOS. It should be borne in mind that the weights are based on comparative judgments of the constructs within each MOS and should not be used for comparisons of importance across MOS. It is, however, interesting to note whether the relative pattern of weights differs across MOS and whether some constructs are fairly consistently given relatively higher weights than others.

To explore differences in the relative pattern of weights, an analysis of variance of the conjoint weights was conducted to test for mean construct differences and for any significant interactions with grade and MOS. The analysis also compared the mean weights assigned by judges drawn from MOS proponent posts with those of judges from USAREUR and FORSCOM posts. The means for grade (officer vs. NCO), type of unit (field vs. proponent), and MOS main effect were set at 20.0 by the scaling method and hence were not a source of variation. Table 3.15 shows the results of the overall analysis of variance. The construct means were significantly different. The interactions of constructs with grade and MOS were also highly significant, indicating that the relative weights were different for officers in comparison with NCOs and were also different across MOS. Finally, there was a significant three-way interaction among the constructs, MOS, and type of judge (field vs. proponent post).

Examination of the construct means in Table 3.14 shows that for all 20 MOS, Military Bearing/Physical Fitness received the lowest relative weight. In 13 of the 20 MOS, Core Technical Skills received the highest relative weight, while the Exercising Leadership construct was second overall. The Leadership component received the highest relative weight in 6 of the 20 MOS. For the most part, the MOS Skills construct received the highest weight for the technical MOS in the sample and the Exercising Leadership construct received the highest weight for the combat MOS (the job of Armor Crewman is a notable exception). The General Skills construct received the highest weight for only one MOS, Military Police (95B). These MOS differences in the constructs receiving the highest weights undoubtedly contributed to the significant Construct by MOS interaction.

Significant mean differences between the weights assigned by officers and NCOs were found for two constructs: Officers gave significantly higher relative weights to the Exercising Leadership construct than did NCOs, while NCOs gave higher weights to the Military Bearing/Physical Fitness construct than did officers. The NCOs may have been giving relatively more weight to aspects of first-tour soldiers' performance that were of more immediate concern to them. Although the mean differences were only significantly different at the .10 level, the NCOs gave the Personal Discipline construct weights that were higher on the average than those assigned by the officers.

The Impact of Scenario on Relative Construct Weights

Toward the end of the data collection, a field experiment was run to determine whether a change in scenario would affect the weighting judgments.

Table 3.14

Mean Construct Weights by Grade and MOS: Conjoint Method

	MOS Skills			General Skills			Exercising Leadership			Personal Discipline			Military Bearing		
MOS	NCO	Off	Total	NCO	Off	Total	NCO	Off	Total	NCO	Off	Total	NCO	Off	Total
11B	19.5	22.9	22.0	18.7	18.5	18.5	21.7	29.1	27.3	22.2	17.2	18.4	18.0	12.3	13.7
12B	20.2	18.4	18.8	22.8	19.7	20.4	21.1	30.2	28.1	23.8	20.3	21.1	12.1	11.5	11.6
13B	28.6	22.7	24.1	16.2	19.2	18.5	21.1	27.7	26.2	20.7	18.3	18.9	13.3	12.1	12.4
16S	20.8	25.9	24.6	16.8	16.3	16.4	23.1	26.3	25.5	24.8	20.2	21.3	14.5	11.4	12.1
19E	30.0	29.4	29.6	20.2	21.1	20.8	16.5	20.5	19.3	23.3	17.9	19.5	10.0	11.0	10.7
77E	21.7	24.2	23.5	20.9	18.0	18.8	21.9	22.6	22.3	21.8	23.0	22.4	14.5	12.4	13.0
31C	29.4	29.0	29.1	20.0	20.3	20.3	16.7	22.0	20.8	19.0	17.3	17.8	14.9	11.4	12.2
51B	19.4	25.5	23.9	20.2	17.2	18.0	22.7	25.6	24.8	20.2	19.7	19.8	17.5	11.9	13.4
54E	28.6	25.4	26.5	16.7	21.5	19.8	17.3	20.7	19.5	20.6	19.8	20.1	16.8	12.6	14.1
55B	32.4	22.4	24.9	18.9	19.5	19.4	14.8	27.8	24.7	16.6	19.5	18.8	17.3	10.8	12.3
63B	21.4	27.5	25.6	21.4	18.1	19.1	21.8	23.5	23.0	19.4	21.1	20.5	16.1	9.9	11.8
64C	21.8	26.1	24.8	18.9	22.8	20.9	23.2	21.8	22.2	20.9	15.4	17.1	17.2	14.8	15.8
67N	28.7	25.9	26.7	15.8	15.9	15.9	23.7	25.3	24.9	20.7	22.2	21.8	11.1	10.6	10.8
71L	20.9	24.1	23.1	20.4	19.9	20.1	21.2	22.7	22.3	20.7	21.0	20.9	16.8	12.3	13.7
76W	29.4	23.6	25.7	19.1	17.2	17.9	17.3	25.0	22.2	18.5	22.9	21.3	15.7	11.4	12.9
76Y	26.3	25.7	25.8	23.3	21.7	22.1	18.7	19.8	19.5	15.8	17.5	17.1	15.8	15.3	15.4
91A	28.2	26.9	27.3	16.8	16.6	17.3	20.6	23.1	22.1	21.3	22.5	22.1	11.7	11.8	11.2
94B	19.9	24.5	23.0	15.0	17.4	16.6	26.7	26.2	26.4	23.1	20.9	21.6	16.3	11.8	12.4
95B	17.5	20.0	19.2	23.5	27.8	26.5	26.5	20.5	22.4	27.2	19.1	20.1	10.3	12.6	11.8
96B	18.9	28.7	25.2	22.2	18.2	19.6	19.0	23.3	21.8	25.2	19.8	21.7	14.7	10.9	11.7
Avg	24.2	24.9	24.7	19.4	19.3	19.3	20.8	24.2	23.3	21.0	19.8	20.1	14.7	11.8	12.6

Table 3.15

Results of Overall Analysis of Variance of Conjoint Weights

Source of Variation	df	Sum of Squares	Mean Square	F Value	P>F
Between Subjects[a]					
Grade	1	0.0			
MOS	19	0.0			
Type of Unit	1	0.0			
Grade X MOS	19	0.0			
Grade X Type	1	0.0			
MOS X Type	14	0.0			
Grade X MOS X Type	13	0.0			
Error	523	0.0			
Within Subjects					
Constructs	4	52604.8	13151.2	161.9	.0000
Constructs X Grade	4	2694.3	673.6	8.3	.0001
Constructs X MOS	76	14133.1	186.0	2.3	.0001
Constructs X Type	4	432.3	108.1	1.3	.2562
Constructs X MOS X Grade	76	6930.5	91.2	1.1	.2227
Constructs X Grade X Type	4	60.1	15.0	.2	.9464
Constructs X MOS X Type	56	6373.9	113.8	1.4	.0276
C X G X MOS X T	52	3276.6	63.0	.8	.8781
Error	2092	169947.7			

[a]The between-subjects sum of squares is equal to zero since the weights for all subjects summed to 100.

Using the direct estimation scaling method, officers and NCOs in 13 MOS judged the relative weight of the five performance constructs under a wartime and a peacetime scenario, after they had completed judging the constructs under the heightened tensions scenario, using both the direct estimation and conjoint methods. The two additional scenarios were as described in Figure 3.2.

An analysis of variance was conducted on the data from 139 officers and 37 NCOs who judged the five constructs under all three scenarios. Of particular interest was whether the within-subject Scenario by Construct interaction term was significant, since that would indicate whether the judges changed the relative weights assigned one or more constructs as a function of the scenario.

The Scenario by Construct interaction was significant, and separate analyses of variance were conducted for each construct to help determine which construct weights were influenced the most by the different scenarios. These analyses indicated that the means of the MOS Skills, General Skills, and Military Bearing/Physical Fitness construct weights were significantly different across the scenarios (see Table 3.16). The Military Bearing/Physical Fitness construct received relatively more weight under the peacetime scenario than it did under the heightened tensions and wartime scenarios. The General Skills construct, on the other hand, received relatively more weight under the wartime scenario than under the heightened tensions and peacetime scenarios, while the MOS Skills construct received its highest weights under the heightened tensions scenario.

Although these scenario differences were statistically significant, the actual mean differences were quite small and the rank ordering of the five components did not change across scenarios. Also, the correlations between the weights assigned under the three scenarios averaged about .85 across the 13 MOS. With weights correlated that highly, overall performance composites obtained through applying the separate sets of scenario weights to construct scores would most likely correlate between .95 and .99. As a consequence, we can predict with certainty that alternative criterion composites based on different scenario weights will <u>not</u> yield different predictor equations.

It is interesting to note that there was more discriminability in the weights assigned the constructs within MOS under the heightened tensions scenario than under the peacetime and wartime scenarios. When the standard deviations of the mean (for n judges) construct weights for each MOS were averaged across MOS, the means were 5.33, 4.76, and 4.80 respectively and these mean differences were significantly different at the .001 level. The reliabilities of the weights assigned under the heightened tensions scenario were also higher. Across the 13 MOS the average 1-rater reliability for the heightened tensions scenario was .224. The corresponding average reliabilities for the peacetime and wartime scenarios were .137 and .202.

Table 3.16

Mean Weights of Constructs by Scenario (Based on Data From 13 MOS)

Construct	Peacetime	Heightened Tensions	Wartime
MOS Skills[a]	21.6	22.3	21.7
General Skills[a]	19.9	20.4	21.3
Exercising Leadership	21.4	21.8	21.5
Personal Discipline	19.9	19.6	19.9
Military Bearing[a]	17.1	15.8	15.7

[a]Construct means significantly different across scenarios at .05 level.

DISCUSSION AND CONCLUSIONS

The five Project A performance constructs received significantly different patterns of weights in different MOS (e.g., see Table 3.14) and the different groups of experts agreed, in general, on the relative ranking of the weights. For example, the Leadership/Effort construct tends to be rated highest among the combat MOS.

Multiple judges per MOS, about 30 on the average, produced n-rater reliabilities that are quite respectable (above .85 for most MOS). The high intermethod correlations (about .95 on the average) between the construct weights obtained by the direct estimation and conjoint methods for the separate MOS further document the reliability of the means of the scaled weights.

That different groups of judges may provide somewhat different MOS weights can be seen in the correlations between the officer and NCO weights, of .617 and .705 for the direct estimate and conjoint methods, respectively. The NCOs tended to give relatively higher weights to the Military Bearing/ Physical Fitness construct, while the officers attached more importance to the Leadership/Effort construct. The NCOs could have been reacting more to the every-day problems of handling first-tour soldiers, while the officers could have been more concerned with performance characteristics required most under near or actual wartime conditions. The pattern of results obtained when the weights were evaluated under wartime and peacetime scenarios in part supports this hypothesis.

Though there were statistically significant differences in the mean weights assigned under the three scenarios, the very small differences will have little impact on the relative ranking of soldiers on the overall performance composites for an MOS. A more critical question is how much impact will the weights themselves have on recommended job assignments in an optimal selection and classification system? Would the same assignment recommendations be made were all weighted equally? Would a different set of predictors be selected using a weighted composite for validation than would have been selected if the constructs had been weighted equally?

The answers to these questions obviously depend not only on the set of weights used but on such factors as the intercorrelations among the construct performance scores, the validity of the predictor battery, the amount of differential prediction it affords across Army jobs, the MOS selection standards in effect, and the assignment algorithms employed.

Applying construct weights to performance scores to obtain a composite score involved the difference between what might be called nominal and operative weights. In nominal weighting the raw score on each component is multiplied by the SME-derived weight for the component and scores are then added across components to get the total criterion composite score. However, a component's operative weight for determining the overall ranking of people on the total composite is also a function of its variance and its covariances with the other components. Components with higher variances

carry more weight, and differential weights have less differential effect as covariances become higher.

The alternatives to the nominal score process of cross-multiplying SME weights with raw component scores are to (a) standardize the component scores to control for variance differences; (b) "assign" the total composite variance (which is the sum of all component variances and covariances) to components by adding a particular component's variance to its covariances with each of the other components, and choosing weights for the components that will make their proportion of the total variance equal to the SME-determined weight; or (c) reconstitute the component scores as orthogonal vectors and assign weights to these variables.

The most straightforward method would be to apply the SME weights to standardized component scores and let the reality of the intercorrelations among the components have their influence. However, the most informative way to address these questions, and the other issues discussed above, is through a series of sensitivity analyses that portray the effects of these parameter on selection and classification validity.

To the extent that the differential weights described here enhance the overall Army selection and classification process, the time and effort that have gone into developing them will be more than worthwhile. However, even if the weights' effect on the selection and classification process proves minimal, we will have developed defensible performance composites for the Project A sample MOS to use as overall criterion measures in validating the ASVAB and other selection instruments and procedures.

Chapter 4

SCALING THE UTILITY OF JOB PERFORMANCE[1]

INTRODUCTION

This chapter describes the Project A research to determine the relative utility to the Army of different levels of performance in entry-level MOS. The main purpose of the utility measurement component in Project A is to provide information that will aid decision-makers in maximizing the payoff to the Army of improved selection and classification procedures.

Two major issues in developing and evaluating a personnel selection or classification system are how to maximize the gain to the organization from using the system, and how to assess the net gain to the organization from using the new system versus not using it. To answer such questions, at least three major elements are needed:

- A model that portrays the relevant parameters in the decision-making process and specifies how they are interrelated.
- A metric that can be used to represent the value of the outcomes that result from a particular course of action.
- A method for estimating the parameters of the model in the appropriate metric.

We know a fair amount about modeling personnel selection decisions (e.g., Cronbach & Gleser, 1965) and somewhat less, but still quite a bit, about modeling personnel classification decisions (e.g., Roulon, Tiedeman, Tatsuoka, & Langmuir, 1967). A great deal of effort by psychometricians and industrial psychologists has been put into developing and refining such models (cf. Cascio, 1982a). We are much less clear as to the metric in which the outcomes of a personnel selection or classification decision should be expressed.

The Utility Issue in Industrial Psychology

Although the steps described below have not occurred in a perfect chronological order, the progression of attempts by psychometricians and personnel researchers to portray the benefits of acumen in selection and classification has been something like the following.

The validity coefficient, in the form of the product moment correlation between a predictor composite and a criterion composite, is the classic method by which the value of a selection program is represented. However,

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[1]This chapter is based on Sadacca and Campbell (1987) and Sadacca, White, Campbell, Di Fazio, and Schultz (in preparation).

to interpret. Early on, a number of transformations, such as the coefficient of determination (r^2_{xy}), the index of forecasting efficiency ($1- \sqrt{1-r^2_{xy}}$), and the standard error of prediction ($Sy \sqrt{1-r^2_{xy}}$), were suggested and found wanting. They still depended very heavily on the correlation coefficient itself, and cannot be interpreted directly in terms of benefits from decision making.

A more useful kind of transformation is represented by the various ways of using the bivariate distribution to construct decision tables. The Taylor-Russell tables (Taylor & Russell, 1939) are an example. With these transformations, the metric becomes the proportion of correct predictions that are made by one selection method versus another. One benefit of looking at selection payoff in terms of decision accuracy is that it illustrates quite clearly how even a small relationship between predictor and criterion can produce significant gains in the number of successful people selected if the selection ratio is very low and/or the variability in performance is high (e.g., base rate for success/failure = .50). However, to express the value of selection in these terms, the organization must define specific criterion categories (e.g., successful versus unsuccessful performance) and must view all the outcomes in a particular category as being equally valuable.

A new dimension was added by the classic work of Brogden (1946, 1949), who showed that if both the predictor and the criterion measures had interval properties and if the relationship between them was linear, then the correlation coefficient is linearly related to the gain in performance in the selected group. Further, the gain, in standard criterion units, that will result from selection can be estimated using existing prediction (i.e., decision) models if a cutting score is set on the predictor. Brogden also argued that a desirable metric for performance and performance gain would be to determine the dollar value of variability in performance.

It remained for Cronbach and Gleser (1965) to add the consideration of selection costs and to portray the utility of selection benefits in terms of the dollar value of performance increases minus the costs of selection. Cronbach and Gleser also elaborated the utility formulation to include more complex selection modes (e.g., multiple hurdles) and made an attempt to formulate classification decisions in utility theory terms.

The application of this kind of utility/decision theory to selection and classification problems was hampered by the difficulty of estimating the variability of performance in dollars, which is a major parameter in the model. Schmidt, Hunter, McKenzie, and Muldrow (1979) proposed a rather simple solution in which supervisors are used as judges to scale individual performance in dollar terms via a magnitude estimation technique. Judges are asked to estimate the dollar payoff to the organization of performance at the 50th percentile and the 85th percentile for people in the job in question. The difference between the two estimates is taken as the standard deviation of individual performance in dollar terms (SD_y). So far, not much attention has been paid to the basis on which supervisors make such

judgments although the value for SD_y is frequently between 40 and 60 percent of the annual salary for the position.

Cascio (1982b) has proposed another technique for estimating SD_y in dollars that also uses expert judgment and is tied explicitly to salary. Job analysis is used to determine the major task components of a job, their relative importance is determined by expert judgment, and a magnitude estimation technique is used to rate every person's performance on each task factor. Average total salary is apportioned to each factor in accordance with its importance weight. Average performance is set equal to 1.0 and the resulting scale is multiplied by the proportion of salary designated for that factor. Performance differences have thus been converted to a dollar metric and the standard deviations of the aggregate differences are put into the Cronbach and Gleser equation.

Utility Judgments in the Military Context

Two principal factors make it difficult to apply the previous work on utility metrics and utility estimation to the Army context. First, compensation practices are quite different in the Army in comparison with the civilian sector. Salaries do not differ by MOS and thus cannot be used as an index of the job's relative worth to the organization. Second, while industrial firms are in business to provide products or services so as to maximize profit, the Army's overall mission is to be prepared to defend the United States against military threats that everyone hopes will never come; it is difficult to try to put a monetary value on success or failure or to even think of the utility of jobs in terms of their monetary benefit.

While dollars may not be an appropriate metric with which to evaluate a new Army classification system aimed at maximizing preparedness for catastrophic events, resources are not unlimited. Choices among alternative personnel practices must be made, whether or not there is an explicit utility metric on which to make comparisons.

The Air Force Procedure. One operational answer to the evaluation problem is the system currently in use in the U.S. Air Force. Entry-level assignments in the Air Force are made by the PROMIS selection and classification system (Ward, Haney, Hendrix, & Pina, 1978). In brief terms, the individual assignment is a function of the following five parameters:

(1) The level of predicted training success, using the ASVAB and other applicant information as predictors.

(2) The individual's job preferences.

(3) The rate at which the targeted quota for a job is currently being filled.

(4) The rate at which the minority group targets for each job are being filled.

(5) The scaled importance value of each combination of Job holder Aptitude Level by Job Difficulty.

It is this last parameter that serves as the analog for a utility metric in the Air Force system. Previous scaling research using expert judges has produced an overall scale value for the relative importance of each combination of job difficulty (as determined by expert judgment) and the aptitude level of a job holder (as determined by ASVAB scores). In general, the greater the job difficulty or the higher the aptitude level of the individual, the higher the value of that personnel assignment. However, the prediction surface that relates the aptitude level/difficulty level combination to assignment value is not a linear plane.

The approach of Project A to the problem is similar but not the same. Instead of scaling the relative importance of job difficulty by aptitude level combinations, the focus in Project A has been on assessing the differential value, or payoff, from MOS-by-predicted-performance-level combinations.

Specific Utility Issues for Project A. The broad objective of Project A is to produce the information necessary to develop a functional personnel classification system for all enlisted personnel. The objectives of its companion research endeavor, Project B, are to develop the necessary algorithms for relating labor supply forecasts, applicant information, and forecasts of system needs in an assignment system that uses Project A data in an optimal fashion. That is, whatever the increments in selection and classification validity produced by procedures developed in Project A, the Project B systems should allow investigation of how to maximize the benefit from using the new procedures.

Within this context, the utility problem for Project A becomes one of assigning utility values to MOS by Performance Level combinations. That is, if it is true that personnel assignments will differ in value to the Army depending on the specific MOS to which an assignment is made and on the level at which an individual will perform in that MOS, then the value of a classification strategy that has a validity significantly greater than zero will increase to the extent that the differential values (utilities) can be estimated and made a part of the assignment system.

For Project A the problem of estimating such utility values breaks down into a number of specific questions:

First, how should performance levels be defined? Should it be in terms of some general performance dimension that is left unspecified and is defined only in terms of relative level (e.g., percentiles)? Should a general performance dimension be explicitly defined, perhaps with behavioral anchors developed via critical incident methodology? Should individual performance components be defined and then explicitly weighted for combination into a total score? All of these are possibilities and a specific research question concerns how performance levels should be defined and described in the MOS by Performance Level combinations.

Second, what is the most appropriate metric for describing the relative value, or utility, of differential assignments across MOS/Performance Level combinations? Previous work in personnel psychology has been linked almost exclusively to a dollar metric and has tried to estimate the variability in payoff from people at different performance levels in dollar terms, but only in a selection context. Estimating differential payoff from a systemwide classification system remains unexplored. Since the dollar metric appears to be inappropriate for the Army context and because there is little previous work on applying utility theory to personnel classification, the metric question for Project A is a very difficult one. It suggested an exploratory approach.

Third, assuming the question of the metric is resolved, the specific method(s) to be used for estimating differential assignment utility in the appropriate metric must then be considered. Only two options seem even possible. In the first, it might be possible to relate the performance of individuals or units to some kind of "bottom line" measure that Army management would consider an appropriate metric. For example, realistic field exercises could be used to determine the relationships of individual performance measures to the performance of a unit in a simulated engagement. The difficulties with this approach revolve around the expense of collecting such data, the necessity of having such exercises for each MOS, and the need to equate scores in some way across MOS.

A second alternative is to turn to scaling technology and use expert judges to estimate the relative value of differential personnel assignments. Since a variety of scaling models and scaling techniques are available, a major problem would be to choose the procedure that is feasible, makes the best use of the information held by the judges, and provides sufficient internal validity information to generate confidence and acceptability for the scale values.

Because the above questions are difficult ones and have been largely unresearched in the past, the plan that was developed for addressing them was exploratory in nature. Its goal was to proceed from a very broad consideration of a number of methods to a focus on a procedure that is valid, feasible, and acceptable to the Army.

GENERAL APPROACH

Phase one consisted of a series of seven small group workshops with Army officers (Sadacca & Campbell, 1987). The workshops were designed to explore a number of issues pertaining to utility metrics, utility estimation, and the definition of performance levels. Each workshop was divided into a period for trying out prototypic judgment tasks and a period for open-ended discussion of issues.

Although the atmosphere was informal and the participants were free to bring up any questions or issues they wished, six questions were used to guide the discussions.

(1) How shall measures of performance be weighted and overall performance defined?

(2) What kinds of scaling judgments can officers reasonably be asked to make?

(3) Are there major scenario effects on performance factor weights and utility judgments?

(4) In what metric should the utility of enlisted personnel assignments be expressed?

(5) What is the form of the relationship between performance and utility within MOS?

(6) Who will make the best judges for the final scaling?

The prototypic judgment tasks that were tried out in this first phase were of the following general nature:

(1) Assignment of importance weights to performance factors.

(2) Rank ordering of overall utility of MOS by Performance Level combinations when performance was defined in percentile terms.

(3) Ratio judgments of comparative utility for different MOS by Performance Level combinations.

The specific reactions of each participant to the sample scaling tasks were also used as items for general discussion.

The second phase of the research was devoted to solving the practical problems of assigning utility values to performance levels in the broad array of entry-level MOS. Additional workshops were conducted to try out various scaling methods and to prepare for the third phase, in which the selected scaling methods were applied to entry-level MOS and within MOS performance levels.

THE EXPLORATORY WORKSHOPS

In this first phase there was no vigorous testing of hypotheses, no experimental design or testing for statistical significance. If something didn't seem to work it was dropped or modified; if something else was suggested it was tried out. The overall intent was to determine what was possible, before being concerned with how to do it most effectively.

Workshop 1

A critical initial concern was whether Army officers would be willing to make evaluative judgments comparing the utility of enlisted soldiers in

different MOS. Officers might, for example, argue that all military jobs are essential, and that it does not make sense to say that the soldier who transports the ammunition has any less utility than the soldier who fires the weapon, or the soldier who treats the wounded, or the soldier who prepares meals.

Another concern was what military situation or scenario should be used as the context in which utility was to be judged. It seemed very reasonable to believe that the utility to the Army of different military jobs, and performance levels within those jobs, would vary as a function of the stipulated military situation.

A third concern centered on what considerations enter into utility judgments made by Army officers. When evaluating a soldier's utility, what contributions to mission accomplishment do officers emphasize?

To get an initial understanding of the various issues, it was decided not to spell out any military context for making the utility judgments to officers attending the first workshop (six field grade officers from the Army Research Institute). The purpose was to find out whether these officers would evoke their own military context for the judgments, and if so, what context they would choose. To assess the reasonableness of making any utility-type judgments, the only scaling task used was simply to ask for a rank ordering of MOS/performance level combinations, rather than for more sophisticated judgments that could yield an interval or ratio utility scale.

After a brief introduction to Project A and a discussion of the concept of job performance utility, the six officers were given the task of rank ordering a set of 57 enlisted MOS/performance level combinations from the set of 19 Project A MOS involved in the Concurrent Validation testing (see "Initial" portion of Figure 4.1). To facilitate their judgments, they were provided with a separate listing of summary job descriptions for each MOS.

Perhaps the most important result was simply that the officers were willing to do the task. They did not argue that it was an unreasonable one and seemed to undertake the task quite seriously and carefully.

Another significant result emerged in the post-task discussion: Independently, each of the six officers had chosen the same setting -- that of a conflict in Europe -- as the context in which he had rank ordered the utility of the MOS/performance level combinations. The officers expressed the opinion that the Army's principal current mission is to ready itself for such a possibility. They also agreed that had we spelled out a peacetime or a different wartime context, their utility rankings would most likely have been different. However, in their opinion, even if we used a peacetime scenario it should be one that emphasized training and other readiness activities geared toward the outbreak of hostilities in Europe.

The rank order intercorrelations among the officers were computed across the 57 MOS/performance level combinations. These correlations ranged from .29 to .90 with an average of .69. These results were heartening, since they indicated that quite reliable (.95 or above) average utility

INITIAL

Overall Soldier Effectiveness:



BELOW STANDARDS

Performs poorly in important effectiveness areas; does not meet standards and expectations for adequate soldier performance.

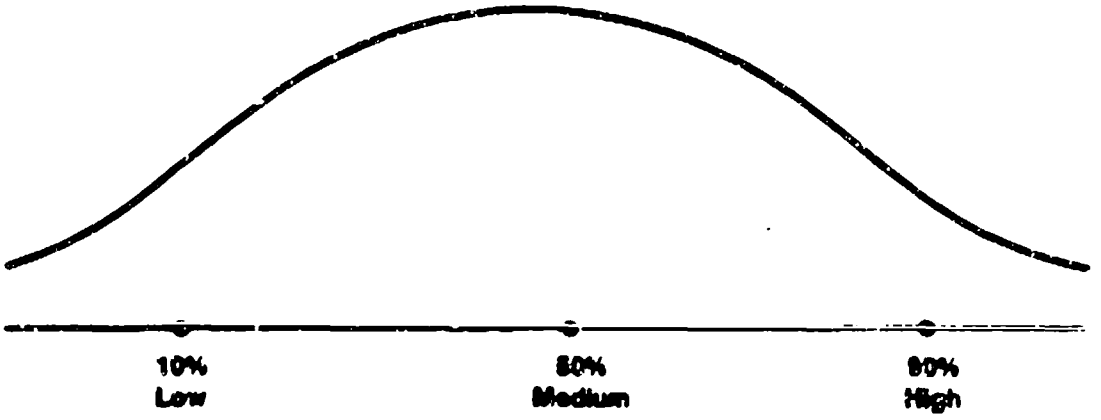
ADEQUATE/MID-RANGE

Adequately performs in important effectiveness areas; meets standards and expectations for adequate soldier performance.

SUPERIOR

Performs excellently in all or almost all effectiveness areas; exceeds standards and expectations for soldier performance.

MODIFIED



OVERALL PERFORMANCE IN MOS

NOTE: 10th percentile indicates low overall performance and 90th percentile indicates high performance.

Figure 4.1. Description of soldier performance.

ranks could be obtained by using 10 or more judges. The results also indicated that there may be a fairly common frame of reference among Army officers in their evaluation of MOS/performance level utilities.

In the manner of a subjective expected utility model, the officers were next asked to evaluate the relative priority of eight outcomes of a military engagement that could result from effective performance of enlisted personnel in that situation. The eight outcomes (increased force survival, enhanced readiness, enhanced efficiency or cost-effectiveness, enhanced mobility and firepower, enhanced physical and psychological well-being, increased local civilian cooperation and support, decreased capability and performance of enemy units, enhanced performance of supporting Army units) were chosen by the research staff without regard to any official Army doctrine. In this section of the workshop a military scenario (chosen before the workshop began) was specified--a scenario describing the outbreak of hostilities in Europe that had been used previously in Project A activities (see Figure 4.2).

In the first variant, the officers rank ordered the eight outcomes; then, assigning ten points to the lowest ranked outcome, they assigned points to the remaining outcomes in accordance with the perceived ratio of their importance to the lowest ranked outcome. For a second method, the officers were presented the eight outcomes in a paired-comparison format; for each possible pair of outcomes, their task was to divide 100 points between the outcomes in a manner that reflected the outcomes' relative importance in the given military situation.

The officers distinctly did not like the paired-comparison format, feeling that it was like a test of their consistency in assigning importance points.

In the discussion period, the officers declared that dollar cost considerations had no place on a battlefield, that losing or even winning a war could not be evaluated in dollar terms. They further indicated that the costs of training and equipping soldiers did not enter into their rankings of MOS/performance level utility.

In response to the question of whether judges should evaluate MOS/performance levels against separate utility dimensions, the officers expressed a clear preference for making one overall utility rating. They also felt that the description of the MOS/performance levels should be kept general rather than made more specific.

Workshops 2 and 3

The second and third workshops were scheduled back-to-back on successive days, with the intent of using the same stimulus materials and judgment tasks in both workshops. However, discussions with the officers in the second workshop led to changes in the procedures used the next day.

WARTIME SCENARIO: FIRST AND SECOND WORKSHOPS

Your unit is assigned to a U.S. Corps in Europe. Hostilities have broken out and the Corps combat units are engaged. The Corps 'mission is to defend, then re-establish, the host country's border. Pockets of enemy airborne/helicopter and guerilla elements are operating throughout the Corps sector area. The Corps maneuver terrain is rugged, hilly, and wooded, and weather is expected to be wet and cold. Limited initial and reactive chemical strikes have been employed but nuclear strikes have not been initiated. Air parity does exist.

WARTIME SCENARIO: THIRD - SEVENTH WORKSHOPS

Hostilities have broken out in Europe and your Corps' combat units are engaged. Your Corps' mission is to defend, then re-establish, the host country's border. Pockets of enemy airborne/heliborne and guerilla elements are operating throughout the Corps sector area. Limited initial and reactive chemicals strikes have been employed but nuclear strikes have not been initiated. Air parity does exist.

PEACETIME SCENARIO: FOURTH - SEVENTH WORKSHOPS

Europe is in the peacetime condition currently prevailing there. Your Corps' mission is to defend and maintain the host country's border should war break out. The potential enemy approximates a combined arms army and has nuclear and chemical capability. Air parity does exist. The Corps has personnel and equipment sufficient to make its mission capable for training and evaluation. The training cycle includes periodic field exercises, command and maintenance inspections, ARTEP evaluations, and individual soldier training/SQT testing.

Figure 4.2. Scenarios used in exploratory utility workshops.

One such change involved the scenario used to describe the military context for the utility judgments. Discussions with the six field grade officers in the second workshop indicated that their utility ratings might well have been influenced by the type of unit to which they imagined themselves assigned. Furthermore, they might have been responding differentially to the "rugged, hilly and wooded" terrain description. One officer, for example, reported that he had downgraded the utility of armor crewmen because of the more limited use of tanks in that setting, while other officers reported that they had nevertheless assigned very high utility values to the Armor Crewman MOS.

The officers suggested keeping the scenario(s) free of specific details that would favor one MOS at the expense of another. The references in the scenario to the specific terrain and weather conditions were therefore deleted from the wartime scenario used in the third and subsequent workshops. Moreover, the military unit of concern was made the entire Corps, rather than an unspecified unit within the Corps. (See Figure 4.2.)

In both the second and third workshops, verbal descriptions of MOS/performance level combinations were used. The descriptions were the same as those used in the first workshop, with one exception: The overall performance scale was changed from one that was behaviorally anchored to one expressed in percentiles (see Figure 4.1). This change was made in recognition of the difficulty of assigning performance-based anchors that would be comparable across MOS in the absence of actual performance data.

In the second and third workshops, in addition to rank ordering the described soldiers, the participating officers were asked to assess the relative utility of each of the soldiers in comparison to one particular or standard soldier whose utility was arbitrarily set at 100. The officers compared each of the 56 remaining soldiers in turn to the standard soldier and assigned a proportionate utility value to each, given that the standard soldier's value was set at 100. Two standard soldiers were used: the 90th percentile Infantryman (MOS 11B) and the 50th percentile Ammunition Specialist (MOS 55B). These two MOS/performance level combinations were, respectively, rank ordered very high and near the median by the first workshop officers. The officers were allowed to assign zero utility values or even negative values if they thought the soldier described would detract from mission accomplishment.

The average interjudge correlations and correlations between like utility measures across workshops were sufficiently high to suggest that very reliable average rank and/or ratio scale values could be obtained using about 10 judges. The high intercorrelations among the different measures suggested that the final utility scale values (with appropriate transformations) might be fairly similar across measurement methods.

It was also apparent that, on the average, the combat MOS received higher utilities than the noncombat MOS at all three performance percentiles.

Differences in average scale values between the 90th and 50th percentile soldiers and between the 50th and 10th percentile soldiers suggested some important nonlinear relationships between performance and utility, which many investigators assume to be linear. Discussions with the officers in the workshops supported the nonlinear view.

In the discussion following the judgment tasks, the participants showed clear preference for the 90th percentile Infantryman rather than the 50th percentile Ammunition Specialist as an anchor, in part because they considered it easier to scale other MOS between the 0 and 100 points, and in part because Infantryman is the most common and best known Army MOS.

When asked what major factors they considered in assigning utilities to the MOS/performance combinations for the wartime scenario given, the officers indicated that potential contribution to unit survival and usefulness in replacing troop losses were foremost. This was consistent with the ratings given by the Workshop 1 officers of the relative importance of various outcomes.

When asked how general or specific the descriptions of the MOS/performance levels should be, the workshop participants said that most officers think in terms of top, bottom, and mid-level enlisted personnel. That is, a soldier is either good, poor, or somewhere in the middle. They felt that very general performance descriptions would best capture this outlook.

Workshops 4 and 5

The fourth and fifth workshops were conducted for the most part with the field grade officers who had participated in the first and third workshops. The officers at both workshops were asked to follow new procedures that had not been tried out. Using the same wartime scenario and the 57 MOS/performance level combinations used in the third workshop, the officers were asked to judge 228 pairs of MOS/performance level combinations.

The judgments were of the form:

(_____) soldiers of MOS/performance level combination 1 are equal in overall value to the Corps in the wartime military situation as (_____) soldiers of performance level combination 2.

The judgmental task was to fill in the two blanks with numbers that would make the two types of soldiers equal in value. For example, if the two MOS/performance level combinations were 90th percentile Utility Helicopter Repairer (MOS 67N) and 50th percentile Combat Engineer (MOS 12B), an officer might judge that seven of one type would be worth five of the other. The officers were allowed to put in any number they liked in order to make the two groups of soldiers equal in worth.

The 228 pairs of MOS/performance level combinations consisted of two types: (a) 57 pairs in which each pair member was from the same MOS but at a different performance level, that is, 10th, 50th, or 90th percentile (19 MOS x 3 pairs -- 10-50, 10-90, and 50-90); and (b) 171 pairs in which each pair member was from a different one of the 19 MOS, with one performance level for each MOS (19 x 18/2 = 171). The 228 pairs were randomized and then presented in the same order to all judges.

Scale values for each of the MOS/performance level combinations making up the 171 judgmental pairs were calculated using a ratio scaling procedure described by Torgerson (1958, pp. 105-112). This procedure results in a set of scale values whose geometric mean is equal to 1.0.

Table 4.1 presents the average of the officers' scale values obtained for the 57 MOS/performance level combinations using the paired-comparison ratio scaling technique described above. Consistent with earlier findings, the combat MOS generally have higher utility ratings at each of the three performance levels (10th, 50th, and 90th percentile) than the noncombat MOS. However, the difference in utility scale values within an MOS from the 90th to 50th percentile performance level is greater for all 19 MOS than the difference in utility scale values from the 50th to 10th percentile performance level. This is especially evident for the combat MOS which, on the average, showed the greatest declines in utility values from the 90th to 50th percentile performance levels.

The inconsistency of these results with those cited earlier may be attributable more to the scaling method used than to the sample of officers involved, since the officers whose judgments were pooled to arrive at the Workshop 5 scale values overlapped considerably with the officers in Workshop 3.

The average interjudge correlation between the scale values of the eight officers taken across the 57 combinations was .61. This value, though not as high as that obtained for the scaling methods tried out in Workshop 3, was considered encouraging enough to try out the scaling method again in Workshops 6 and 7.

As five of the six officers in Workshop 5 had rank ordered the 57 MOS/performance level combinations using the same wartime scenario as in Workshop 3, one and one-half months earlier, it was of interest to determine how reliable their average rankings were. The correlation between the first and second average rankings by the five officers across the 57 combinations was .98.

Another indication of the stability of the average rankings is the average interjudge correlation obtained among the rank orders of the six officers. The obtained average, .79, is slightly higher than the average obtained for Workshop 3 (.75). Both average interjudge correlations indicate that the average rank ordering based on 10 judges would probably have a reliability of .95 or better.

Table 4.1

Scale Values of MOS/Performance Level Hypothetical Soldiers
(50th Percentile Infantryman = 1.0; n = 8, Workshops 4 and 5)

MOS	Percentile			Scale Difference	
	10	50	90	(90-50)	(50-10)
Administrative Specialist (71L)	.10	.23	.46	.23	.13
Ammunition Specialist (55B)	.17	.49	1.01	.52	.32
Carpentry/Masonry Specialist (51B)	.09	.21	.43	.22	.12
Chemical Operations Specialist (54E)	.26	.70	1.51	.81	.44
Food Service Specialist (94B)	.10	.23	.53	.20	.13
Light Wheel Vehicle Mechanic (63B)	.16	.43	.75	.32	.27
Medical Specialist (91B)	.21	.58	1.29	.71	.37
Military Police (95B)	.17	.34	.66	.32	.17
Motor Transport Operator (64C)	.12	.37	.68	.31	.25
Petrol. Supply Specialist (76W)	.13	.31	.71	.40	.18
Single Channel Radio Operator (05C)	.15	.41	.91	.50	.26
TOW/Dragon Repairer (27E)	.23	.64	1.26	.62	.41
Unit Supply Specialist (76Y)	.08	.23	.45	.22	.15
Util. Heli. Repairer (67N)	.17	.52	1.06	.54	.35
Noncombat MOS Average				.42	.25
Armor Crewman (19E/K)	.42	1.28	2.71	1.43	.86
Cannon Crewman (13B)	.29	.75	1.53	.78	.46
Combat Engineer (12B)	.26	.72	1.46	.74	.46
Infantryman (11B)	.34	1.00	2.01	1.01	.66
MANPADS Crewman (16S)	.27	.72	1.26	.54	.45
Combat MOS Average				.90	.58

After the six officers in Workshop 5 finished scaling the MOS/performance level combinations, they were asked to re-rank the 57 combination cards under a peacetime scenario (see Figure 4.2). The peacetime scenario was set in Europe under current conditions and emphasized maintaining force readiness. Table 4.2 shows the MOS/performance level combinations having differences in average assigned rank of 10 or more under the wartime versus peacetime scenarios. The trend in the data from the six officers is clear: Low-performance-level combat troops are ranked higher in wartime than peacetime, while high-performance-level support personnel are ranked lower in wartime than peacetime.

The differences in average utility ranks found in Table 4.2 are certainly not surprising. They raise the question of how a computerized selection and assignment procedure can best use utilities if such utilities are in some part a function of the context in which the judgments of utility are made. It may be necessary to use utilities obtained through a number of scenarios or to decide upon one particular scenario as the context for the utility judgments. On the other hand, if the differences are not large, there may not be a significant difference in the recommended assignments to Army jobs using utilities obtained under different scenarios. The correlation across the 57 combinations of the average rank assigned by the six officers under the wartime and peacetime scenarios was .85. Computer simulations using different utility values and realistic operational constraints may eventually be needed to determine the practical significance of scenario differences.

After the officers had completed the judgmental tasks, a number of utility issues were discussed. The officers reported being concerned, when using the paired-comparison ratio scaling method, that they were being inconsistent in assigning numbers across the judgmental pairs of MOS/performance level combinations. They were assured that inconsistency could be expected within that type of judgment series. (The instructions were later modified in Workshops 6 and 7 to stress that it was not necessary to strive for consistency in making these kinds of judgments.)

When asked what MOS/performance level soldiers might best be used as a standard or unit in measuring the utility of other soldiers, the officers agreed that the 50th percentile Infantryman would be the best choice. They felt that not only are there more Infantrymen than soldiers in any other MOS, but that officers in general have a good understanding of what an average Infantryman is like and what he can do.

The officers were also asked what their reaction would be to expressing the differential worth or utility of soldiers in terms of dollars. They reacted very negatively to this concept, citing possible adverse political consequences as well as internal Army morale problems if dollar figures were placed on soldiers' worth.

Table 4.2

MOS/Performance Level Hypothetical Soldiers With Large Mean Wartime vs. Peacetime Differences in Rank Order (n = 6, Workshop 5)

MOS/Performance Level	MOS	Mean Rank	
		Wartime	Peacetime
Wartime Higher Than Peacetime			
Cannon Crewman, 10th percentile	13B	29	39
Cannon Crewman, 50th percentile		10	20
Chemical Opers Spec, 10th percentile	54E	35	48
Infantryman, 10th percentile	11B	25	40
Infantryman, 50th percentile		10	20
Armor Crewman, 10th percentile	19E/K	25	37
MANPADS Crewman, 10th percentile	16S	31	42
Peacetime Higher Than Wartime			
Administrative Spec, 10th percentile	71L	56	45
Administrative Spec, 50th percentile		46	28
Administrative Spec, 90th percentile		36	17
Carpentry/Masonry Spec, 50th percentile	51B	50	39
Carpentry/Masonry Spec, 90th percentile		41	26
Food Service Spec, 50th percentile	94B	41	25
Food Service Spec, 90th percentile		30	12
Unit Supply Spec, 90th percentile	76Y	28	14

Workshops 6 and 7

When the officers in Workshops 6 and 7, which were held in Europe, were asked the same question concerning the use of a utility dollar metric their reaction was, if anything, even more strongly negative. They, like the officers in earlier workshops, agreed that the 50th percentile Infantryman would make the best standard against which the utility of soldiers in other MOS/performance level combinations could be judged.

Thirteen officers attended Workshops 6 and 7. All were captains and majors, while the earlier workshop participants all had been majors and lieutenant colonels. The consistency of the opinions expressed by the officers in the discussion periods, despite the differences in grade levels and locations, suggests that Army officers have a fairly well-shared frame of reference.

This common viewpoint was also reflected in the results of the analyses of the workshop data. The Workshops 6 and 7 participants were asked to make essentially the same types of judgments made by earlier workshop participants. However, this time they judged the utility of 95 MOS/performance level combinations (5 performance levels--10th, 30th, 50th, 70th, and 90th percentile--for each of the 19 MOS) instead of 57 combinations. The correlation was .94 across the average paired-comparison ratio scale values of the 57 combinations that were common between Workshops 4 and 5 (majors and lieutenant colonels) and Workshops 6 and 7 (captains and majors).

The means of the rank orders assigned the 95 MOS/performance level combinations under the war and peacetime scenarios by the 13 officers are shown in Table 4.3. The MOS in the table have been placed in three groups based on comparative rankings. The first group contains mostly combat MOS. All the MOS/performance level combinations involving these MOS had higher average rank orders under the wartime than under the peacetime scenario. In the second group of MOS all the MOS/performance level combinations were ranked higher under the peacetime than the wartime scenario. In the third group of MOS the average rank orders of the MOS/performance level combinations were all higher under peacetime than wartime at the upper levels of performance, but were all lower under peacetime than wartime at the lower levels of performance. Soldiers in these MOS generally have a higher probability of being in a combat situation than soldiers in the second group of MOS.

These data were consistent with the Workshop 4 and 5 findings and the statements made during the discussion periods: Soldiers at low performance levels who are likely to be involved in combat are assigned relatively higher utility under a wartime scenario, while soldiers at high performance levels who are unlikely to be involved in combat are assigned relatively higher utility under a peacetime scenario. However, since the correlation across the 95 combinations of the utility values under the two scenarios may be quite high (the correlation of average rank orders was .83 in the Workshops 6 and 7 data and .85 for the comparable Workshops 4 and 5 data), the simulations may well result in relatively minor scenario-derived differences.

In Workshops 6 and 7, 12 of the officers scaled the 95 combinations in two ways. One method was the paired-comparison ratio procedure used by the Workshops 4 and 5 participants. They also scaled the 95 combinations using the subjective estimation procedure employed by the Workshops 3 and 4 participants. In this method one combination is given a utility value of 100 and the other combinations are assigned scale values that reflect their respective proportionate utilities; the combination assigned the value of 100 was the 90th percentile Infantryman. The scales obtained by the two methods were then transformed to scales in which the 50th percentile Infantryman had a utility value of 1.0.

Table 4.4 shows the scale values of the 95 MOS/performance level combinations obtained through using both methods. The utility scale values obtained from the two methods are quite similar at the lower performance levels. However, with the exception of the Infantryman and Armor Crewman MOS, the scale values for the higher performance levels obtained from the

Table 4.3

Mean Rank Order of MOS/Performance Level Combinations Under Wartime and Peacetime Scenarios (n = 13, Workshops 6 and 7)

MOS		Performance Percentile				
		10	30	50	70	90
Ranked Higher in Wartime Scenario						
Infantryman (11B)	W	64	43	23	13	6
	P	83	69	47	33	17
Armor Crewman (19E/K)	W	66	48	25	15	7
	P	83	67	47	32	16
Cannon Crewman (13B)	W	68	46	27	17	9
	P	83	68	51	32	16
Chemical Operations Specialist (54E)	W	73	57	40	24	14
	P	86	69	52	30	19
Single Channel Radio Operator (05C)	W	77	60	41	26	14
	P	84	72	53	35	15
Combat Engineer (12B)	W	72	52	32	17	14
	P	87	68	46	34	19
MANPADS Crewman (16S)	W	74	53	37	24	15
	P	86	68	54	35	18
Ranked Higher in Peacetime Scenario						
Administrative Specialist (71L)	W	83	77	68	57	41
	P	80	57	40	25	7
Unit Supply Specialist (76Y)	W	82	73	54	42	27
	P	76	61	39	22	7
Light Wheel Veh Mech (63B)	W	79	63	48	33	23
	P	79	61	42	27	10
Food Service Specialist (94B)	W	83	70	56	46	35
	P	81	60	44	28	12
Carpentry/Masonry Specialist (51B)	W	91	84	75	67	56
	P	84	65	50	34	20
Either						
Medical Specialist (91B)	W	74	57	45	28	15
	P	82	61	42	23	7
TOW/Dragon Repairer (27E)	W	80	62	50	35	27
	P	83	67	46	33	15
Utility Helicopter Repairer (67N)	W	76	61	45	34	23
	P	81	65	43	28	18
Motor Transport Operator (64C)	W	80	63	52	39	33
	P	82	65	45	29	13
Military Police (95B)	W	81	66	53	41	28
	P	83	67	45	31	11
Petrol Supply Specialist (76W)	W	79	64	50	32	20
	P	82	63	48	30	12
Ammo Specialist (55B)	W	78	65	48	33	22
	P	84	72	55	37	19

Table 4.4

Mean Values of MOS/Performance Level Combinations Using Subjective Estimate and Paired-Comparison Ratio Scaling Techniques
(n = 12, Workshops 6 and 7)

MOS	Method[A]	Performance Percentile 10	30	50	70	90
Administrative Specialist (71L)	SE	-.07	.29	.47	.74	.86
	PC	.09	.16	.24	.31	.45
Ammunition Specialist (55B)	SE	.12	.46	.69	.90	1.13
	PC	.12	.26	.38	.52	.73
Armor Crewman (19E/K)	SE	.40	.68	1.03	1.26	1.60
	PC	.25	.48	.73	1.14	1.63
Cannon Crewman (13B)	SE	.30	.69	.93	1.24	1.49
	PC	.24	.41	.64	.90	1.28
Carpentry/Masonry Specialist (51B)	SE	.00	.09	.37	.61	.80
	PC	.07	.11	.18	.24	.38
Chemical Operations Specialist (54E)	SE	.20	.53	.86	1.16	1.38
	PC	.16	.35	.48	.67	.96
Combat Engineer (12B)	SE	.20	.65	.96	1.22	1.52
	PC	.19	.38	.57	.77	1.05
Food Service Specialist (94B)	SE	.09	.33	.59	.83	1.04
	PC	.11	.18	.27	.38	.50
Infantryman (11B)	SE	.29	.71	1.00	1.30	1.58
	PC	.39	.63	1.00	1.53	2.18
Light Wheel Vehicle Mechanic (63B)	SE	.17	.51	.68	1.02	1.24
	PC	.13	.24	.37	.60	.85
MANPADS Crewman (16S)	SE	.19	.57	.83	1.09	1.38
	PC	.16	.31	.45	.65	.96
Medical Specialist (91B)	SE	.17	.48	.79	1.07	1.37
	PC	.15	.30	.42	.62	.95
Military Police (95B)	SE	.15	.47	.71	.97	1.20
	PC	.16	.26	.38	.52	.74
Motor Trans. Operator (64C)	SE	.06	.39	.59	.83	.97
	PC	.13	.21	.33	.43	.65
Petrol. Supply Specialist (76W)	SE	.16	.51	.72	.82	1.11
	PC	.13	.25	.39	.52	.78
Single Channel Radio Operator (05C)	SE	.13	.54	.77	1.09	1.30
	PC	.16	.26	.42	.53	.80
TOW/Dragon Repairer (27E)	SE	.10	.53	.74	.99	1.33
	PC	.16	.28	.43	.56	.78
Unit Supply Specialist (76Y)	SE	.08	.40	.60	.91	1.07
	PC	.12	.22	.34	.50	.69
Utility Helicopter Repairer (67N)	SE	.15	.49	.82	1.06	1.32
	PC	.17	.30	.43	.62	.90

A SE: Slightly greater decline in lower half than in upper for both combat and noncombat.

PC: Slightly greater decline in upper half than lower half for both combat and noncombat but somewhat larger for combat.

subjective estimation procedure are higher than those obtained using the paired-comparison ratio scaling technique.

Examination of the utilities assigned to the performance levels within MOS revealed that on the average, for both the combat and noncombat MOS, the subjective estimation utility values had a somewhat greater decline in the lower half of the performance levels (between the 50th and 10th percentiles) than in the upper half (between the 90th and 50th percentiles). The paired-comparison utility values, on the other hand, on the average had a somewhat greater decline in the upper half of the performance levels than in the lower half for both kinds of MOS.

As in the case of the scenario differences, these scaling method differences may or may not have practical significance. The correlation between the mean values assigned the 95 combinations by the two methods was .91.

It is also of interest to note that in general the highest disagreement in assigning scale values occurred with high-performance-level noncombat MOS combinations, whereas the highest agreement in assigning scale values occurred with low-performance-level noncombat MOS combinations.

In general, however, as noted earlier, the Army officers seem to have a fairly common frame of reference. The median intercorrelations among the officers for the wartime rank orders and scaling values ranged from .76 to .80. Average scale values based upon the judgments of 10 or more officers should therefore have reliabilities of .95 or higher.

Summary Comment

Perhaps the most significant finding is that Army officers would be willing and able to assign differential utility values across MOS and performance levels. Perhaps the next most significant finding is that fairly stable scale values could be obtained from averaging across a relatively small number of officer/judges.

In addition, the scenario(s) used should be free of the detail that suggests greater or less utility for certain specific MOS. Utilities of soldiers in wartime should not be expressed in terms of dollars; an acceptable metric would be the utility of a 50th percentile Infantryman (his value for the survival of the unit and in replacing troop losses is much more readily apparent). Directions to the judges should be reassuring concerning inconsistencies that can possibly occur in a long series of judgments.

As discussed earlier, some of the problems identified (e.g., scenario effects) may have little practical significance in terms of how a computerized enlisted personnel selection and classification system would process Army applicants under operational constraints. Further research should examine, through sensitivity analyses and computer simulations, how differences in the utilities of MOS/performance level combinations affect system output.

TRYOUT OF METHODS FOR ASSIGNING UTILITIES TO PERFORMANCE LEVELS

The second phase of utility scale development was devoted to formulating the final procedures to be used in actually assigning utilities to performance levels in all entry-level MOS. Several inferences drawn from the exploratory findings in the earlier workshops guided the developmental process.

First, the apparent nonlinear relationships between utility and performance found in some MOS would necessitate obtaining judgments of the utility of at least five performance levels within each MOS. Five data points would allow the derivation of a best fitting utility/performance curve with two inflection points (if necessary) within an MOS.

Second, the task of assigning utility scale values to at least five performance levels in 275 MOS was much too onerous to assign to any one judge. Some system for obtaining the judgments would need to be employed that allowed the task to be divided among groups of judges, but that still allowed utilities to be reliably scaled both between and within MOS.

Third, the system used to obtain judgments from a group of judges could employ more than one scaling method. The high correlations between utility values obtained earlier from different scaling methods suggested that a combination of methods might allow the overall scaling task to be accomplished more efficiently than through using one method only. The goal was to place on the same ratio scale the utility values of at least 275 x 5, or 1,375, MOS/performance Level/combinations. (A ratio scale would permit utilities to be summed across individual MOS assignments in comparing selection/classification systems.)

Procedure

An additional 12 workshops were conducted to try out various scaling methods and to prepare for the third phase of the research, in which the selected scaling methods would be applied to all entry-level MOS and within-MOS performance levels. These workshops, like the previous ones, were attended by small groups of Army field grade officers.

The methods tried out at the workshops were rank ordering, paired comparisons, a conjoint scaling procedure, the sorting or placement of MOS/performance level combinations into piles, and the direct estimation of ratio scale values using a standard MOS/performance level set at 100. Of these techniques, the latter two were the scaling procedures eventually selected.

Alternative Methods

The rank ordering task involved rank ordering a list of 135 MOS with all performance levels set at the 50th percentile. This method produced negative reactions from the workshop participants. They objected to the time it took to perform the rankings and to their inability to assign tied ranks under the method used. They felt that they did not know enough about

all the MOS to make the fine discriminations called for in rank ordering. They also objected to the very task of rank ordering MOS, saying that all Army MOS were important. Though the Project A staff had anticipated this latter reaction from some officers in earlier workshops, it was not exhibited until this instance, in which participants were asked to make utility judgments only between MOS, since all performance levels were set at the 50th percentile.

Modifications to deal with four issues were incorporated in the subsequent workshops. First, it was decided to use only scaling methods that allowed judges to report that two or more MOS performance levels combinations were approximately equal in utility. Second, the judges were offered the alternative of not evaluating the utility of some MOS if they felt they did not know enough about the MOS to make informed judgments. Third, different performance levels were included within MOS, as well as between MOS, in the set of combinations to be judged.

The fourth change involved placing the judgments in a selection and classification context. That is, the officers were asked to judge the utility of predicted performance of Army applicants or recruits rather than actual performance of Army job incumbents (as had been done in the earlier workshops). Percentile levels were still used as in earlier workshops, but the percentiles were for predicted performance for the given MOS of all Army applicants or recruits. The judges were asked to assume that the performance percentiles given were accurate estimates of future on-the-job performance percentiles if the applicants or recruits were actually assigned to the MOS. After this adjustment was made, none of the judges in subsequent workshops objected to the basic concept of assigning differential utilities to various MOS/performance levels.

Two variants of the paired-comparison method were tried out, using a limited number of MOS/performance level combinations. One involved judgments of number equality, as in Workshops 4 and 5. The other involved assigning 100 enlisted applicants with given predicted performance percentiles to pairs of MOS; for example, if there were 100 applicants who were at the 10th percentile for the job of illustrator (MOS 81E), and at the 30th percentile for the job of physical activities specialist (MOS 03C), how many of the 100 applicants should be assigned to each job?

Though both of these paired-comparison tasks called for complex judgments, the officers performed them readily. However, the methodology was time consuming, and would be even more so with larger numbers of MOS/performance level combinations to judge. Moreover, the officers felt they should be allowed to indicate that some applicants should not be selected at all. The judgment was subsequently shifted from predicted performance levels of applicants to that of recruits (selected applicants), thereby eliminating the "do not select" alternative. However, the judges were allowed to indicate that they thought a given recruit would have zero or negative utility for the Army if placed in an MOS where his or her predicted performance was low.

Other questions that were raised concerned the field strength of Army units staffed with various MOS complements, and the possibility of potential troop losses if open warfare broke out. Some officers reported that they considered these factors in evaluating the utility of the applicants or recruits. To divorce both troop strength and troop replacements from utility/assignment decisions, judges in subsequent workshops were told that the field strength of all MOS was 70 percent and that the problem of compensating for troop losses was being handled by another part of the assignment algorithm and should not enter into their MOS utility judgments.

A conjoint scaling method was also tried out to determine whether it was possible to obtain MOS/performance level utility evaluations at the same time that weights were established for different components of performance. Each of 16 MOS was paired with each other MOS in the set, at the same time that predicted percentile levels for 15 different pairs of performance factors were given. Although a conjoint procedure later proved effective for use in arriving at weights for combining performance factors into overall measures of MOS performance (see Chapter 3), the method tried here was much too difficult and time consuming for use in scaling large numbers of MOS/performance level combinations.

One method that did prove effective for making large numbers of scaling utility decisions was the pile placement method, in which judges sorted cards containing MOS/performance level combinations into piles, based upon their perceived utility or selection priority. Seven piles of predicted performance utility were used, ranging from negative through zero utility to high utility. The judges initially sorted 135 MOS/performance level combinations, then 210 combinations, and eventually 280 combinations, without complaining about the judgment burden.

Likewise, judges in the ratio judgment method, in which they evaluated MOS/performance level utilities in relationship to that of a 90th percentile Infantryman, judged 59 combinations without the task becoming burdensome.

Using data from one of the last workshops in phase two, separate analyses of variance were performed on the mean pile placements and ratio judgments given 59 combinations judged by the 12 officers using both methods. Remarkably similar F ratio patterns were obtained (see Table 4.5). For both scaling methods, there were large mean differences in assigned ratings for different predicted performance levels. Likewise, there were significant mean differences for rater and MOS, while the MOS by Percentile level interaction was not significant in either analysis. The intraclass correlation reliability estimate for the pile placement procedure was .58 and the comparable coefficient for the direct ratio judgment was .65.

These results indicated that satisfactory reliabilities for mean utilities could be obtained by both methods, if the means were based upon 10 or more judges. The correlation between the mean utilities assigned by the 12 officers to the 59 common combinations using the two methods was .89. Though this intermethod correlation was not as high as might be desired, it should be increased by using MOS/performance level combinations with a

Table 4.5

Analysis of Variance of Pile Placement and Ratio Utility Values, Based on 59 Common Combinations (n = 12 Officers, Workshop 11)

		Pile Placement			Ratio		
Source	df	F	P> F	R^2	F	P> F	R^2
Model	69	14.76	.0001	.61	23.54	.0001	.72
Error	638						
TOTAL	707						
MOS	11	1.91	.0358		10.98	.0001	
Level	4	220.37	.0001		319.42	.0001	
MOS X Level	43	.61	.9771		.90	.6589	
Rater	11	8.17	.0001		17.01	.0001	

greater range of utilities and by raising the reliability of both sets of scale values by an increase in the number of judges.

Methods Selected

In the light of all the information available from the first and second phase workshops, it was decided to use the pile placement and direct ratio estimation methods in the final determinations of the utilities of approximately 275 MOS x 5 performance levels, or 1,375 combinations. The pile placement method provided a means of reliably scaling the utility of large numbers of combinations in a reasonable time period, while the direct estimation method could be used to place a limited number of combinations on a reliable ratio scale having a meaningful zero point and the potential for assigning negative utilities to low predicted performance levels.

The procedures used to place the 1,375 combinations on one utility scale are described in the next section, which also presents the results of the third and final phase of the utility scaling effort.

OBTAINING A COMPLETE SET OF UTILITY ESTIMATES

The goal of the exploratory workshops was to develop a scaling method(s) for obtaining utility functions, for a large set of MOS, that to the maximum extent possible reflected the relative payoff to the Army of different levels of job performance. The results of these exploratory workshops were largely successful. First, for the Army jobs being considered in these workshops, utility scale values varied across MOS in a manner generally consistent with expectations. Second, the utility values assigned

by the officers were sufficiently alike to indicate that fairly stable scale values could be obtained by averaging across officer judgments. Collectively, these results pointed to the feasibility of obtaining information on the relative value of performance in Army MOS that could be used to guide decisions in a personnel selection and classification system.

The next goal was to assign a utility to any predicted level of performance on any entry-level MOS. The obtained utility values could be used to (a) assess the net gain to the Army of using new selection/classification procedures, and (b) help guide classification algorithms in optimizing assignments of individual recruits.

Method

Design Issues. Observations made in earlier workshops of the amount of time it took field grade officers to place MOS/performance level combinations in piles on the basis of judged utility indicated that they could judge 250 combinations in about 1 1/2 hours. Similar observations of the amount of time it took to directly judge the utility of combinations relative to the standard of a 90th percentile Infantryman indicated that the officers could judge 50 combinations in about 40 minutes. It was apparent that only a subset of the total number of MOS/performance level combinations could be presented to any one officer.

To place all utilities on a ratio scale, the project staff chose to use both the pile placement method and a direct judgment method. The pile placement method would be used to place the utilities on an interval scale and the direct estimation method would be used to develop a ratio scale for a target set of MOS by performance combinations against which the interval scale values could be calibrated.

To merge the utilities obtained from the two methods, the same officers should judge a common set of MOS/performance level combinations using both methods. Therefore, to adjust for differences among the samples of officers assigned particular subsets of MOS/performance level combinations in the pile sorting method, all judges were asked to judge one common set of 60 combinations using both methods.

Another issue concerned the number of performance levels within each MOS. Because of the large number of entry-level MOS, the number of performance levels within each MOS was restricted to five. This number still allowed for the derivation of a nonlinear function with inflection points when expressing utility as a function of the level of performance within each MOS.

Selection and Grouping of Entry-Level MOS. AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties (October 1985), was used in the selection of 276 entry-level MOS. All MOS that listed Skill Level 1 duties and that required an ASVAB Aptitude Area score for assignment to the MOS were selected.

Consequently, there were 276 MOS times 5 levels or 1,380 MOS/performance level combinations to be judged separately. To make the scaling task more acceptable to the judges, seven sets of combinations were formed. The first set, consisting of 12 MOS times 5 performance levels, or 60 combinations, was to be judged by all judges and would provide the basis for a common utility scale.

The Infantryman (11B) MOS was selected first because the utility of the 90th percentile infantryman was to be used as the standard (set at 100) against which the utility of all other MOS/performance level combinations was to be compared in the direct judgment method. Judgment data from earlier workshops were used to identify 11 additional MOS that met the following three criteria: (a) No officers had refused to scale the MOS because of unfamiliarity with the MOS; (b) utility values for the 55 MOS/performance level combinations were evenly spread across the range of utilities assigned all MOS used in the workshops; and (c) extremely low or negative utility values were likely to be obtained for performance in some of the MOS at the 10th percentile and high utility values were expected for some jobs at the 90th percentile.

The remaining 264 MOS were grouped into six subsets of 44 MOS each. The subsets were made comparable through a systematic, stratified assignment procedure. The MOS were first grouped in accordance with the results of a cluster analysis based upon judgments of job and task similarity (Hoffman, 1987). This analysis identified 23 MOS clusters. The MOS in each cluster were placed in numerical-alphabetical sequence. Then every sixth MOS was assigned to one of the six subsets, which were labeled Decks A, B, C, D, E, and F.

Each subset or deck contained 280 MOS/performance level combinations -- 12 common MOS plus 44 noncommon MOS and five performance levels for each job[2]. The combinations in each deck were randomized before being administered to the judges.

Sample of Officers Used as Judges. Data from the exploratory workshops indicated that about 10 officers would be needed to obtain an interjudge reliability of about .95 in utility judgments. To ensure that a total sample of 60 officers (10 officers x 6 decks) was obtained, utility workshops were held at six CONUS Army posts and in USAREUR. Altogether, 74 field grade officers attended the workshops. The 74 participants consisted of 14 Infantry, 21 Armor, 14 Other Combat (e.g., Artillery), 12 Combat Support, and 13 Combat Service Support officers. Most of the officers were majors; there were 54 majors, 13 lieutenant colonels, and 7 colonels among the participants.

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[2]Three noncommon MOS and their performance levels were subsequently dropped from the judgment sets because the three MOS were rescinded from operational status. Two of these MOS were in Deck C, the other in Deck E. The number of combinations in the six decks therefore ranged from 270 to 280. For convenience, the number 280 is used in the text and tables to indicate the number of MOS/performance level combinations in the decks.

The Utility Judgment Workshops

After a brief overview of Project A and description of the workshop agenda by the workshop leader, the participants completed a Background Information Sheet, including items pertaining to grade, military specialty, current and previous positions, and years of service.

The leader then gave a more detailed overview of the workshop and its purpose, and discussed assumptions that the participants were to use in making their judgments. The three critical assumptions are given below (the complete set of assumptions and copies of the workshop instructions and forms are supplied in Appendix D).

(1) The military context for which the utility of the recruits is being considered is as follows: The world is in a period of heightened tensions. There is an increasing probability that hostilities will break out in Europe, Asia, the Caribbean, Latin America, and Africa. The Army's mission is to support U.S. treaty obligations and to help defend the borders of allied and friendly nations. Some of the potential enemies have nuclear and chemical capability. Air parity does exist between allied forces and potential hostile nations. U.S. Army training and other preparatory activities have been substantially increased. Most combat and associated support units are participating in frequent field exercises. Most units are being actively resupplied.

(2) The overall MOS performance measure for each MOS represents an optimally weighted (for that MOS) combination of several performance factors. Thus, recruits at the highest predicted performance level (90th percentile) in each MOS are more likely to be dependable, be proficient in MOS tasks, know the facts and procedures required to do their jobs, perform more effectively under adverse or difficult conditions, avoid disciplinary problems, provide support to fellow soldiers, and be more physically fit.

(3) The predicted performance levels for the recruits are accurate. That is, the recruits will actually perform at the predicted levels.

Note that the judgment called for in both utility scaling methods was the relative value of recruits with different predicted performance levels for the entry-level MOS. The decision to use predicted performance levels rather than actual performance levels was based upon the fact that, in application, a computerized enlisted personnel selection and classification system would be operating with predicted or estimated performance (a major purpose of Project A is to improve the accuracy of that prediction).

The participants then read a description of the pile placement method. Emphasis was placed on the definitions given the seven piles in which the judges were to place the MOS/performance level combinations.

- High positive utility would probably result if these recruits were placed in these MOS.
- Between moderate and high utility would probably result if these recruits were placed in these MOS.
- Moderate utility would probably result if these recruits were placed in these MOS.
- Between low and moderate utility would probably result if these recruits were placed in these MOS.
- Low positive utility would probably result if these recruits were placed in these MOS.
- Advantages of placing these recruits in these MOS would probably be equal to the disadvantages (expected utility = 0).
- Negative utility would probably result if these recruits were placed in these MOS. (Any positive contribution would probably be outweighed by problems associated with low levels of overall performance.)

Each MOS/performance level combination was printed on a separate card (see samples in Figure 4.3). On each card there was a short description of the MOS (Skill Level 1) taken from AR 611-201. The performance level, either the 10th, 30th, 50th, 70th, or 90th percentile, was also listed on the card. The instructions indicated that the percentiles were the predicted performance percentiles of recruits, if all recruits were rank ordered in terms of their predicted performance in the given MOS without regard to current cut-off scores. The instructions also allowed the judges to place in an eighth unrated pile any MOS/performance level combinations that they were not familiar enough with to evaluate. No restrictions were placed on the number of cards that could be placed in any one pile. The cards in each deck were thoroughly shuffled prior to the workshops. Decks were assigned to participants randomly.

Upon completing the pile placement method and a short break, the judges read the instructions for the direct judgment method. After first reviewing the assumptions and re-familiarizing themselves with the 12 common MOS, the participants wrote the value, 100, on the 90th percentile Infantryman card, which was on top of the deck of 60 cards. The task of the judges was to assign a utility value to each of the remaining 59 MOS/performance level combinations, taking into consideration that a 90th percentile infantryman had a utility of 100. Zero and negative utility values were permitted.

The judges wrote the assigned utilities directly on the cards. After they had gone through the deck once, they were instructed to arrange the cards in ascending numerical order and then go through the cards again, changing any utility values that they felt were out of line with the others in terms of the ratios of the assigned utilities.

RADIO TELETYPE OPERATOR
(Radio TT Operator) (MOS 05C)

SUMMARY: Supervises or operates and installs radio teletypewriter and tape relay equipment in radio teletypewriter and tape relay tactical or administrative communications nets.

DUTIES: Operates radio teletype equipment to transmit and receive messages.

OVERALL EFFECTIVENESS: 70 percentile

HEAVY ANTIARMOR WEAPONS INFANTRYMAN
(MOS 11H)

SUMMARY: Leads or serves as member of heavy antiarmor crew-served weapons squad, section, or platoon employing heavy antiarmor crew-served weapons in offensive and defensive combat operations.

DUTIES: Assaults and destroys enemy tanks and armor vehicles, emplacements, weapons, and personnel with heavy antiarmor weapons (TOW).

OVERALL EFFECTIVENESS: 30 percentile

Figure 4.3. Samples of MOS/Performance Level combination cards.

Reliability and Validity Analyses

Identification and Deletion of Atypical Judges. An initial question posed was whether some of the judges' responses were sufficiently atypical on a priori grounds to warrant excluding these judges from later analyses. For example, if any of the participants did not fully comprehend the task or its underlying assumptions, or if they were inattentive in accomplishing the task, then inclusion of their data could decrease the reliability and validity of the final scale values.

Four indexes were used to determine the degree of atypicality:

(1) The number of times a judge assigned greater utilities to lower performance level recruits than to higher performance level recruits in the same MOS.

(2) The median correlation of the utilities assigned by a judge across the MOS/performance level combinations with the utilities assigned by the other judges.

(3) The mean utility assigned the MOS/performance level combinations by a judge. Unusually high or low mean values would indicate that the judge was assigning many of the combinations greater or lesser utilities than the other judges were.

(4) The standard deviation of the utilities assigned the MOS/performance level combinations by a judge. Large or small standard deviations would indicate that the judge was assigning an unusually wide or narrow range of utilities to the combinations.

These indexes were calculated for both the pile placement and the direct judgment data from each judge. Frequency distributions of the eight sets of indexes were examined and the judges who had relatively extreme values were identified.

Of the eight indexes, those considered to be most indicative of atypicality were high numbers of inversions and/or low median correlations with other judges for either the pile placement or the direct judgment data. A "rule of thumb" was adopted that a judge had to have atypical values on at least one of these four indexes to be considered for exclusion. On the basis of this rule, seven judges were excluded. Tables 4.6 and 4.7 show the frequency distributions for the number of within-MOS inversions. Table 4.8 shows the frequency distributions of the median correlations between the judges.

The median correlations for the pile placement data were obtained by forming a separate intercorrelation matrix for the judges assigned each deck. Here the correlation between any pair of judges was computed across their joint pile placements of the 280 combinations in their respective decks. The median correlations for the direct judgment data were obtained by forming an intercorrelation matrix for all judges. The correlation between any two judges was computed across the utility values they assigned

Table 4.6

Frequency Distribution of Number of File Placement Inversions Made by Judges (280 Combinations)

Number of Inversions	Number of Judges	Judge ID[a]
0	12	
1 - 10	24	
11 - 20	10	
21 - 30	8	
31 - 40	7	
41 - 50	2	
51 - 60	2	
61 - 70	2	
71 - 80	1	
81 - 100	0	
101 - 200	4	4, 38, 64, 84
201 and Above	2	67, 83
Total	74	

[a] Some identification numbers for judges are higher than 74 because earlier lists of judges included a few company grade officers. The final set of analyses was limited to field grade officers.

Table 4.7

Frequency Distribution of Number of Direct Judgment Inversions Made by Judges (60 Common Combinations)

Number of Inversions	Number of Judges	Judge ID
0	23	
1 - 5	33	
6 - 10	8	
11 - 15	5	
16 - 20	3	
21 - 40	0	
41 and Above	2	4, 53
Total	74	

Table 4.8

Frequency Distribution of Median Correlations Between Judges

Median Correlation With Other Judges	Pile Placement (280 Combinations) No. of Judges	Pile Placement (280 Combinations) Judge ID	Direct Judgment (60 Common Combinations) No. of Judges	Direct Judgment (60 Common Combinations) Judge ID
0 - .10	1	56	0	
.11 - .20	2	64, 83	1	64
.21 - .30	2	38, 67	1	53
.31 - .40	0		1	67
.41 - .50	0		1	83
.51 - .60	3		4	
.61 and Above	66		66	
Total	74		74	

the 60 common combinations. While over 90 percentile of the judges had median correlations above .50 for both types of judgments, six judges had median correlations of .50 or below for either the pile placement or the direct judgment method. Three of these judges had median correlations of .50 or below for both judgment sets.

The frequency distribution of the mean pile placements did not indicate that any judges had mean pile placements that were out of line or atypical. However, for the direct judgments, the means of the values assigned the 60 common combinations by three of the judges were considerably higher, and those assigned by one judge were considerably lower, than the mean values assigned by the rest of the judges. Examination of the frequency distributions of the standard deviations of the pile placement and direct judgment utilities assigned by the judges indicated that only three judges had fairly atypical indexes.

Table 4.9 summarizes the information presented above by showing all the judges who had atypical values for one or more of the eight indexes used. Of the 11 judges listed, six had two or more atypical values for number of inversions and/or median correlations with other judges. Using the rule of thumb adopted earlier, these six judges were removed from the sample. A seventh judge, identification number 56, was also removed because this judge had a median pile placement correlation with other judges of .05, the lowest recorded for any judge.

Before removing these seven judges, a check was made to see whether as a group they were in basic agreement with one another. (Here we were trying to avoid possibly eliminating a coherent minority of judges who simply had a different point of view concerning the utility of the various combinations than did the majority of field grade officers.) The intercorrelations

Table 4.9

Judges With One or More Problems in Their Utility Judgmental Data

Judge ID [a]	No. of Inversions [b]		Median Correlations		Mean Utility		Utility SD	
	Pile PL	Direct	Pile PL	Direct	Pile PL	Direct	Pile PL	Direct
* 4	X	X				X		X
16								X
*38	X		X			X		
45						X		
*53		X		X				
*56			X					
*64	X		X	X		X		
*67	X		X	X				
*83	X		X	X				
84	X							
86								X

[a] * indicates judge's data were removed from later analyses.
[b] Pile PL = Pile Placement; Direct = Direct Judgment.

across the 60 common combinations among the seven judges' utilities were calculated for both the pile placement and the direct judgment methods. Their median intercorrelations were .15 for the pile placements and .30 for the direct judgments (the remaining 67 judges had median intercorrelations of .50 and above for both the pile placement and direct judgment methods). That is, the seven judges agreed neither with the other judges nor among themselves. Consequently, their judgments were excluded from the final analyses.

Imputation of Missing Data. A number of the judges had failed to provide utilities for all the MOS/performance level combinations they had been assigned. Four judges did not record their direct judgment utilities for one or two combinations. A larger number, 23, did not place one or more combinations in any of the seven utility level piles because they were not familiar enough with the job to assign a utility value. Table 4.10 shows a frequency distribution by number of unsorted combinations.

Although the missing judgments constituted only about 1 percent of the total data set, there was some concern that the average scale values of some MOS might be unduly affected by not being based on the same set of judges as other MOS. Consequently, the missing values were imputed, using a multiple regression procedure. Treating each judge with missing data as a dependent

Table 4.10

Frequency Distribution of Unsorted MOS/Performance Level Combinations (Pile Placement Method)

Number of Unsorted Combinations	Number of Judges
0	51
1 - 10	15
11 - 20	2
21 - 30	4
31 or More	2
Total	74

variable and judges with complete data as candidate independent variables[3], analysts used a stepwise variable selection routine to select judges whose utility ratings or pile placements added the most to the prediction of the known utility values of the judges with missing data. Judges (independent variables) were allowed to enter the multiple regression equation provided that their F ratio to enter was significant at the .10 level. The multiple correlation coefficients obtained for the most part were .90 or higher.

Comparison of Nonedited and Edited Data. The cumulative effect of removing seven judges and imputing pile placement or direct judgment utilities for other judges was assessed through comparing the intercorrelations and reliabilities of the nonedited and edited data sets. Table 4.11 shows that for the pile placement data, the 1-rater and n-rater reliabilities did improve for the three decks (B, D, and E) for which one or more judges had been removed. The 1-rater reliabilities improved from about .58 to .73 on the average. In contrast, the imputation of pile placement values for the combinations that were not missing one or more judges had practically no effect on the obtained reliabilities.

The 1-rater and n-rater reliabilities of the 60 common MOS/performance level combinations were also obtained for both the nonedited and edited ratio scale data. The 1-rater reliability rose from .564 for the nonedited data to .653 for the edited data and the n-rater reliability (based on 74 judges) increased from .990 to .992. When the pile placement reliabilities for the 60 common combinations were computed for comparison purposes, the 1-rater reliability rose from .673 to .746, while the n-rater reliability rose

[3]Here, the correlations are computed over the MOS/performance level combinations rated in common by the judges. The performance percentiles assigned to the combinations were used as an additional independent variable.

Table 4.11

Intraclass Reliabilities for Pile Placement Data by Deck (Common and Noncommon Combinations)

Deck	Nonedited Data			Edited Data		
	No. of Raters	1-Rater	n-Rater	No. of Raters	1-Rater	n-Rater
A	12	.778	.977	12	.774	.976
B	13	.548	.939	11	.707	.964
C	12	.718	.968	12	.717	.968
D	13	.622	.954	11	.752	.971
E	12	.562	.937	9	.733	.961
F	12	.657	.958	12	.658	.958
Average		.648	.956		.724	.966

from .993 to .995. The high values for these n-rater reliabilities indicate that not much is to be gained by such editing when the number of judges is large.

The correlations between the utilities obtained for the nonedited and edited data were very high. Table 4.12 shows that even for the decks (B, D, and E) where judges were dropped because they were not typical, the correlations of mean pile placement across the 280 combinations averaged .990. The corresponding correlation for the mean direct judgment utilities assigned the 60 common combinations using nonedited and edited data was .999. While it is apparent from these results that not much was gained by editing the data, it is also evident that the editing did not unduly affect the resultant relative utility values.

Scaling Method Reliabilities. The small differences in reliability obtained for the edited vs. nonedited data should not obscure the finding that the average scale values assigned to the MOS/performance combinations had a very high degree of reliability. The n-rater reliabilities for the six separate decks ranged from .958 to .976 for the edited pile placement data. The n-rater (67 judges) reliability for the edited direct judgment utilities of the common combinations was .992. The corresponding reliability for the pile placements of the common combinations (across all decks and the 67 judges) was .995. The correlation obtained between the average scale values from the two methods across the 60 common combinations was .98.

This high correlation is not wholly attributable to judges simply assigning higher values to combinations with higher percentiles. This can be seen by the correlations between average pile placement and direct judgment utilities attained when the correlations are computed across the 12 common MOS holding percentile level constant. These correlations, presented in Table 4.13, had an average value of .77. The n-rater (67 judges)

Table 4.12

Correlation Between Mean Pile Placement Using Nonedited and Edited Data

Deck	Number of Combinations	Edited vs. Nonedited Correlation
A	280	.9998
B	280	.9930
C[a]	270	.9999
D	280	.9929
E[b]	275	.9856
F	280	.9998

[a] MOS 16L and 27Q were rescinded as of 31 October 1987, so their data were deleted.
[b] MOS 24W was rescinded as of 31 October 1986, therefore its data were deleted.

Table 4.13

Correlations and Reliabilities of Pile Placement and Direct Judgment Scale Utilities Holding Percentile Level Constant

Percentile Level	Number of Common Combinations	Correlation of Mean PP with DJ[a]	n-Rater Reliability	
			Pile Placement	Direct Judgment
10	12	.85	.89	.67
30	12	.84	.90	.68
50	12	.59	.88	.83
70	12	.63	.82	.95
90	12	.95	.94	.97
Average		.77	.89	.82

[a] PP = Pile Placement; DJ = Direct Judgment

reliabilities averaged .89 and .82 respectively for the pile placement and direct judgment utilities when the reliabilities were computed for each percentile level separately.

These results clearly demonstrate that, in making their utility judgments, the judges were reacting to more than the percentile levels assigned to the combinations. Figure 4.4 shows the bivariate plot of mean pile placement and mean direct judgment by percentile level for the 60 common combinations.

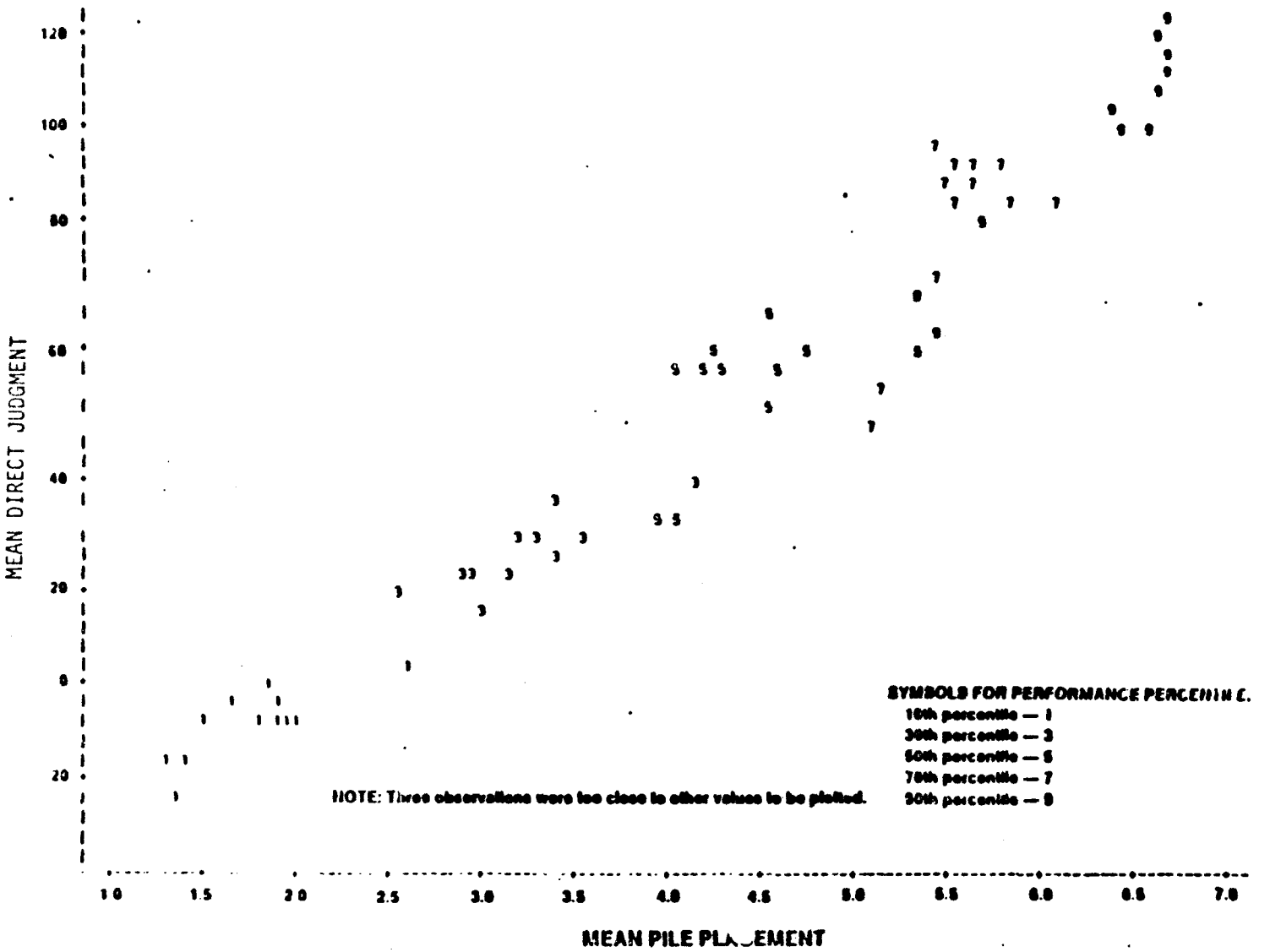


Figure 4.4. Plot of mean pile placement and direct judgment utilities by Performance Percentile for 60 common combinations: 67 judges.

Illustrative Interval Scale Utilities. It is of interest to note which MOS/performance level combinations received the lowest and highest utilities. Does the pattern seem reasonable? Do the relative values make sense given what we know about the MOS? Table 4.14 presents the noncommon combinations that received mean pile placements of 1.1 or less by the 9 to 12 officers who judged them. (The lowest or negative utility pile was assigned a value of 1.0.) Poor performance (10th percentile) was assigned the most negative utility for repairers of complex military equipment and for the Cardiac Specialist and Pharmacy Specialist. In each of these MOS, the consequences of poor performance are judged to be especially costly.

Table 4.14

List of MOS/Performance Level Combinations Receiving Lowest Pile Placements (Mean Placement 1.1 and Below)

MOS ID[a]	MOS Name
23N	NIKE/HERCULES Track Radar Repairer
34Y	Field Artillery Tactical Fire Direction Systems Repairer
35R	Avionic Special Equipment Repairer
63N	M60A1/A3 Tank System Mechanic
67N	Utility Helicopter Repairer
67R	AH-64 Attack Helicopter Repairer
67Y	AH-1 Attack Helicopter Repairer
68B	Aircraft Powerplant Repairer
68F	Aircraft Electrician
91N	Cardiac Specialist
91Q	Pharmacy Specialist

[a]All associated performance levels were at the 10th percentile.

Table 4.15 lists the noncommon combinations that received the highest mean pile placements (means of 6.9 or more on a scale of 7). This list includes both repairers and operators of advanced weapon systems. High performance in two intelligence MOS, 96B and 98C, was also assigned a high utility. In comparison, the mean pile placement for the 90th percentile Infantryman (11B) was 6.6.

Table 4.15

List of MOS/Performance Level Combinations Receiving Highest Pile Placements (Mean Placement 6.9 and Above)

MOS ID[a]	MOS Name
11H	Heavy Anti-Armor Weapons Infantryman
13C	TACFIRE Operations Specialist
13R	Field Artillery Firefinder Radar Operator
15E	Pershing Missile Crewmember
15J	MLRS/Lance Operations/Fire Directions Specialist
16J	Defense Acquisition Radar Operator
21L	Pershing Electronics Repairer
24E	Improved Hawk Fire Control Mechanic
24L	Improved Hawk Launcher and Mechanical Systems Repairer
24P	Defense Acquisition Radar Mechanic
34L	Field Artillery Digital Systems Repairer
35R	Avionic Special Equipment Repairer
45N	M60A1/A3 Tank Turret Mechanic
45T	Bradley Fighting Vehicle System Turret Mechanic
63B	Light Wheel Vehicle Mechanic
63N	M60A1/A3 Tank System Mechanic
67R	AH-64 Attack Helicopter Repairer
67X	Heavy Lift Helicopter Repairer
68B	Aircraft Powerplant Repairer
96B	Intelligence Analyst
98C	EW/SIGINT Analyst

[a]All associated performance levels were at the 90th percentile.

The field grade officers who served as judges came from a variety of Army backgrounds. Analyses were conducted to determine whether officers in different military primary specialties assigned significantly different utilities to the common MOS/performance level combinations. First, the officers in the Combat branches were placed into four categories -- Armor, Aviation, Infantry, and Other Combat (Air Defense and Artillery). Then, the separate means of the direct judgment utilities of each of the 59 common combinations were compared, using analysis of variance.

Comparison of Utility Ratings by Different Officer Groups. To further test whether the type of judge influenced utility ratings, a separate linear regression equation was computed for each of the 12 common MOS for each judge, using performance percentiles as the independent variable and the direct judgment utilities assigned by the officer as the dependent variable. The mean slopes and the mean y-intercepts or equation constants of the officer groups were then analyzed for significant differences, using separate analysis of variance for the 12 regression slope means and the 12 intercept means.

Analyses were conducted to determine whether officers in different primary military specialties assigned significantly different values to the various combinations. Similar sets of analyses of variance tests were run comparing the utilities assigned by Combat, Combat Support, and Combat Service Support officers. In addition, the utilities assigned by the 47 majors in the sample were compared to those assigned by a combined group of 20 lieutenant colonels and colonels.

In all, only 10 of the more than 250 statistical tests run to compare various types of officer groups were significant at the .05 level. Examination of the significant differences that were obtained did not reveal any trend in the data indicating that certain types of officers favored particular MOS or performance levels.

Estimation of Ratio Scale Utilities From Pile Placement (Interval) Data. A basic objective of the overall research design was to place all 1,380 MOS/performance level combinations on the same utility scale. Using the averages (across all judges) of the direct judgment utilities assigned the 60 common combinations as the dependent variable, and the pile placement of the same common combinations as the basic independent variable, an equation was derived for each separate group of judges expressing direct judgment utilities as a function of average pile placement.

This equation was then used to estimate the ratio scale values (direct judgment utilities) that each group would have assigned all the noncommon MOS/performance level combinations if they had been given that scaling task. It was assumed that since these equations would place all the estimated utility values on the same scale, minor group differences in pile placements of the 60 common combinations would be averaged out. (As the judges were assigned randomly to decks, any differences among the groups in mean pile placements could be attributed to sampling error.[4])

To explore the use of alternative regression equations for estimating the ratio scale values from the pile placement data, a subset of 20 of the common combinations was temporarily set aside and not used in the initial derivation of the reregression equations. These 20 combinations came from

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[4]Analysis of variance significance tests run on the 59 common combinations to compare their mean pile placements by deck resulted in only one significant difference, a result easily attributable to chance.

four MOS having performance percentiles that had utilities fairly evenly spread across the range of ratio scale utilities (based on the 67-judge averages).

Since both estimated and actual values would be available for these 20 combinations, the ability of alternative regression equations to estimate ratio scale utilities from the pile placement data could be evaluated or cross validated. That is, a regression equation from each deck based on 40 common combinations could be used to estimate the ratio scale values of the 20 set-aside combinations, for which actual values were available.

Two indexes of how well the estimated ratio scale values corresponded to the actual values were (a) the mean difference between the actual and the estimated values, and (b) the square root of the mean square of the difference between the actual and estimated values. The two indexes were computed using five different sets of independent variables:

(1) Average pile placement of the 40 combinations.

(2) Average pile placement and the performance percentiles of the 40 combinations.

(3) Average pile placement and the square of the average pile placement.

(4) Average pile placement and the cube of the average pile placement.

(5) Average pile placement and both the square and cube of average pile placement.

The square and the cube of the average pile placements were used as independent variables because the by-deck bivariate plots of the average ratio scales (the dependent variable) versus the average pile placement (the independent variable) suggested that there might be inflections in the best fitting lines at the two ends of the utility continuum. This might be brought about by the restriction inherent in the procedure used that limited the judges to seven utility levels when placing the combinations into piles.

Table 4.16 shows the results of these analyses. The equations based on all five sets of independent variables tended to overestimate somewhat the actual utilities of the 20 holdout combinations. This tendency was most pronounced for combinations having intermediate actual utilities. In general, the equations tended to underestimate the utilities of the holdout combinations having high actual utilities, and slightly overestimate the utilities of the combinations having low actual utilities. The best balance was achieved by using average pile placement and both its square and its cube as the independent variables.

The lowest mean squares for prediction errors was also obtained by the equations that used the average pile placement and both the square and the cube of average pile placement. For all equations, the largest squared

Table 4.16

Comparison of Equations Estimating Ratio Scale Utilities From Pile Placement Data (n = 20 Combinations in Each of 6 Decks)

Equation Independent Variable	Average $(A - E)$[a]	Sq. Root of Average $(A - E)^2$	Average R^2 of Decks[b]
Average pile placement (PP)	- .87	9.15	.943
PP and performance percentile	-1.65	10.01	.950
PP and $(PP)^2$	- .86	9.04	.944
PP and $(PP)^3$	- .85	9.01	.944
PP, $(PP)^2$, and $(PP)^3$	- .79	8.96	.945

[a]Actual ratio scale utility (A) minus estimated ratio scale utility (E).
[b]Forty common combinations were used in each deck to obtain the squares of the multiple correlation coefficients (R^2).

errors were for the combinations having actual abilities in the mid-range. As mentioned above, the equations slightly, but consistently, overestimated these utilities.

Based on these data, pile placement and its square and cube were used as the independent variables. The equations for each deck were recomputed, using the pile placement and direct judgment values for all 60 combinations. Table 4.17 presents the adjusted correlation coefficients (R^2) obtained for each deck, as well as the actual equation weights. The multiple correlation coefficients remained high (about .97 on the average). The sign of the weights obtained formed a fairly consistent pattern, with average pile placement always having a positive weight, and (except for Deck A) the square and the cube of average pile placement having negative and positive weights, respectively.

Cross-Validation of Estimation Equations on a Holdout Sample. How would the utility values derived from the equations given in Table 4.17 compare with utilities obtained from direct judgments by field grade officers? To explore this question, the participants[5] in the last utility workshop were given an additional 40 combinations (8 MOS x 5 levels) on which to make their

[5]None of the 10 participants were Armor officers, unlike the remaining sample where 17 of the 58 officers were Armor officers. One of the 10 was Judge ID #83 who, as noted earlier, was removed from the sample because of a large number of inversions and low medium correlations with the other judges. Hence the final analyses from this workshop were based on nine participants.

Table 4.17

Multiple Regression Equations for Estimating Ratio Scale Utilities From Average Pile Placement Data (Based on 60 Common Combinations)

Independent Variable	Deck A	B	C	D	E	F
Pile placement (PP)	14.00	21.81	43.39	24.09	46.99	49.45
$(PP)^2$	1.455	-.323	-5.785	-1.344	-6.922	-6.932
$(PP)^3$	-.053	.067	.485	.169	.545	.549
Intercept	-34.09	-41.75	-69.44	-47.74	-63.80	-77.85
Adjusted R^2	.965	.926	.954	.944	.912	.924

direct judgments of utility. The mean of the direct judgment utilities given these 40 combinations by these officers could then be compared to values from the other 58 officers computed by formulas derived for each deck excluding the data obtained from the last workshop.

Before the utility comparison, the set of 40 new utility estimates from the holdout sample were adjusted so that the new values corresponded to the utilities that could have been expected if the remaining sample of 58 judges had actually evaluated the additional 40 combinations using the direct judgment procedure. A multiple regression equation was derived using the mean direct judgment utility assigned the 60 common combinations by the 58 officers as the dependent variable, and the mean utilities assigned the 60 combinations by the nine officers, the square of these utilities, and the performance percentile of the 60 combinations as the independent variables. This equation was then used to obtain the estimated direct judgment values for the 40 extra combinations. This procedure adjusted the holdout sample utilities for random and nonrandom differences between the holdout and remaining sample judges in the direct judgment of the 60 common combinations.

As shown in Table 4.18, very high correlations (.97) were obtained between the utilities estimated from the separate deck equations and the holdout sample unadjusted and adjusted direct judgment utilities. Moreover, the utility means, standard deviations, and ranges for the 40 extra combinations obtained from the holdout sample direct judgments were quite similar to those estimated from the deck equations. This was especially evident after adjustment for utility differences between the two officer samples on their direct judgment of the 60 common combinations.

Table 4.18

Comparison of Utilities Obtained for 40 Extra MOS/Performance Level Combinations

	Origin of Variable Utility Estimate	Judges	Mean	Standard Deviation	Range
(1)	Direct judgments by holdout sample of officers	9	62.8	38.4	-9.7 to 123.7
(2)	Variable 1 adjusted for differences between the holdout and remaining samples on 60 common combinations	9,58	54.2	36.5	-5.8 to 110.8
(3)	Separate deck equations based on data from remaining officer sample only	58	56.3	36.1	-8.2 to 111.7

Intercorrelations

	(1)	(2)
(1)	---	---
(2)	.993[a]	---
(3)	.972	.973

[a]Variable 1 was used in the derivation of Variable 2.

THE FINAL UTILITY VALUES

All the analyses that have been described were performed for the purpose of establishing the reliability and validity of the utility estimates for MOS by Performance Level combinations obtained by using the technique described in this chapter. All of these reliability and validity analyses were based on data that had been carefully edited for missing data and outliers. The analyses support the conclusions that:

(1) For both methods the reliability of a single judge is reasonably high.

(2) For both methods the reliability of the average value produced by 11 judges or more is very high.

(3) Reliabilities are high even when performance level is controlled and differences are due only to MOS differences within performance level.

(4) The agreement between the two methods when scale values are compared on a set of common stimuli is very high and equal to the limit of their reliabilities.

(5) Officers of different ranks or MOS specialties do not produce different patterns of scale values.

(6) Patterns of high and low utility values "make sense."

(7) A relatively simple exercise in equation fitting produced a useful method for estimating ratio scale values (which could not be obtained for all MOS by Performance Level combinations) from the interval scale values obtained from all MOS by Performance Level combinations, using the pile placement method.

(8) As determined on a cross-validation sample of stimuli, the equations used to estimate ratio values from interval data were highly accurate ($R_{estimated \times actual} = .97$).

Utilities for MOS/Performance Level Combinations

The derived equations for each deck were used to estimate the ratio scale utilities for the noncommon MOS/performance level combinations for the entry-level list of 273 MOS. These values are given in Appendix F, along with the actual average direct judgment utilities for the 60 common combinations.

Consequently, Appendix F represents the "bottom line" of the Project A utility scaling work at the end of FY87. It contains ratio scale utility values for 273 x 5, or 1,365, MOS/performance level combinations. Within the limits of the reliability and validity evidence discussed in this report, the 1,365 combinations have been placed on the same scale. As an example of this extended MOS list of utility values, the ratio scale values for the 19 Project A MOS are shown in Table 4.19.

Equations for Estimating Utilities for Continuous Performance Distributions

To make it possible to assign a utility value to any performance percentile within an MOS (not just the 10, 30, 50, 70, and 90 percentiles), a separate equation was derived for each of the 273 MOS relating performance percentile and the square and cube of performance percentile (the independent variables) to utility (the dependent variable).

Each equation was based on five data points, the estimated (or actual) average ratio scale utilities respectively assigned the 10th, 30th, 50th, 70th, and 90th percentile levels within the MOS. To determine the general shape of the relationship between percentile level and utility across the MOS, a stepwise multiple regression procedure (SAS) was used. The order of

Table 4.19

Average Ratio Scale Utilities by Performance Percentile For the Project A MOS

	Percentile				
MOS	10	30	50	70	90
11B*	4.5	38.7	61.7	82.3	100.0
12B	5.1	47.2	63.3	86.8	112.6
13B	20.8	35.0	67.1	85.2	111.7
16S	-8.2	33.4	40.3	77.3	105.6
19E	8.4	45.6	68.3	98.0	108.2
27E	-13.8	31.0	50.7	91.1	115.2
31C	-6.4	25.4	54.3	86.8	97.9
51B	22.7	36.9	54.0	65.9	59.3
54E	1.8	31.7	45.4	89.1	108.7
55B	0.6	40.1	61.5	82.6	100.2
63B	0.5	35.0	55.1	87.7	111.7
64C	22.7	48.8	52.2	81.9	79.6
67N	-24.0	8.5	46.9	80.5	107.7
71L	0.5	27.3	54.3	70.8	86.8
76W	15.5	39.2	59.1	73.5	82.7
76Y	-5.0	33.1	66.4	81.5	92.7
91A	-4.0	17.6	52.5	76.6	100.2
94B	2.7	27.4	63.9	85.5	90.8
95B	-8.2	38.6	63.1	84.2	108.7

*One of 12 common MOS assigned actual ratio scales.

entry of the independent variables into the equation and the significant levels and signs (positive or negative) of their regression weights were noted for each MOS equation.

The equations derived for the 273 MOS are summarized in Table 4.20. Performance percentile was the first independent variable to enter into the equation for each MOS. For 91 of the MOS equations, a second independent variable entered the equation with a statistically significant weight (.10 level of significance). For the most part (95%), this second variable entered with a negative weight, indicating that the rate of increase in utility was declining for higher performance percentiles. The cube of performance percentile was selected as the second equation variable a little more often than the square of performance percentile (52 vs. 39 times). For only three of the 91 equations did a third independent variable also enter the equation significantly (.10 level). This would indicate a best fitting line with two inflection points.

Table 20

Summary of MOS-Specific Equations Derived for Estimating the Utility of Performance at Different Percentile Levels

	First Variable Entering Significantly Into Equation		Second Variable Also Entering Significantly Into Equation		Third Variable Also Entering Significantly Into Equation	
	Sign of Regression Weight		Sign of Regression Weight		Sign of Regression Weight	
Independent Variable	+	-	+	-	+	-
Performance percentile (P)	273	0	0	0	0	0
Percentile squared (P^2)	0	0	1	38	1	1
Percentile cubed (P^3)	0	0	4	48	1	0
Total	273	0	5	86	2	1

Figure 4.5 shows bivariate plots between utility and performance percentile within three MOS. Line B in the figure shows a typical plot when the relationships are essentially linear between utility and performance. An example of a plot where a second variable (percentile squared) enters into the regression equation with a negative weight is provided by line A while line C shows an example where the second independent variable entering the equation is percentile cubed.

Notice the very high values of adjusted R^2 in the examples shown. The five data points in the plots were determined from utility judgment data. As shown earlier (see Table 4.13), reliable differences between the utilities assigned MOS are obtained at all percentile levels when performance percentile is held constant. Within MOS, however, utility is highly predictable from performance percentile, though the relationship is frequently not linear over the range of performance.

The operational significance of these findings is that the utility of assigning a recruit to any MOS can be estimated using a within-MOS equation to relate the level of the recruit's predicted performance in the MOS to his or her utility for that MOS. These utilities, in turn, could be used to help decide the MOS to which the recruit should be assigned under an algorithm for optimizing job assignments.

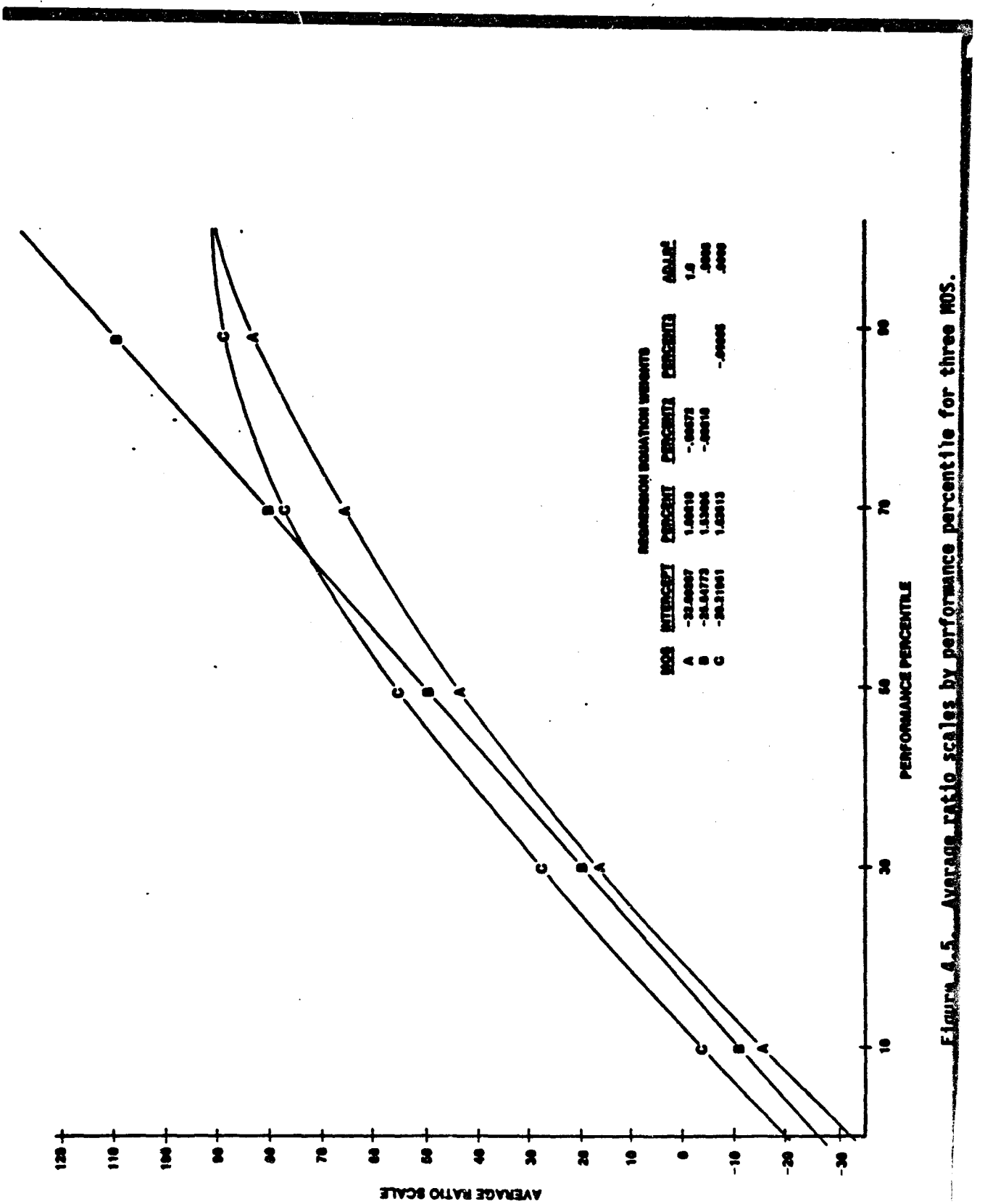


Figure 4.5. Average ratio scales by performance percentile for three MOS.

DISCUSSION AND CONCLUSIONS

Perhaps the most important finding in this first research effort to establish utility values for different levels of performance in all Army entry-level MOS is that it can be done. One can fault the subjective nature of the judgments called for, but the fact remains that the mean utilities had very high reliabilities, both within and between methods (for example, for the common set of combinations, .99 within the utility scaling method and .98 between methods). The high correlation (.97) and similarity between the utilities derived from separate deck equations and the utilities assigned directly by the holdout officer sample (Table 4.18) further attests to the stability of the utilities across methods and officer samples.

The high reliabilities of the mean utilities assigned the MOS/performance level combinations, and the lack of any clear pattern of differences in average utilities assigned by officers from different MOS specialties, also indicate that similar values would result if the utilities were assigned by a different sample of officers than the one used in this research. Field grade Army officers apparently share similar perceptions of the relative worth/costs of low and high performance in Army MOS. This research clearly demonstrates that this shared organizational value function can be reliably scaled.

The finding that consistent differences in the utility of performance are obtained for different MOS at each percentile level is also worth noting, especially when combined with the finding that the relative ranking of the MOS in terms of their utility levels shifts depending upon the predicted performance level. A personnel assignment algorithm that took these utility differentials into account at all performance levels would most likely be able to effect more optimal Army-wide assignments than one that did not.

However, a number of critical problems need to be addressed before utilities similar to the ones obtained in this research can be used operationally. Foremost perhaps is the problem of how to ensure that the proper distribution of available personnel talent is assigned to each MOS. An assignment algorithm that paid attention only to the utility of assigning individual recruits to MOS or CMF, without regard to the utility of the total distribution of low- or high-quality personnel being assigned to each job, could result in certain jobs being filled by insufficient numbers of technically proficient recruits. Research to determine the utility of different distributions of available recruits in Army jobs is the subject of an ongoing parallel effort being undertaken by ARI researchers (Nord & White, 1987).

Another issue concerns obtaining the acceptance of these utility values by those who are responsible for personnel policies and decisions. Such approval is unlikely to occur unless it can be demonstrated that use of the utility information would result in more optimal manpower allocations. Work is now in progress (Nord & White, 1987) to examine the effects of using (or

not using) these job-specific utility functions to make personnel classification and job assignment decisions.

Yet another issue concerns the duration of time that the recruits actually remain in the Army. All other things being equal, recruits who complete their first tour of enlistment will have higher utility than those who do not. Similarly, high-quality soldiers who reenlist will have more utility to the Army than those who fail to reenlist.

A related consideration is cost. Recruiting, training, maintaining, and retaining high-quality soldiers is a costly operation. These costs are not equal across Army jobs. It costs more to recruit high-quality personnel than it does to obtain recruits of lower quality. Likewise, it may take longer and be more costly to train soldiers in high-technology career management fields than in some other types of CMF. Obviously, potential cost, reenlistment propensity, and NCO potential all should be considered, if at all possible, in making the initial assignments of recruits to jobs.

Finally, assuming that judged utility of performance has a role in an optimal classification and job assignment system, questions remain concerning how the requisite judgments should be obtained operationally. What types of officers should make the judgments involved? How often do the resultant utility functions have to be updated to keep the utilities current? Do the utilities of all entry-level MOS have to be determined, or can the utilities for most MOS be inferred from those assigned a representative sample of MOS taken from career management fields or other MOS groupings?

Clearly, this research has affirmatively answered the question of whether a coherent, reliable set of relative utility values could be derived for all performance levels in all entry-level Army MOS. The next steps involve how to make best use of that finding in improving the Army's selection, classification, and assignment processes.

Chapter 5

JOB ANALYSIS OF SECOND-TOUR PERFORMANCE[1]

INTRODUCTION

As Project A entered its fifth year, a major added area of criterion development centered on job analyses and performance assessment for Army enlisted personnel who have been in the Service for 3 to 5 years -- a cohort that we now refer to as the "second tour." The overall goals of this later part of the project include developing selection/classification procedures that will aid in identifying accessions who have high potential to become successful noncommissioned officers (NCOs) after reenlistment.

General Approach

To encompass NCO potential in the Project A research domain, the original Research Plan provides for a second-tour followup of soldiers tested in both the 83/84 Concurrent Validation sample and the 86/87 Longitudinal Validation sample. As described in earlier reports (e.g., Campbell, 1986a), the CV sample was made up of individuals who entered the Army in the 83/84 "window" and were assessed on the predictor battery and criterion measures during 1985/86. The LV sample was tested during 1986/87 on the experimental predictor battery as they entered the Army and will be assessed in 1988 on the performance measures. The second-tour followup of the 83/84 cohort will involve extensive measurement of the performance of the individuals who were assessed during the CV in 1985 and are still in the Army in 1988. The second-tour followup of the 86/87 cohort will be conducted in 1991.

To identify valid selection/classification procedures for assessing NCO potential, measures of second-tour job performance are needed. After the criteria are available, the following questions can be examined:

- To what extent does the experimental predictor battery predict performance beyond the first term of enlistment?
- Does early performance predict later performance, when additional responsibilities, such as supervision and leadership, are presumably required?
- What combination of selection/classification test information and first-tour performance data is most effective for predicting second-tour performance?

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[1]The initial draft of this chapter was written by Charlotte H. Campbell of the Human Resources Research Organization.

- How does entry-level training performance relate to later job performance in the first and second tours?

Before criterion measures are developed and the above questions addressed, "second-tour" job analyses of the NCO position needed to be made.

In the first-tour job analyses in earlier Project A research, we used both task-based and critical incident-based methods to obtain the needed information. The task-based method involved heavy reliance on existing job information, supplemented by interviews with job experts, to first identify all the relevant tasks encompassed by a job; from this list, a smaller set of tasks was chosen to represent the full domain for measurement purposes. The critical incident-based method involved conducting a series of workshops in which job experts generated examples of good, poor, and average performance. These examples were then clustered into dimensions of performance, in a fashion similar to that used in developing behaviorally anchored rating scales (BARS) (Toquam, et al., 1986).

This information-gathering approach was, in our judgment, reasonably successful for the earlier analysis of entry-level jobs. However, second-tour soldiers were expected to have supervisory and leadership responsibilities as well as technical job requirements. Supervisory behaviors tend to be continuous rather than discrete, are not easy to observe and measure, and are difficult to fix in time (Rumsey, 1987). Consequently, the basic job-analytic methods used earlier were modified and extended, as described in this chapter, to accommodate these expected properties of the second-tour job content.

Specific Objectives for the Second-Tour Job Analysis

The overall goal of the second-tour job-analytic work was to define the domain of higher level performance requirements for a representative sample of Army enlisted jobs. Specifically, the objectives were to:

- Describe the major differences between entry-level and higher level performance content, within Military Occupational Specialty (MOS).
- Describe the major differences across MOS within the higher level jobs.
- Describe the specific nature of the supervisory/leadership component of these higher level jobs.

Once these objectives were achieved, and full descriptions within and across MOS were available, the information would be used to address four questions about measurement of NCO potential:

- What should be the conte t of the new criterion measures?
- What kinds of measurement methods are needed?

- Are separate measures needed for each job? Or are the jobs so similar that the same measures can be applied to all?

- To what extent can measures developed for entry-level soldiers be used among higher level soldiers?

The methods and results of the multiple approaches used to analyze the higher level positions are described in this chapter.

The Second-Tour Cohort

The second-tour (as noted earlier, Project A uses this term to designate soldiers who have been in the Army 3 to 5 years) samples were taken from the nine MOS (known as Batch A) that had been originally designated for more intensive job-specific performance measurement during the first-tour data collections. They were drawn from the full sample of 19 Project A MOS that were selected because of the following characteristics: (a) high-density MOS that would provide sufficient sample size for statistically reliable estimates of new predictor validity and differential validity across racial and gender groups; (b) representative job content; (c) representative of the Army's designated Career Management Fields; (d) high-priority MOS, as rated by the Army in the event of a national emergency; (e) representative of combat, combat support, and combat service support MOS.

The paygrade of these "second-tour" soldiers at the time of data collection will vary from one MOS to another because of differences in MOS density and Army promotion needs, which affect reenlistment rates and promotion opportunities (Table 5.1). We expect that, depending on MOS, from 15 to 68 percent will be classed as Skill Level 2 (E5 NCOs). Most of the others will be Skill Level 1 (E1 through E4; most will probably be E4), and a very few will be Skill Level 3 (E6 NCOs).

There were several reasons for defining the second-tour cohort in terms of time in service rather than in terms of paygrade, skill level, or reenlistment rate. None of these designations would produce a "clean" or "pure" cohort; not everyone with 3 to 5 years of service will be at the same paygrade or skill level, and reenlistment rates differ across MOS. The situation would be even less clear if the cohort were defined as E5 or as Skill Level 2. For example, at any given time many E4s are filling E5 positions and there is no reasonable way to account for all the situational contingencies that lead to this result; thus, the distinctions between E4 and E5 may not correspond to the actual duty positions being filled. Also, "skill level" is a task designation, and the number and proportion of Skill Level 2 tasks vary widely across MOS. At any given time a particular Skill Level 2 task might be performed by an E4, E5, or E6.

If the cohort to be sampled is defined by time since Basic Training, the measurement goal is to predict performance at a future date, not to predict performance on Skill Level 2 tasks, or as an E5, whenever that occurs. Consequently, the rate at which an individual has progressed will become

Table 5.1

Projected Percentage of Second-Tour Cohort by Skill Level at Time of Data Collection Planned for Summer, 1988

MOS		Reenlistment Percent	Skill Level SL1	SL2	SL3
11B	Infantryman	27	41	58	1
13B	Cannon Crewman	31	70	30	0
19E	Armor Crewman	38	31	68	1
31C	Single Channel Radio Operator[a]	35	41	58	1
63B	Light Wheel Vehicle Mechanic[b]	31	84	15	1
88M	Motor Transport Operator[c]	25	80	20	0
71L	Administrative Specialist	40	64	35	1
91A/B	Medical Specialist/Medical NCO[d]	37	59	41	<1
95B	Military Police	26	34	66	<1

[a] Initially termed Radio Teletype Operator.
[b] Initially termed Vehicle and Generator Mechanic.
[c] Initially MOS 64C.
[d] Some MOS 91A soldiers will change to MOS 91B when they are promoted to Skill Level 2.

part of the performance criterion. Defining a cohort in this time-oriented way appears to be the only feasible way of capturing a sample with which to validate prediction of NCO performance after the first reenlistment and before the second tour ends.

Thus the cohort for the first longitudinal follow-up in the summer of 1988 is specified to consist of soldiers in the Batch A MOS who were previously tested on predictors and first-tour measures in the Concurrent Validation, have 3 to 5 years' time in service, and are still in the same MOS in which they were previously tested (excepting the 91A who may be 91B). For the second longitudinal follow-up, the cohort will be comprised of soldiers in the Batch A MOS who entered the Army in 86/87, have 3 to 5 years in service in the same MOS in which they received initial training, and are currently being tested on the Experimental Predictor Battery and the training knowledge and performance measures; they will be assessed with the first-tour criterion measures of job performance in the summer of 1988, and reenlistees are to be assessed with the second-tour performance measures in 1991.

THE JOB ANALYSIS PROCESS FOR THE SECOND TOUR

During the first three years of Project A, significant time and effort were devoted to gathering job analysis information for first-tour performance in each of the nine selected MOS (C. H. Campbell, R. C. Campbell, Rumsey, & Edwards, 1986; Toquam et al., 1986). Sources of information included the Soldier's Manual of Common Tasks - Skill Level 1, the MOS-specific Soldier's Manuals, the data from the MOS-specific Army Occupational Survey Programs (AOSP), generation and content analysis of critical incidents by MOS subject matter experts (SME), and Army personnel management records and policies. The job information was used to develop a variety of first-tour performance measures: hands-on job sample tests, written job knowledge tests, behavioral summary rating scales, self-report questionnaires regarding administrative actions, and questionnaires regarding recency and frequency of task performance (C. H. Campbell et al., 1987).

By Army policy, every soldier is responsible for the ability to perform all tasks at lower skill levels, as well as the tasks at the current skill level. As stated in AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties:

> "If two or more skill levels are authorized for use with an MOS, they are cumulative in nature." (para 1-8a(2), p. 7)
>
> "Skill level identifies skills, proficiency, or ability typically required for successful performance at the grade with which the skill level is associated. There is a direct relationship between grade and skill level, without regard to nonsupervisory and supervisory skills." (para 1-8c, p. 7)
>
> "The soldier must be able to perform all tasks below the skill level of his or her current grade." (para 1-9d(1), p. 7)

Thus, the first-tour job analyses could be used as a starting point for the second-tour analyses, but expanded performance requirements for second-tour soldiers made further job analysis necessary. Comparisons of source material showed that job content for each job is different, to some degree, when first tour is compared to second tour. For all but two of the Batch A MOS, tasks were added to the job task domain set forth in the MOS-specific manuals at Skill Level 2; for every MOS, more common tasks were added. Also, new versions of the AOSP had been fielded since the first-tour analysis was made and were available for most MOS. Finally, when they become NCOs, all soldiers assume various supervisory/leadership responsibilities simply by virtue of their rank.

Supervision/leadership was the area of greatest relevance in the second-tour job analysis. The available literature (Hebein, Kaplan, Miller, Olmstead, & Sharon, 1984; Wallis, Korotkin, Yarkin-Levin, Schemmer, & Mumford, 1986) indicated that Skill Level 2 soldiers have supervisory as well as technical job requirements. The Primary Leadership Development Course, required for all Skill Level 2 soldiers, includes 99 hours of training (almost half of the course hours) in areas such as leadership, communications, resource management, and training management, which are explicitly leader-oriented (U.S. Army Sergeants Major Academy, 1984). The remaining course time covers areas of "Military Studies," where the emphasis is on supervision and leading troops in the field. Throughout the documentation, the students are referred to as "Junior Leaders."

To capture both the technical and the supervisory aspects of an MOS, Project A staff used four methods for second-tour job analysis:

- Task-Based Job Analysis -- This approach, which had been used in the first-tour job analysis, relied heavily on existing job information for Skill Level 2, to identify a population of second-tour technical tasks for each Batch A MOS.

- Definition of Supervisory/Leadership Components -- This approach drew on task information developed during current Army research on the nature of supervision and leadership. Tasks from this analysis were added to the list of technical tasks originating in the task-based job analysis. (This combined list was then used as the pool from which to select a group of representative tasks for criterion measurement.)

- Critical Incident-Based Task Analysis -- This approach, which also was used in the first-tour job analyses, made use of critical-incident workshops in which job experts generated examples of good, poor, and average second-tour performance, on both an Army-wide and an MOS-specific basis. These were then clustered into dimensions, for use in modifying performance rating scales developed as part of first-tour tests.

- Job Analysis Interviews -- Small groups of senior NCOs were interviewed to obtain information about the frequency and importance of various technical and supervisory activities of junior NCOs and to provide background to the Project A staff on the nature of supervisory activities and responsibilities.

Job Analysis of Technical Tasks

For each of the nine Batch A jobs, definition of the second-tour job domain began with the Soldier's Manuals for each job. Since Skill Level 2 soldiers are held responsible for all Skill Level 1 and 2 tasks, the Skill Level 1 task lists prepared for the first-tour job analyses were augmented by Skill Level 2 tasks from the higher-level manuals. Soldier's Manuals, prepared by Army agencies for every job and every skill level within the job, list not only the tasks required but also the conditions under which the soldier should be able to perform them, and the steps required for performance. The Army also expects soldiers to be proficient on the tasks in the Soldier's Manuals of Common Tasks, which likewise include tasks, conditions, and steps for basic soldiering tasks (tasks such as map reading, basic first aid, and operation of individual weapons) at each skill level.

Data from AOSPs were also used to specify the technical task domains. These surveys, which list hundreds of task statements for each job, are administered periodically by the Army to representative samples of soldiers at every skill level of each job. Analyses of the data include the percentage of soldiers at each skill level who report that they perform the tasks. The project staff screened the lists to eliminate statements of tasks not performed by Skill Level 2 soldiers, and then matched the remaining AOSP statements with the task lists from the Soldier's Manuals. Any AOSP statements that could not be matched with Soldier's Manual tasks were added to the population of tasks for that MOS. If Skill Level 3 or 4 tasks were performed by a significant number of Skill Level 2 soldiers, they were considered to be a part of the job domain.

After the second-tour task population was specified, project staff visited the Army agencies responsible for training and doctrine in each MOS and asked them to review the completeness and accuracy of the list. Each proponent was also asked to indicate whether any of the tasks were likely to be eliminated soon because of equipment or doctrine changes, or whether other tasks should be added for similar reasons. After the proponent completed review and concurred on doctrinal accuracy, the domain description of technical tasks was considered to be complete. (The process parallels that used in defining the Skill Level 1 domains, described in C. H. Campbell, et al., 1986.) The total technical task domains in the nine Batch A MOS ranged between 153 and 409 tasks each, with an average of 260.

For Skill Level 1, job experts had sorted the tasks into clusters based on similarity of task content. Because Army jobs are hierarchical and cumulative (i.e., soldiers at higher skill levels are responsible for proficiency on tasks at all lower skill levels), the task clusters that had been developed for Skill Level 1 were used as a starting point for Skill Level 2. The new second-tour tasks were sorted into these same clusters by the project staff. Where no clusters of Skill Level 1 tasks were similar to the new second-tour tasks, new clusters were formed.

To aid in subsequent selection of a smaller sample of critical tasks to represent each domain, judgments of task criticality and performance difficulty were needed. However, concurrently with the technical domain

definition just described, the staff were also working on defining the components of supervision/leadership, as reported in the following section. Once defined, the technical and supervisory lists were merged and judgments of task importance and difficulty were collected. This process is described following the section on the supervisory/leadership components.

Analysis of Supervisory/Leadership Components

At the same time that the technical task descriptions were being developed for each MOS, research on conceptualizing supervisory/leadership activities and responsibilities was also proceeding. The description of the supervision/leadership components took advantage of both previous and current Army research. An earlier project had developed the Supervisory Responsibility Questionnaire, based on critical incidents describing work relationships between first-term soldiers and their NCO supervisors, and a current effort is using a comprehensive questionnaire checklist known as the Leader Requirements Survey.

The Supervisory Responsibility Questionnaire

The Supervisory Responsibility Questionnaire was a product of previous Project A research, which examined the effects of supervision on first-tour soldier performance (Hough, Gast, White, & McCloy, 1986; White, Gast, & Rumsey, 1985). As part of this research, critical incidents had been collected to identify supervisory behaviors that influence the performance of first-tour soldiers (i.e., subordinates).

The incidents were written by 80 job experts from five of the Project A target jobs. These experts were asked to provide examples of how Army supervisors had been particularly effective or ineffective in influencing subordinates. In all, they generated more than 400 examples. Next, a retranslation was conducted in which a second group of 31 job experts, who were familiar with Army leadership requirements, were asked to classify the examples into a modified version of Yukl's 13-dimension taxonomy of supervisory behavior (Yukl, 1987). As a result of retranslation, 9 of the 13 modified Yukl dimensions remained.

The Supervisory Responsibility Questionnaire was constructed from a subset of these incidents and their respective categories. First, all incidents that were not reliably categorized into a single dimension were eliminated, as were multiple incidents referring to a single task or behavior. The incident list was further reduced by excluding incidents not describing a specific task (e.g., "The soldier fell asleep while on guard duty. [The supervisor] walked up to the sleeping soldier and scared him."). In the end, a total of 34 behavioral statements (e.g., Recommended soldiers for promotion) were written to represent eight of Yukl's original categories (e.g., Recognize and Reward). No statements were written for one category, Act as Role Model, because the incidents grouped under that category were not rich enough to extract supervisory tasks.

The Leader Requirements Survey

Another source of supervisory/leadership information was the Leader Requirements Task Analysis Survey (Steinberg, 1987), which was developed to provide the Army with information about the leadership job requirements of Army commissioned and noncommissioned officers (second lieutenant through colonel, and sergeant through command sergeant major). It contains items that cover the leadership domain of all these organizational levels.

This task list was constructed through an iterative interview strategy. Several hundred interviews were conducted -- typically with six to eight military experts at a time, and lasting approximately 90 minutes. Interviewees were asked to describe their job, focusing on what they did to influence others to accomplish their mission (i.e., the Army definition of military leadership as documented in FM 22-100), and especially on those leadership tasks that differentiated their jobs from those performed by others in higher or lower ranks than themselves, or in different Career Management Fields. To ensure that the resulting task list both encompassed the domain of military leadership and was worded in terms commonly employed by job incumbents, each successive group of experts was shown the task list developed by the previous groups and asked to comment. These iterative interviews were conducted until new groups no longer added new tasks and were comfortable with the wording of tasks already collected. Consensus on the final list of tasks was reached by a review committee representing the Center for Army Leadership, the U.S. Army Sergeants Major Academy, and the Army Research Institute.

The resulting Leader Requirements Survey task list contains tasks in four broad categories -- Train, Teach, and Develop (146 tasks); Motivate (170 tasks); Manage (86 tasks); and Provide Direction (158 tasks) -- for a total of 560 tasks. In the present research, 25 of the tasks in the category "Provide Direction," coming under the subheading of "Provide Input for the Direction of the Larger Organization," were not used because they were more applicable to higher-level commissioned officers. (See Steinberg, 1987, and Steinberg, van Rijn, & Hunter, 1986, for more information on the Leader Requirements Survey.)

Combining Data From the Two Questionnaires

To determine which of the tasks in the Supervisory Responsibilities Questionnaire and which of the activities on the Leader Requirements Survey task list should be a part of the job content for second-tour soldiers, both questionnaires were administered to NCOs (E6 and E7) in the nine Batch A MOS. Approximately 125 NCOs received the Supervisory Responsibility Questionnaire and 50 NCOs received the Leader Requirements Survey. For each questionnaire, the NCOs were asked to indicate the importance of each task for performance in the E5's job. On the Supervisory Responsibility Questionnaire they were also asked to indicate how often each task is performed. (Gast, Campbell, Steinberg, & McGarvey, 1987.)

Analysis of the Supervisory Responsibility Questionnaire data confirmed that all the 34 tasks were sufficiently applicable, across a variety of Army jobs, to be retained as part of the second-tour domain. The Leader Requirements Survey data were used to select tasks that more than half of the respondents considered absolutely essential to the E5's job. Additional highly rated tasks were also selected from any of the 19 Leader Requirement Survey categories and subheadings not already represented by at least two tasks; ultimately, two subheadings were eliminated because they failed to meet the importance criteria. By this process, 53 tasks were selected from the Leader Requirements Survey to be considered for the job domains.

Content analysis of the two task lists resulted in a single list of 46 tasks that incorporated all of the activities on both lists. Those 46 tasks included the 34 tasks from the Supervisory Responsibility Questionnaire (which also covered many of the Leader Requirements tasks); eight of the 53 Leader Requirements Survey tasks which were not on the Supervisory Responsibility list; and four new task statements prepared to cover two or more Leader Requirements Survey subheadings each.

The 46 task statements were further examined by reference to the categories used for the original Supervisory Responsibility Questionnaire. Eight categories evolved for the 46 tasks.

Merging of Technical and Supervisory/Leadership Task Lists for Measurement Sample

The task lists derived from the first two job analysis methods -- technical tasks and supervisory/leadership components -- were to be merged and then used as a population from which to select representative tasks that would eventually be used to measure second-tour job performance. Selection of tasks for measurement was to be based on task characteristics -- importance, difficulty, and variability -- along with performance frequency (from AOSP) and a task cluster analysis of job similarities.

Judging Task Importance and Difficulty

As a first step in choosing the tasks to be used for criterion measurement, the Army agency responsible for each MOS was asked to designate 15 job experts -- officers or NCOs in that military specialty who had recent field experience supervising E5s in the job. These job experts rated the importance and difficulty of tasks for a hypothetical E5 soldier who had between 3 and 5 years of service.

For the task importance judgments, the experts were given one of three scenarios, and asked to rate (on a 5-point scale) the importance of the task in accomplishing the unit's mission under that scenario. The three scenarios described either combat conditions (European, non-nuclear), increasing tensions (European, with a high state of training and strategic readiness, but short of actual conflict), or a garrison environment (state-side, with training as the primary activity and mission). In all, 10 SME ratings for each scenario combination were collected, for a total of 30 sets

of ratings per job. The importance ratings were averaged across the 10 experts in each rating condition to yield three importance scores.

For the task difficulty judgments, the experts were asked to sort a "typical" group of 10 hypothetical soldiers into five performance levels, designating how many of the 10 could perform the task all of the time (5) to none of the time (1). Task difficulty was then computed as the mean of the distribution of the 10 soldiers, averaged across the experts. Task performance variability was computed as the standard deviation of the distribution of the 10 soldiers, averaged across experts.

For the cluster analysis, the supervisory/leadership tasks, in eight clusters, were added to the Skill Level 2 job task list from the task-based job analysis. Tasks already on that list that were similar in content to the 46 supervisory/leadership tasks were subsequently clustered with those tasks in the eight supervisory clusters.

Sampling Tasks for Measurement

To select a sample of tasks for measurement, the Army agencies for each MOS were asked to provide six job experts with recent field experience. One Project A staff member also served on the task selection panel. The information to be considered included the task content itself; the importance rating for each task; the performance difficulty and expected performance variability for each task; the frequency of task performance as shown by the AOSP analyses; and the task cluster membership for each task.

The panel was to select 45 tasks for each job, 30 technical tasks and 15 supervisory tasks. The separate targets were provided to give both the technical and the supervisory portions of the domain independent consideration. Proportional targets were also set for each cluster.

Tasks were selected by a modified Delphi process. In the first session, the experts on the selection panel independently selected tasks, using the given target numbers for each cluster. The picks were tallied and presented to the panel in the second session. They again made independent selections, this time giving reasons for each of their picks. The picks were again tallied, and the reasons summarized, for consideration in the third round of independent selections.

Finally, in the fourth session, the panel members met as a group to discuss their selections and resolve their differences, until they arrived at a consensus on the 45 tasks. During this final session, they were permitted to violate the cluster target numbers, but were still within the constraints of 30 technical and 15 supervisory tasks. The panel members then also assigned rankings to the tasks to indicate priority for inclusion in the final set of tasks representing the jobs.

Critical Incident-Based Job Analysis

The content of performance for second-tour MOS was initially hypothesized to include both technical and supervisory components which would be incorporated into the second-tour performance measures. However, it seemed likely that the extent to which supervision is an important part of the second-tour job would vary across the different MOS, which suggested the possibility that some supervisory components might be applicable to all MOS while others might be MOS-specific.

To incorporate the Army-wide versus MOS-specific distinction, the procedures used to develop Behavioral Summary Scales (Borman, 1979) were applied to analyzing second-tour job performance. (Details concerning the sample and procedures may be found in Pulakos, et al., 1987.)

The procedures are based on an inductive critical incident analysis strategy (J. P. Campbell, Dunnette, Arvey, & Hellervik, 1973), which requires persons familiar with the performance demands of a job to generate examples of effective, mid-range, and ineffective behavior observed on that job. Content analysis of the examples then yields preliminary dimensions of performance, and an independent retranslation of the examples into the dimensions provides a way of checking on the clarity of the individual critical incidents and the content validity of the dimension system. This is accomplished by asking persons familiar with the target domain to make two judgments about each incident example: the dimension or category to which it belongs, based on its content, and the effectiveness level it reflects. If disagreement occurs on either category membership or rated effectiveness level, the incident may be unclear, in form and/or substance, and should be revised or eliminated. Also, confusion between two or more categories in the sorting of several examples may reflect a poorly formed category system.

Army-Wide Critical Incident Analysis

In a series of workshops, the participants were asked to generate examples of what they considered to be the performance domain of second-tour soldiers. A total of 1,000 critical incidents was generated by 172 officers and NCOs. These incidents were edited to a common format and then content analyzed to form 12 preliminary dimensions of second-tour Army-wide performance.

The Army-wide performance categories that had been developed for the first-tour soldiers (Pulakos & Borman, 1986) were also found in the analysis for second-tour soldiers. In addition, three generic supervisory dimensions emerged from the content analysis of the incidents, which suggested that second-tour soldiers do, in fact, perform most of the work that first-tour soldiers perform and also supervise that work.

The retranslation judges were a group of 81 officers and NCOs, none of whom had participated in the workshops to generate the critical incidents. To accomplish the retranslation, judges were provided with definitions of the 12 dimensions and a 7-point effectiveness scale (where 1 = extremely

ineffective, 4 = average, and 7 = extremely effective) to guide their ratings of effectiveness. To keep the retranslation exercise within reasonable bounds, each judge was asked to evaluate only 250 behavioral incidents.

An initial screening of the judging results identified potential random responders or individuals who obviously did not understand the retranslation task. Specifically, respondents were scored on 12 critical incidents, each of which the research staff believed could be reliably classified into one of the 12 dimensions by anyone who understood and attended to the task. Respondents who did not correctly categorize at least 50 percent of these incidents were deleted from the sample. Using this criterion, seven respondents out of the total 81 were omitted from the judging sample, leaving a sample size of 74 respondents for the retranslation analyses.

Two criteria were adopted for retaining critical incidents for development of scales: (a) more than 50 percent of the judges sorted the example into a single dimension, and (b) the standard deviation of the given effectiveness ratings for the example is less than 1.50. Application of these criteria left 734 of the 1,000 examples (73.4%) for subsequent scale development efforts (between 21 and 168 per dimension). The retranslation results also indicated that all 12 of the dimensions resulting from the initial categorization of the incidents should be retained.

MOS-Specific Performance Analysis

While the second-tour Army-wide dimensions were developed using the entire sequence of behavioral summary scale procedures, development of the second-tour MOS-specific dimensions followed a different procedure. It involved a process for revising the existing first-tour MOS-specific rating scales so that they would be appropriate for describing and evaluating second-tour performance.

To accomplish the revision, a critical incident analysis workshop was conducted with approximately 25 officers and NCOs in each of the nine target jobs (Batch A MOS) to generate examples of effective, average, and ineffective second-tour MOS-specific job performance. The procedures previously used to generate the Army-wide critical incidents were also used in the MOS-specific workshops. However, rather than writing examples that would apply to any MOS, participants were instructed to write critical incidents specific to their particular job. The number of incidents generated for each MOS ranged from 58 to 236, with an average of 180.

Comparison of First- and Second-Tour MOS-Specific Incidents. After the incidents were edited to a common format, they were categorized by the project staff, using the first-tour MOS-specific category system as a starting framework. If a second-tour incident did not fit into an existing first-tour category, a new category was introduced. This process made it possible to judge whether the same or different categories should be used for evaluating second-tour performance. It also yielded information regarding what specific category additions or deletions were needed to describe the second-tour performance domain comprehensively.

Almost all of the first-tour MOS-specific performance categories were judged to be appropriate for second-tour MOS. For each category, the next step was to examine the content of the incidents to determine whether the performance requirements were appreciably different for second-tour and first-tour soldiers. This was an important step because, although the general meaning of the performance dimensions for first and second tour might be the same, it was at least possible that the dimension definitions or anchors might need to be modified to make the scales more precisely relevant for evaluating second-tour performance.

For some dimensions, comparisons indicated that more was expected of second-tour soldiers than was expected of their first-tour counterparts. Under such circumstances, the summary statement anchors were modified to reflect the appropriate performance standards. For other dimensions the incidents suggested that second-tour soldiers were responsible for knowing how to operate and maintain more/different pieces of equipment than were first-tour soldiers. This distinction also was incorporated into the second-tour summary statements.

For several MOS, the second-tour incidents suggested that MOS-specific supervisory performance categories should be developed. Accordingly, preliminary summary statement anchors were written for these supervisory dimensions. However, care was taken not to duplicate the Army-wide leadership/supervision dimensions as the MOS-specific categories were intended to reflect aspects of supervision that were relevant only to the particular job. For five of the nine MOS, a total of six MOS-specific supervisory dimensions were developed.

Content Validation. For each of the nine MOS, two scale revision workshops were conducted with 10-14 participants (officers and NCOs) in each. These individuals were different from those who generated the behavior examples. The purpose was to have subject matter experts review the proposed second-tour performance categories and revise the dimension definitions and anchors as necessary to make the scales appropriate for evaluating second-tour MOS-specific performance. Participants were asked to address three focal questions:

- Do the dimension anchors contain material that is not relevant for evaluating second-tour soldier effectiveness?
- Do the dimension anchors for various levels of effectiveness accurately reflect what would be expected of a second-tour soldier performing at the ineffective, average, and effective levels of performance?
- Do the proposed dimensions tap all of the MOS-specific performance components of the second-tour soldier's job?

Participants were asked to think about expectations for second-tour performance and recommend any changes that would make the scales maximally relevant for evaluating second-tour soldiers.

Based on the input from the workshop participants, the scales were revised. In most cases, only minor wording changes were made to the summary statements. In a few cases, however, the dimensions themselves as well as their anchors were changed substantially -- usually because the job requirements had actually changed since the time the first-tour scales were developed and the second-tour critical incidents were collected.

For each MOS a retranslation workshop also was conducted with approximately 20 officers and NCOs. Workshop participants were again different from those who generated the critical incidents and those who reviewed and revised the proposed second-tour rating scales. The purpose was to check on the intended effectiveness levels of the behavioral summary statements anchoring each MOS-specific performance dimension, as well as to check on the dimension structures themselves.

Rather than retranslating individual critical incidents (as was done with the Army-wide retranslation workshops described earlier), participants were asked to retranslate the actual summary statements that would be used to anchor the rating scale dimensions. As noted earlier, three summary statements were used to anchor each dimension: one describing low-level or ineffective performance, one describing middle-level or average performance, and one describing high-level or effective performance. Participants were provided with definitions of each dimension and a booklet containing the summary statements listed in a random order. They were asked to make two judgments about each summary statement: the dimension or category to which it belonged based on its content, and the effectiveness level it represented from 1 (very ineffective) to 7 (very effective). The number of dimensions for the different MOS ranged from 7 to 14.

Again, an initial screening was undertaken to identify potential random responders or individuals who obviously did not understand the retranslation task. For each MOS, respondents were scored on approximately 10 critical incidents, each of which the research staff believed could be reliably classified into one of the performance dimensions. If respondents did not correctly recategorize at least 50 percent of these incidents, they were deleted from the sample. Of the 193 total participants in the retranslation workshops, this procedure led to the exclusion of 22 from the retranslation analyses reported below.

For almost all (98%) of the summary statements for all of the nine MOS, at least half of the retranslation sample placed them in the intended category, and for 92 percent of the statements more than 75 percent of the sample categorized them as intended. The mean effectiveness level was also very close to the intended effectiveness level for most of the summary statements. That is, if the statement was intended to be a low-level or ineffective anchor, its mean effectiveness level was about 1.0. For those intended to be a middle-level or average anchor, the mean effectiveness level was about 4, and for those intended to be a high-level or effective anchor, the mean effectiveness level was about 7.

However, in a few statements (about 14% across all MOS) there was some discrepancy between the mean effectiveness level and the intended effectiveness level (i.e., the effectiveness rating was more than 1.0 point away from the intended effectiveness level). Such statements were revised to ensure that they reflected the proper effectiveness levels.

Comments on the MOS-Specific Scale Development. One lesson learned from the MOS-specific scale development effort is that a procedure less time consuming than the usual sequence for developing behaviorally anchored rating scales may be very effective when rating scales based on critical incidents for a similar job are already available. Because the first-tour rating scales were available for each of the nine MOS and because the second-tour performance requirements were reported to be similar in many ways to first-tour requirements, it seemed appropriate to simplify the procedure for developing the MOS-specific scales. Accordingly, the first-tour scales were used as a starting point and those parts of the scales needing changes were revised utilizing a relatively small number of performance examples and a group of job experts working directly on the scales' summary statements. This shortened procedure considerably reduced the time and expense needed to develop rating scales without reducing the quality of the scales, as was apparent from the satisfactory retranslation results for the final summary statements.

Job Analysis Interviews

The final job analysis method used for the second-tour investigation consisted of short (one-hour) structured interviews conducted with small groups (5-8 people) of NCOs in each of the nine MOS. They were asked about the number or percentage of E5s who would probably be in different duty positions, and about the normal activities of those individuals. They were also asked to indicate how many hours per week those individuals would spend on each of nine supervisory activities and each of two general areas of actual task performance, and how important each of those 11 aspects of the job is for the second-tour NCO. A copy of the interview protocol for one MOS is shown in Appendix G.

The interviews proved to be of particular value in educating the project staff about the nature of the second-tour job in each of the nine MOS. Information about the relative importance and time spent on leadership/supervision versus technical activities supplemented the information obtained from the other job analysis methods.

RESULTS FROM JOB ANALYSES

The information gathered by the methods described was summarized in a job analysis summary book for each MOS. These books provided, as consolidated sources, information concerning activities, tasks, and critical behaviors required of second-tour soldiers in each of the nine MOS, for use

by job analysts in ensuring coverage of all aspects of the jobs in the critical domains. Each MOS volume contains the following sections: Job Analysis Interview Summary; Second-Tour Task Description; Second-Tour Critical Incident Analysis; and Comparison of Task-Based Analysis, Supervisory Analysis, and Behavior-Based Analysis Results.

Task-Based Job Analysis

For every MOS, as defined by the task-based descriptions, the content of the second-tour job tasks tends to be more difficult and more complex than for first-tour soldiers. As mentioned earlier, this is in part a result of the Army's policy regarding skill level progression: The soldier must be able to perform all tasks below the skill level of his or her current grade plus the additional tasks introduced at that grade.

For the most part, the additional second-tour tasks are more difficult but are of the same general content as the first-tour tasks, as shown by comparison of the first-tour and second-tour cluster structures. Within the six noncombat jobs, common task clusters were significantly realigned; by contrast, there was little change in the combat jobs (MOS 11B Infantryman, 13B Cannon Crewman, and 19E Armor Crewman). The addition of tasks also caused several of the technical clusters to split into better differentiated groups of tasks. The changes to the cluster structures are detailed for each of the nine MOS in Appendix H; an example for one MOS is shown in Figure 5.1.

An important difference between the first- and second-tour task lists lies in the expansion of MOS-specific leadership clusters for every MOS. In seven of the MOS (13B Cannon Crewman, 19E Armor Crewman, 31C Single Channel Radio Operator, 63B Light Wheel Vehicle Mechanic, 88M Motor Transport Operator, 91A/B Medical Specialist/Medical NCO, and 95B Military Police), a new cluster was formed to represent tasks involving either tactical operations leadership or administrative supervision. In the other two MOS (11B Infantryman and 71L Administrative Specialist), such clusters were greatly expanded due to the addition of new tasks.

Examination of the complete second-tour task list permits us to estimate the relative proportion of content in each Batch A job that involves supervisory responsibilities, in contrast to the performance of technical tasks. Although the number of tasks judged to explicitly require the exercise of supervision varies widely across MOS, ranging from 48 to 129 tasks, the percentage of tasks that were judged supervisory in nature was very similar for all nine MOS, ranging from 30 to 33 percent of the total. Keep in mind that this is <u>not</u> an estimate of relative criticality, or amount of time spent; those data come from other sources.

Except for the 46 tasks derived from the Supervisory Responsibility Questionnaire, nearly all of the tasks requiring second-tour soldiers to perform as supervisors are derived from MOS-specific sources. Three Skill Level 2 common tasks have supervisory responsibilities, and they are in the

11B Infantryman Task Domain

Of the 12 Skill Level 1 task clusters, 11 were retained for second tour; the cluster on Maintaining and Operating Vehicles was dropped at the request of the Proponent. All new second tour tasks were categorized into the 11 first tour clusters. Therefore no additional clusters were formed for second tour. Although clusters nearly always changed in size and in the specific tasks included, the general content of ten of the clusters was unchanged.

The one cluster that did change dramatically was the cluster entitled "Conduct Tactical Operations." For second tour, the cluster has nearly twice as many tasks (22 compared to 12), including 11 tasks on supervising and directing activities of the fire team, squad, or platoon, five tasks on leading patrols or missions, and two tasks on supervising weapons and combat operations. These are directly comparable to the two leadership/supervisory dimensions that emerged from the behavioral performance work.

The 46 Supervisory Responsibilities Questionnaire activities were categorized into eight supervision clusters. In addition, the domain included seven MOS-specific supervision tasks that were also categorized into those eight clusters. Specifically, four tasks pertaining to field reports and orders were placed in the cluster "Provide Information," and three MOS-specific training tasks are in the cluster "Train and Develop." Thus these two clusters, for the 11B E5, represent more than just generic activities of passing on information and providing training.

The task clusters for the 11B second tour domain are listed on the following page, along with brief descriptions of the cluster content.

Figure 5.1. Example of Second-Tour Task Clusters: MOS 11B Infantryman (Page 1 of 2 pages).

Task Clusters: 11B Infantryman

FIRST AID: Diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Moving over unknown terrain, reading maps, reading compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Operation, maintenance, and positioning of weapons (M16 rifle, M60 machinegun, LAW, SAW, grenades, grenade launcher, .45 cal pistol, .50 cal machinegun, dragon.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive situations.

COMMUNICATIONS: Installation and operation of radio and field telephone equipment, and communications security procedures.

DETECT AND IDENTIFY THREATS: Surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

NIGHTSIGHTS: Operation (mounting, zeroing, engaging targets) and maintenance of hand-held and weapon-mounted night sighting devices.

MINES AND DEMOLITIONS: Installing and disarming mines and booby traps, and constructing nonelectric and electric demolition systems.

MOVEMENT IN URBAN TERRAIN: Tactical operations in built-up areas.

CONDUCT TACTICAL OPERATIONS: Supervising and directing activities of the fire team, squad, or platoon, leading patrols or missions, supervising weapons and combat operations.

PLAN, ORGANIZE, AND MONITOR: Assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Passing on information concerning mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN, DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

Figure 5.1. Example of Second-Tour Task Clusters: MOS 11B Infantryman (Page 2 of 2 pages).

domain for every MOS. Additionally, many tasks that are derived from MOS-specific sources (Soldier's Manuals and AOSP) appear in more than one of the MOS.

Critical Incident-Based Job Analysis

As mentioned previously, analysis of the Army-wide critical incidents generated by the workshops led to the addition of three dimensions reflecting increased supervisory/leadership responsibilities across all jobs. These three dimensions in effect replaced a single first-tour leadership dimension. All nine of the other Army-wide dimensions that had been developed for first-tour soldiers were replicated for the second-tour job. Thus the Army-wide performance behaviors which were considered to be important for first-tour soldiers were also judged to be components of effective performance for second-tour soldiers, regardless of MOS. The 12 Army-wide performance dimensions are shown in Table 5.2.

Table 5.2

Second-Tour Army-Wide Dimensions

A.	Displaying Technical Knowledge/Skill
B.	Displaying Effort, Conscientiousness, and Responsibility
*C.	Organizing, Supervising, Monitoring, and Correcting Subordinates
*D.	Training and Developing
*E.	Showing Consideration and Concern for Subordinates
F.	Following Regulations/Orders and Displaying Proper Respect for Authority
G.	Maintaining Own Equipment
H.	Displaying Honesty and Integrity
I.	Maintaining Proper Physical Fitness
J.	Developing Own Job/Soldiering Skills
K.	Maintaining Proper Military Appearance
L.	Controlling Own Behavior Related to Personal Finances, Drugs/Alcohol, and Aggressive Acts

*New leadership/supervisory dimensions for second tour.

Analysis of the MOS-specific critical incidents and subsequent retranslation suggested that all but two of the first-tour dimensions be retained (one dimension was dropped from the MOS 71L Administrative Specialist as being too low level for second-tour soldiers, and one dimension was dropped for MOS 95B Military Police because it was covered by other dimensions). In three cases, a single first-tour dimension was split into two dimensions for second tour.

Of the 85 first-tour MOS-specific dimensions, 38 (45%) were unchanged for second tour, except for minor wording changes for clarification. The added technical and supervisory responsibilities for second-tour soldiers resulted in substantial changes to 44 (52%) of the dimensions. As mentioned previously, MOS-specific supervisory dimensions were developed for five of the nine MOS; the names of the second-tour supervisory performance dimensions by MOS are shown in Table 5.3. Detailed summaries of the changes to the dimensions structure for second-tour are given for each MOS in Appendix I; an example for one MOS is shown in Figure 5.2.

Table 5.3

Supervisory Performance Categories for Second-Tour MOS-Specific Scales

MOS		Performance Category Name
11B	Infantryman	Supervising Soldiers in the Field
		Leading the Team
13B	Cannon Crewman	None
19E	Armor Crewman	Assuming Supervisory Responsibilities in Absence of Tank Commander
31C	Single Channel Radio Operator	Managing the RATT Rig
63B	Light Wheel Vehicle Mechanic	Checking Repairs Made by Other Mechanics
88M	Motor Transport Operator	None
71L	Administrative Specialist	None
91A/B	Medical Specialist/Medical NCO	None
95B	Military Police	Leading the Team in a Tactical Environment

11B Infantryman Behavioral Performance Categories

The content of six of the 12 first tour performance categories was unchanged for second tour. Five categories were modified to reflect additional performance requirements/expectations (such as maintaining equipment even when not specifically told to do so, being able to demonstrate use of weapons in addition to being able to use the weapons expertly, and supervising subordinates in guard positions.)

The greatest difference between first and second tour responsibilities is evidenced by the critical incidents pertaining to leadership responsibilities. The first tour category "assisting and Leading Others" was divided into two second tour categories: "Leading the Team" and "Supervising Soldiers in the Field." These two categories include responsibilities for ensuring that troops have the required supplies and equipment, ensuring the safety and well-being of soldiers, briefing troops about the mission, ensuring that work is properly completed, using sound judgment to accomplish the mission, and leading by example.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Maintaining Supplies, Equipment, and Weapons	Maintaining and Accounting for Weapons and Equipment
Assisting and Leading Others	Supervising Soldiers in the Field
	Leading the Team
Navigation	Navigation
Use of Weapons and Other Equipment	Use of Organic Weapons and Equipment
Field Sanitation, Personal Hygiene and Personal Safety	Field Sanitation, Personal Hygiene, and Personal Safety
Fighting Positions	Fighting Positions
Avoiding Enemy Detection	Avoiding Enemy Detection
Operating a Field Phone/Radio	Operating a Radio Set
Reconnaissance and Patrol	Reconnaissance
Guard and Security Duties	Guard and Security Duties
Prisoners of War	Prisoners of War
Courage and Proficiency in Battle	Proficiency in Battle

Figure 5.2. Example of Performance Dimension Changes for Second Tour: MOS 11B Infantryman (Page 1 of 2 pages).

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: INFANTRYMAN (11B)

A. Maintaining and Accounting for Equipment and Weapons

How effective is each soldier in ensuring that all equipment and weapons are well maintained and available for use in the field?

B. Supervising Soldiers in the Field

How effective is each soldier in ensuring the troops have necessary supplies/ equipment and ensuring the safety and well-being of soldier?

C. Leading the Team

How effective is each soldier when leading a team in a field environment?

D. Navigation

How effective is each soldier in using navigational equipment and navigating in the field?

E. Use of Organic Weapons and Equipment

How effective is each soldier in using organic weapons and equipment safely and proficiently?

F. Field Sanitation, Personal Hygiene, and Personal Safety

How effective is each soldier in maintaining sanitary conditions, personal hygiene, and personal safety in the field?

G. Fighting Positions

How effective is each soldier in preparing a fighting position, range cards, and sector sketches?

H. Avoiding Enemy Detection

How effective is each soldier in avoiding enemy detection during movement and in established defensive positions while in the field?

I. Operating a Radio Set

How effective is each soldier in putting a radio into operation and using it properly?

J. Reconnaissance

How effective is each soldier in performing reconnaissance activities?

K. Guard and Security Duties

How effective is each soldier in performing sergeant of the guard and security duties and manning observation posts?

L. Prisoners of War

How effective is each soldier in guarding and processing prisoners of war during field exercises or in combat?

M. Proficiency in Battle

How effective is each soldier in demonstrating proficiency in engaging the enemy during field exercises or in combat?

Figure 5.2. Example of Performance Dimension Changes for Second Tour: MOS 11B Infantryman (Page 2 of 2 pages).

Thus, although the Batch A MOS vary in the extent to which supervisor/leadership responsibilities constitute new dimensions of job content, the second-tour soldiers in all MOS are responsible for the performance of subordinates. The technical content of the jobs is, for the most part, similar to the content of first-tour jobs, although higher proficiency is often expected, and more difficult tasks are frequently added.

The content of the performance examples or incidents gathered for the nine MOS allows a rough estimate of the relative importance of the technical and supervisory aspects of the second-tour soldier job. Recall that the NCOs and their supervisors from each of the target MOS were asked in a workshop setting to record behavioral incidents they recalled from observing second-tour soldiers working in these MOS; workshop participants were told that the incidents could refer to any part of the job. We would expect the content of the incidents gathered in this manner to representatively sample the critical elements of the job. More precisely, we would expect the performance incidents elicited in this way to reflect what it takes to be effective on these jobs (rather than, for example, the time spent on different job activities).

Table 5.4 shows the percentage, as judged by the project research staff, of supervisory performance incidents for each of the nine MOS, along with the total percentage of MOS-specific incidents that were supervisory in nature across all nine MOS. In general, second-tour MOS 11B Infantrymen and 63B Light Wheel Vehicle Mechanics seem to do the most supervising in the technical arena, while 19E Armor Crewmen and 88M Motor Transport Operators have the least involvement in supervising soldiers.

Comparing Table 5.4 with Table 5.3, notice that the decision to develop (or not to develop) MOS-specific categories of supervisory job content for each MOS was not directly related to the percentage of supervisory incidents gathered for that MOS. Rather, as mentioned previously, MOS-specific supervisory categories were developed only when the incidents for that MOS reflected aspects of supervision that were not tapped by the Army-wide supervisory dimensions.

Job Analysis Interviews

The job analysis interviews showed that, for every MOS, the actual performance of MOS-specific and common tasks still requires a substantial proportion of the NCO's time; the estimates ranged from 20 to 64 percent across the MOS and the job environments. During the course of the interviews, job experts also rated the importance of various activities and discussed their ratings: For every MOS, under every scenario of job environment, the actual performance of MOS-specific and common tasks was considered among the most important responsibilities of E5 NCOs.

Table 5.4

Percentage of Supervisory Performance Incidents From MOS-Specific Workshops

MOS		Total Number of Incidents	Number of Supervisory Incidents	Percent Supervisory MOS-Specific Incidents
11B	Infantryman	159	71	44.7%
13B	Cannon Crewman	57	13	22.8%
19E	Armor Crewman	236	27	11.4%
31C	Single Channel Radio Operator	212	49	23.1%
63B	Light Wheel Vehicle Mechanic	180	76	42.2%
88M	Motor Transport Operator	184	31	16.8%
71L	Administrative Specialist	156	36	23.1%
91A/B	Medical Specialist/ Medical NCO	89	33	37.1%
95B	Military Specialist	234	73	31.2%
Total		1507	409	27.1%

Job Analysis Summary

General Findings

The results of the several types of job analyses may be summarized as follows:

- The cluster structure generated on first-tour task content was modified to accommodate the additional second-tour tasks. Clusters became more clearly differentiated, supervisory clusters were added, and clusters of tactical leadership or administrative duties were added.
- The Army-wide dimensions for first tour were replicated, and three Army-wide supervisory dimensions were added to complete the picture of second-tour Army-wide performance.
- For five of the MOS, second-tour job-specific supervisory dimensions based on a modified BARS procedure were added. Only two MOS-specific BARS were dropped as inappropriate for second-tour soldiers.

Results from both the task-based and the critical incident-based work, as well as from the interviews among job experts, suggest that indeed the second-tour soldier job has performance requirements in both the technical

and supervisory areas. For most of the MOS, roughly one-quarter to one-third of the performance demands are likely to be supervisory in nature, with the rest involving performance of technical tasks.

Differences Across MOS

There is considerable overlap among the MOS. Much of it is by design, since the 99 common tasks for Skill Levels 1 and 2 are the responsibilities of all soldiers in all jobs. While there might be differences in the specific circumstances under which the activities covered by these tasks would be performed by soldiers in the different MOS, the Soldier's Manual of Common Tasks lists the same initiating conditions, steps, and standards of performance for all soldiers (hence the term "common task").

However, there are also substantial differences among the MOS. Beyond the similarities found in the common tasks and the Army-wide performance dimensions, second-tour soldiers perform a variety of MOS-specific technical tasks and supervise other soldiers on specific technical tasks.

Specific Nature of the Supervision/Leadership Component

Activities of the Junior NCO

As a category of job content, supervision and leadership represent a sizeable proportion of the junior NCO position. For example, as judged by the previously described job analysis interview panels, from 35 to 80 percent of the NCO's time is spent on supervisory activities. Table 5.5 shows the range of these time estimates across MOS and between duty positions within MOS. While these are rough estimates, they do argue strongly that supervision/leadership is a big part of the NCO's job.

Table 5.6 presents a breakdown of the MOS-specific and Army-wide supervisory performance incidents. Shown are the percentages of the 734 total Army-wide incidents reliably retranslated into the supervisory performance dimensions in the Army-wide scale development effort.

Also shown is a sorting of the supervisory incidents obtained in the MOS-specific workshops that could be attributed to the three Army-wide dimensions. The MOS-specific dimensions obtained from the remaining incidents generated in the MOS-specific workshops were shown previously in Table 5.3.

Although the total percentages of MOS-specific and Army-wide generated supervisory incidents are reasonably close (27.1% and 30.5%), the distribution of these incidents among individual supervisory categories is very uneven across the two sources of incidents. The majority of the MOS-specific supervisory incidents fall in the Organizing, Supervising, Monitoring, and Correcting dimension, whereas supervisory incidents are somewhat more evenly sprea across all three categories in the Army-wide case.

Table 5.5

Job Analysis Panel Judgments on Percentage of Time Spent in Supervision and Leadership Activities

MOS	Percent Time Spent Performing Supervisory Duties [a]
11B	50 - 70
13B	60 - 80
19E	40 - 50
31C	55 - 75
63B	70
71L	40
88M	35 - 75
91A/B	40
95B	65

[a] Range within MOS is between garrison and field situations.

Table 5.6

Number and Percentage of Performance Incidents by Army-Wide Supervisory Category

Category	MOS-Specific Incidents		Army-Wide Incidents	
	N	%	N	%
Organizing, Supervising, Monitoring, and Correcting Subordinates	310	20.6	99	13.5
Training and Developing Subordinates	82	5.4	63	8.6
Showing Consideration and Concern for Subordinates	17	1.1	62	8.4
Total number of supervisory incidents	409	27.1	224	30.5
Total number of incidents	1507		724	

The reason for so few MOS-specific incidents in the Showing Concern dimension is probably the more generic nature of that dimension and the instructions to MOS-specific workshop participants to focus on performance examples relevant only to the target MOS. It appears that training is viewed as a generic activity but that there are technical components that move the organizing, supervising, monitoring, and correcting dimension out of the province of Army-wide performance and into the MOS-specific domain.

Dimensions of Supervisory Task Content

Given the sizeable nature of the supervision/leadership component, the next step was to attempt a more detailed description of the content in terms of specific dimensions. The procedure for identifying the dimensions was as follows.

An item pool was created by first using project staff judgments to identify the tasks in each MOS task domain that represented leadership or supervision content. This total list, summed over the nine Batch A MOS, was edited for obvious redundance and then combined with the 46 items from the Supervisory Responsibilities Questionnaire/Leader Requirements Survey. This produced a total pool of 341 items (tasks).

The pool of 341 individual task items was then content clustered by each of 12 judges selected from the Project A staff. Given the target that the number of content clusters should be between 5 and 15, if possible, each judge sorted the task items into categories and wrote a brief definition for each category (i.e., dimension). Consequently, there were 12 cluster solutions based on individual expert judgment.

Next, the degree of agreement among all 12 judges, in terms of how every pair of items should be clustered, was used as input to an empirical cluster analysis. The results of the cluster analysis were compared to the expert judgment solutions and a synthesized description of specific content dimensions was written by the project staff. To say it another way, a pooled solution was obtained by expert judgment. The results of this pooled solution are shown as Figure 5.3.

IMPLICATIONS FOR CRITERION MEASUREMENT

A considerable amount of job analysis information is now available on which to base second-tour performance measurement. The critical incident analysis yielded a portrayal of each MOS in terms of its general and specific performance components as inferred from the content of a large pool of effective and ineffective critical incidents generated by several panels of NCOs and officers. A series of job analysis interviews provided a rough estimate of the relative importance and time spent for technical versus supervisory activities for each MOS. Cluster analyses further specified the particular dimensions of supervisory/leadership performance.

1. Planning Operations

Activities that are performed in advance of major operations of a tactical or technical nature. That is, planning for, getting ready for, and developing orders for various kinds of team operations, whether it be combat, support, or technical operations. It is the activity that comes before actual execution out in the field or work place.

2. Directing/Leading Teams

The tasks in this category are concentrated in the combat and military police MOS. They involve the actual direction and execution of combat and security team activities. They occur out in the field and are heavily dependent on MOS-specific skills. Leading reconnaissance teams, setting up offensive and defensive positions, carrying out a fire mission, directing the clearing of mine fields, etc. would all be part of this category. They require "real time" decision making under pressure.

3. Monitoring/Inspecting

This cluster includes interactions with subordinates that seem to involve keeping an operation going once it has been initiated, such as checking to make sure that everyone is carrying out their duties properly, assisting people to overcome problems, making sure everyone has the right equipment, monitoring or evaluating the status of equipment readiness, supply levels, completeness of written reports, adequacy of current operating procedures, etc. This is a non-combat or non-crisis set of activities.

4. Individual Leadership

The content of the tasks in this cluster reflects attempts to influence the motivation and goal direction of subordinates by means of goal setting, interpersonal communication, sharing hardships, building trust, etc.

Figure 5.3. Supervision/Leadership Task Categories Obtained by Synthesizing Expert and Empirical Cluster Analysis Solutions (page 1 of 2 pages).

5. Acting as a Model

This dimension is not tied to a specific task content but refers to the NCO modeling the correct performance behavior whether it be technical task performance under adverse conditions, or exhibiting appropriate military bearing. The NCO sets the example.

6. Counseling

A one-on-one interaction with a subordinate during which the NCO provides support, guidance, assistance, and feedback on specific performance or personal problems that the soldier might be experiencing. It includes counseling on problems of a disciplinary nature.

7. Communication With Subordinates, Peers, and Supervisors

The tasks in this category deal with composing specific types of orders, briefing subordinates on things that are happening, and communicating information up the line to superiors, as with peers. Information is disseminated in both written and oral formats.

8. Training Subordinates

This very distinct cluster of tasks describes the day-to-day role of the NCO as a trainer for individual subordinates. When such tasks are being executed, they are clearly identified as instructional (as distinct from evaluations or disciplinary actions). They involve scheduling, planning, and conducting training.

9. Personnel Administration

This category is made up of "paperwork" or administrative tasks that involve actually doing performance appraisals, making or recommending various personnel actions, keeping and maintaining adequate records, and following standard operating procedures for Army personnel practices.

Figure 5.3. Supervision/Leadership Task Categories Obtained by Synthesizing Expert and Empirical Cluster Analysis Solutions (page 2 of 2 pages).

For each MOS, task selection panels of job experts have designated 30 technical (MOS-specific and common) tasks and 15 supervisory tasks to be tested to evaluate second-tour performance. The technical tasks represent all of the nonsupervisory task clusters in each MOS. Each selected task has been judged in terms of its relative criticality, difficulty, and cluster content. In addition, all 45 selected tasks were rank ordered in terms of their overall importance to the MOS.

The considerable degree of convergence across all methods reinforces the descriptions of how job content differs across MOS, of how second-tour positions differ from first tour, and of the supervisory/leadership content of each MOS.

The procedure for FY88 is to develop actual performance measures of the major performance components in each MOS. Given available resources, constraints on testing time, and guidance from the literature and previous Project A work, a tentative set of measurement methods will be identified and reviewed by the project staff and the Scientific Advisory Group. The review will include considerations of feasibility, cost, estimated construct validity, and appropriateness for the job content identified by the job analyses.

For the methods that survive the above review, prototype instruments will be pilot tested during the first quarter of FY88. After pilot test modifications, the revised criterion measures will be field tested on larger samples during the second quarter of FY88. After completion of the field tests, the performance measures will be given their final revision before the second-tour data collection during the Longitudinal Validation. The results of the second-tour criterion construction efforts will be reported in the Annual Report for FY88.

Chapter 6

PREDICTOR DATA COLLECTION FOR LONGITUDINAL VALIDATION[1]

During the fifth year of Project A the major Longitudinal Validation activities with respect to predictor measurement and data collection involved the following:

(1) Preparing the predictor battery for administration to the Longitudinal Validation (LV) sample.
(2) Obtaining the military organizational support necessary.
(3) Designing the data collection procedures.
(4) Hiring and training the data collection staff.
(5) Completing most of the LV predictor data collection.

In this chapter, after a brief explanation of where the LV predictor data collection fits into the overall Project A Research Plan, the activities listed above are described in more detail.

THE CONTEXT

The Annual Report for FY 1986 described the Concurrent Validation (CV) data collection and the basic analyses of those data. Those analyses were used to revise the predictor battery, called the Trial Battery during CV administration, for its administration in the first LV phase as the Experimental Predictor Battery.

Figure 6.1 again portrays the overall data collection plan for Project A, which stipulated that the Experimental Battery was to be administered to a longitudinal sample consisting of soldiers entering the service in FY 86/87. This sample was to provide the data base for a study of the longitudinal validity of the Experimental Battery, to build on and expand the validity evidence obtained from the CV sample.

One objective of the LV data collection was to administer the predictors as closely as possible to the point where they would ultimately be administered operationally. Testing during reception station processing of recruits was chosen as the most feasible method of obtaining the desired LV sample. Collecting predictor data during reception processing is only one step removed from collecting data at the Military Entrance Processing Stations (MEPS), where the predictors would be used operationally. Since all incoming soldiers must be processed through one of eight Reception Battalions in the continental United States, it was eminently more practical to administer the Experimental Predictor Battery in these battalions rather than at the vastly larger number of MEPS that are located throughout the country.

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[1]The material in this chapter was drafted by Janis S. Houston of the Personnel Decisions Research Institute.

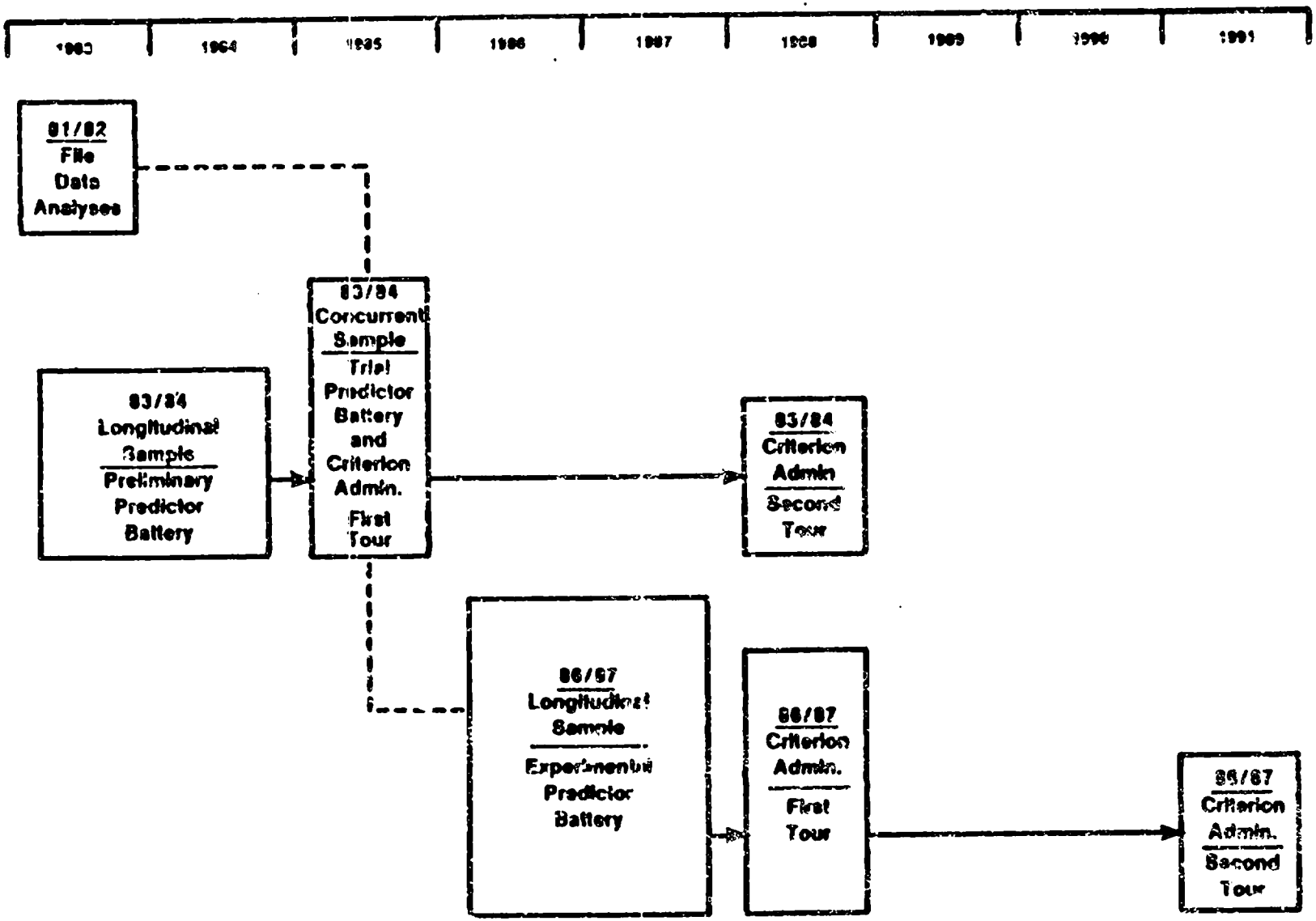


Figure 5.1. The overall data collection plan for Project A.

As specified in the Research Plan, the Longitudinal Validation effort was to begin with administration of the Experimental Battery of tests to recruits at the reception station, and then would follow these soldiers through their Advanced Individual Training (AIT), where they would be administered several criterion measures of performance during training. Soldiers in the LV sample would then be followed into their first tour, during which the first-tour job performance criterion measures would be administered. Eventually soldiers who reenlisted would be followed into their second tour, where the second-tour performance measures could be administered. This LV data collection scheme is summarized schematically in Figure 6.2. The first phase, administration of the predictor tests, is described in this chapter.

THE SAMPLE

To obtain MOS samples large enough for the desired validity analyses, given estimated attrition rates over the period of the validation assessment, each of the eight Reception Battalions was asked to test all Regular Army soldiers entering any one of the 21 MOS listed in Table 6.1 for an entire calendar year. The intent was to test a total of approximately 50,000 soldiers for the 86/87 sample, with the goal of preserving a sample of 400-600 job incumbents in each of the 21 MOS for the LV test sequence.

Although considerably more than 50,000 Regular Army accessions enter the 21 target MOS each year, numerous cases could be expected in which all soldiers in the target sample could not be tested. For example, on the occasions when the usual 3-day (72-hour) processing schedule must be shortened to 2 days, it would simply not be feasible to administer 4 hours of predictors to these "two-day-shippers." Another instance is when a group of soldiers at the reception station is sent off-site to be processed by Army Reserve units. Also, when large numbers of recruits were being processed, time would not be available for all members of a group to take the computer-administered portions of the tests. Even given such constraints, a goal of 50,000 soldiers seemed reasonable.

The start-up dates for administering the Experimental Battery varied from one Reception Battalion to another. This allowed project staff members to be physically present during start-up at each site, to provide on-the-job training of the test administrators, and to help resolve any problems that arose as testing actually got underway. The testing sites and the predictor data collection period for each site are as follows:

Site	Predictor Testing Period
Fort Sill	20 Aug 86 - 20 Aug 87
Fort Benning	27 Aug 86 - 27 Aug 87
Fort Bliss	4 Sep 86 - 4 Sep 87
Fort Knox	10 Sep 86 - 10 Sep 87
Fort McClellan	17 Sep 86 - 17 Sep 87
Fort Dix	24 Sep 86 - 24 Sep 87
Fort Leonard Wood	1 Oct 86 - 1 Oct 87
Fort Jackson	19 Nov 86 - 19 Nov 87

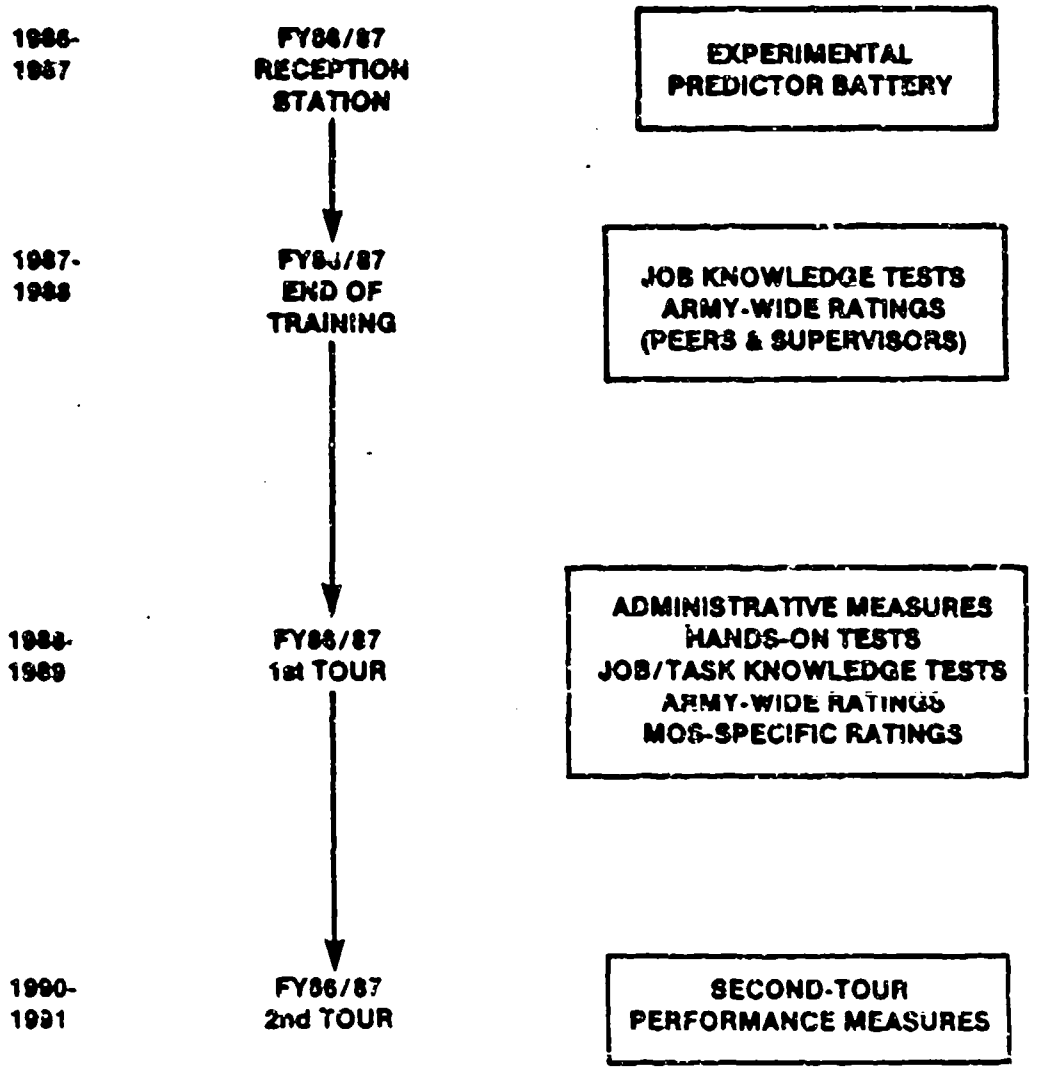


Figure 6.2 Data collection scheme for Longitudinal Validation.

Table 6.1

Project A MOS in Longitudinal Validation Sample

Batch A		Batch Z	
MOS		MOS	
11B	Infantryman	12B	Combat Engineer
13B	Cannon Crewman	16S	MANPADS Crewman
19E/M48	M60 Armor Crewman	27E	Tow/Dragon Repairer
19K	M1 Armor Crewman	29E	Comm.-Electronics Radio Repairer
31C	Single Channel Radio Operator	51B	Carpentry/Masonry Specialists
63B	Light-Wheel Vehicle Mechanic	54E	NBC Specialist
71L	Administrative Specialist	55B	Ammunition Specialist
88M	Motor Transport Operator	67N	Utility Helicopter Repairer
91A	Medical Specialist	76Y	Unit Supply Specialist
95B	Military Police	94B	Food Service Specialist
		96B	Intelligence Analyst

THE EXPERIMENTAL BATTERY

The Experimental Predictor Battery consists of six timed cognitive paper-and-pencil tests, 10 computer-administered tests, and three untimed non-cognitive paper-and-pencil inventories. A soldier needs approximately 4 hours to complete the battery, with the following breakdown by type of test:

Timed Tests	1.50 hours
Computerized Measures	1.25 hours
Untimed Inventories	1.25 hours

Description of Tests

Table 6.2 shows the complete array of tests and inventories in the Experimental Battery, the number of items in each, and the time limit (for the timed tests) or approximate time to finish (for the untimed measures). In general, the six cognitive tests assess spatial, map-reading, and mechanical abilities, and the 10 computerized tests measure various perceptual and psychomotor abilities. The ABLE, AVOICE, and JOB inventories contain measures of temperament, biodata, vocational interests, and work environment preferences. Complete descriptions of these tests, their item content, and format can be found in prior Annual Reports and other Project A reports and will not be repeated in detail here. Modifications made for the Experimental Battery administration are described below.

Table 6.2

Description of Tests in Experimental Predictor Battery

Cognitive Paper-And-Pencil Tests	Number of Items	Time Limit (minutes)
Reasoning Test	30	12
Object Rotation Test	90	7.5
Orientation Test	24	10
Maze Test	24	5.5
Map Test	20	12
Assembling Objects Test	36	18

Computer-Administered Tests	Number of Items	Approximate Time
Demographics	2	4
Reaction Time 1	15	2
Reaction Time 2	30	3
Memory Test	36	7
Target Tracking Test 1	18	8
Perceptual Speed and Accuracy Test	36	6
Target Tracking Test 2	18	7
Number Memory Test	28	10
Cannon Shoot Test	36	7
Target Identification Test	36	4
Target Shoot Test	30	5

Non-Cognitive Paper-And-Pencil Inventories	Number of Items	Approximate Time
Assessment of Background and Life Experiences (ABLE)	199	35
Army Vocational Interest Career Examination (AVOICE)	182	20
Job Orientation Blank (JOB)	31	5

Differences Between Trial and Experimental Batteries

As mentioned earlier, project staff used the information obtained from the analyses of CV data to make the final revisions to the predictor battery, preparatory to its use in the Longitudinal Validation phase. These revisions were not substantial, since the battery had already been through several iterations of data collection, analysis, and revision. The revisions incorporated into the Experimental Battery on the basis of Trial Battery analyses may be summarized as follows.

Of the six cognitive tests, only one had actual change in item content. The Assembling Objects Test was made more difficult by adding four new, relatively difficult items and revising three existing items to make them more difficult; two minutes were added to the time limit for this test. Minor modifications to the instructions, to simplify and clarify, were made for all six cognitive tests. Finally, a visual aid was developed to be used while giving the instructions for the Orientation Test, since the CV data collection experience suggested that respondents found these instructions somewhat difficult to understand.

In the computerized portion of the predictor battery, minor modifications also were made to the instructions (displayed on the screen). Several changes were made in the software, and several items on the Target Identification Test were revised to better balance the item types.

Revisions to the non-cognitive inventories were somewhat more extensive. The ABLE revisions included deleting 10 items, revising 16 items, and using a separate answer sheet for responding. For the AVOICE several changes were made in the scoring procedures, switching existing items to scales where their item-total score correlations were higher, and in two cases combining two existing scales into one scale. A total of 10 items were dropped from the AVOICE, 16 were added, several scales were renamed, and a separate answer sheet was prepared. The JOB was shortened by seven items and had five items reworded, and all scales were reconstituted and renamed on the basis of factor analyses of the CV data. A list of the final scales on all three noncognitive inventories appears as Table 6.3.

DATA COLLECTION PROCEDURES

Initiating, designing, coordinating, and monitoring the LV data collection required considerable time and effort. This section describes the process, from obtaining the necessary military support, through hiring and training testing site staff, to actual data collecting/monitoring.

Obtaining Military Support

Far in advance of the actual data collection, Project A staff submitted Troop Support Requests (TSRs) to the Commanding General of the U.S. Training and Doctrine Command (TRADOC). These requests provided details on the purpose of the data collection and the proposed schedule of events,

Table 6.3

ABLE, AVOICE, and JOB Scales in Experimental Battery

ABLE Scales

Adjustment: Emotional Stability

Dependability: Nondelinquency
Traditional Values
Conscientiousness

Achievement: Work Orientation
Self-Esteem

Surgency (Leadership/Potency): Dominance
Energy Level

Agreeableness/Likability: Cooperativeness

Locus of Control: Internal Control

Physical Condition: Physical Condition

Response Validity Scales: Unlikely Virtues (Social Desirability)
Self-Knowledge
Non-Random Response
Poor Impression

AVOICE Scales

Realistic: Mechanics
Heavy Construction
Electronics
Electronic Communication
Drafting
Law Enforcement
Fire Protection
Audiographics
Rugged Individualism
Firearms Enthusiast
Combat
Vehicle Operator

Conventional: Clerical/Administrative
Warehousing/Shipping
Food Service--Professional
Food Service--Employee

Social & Enterprising: Leadership/Guidance

Investigative: Medical Service
Mathematics
Science/Chemical
Computers

Artistic: Aesthetics

JOB Scales

Job Pride
Job Security/Comfort
Serving Others
Job Autonomy
Job Routine
Ambition

location, number of hours required of each soldier tested, and complete requirements for personnel, classrooms, and equipment.

After the TSRs were submitted, senior project staff met with the Chief Executive Officers (four-star generals) of the organizations providing support. Numerous briefings were conducted at various points down the chain of command, culminating in several meetings with the Points of Contact (POC) at each of the eight Reception Battalion sites, several months prior to data collection at that site. From this point until testing began, coordination was taken over by the POC, who was responsible for providing the required troops to be tested, classrooms/offices, and necessary equipment (e.g., storage cabinets with locks, phones).

The two main challenges in preparing each site for testing were (a) fitting 4 hours of testing into an already demanding 72-hour processing schedule, and (b) obtaining adequate space for testing, that met good testing standards, every day for a full year. The solutions to these problems were as many and varied as the number of testing sites. They ranged (a) from administering the predictors in a single 4-hour block to administering them in three separate sessions over 2 or 3 days, and (b) from redesigning/rewiring World War II barracks to creating new rooms to accommodate the computer testing. Eventually, all eight reception sites had workable testing arrangements.

Hiring and Training Test Site Personnel

To handle data collection at each site, local civilians were hired and trained to collect the LV data, rather than sending project personnel to each site as was done for the CV data collection (which was much shorter in duration).

A Test Site Manager (TSM) was hired to be in charge of each site. This manager was supported by from one to as many as eight Test Administrators (TAs) per site, depending on the testing schedule and volume. Applications were taken by mail for both positions, and all initial interviewing and hiring was done on site by experienced Project A staff.

The staff prepared test administration manuals, with data collection procedures described in minute detail. These manuals were used as the basis for a 1-week training course, conducted at each site for the newly hired test site personnel. Two experienced project staff members conducted the training sessions at each site. They were also present for the first 2 or 3 days of each site's predictor testing, to ensure that all was going smoothly and to provide additional on-the-job training.

Data Collecting/Monitoring

As previously mentioned, the testing schedule varied from site to site. It was often necessary to schedule different portions of the Experimental Battery for different days. However, regardless of when each subset of the predictors was administered, the precise directions for administering each predictor did not vary. To ensure standardization for tests across sites

and situations, scripts were prepared for each test or inventory (including a script to precede the self-administration computer measures) and test site personnel were trained in their use. Extensive training and practice was also given in handling questions from respondents.

Another feature of the data collection process that helped maintain standardization of tests across sites was the weekly phone report that TSMs were required to make. Each week, at a pre-arranged time, the TSM called the Project A staff person in charge of the data collection and reported the number of soldiers tested the previous week, discussed any questions or problems he or she had, and received relevant news or instructions.

In addition to the weekly phone reports, the site managers were required to submit monthly written reports of their testing progress, along with documentation of any problems that had occurred or events that may have had an impact on test results (e.g., interruptions during testing sessions, a soldier falling asleep during a timed test).

Monitoring site visits were scheduled so that Project A and/or ARI staff visited each site from one to three times throughout the year's testing. The purpose of these visits was to monitor the test administration, providing feedback where appropriate, go over any questions or unresolved problems, and generally try to reinforce esprit de corps.

While the LV predictor data collection at the reception stations has certainly not been devoid of problems, the cooperation from military personnel on post has generally been very good, and the competence of the Project A site personnel has been commendable.

TESTING COMPLETED BY END OF FY87

Table 6.4 presents the number of soldiers for whom paper-and-pencil predictor data had been obtained as of 1 October 1987, by site and by MOS. A total of 47,896 incoming soldiers had been tested by that date. This number represents the final count at all sites except Fort Jackson, where the predictor testing schedule continued through 19 November 1987. All other sites had completed their administration of the Experimental Predictor Battery and their data (paper-and-pencil testing) are included in Table 6.4.

The total number of soldiers from whom computer-administered predictor data were obtained is considerably smaller than the total shown in Table 6.4 for paper-and-pencil predictors. By 1 October 1987, approximately 38,000 soldiers had completed all computer predictors. The primary reason for this discrepancy is that only about 30 percent of the 14,000-plus soldiers tested at Fort Benning could be scheduled for the computer-administered portion of the predictor battery. However, since Fort Benning processes only Infantrymen (MOS 11B), and in very large numbers, the "missing data" on the computer tests is not a serious problem; complete predictor data are available for approximately 4,500 Infantrymen.

Table 6.4

LV Predictor Sample as of 1 October 1987
(Paper-and-Pencil Predictors Only)

	LV Reception Site								
MOS	Fort Benning	Fort Bliss	Fort Dix	Fort Jackson	Fort Knox	Fort McClelland	Fort Sill	Fort Leonard Wood	Total
11B	14182		3	1	1				14187
12B			3	2	3			2110	2118
13B			4	3	1	2	5070		5080
16S		681	23	10	6	12			771
19E					580				580
19K			1		1843				1844
27E			5	4	7	69		50	135
29E			7	190	12	16		16	241
31C			109	651	76	28		30	894
51B			27	17	9	2		401	456
54E			5	412	6	501		11	935
55B			46	58	33	215		124	476
63B			721	748	119	39		409	2036
64C			844	104	27	60		477	1512
67N			28	2	227	63		14	334
71L			314	1438	34	146		2	1934
76Y			238	1504	191	127		432	2492
91A		1141	651	961	453	177		597	3980
94B			857	1112	213	228		958	3368
95B			10	1	8	4181		6	4206
96B			248	54		2		13	317
Total	14182	1822	4144	7272	3849	5868	5070	5689	47896

NEXT STEPS IN LONGITUDINAL VALIDATION

As a 1 October 1987, the only site still collecting LV predictor dsta was Fort Jackson. Testing was scheduled to be completed at this site 19 November 1987.

The work that remains to be done with regard to LV predictors is to finish collecting and processing these data, merge the various predictor data files (paper-and-pencil and computer-administered), and edit the data in preparation for scoring and analysis.

During FY88 soldiers in the target MOS who took the predictor tests will be followed into their training assignments. Data from training performance measures will be collected as the soldiers complete AIT or one-station unit training (OSUT). Subsequently a sample from each MOS will be tested on their performance on the job.

Chapter 7

THE FUTURE

The principal focus of activity for Project A during FY88 will be on preparing for and executing the criterion data collection for the Longitudinal Validation. The sample of MOS that are now included as part of the project were listed in Table 6.1.

The troop support requests for the LV sample followup for these 21 MOS ask for a total of 15,000 first-tour job incumbents, all of whom were tested with the Experimental Predictor Battery when they entered the Army during FY87. The LV sample will also include as many as possible of those individuals from the Concurrent Validation sample (83/84 cohort) who reenlisted and can be assessed on a battery of performance measures appropriate for second-tour personnel.

The major steps to be accomplished in this phase of the project during FY88 are as follows:

- The administration of the Experimental Predictor Battery to the sample of new accessions in the Longitudinal Validation sample must be completed. Data remain to be collected at only one of the eight reception stations.

- The administration of the training performance measures (i.e., the rating scales and knowledge tests) to the individuals in the sample at the end of their Advanced Individual Training must be completed.

- The job performance criterion measures that were used to evaluate first-tour job incumbents in the Concurrent Validation sample must be revised, updated, reviewed, and made ready for administration to first-tour job incumbents in the LV sample.

- Job performance criterion measures for the second-tour positions, based on the job analyses reported in Chapter 5, must be developed, field tested, and prepared for administration to members of the CV sample who have reenlisted. Special attention must be given to measures of the supervisory/leadership components of NCO positions.

- Data collection teams for the LV criterion data collection must be identified and trained. The specific data collection procedures for administering criterion measures to the LV sample (first tour) and the CV followup sample (second tour) are to be developed.

- First-tour and second-tour job performance criterion measures must be administered to sample members of the 86/87 cohort and 83/84 cohort respectively.

While the above activities will occupy the Project A staff during FY88, much remains to be done to accomplish the objectives of the LV data collection, as well as longer range goals. Extensive data analyses of second-tour data will be needed to develop basic job performance scores for NCO positions. The portrayal of first-tour performance developed during the CV sample analysis needs to be put to a confirmatory test with data from the LV sample. The covariance structure of the Experimental Predictor Battery should be modeled, and the validation results obtained with the CV sample should be cross-validated with the LV sample.

Given a reasonable portrayal of the covariance structures of the predictors, training criteria, first-tour performance criteria, and NCO performance criteria, a great deal of analyses will be needed to portray the effects of alternative strategies for selection and classification. These analyses would include the optimal weighting/keying of predictor data and sensitivity analyses under different goals (e.g., maximize aggregate performance vs. minimize attrition) and varying constraints (e.g., different testing times).

Consequently, while much of the work planned under Project A has already been accomplished, more remains to be done to make the most effective use of the information that has been and is being assembled. A great deal of excitement lies ahead.

REFERENCES

Alpert, M. I., Betak, J. F., & Golden, L. L. (1978). Gathering issues in conjoint measurement. Working paper, Graduate School of Business, Stanford University.

Arabian, J. M., & Mason, J. K. (1986, November). Relationship of SQT scores to Project A measures. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT. (In ARI Research Note in preparation.)

Bernardin, H. J, & Beatty, R. W. (1984). Performance appraisal: Assessing human behavior at work. Kent Publishing Company: Belmont, California.

Borman, W. C. (1979). Format and training effects on rating accuracy and rating errors. Journal of Applied Psychology, 64, 412-421.

Brogden, H. E. (1946). On the interpretation of the correlation coefficient as a measure of predictive efficiency. Journal of Educational Psychology, 37, 65-76.

Brogden, H. E. (1949). When testing pays off. Personnel Psychology, 2, 171-183.

Campbell, C. H., Campbell, R. C., Rumsey, M. G., & Edwards, D. C. (1986). Development and field test of Project A task-based MOS-specific criterion measures (ARI Technical Report 717). (AD A182 645)

Campbell, C. H., Borman, W. C., Felker, D. B., Ford, P., Park, M. V., Pulakos, E. D., Riegelhaupt, B. J., & Rumsey, M. G. (1987, April). Development of Project A job performance measures. Paper presented at the Annual Conference of the Society of Industrial and Organizational Psychology, Atlanta. (In ARI Research Note in preparation).

Campbell, J. P. (Ed.). (1985). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1985 fiscal year (ARI Technical Report 746). (AD A193 343)

Campbell, J. P. (Ed.). (1986a). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1986 fiscal year (ARI Technical Report 792). (AD A198 856)

Campbell, J. P. (1986b, August). Project A: When the textbook goes operational. Paper presented at the Annual Convention of the American Psychological Association, Washington, DC. (See ARI Research Note 88-36.)

Campbell, J. P., Dunnette, M. D., Arvey, R., & Hellervik, L. (1973). The development and evaluation of behaviorally based rating scales. Journal of Applied Psychology, 57, 15-22.

Cascio, W. F. (1982a). Applied psychology in personnel management (2nd ed.). Reston, VA: Reston Publishing.

Cascio, W. F. (1982b). Costing human resources: The financial impact of behavior in organizations. Boston: Kent Publishing.

Cronbach, L. J., & Gleser, G. C. (1965). Psychological tests and personnel decisions. (Rev. ed.). Urbana: University of Illinois Press.

Eaton, N. K., & Goer, M. H. (Eds.). (1983). Improving the selection, classification, and utilization of Army enlisted personnel: Technical appendix to the annual report (ARI Research Note 83-37). (AD A137 117)

Eaton, N. K., Goer, M. H., Harris, J. H., & Zook, L. M. (Eds.). (1984). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1984 fiscal year (ARI Technical Report 660). (AD A178 994)

Gast, I. F., Campbell, C. H., Steinberg, A. G., & McGarvey, D. A. (1987, August). A task-based approach for identifying junior NCOs' key responsibilities. Paper presented at the Annual Convention of the American Psychological Association, New York. (In ARI Research Note in preparation.)

Green, P. E. (1974). On the design of choice experiments involving multifactor alternatives. The Journal of Consumer Research, 1, 61-73.

Green, P. E., & Srinivasan, V. (1978). Conjoint analysis in consumer research: Issues and outlook. Journal of Consumer Research, 5, 103-123.

Hebein, J., Kaplan, A., Miller, R., Olmstead, J., & Sharon, B. (1984). NCO leadership: Tasks, skills, functions (ARI Research Note 84-95). (AD A143 512)

Hoffman, R. G. (1987). Clustering Army Military Occupational Specialties for Project A: Phase Two (HumRRO IR-PRD-82-22). Alexandria, VA: Human Resources Research Organization.

Hough, L. M., Gast, I.F., White, L. A., & McCloy, R. (1986, August). The relation of leadership and individual differences to job performance. Paper presented at the Annual Convention of the American Psychological Association, Washington. (See ARI Research Note 88-36.)

Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, & Army Research Institute. (1983). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report (ARI Research Report 1347). (AD A141 807)

Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, & Army Research Institute. (1984). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report synopsis, 1984 fiscal year (ARI Research Report 1393). (AD A173 824)

Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, & Army Research Institute. (1984). Improving the selection, classification, and utilization of Army enlisted personnel: Appendices to annual report, 1984 fiscal year (ARI Research Note 85-14).

Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, & Army Research Institute. (1987). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1985 fiscal year - Supplement to ARI Technical Report 746 (ARI Research Note 87-54). (AD A188 267)

Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, & Army Research Institute. (1986). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1986 fiscal year - Supplement to ARI Technical Report 792 (ARI Research Note 88-36). (AD A196 274)

Jain, A. K., Acito, F. M., Malhotra, N., & Mahajan, V. (1978). A comparison of predictive validity of alternative methods for estimating parameters in preference models. Working paper, School of Management, State University of New York at Buffalo.

Johnson, R. M. (1974). Trade-off analysis of consumer values. Journal of Marketing Research, 11, 121-127.

Johnson, R. M., & VanDyk, G. J. (1975). A resistance analogy for efficiency of paired comparisons designs. Unpublished paper, Market Facts, Inc., Chicago.

Kane, J. S. (1980). Performance distribution assessment: A new framework for conceiving and appraising job performance. Unpublished paper, Kane and Associates.

Lord, F., & Novick, M. (1968). Statistical theories of mental test scores. Reading, MA: Addison-Wesley.

McLaughlin, D., Rossmeissl, P., Wise, L., Brandt, D., & Wang, M. (1984). Validation of current and alternative ASVAB area composites, based on training and SQT information on FY 1981 and FY 1982 enlisted accessions (ARI Technical Report 651). (AD A156 807)

Montgomery, D. B., Wittink, D. R., and Glaze, T. (1977). A predictive test of individual level concept evaluation and trade-off analysis (Research Paper No. 415). Graduate School of Business, Stanford University.

Nord, R., & White, L. A. (1987). Optimal job assignment and the utility of performance. Paper presented at the Annual Meeting of the American Psychological Association, New York. (In ARI Research Note in preparation).

Oppedijk van Veen, W. M., & Beazley, D. (1977). An investigation of alternative methods of applying the trade-off model. Journal of Market Research Society, 19, 2-9.

Potthoff, R. (1964). On the Johnson-Newman technique and some extensions thereof. Psychometrika, 29, 241-245.

Pulakos, E. D., & Borman, W. C. (Eds.). (1986). Development and field test of the Army-wide rating scales and the rater orientation and training program (ARI Technical Report 716). (AD B112 857)

Pulakos, E. D., Hanson, M., Borman, W. C., Hallam, G., Carter, G. & Owens-Kurtz, C. (1987, April). Developing behavioral rating scales to evaluate second-tour performance in the Army. Paper presented at the Annual Conference of the Society of Industrial and Organizational Psychology, Atlanta. (In ARI Research Note in preparation).

Ross, R. T. (1934). Optimum orders for presentation of pairs in pair comparisons. Journal of Educational Psychology, 25, 375-382.

Roulon, P. J., Tiedman, D. V., Tatsuoka, M. M., & Langmuir, C. R. (1967). Multivariate statistics for personnel classification. New York: John Wiley & Sons.

Rumsey, M. G. (1987, August). Getting answers to the right questions: Job analysis strategy. Paper presented at the 95th Annual Convention of the American Psychological Association, New York.

Sadacca, R., & Campbell, J. P. (1987). Assessing the utility of a personnel/classification system. Paper presented at the meeting of the Southeastern Psychological Association, Atlanta. (In ARI Research Note 87-54). (AD A188 267)

Sadacca, R., Campbell, J. P., White, L. A., & DiFazio, A. S. (1988). Weighting criterion components to develop composite measures of job performance (ARI Technical Report 838). (AD A210 357)

Sadacca, R., deVera, M. V., DiFazio, A., & White, L. A. (1986). Weighting performance constructs in composite measures of job performance. Paper presented at the convention of the American Psychological Association, Washington, DC. (ARI Research Note 88-36). (AD A196 274)

Sadacca, R., White, L. A., Campbell, J. P., DiFazio, A. S., & Schultz, S. R. (1988). Assessing the utility of MOS performance levels in Army enlisted occupations. (ARI Technical Report 839). (AD A211 608)

Schmidt, F. L. (1977). The measurement of job performance. Unpublished manuscript, U.S. Office of Personnel Management.

Schmidt, F. L. (1977). The measurement of job performance. Unpublished manuscript, U.S. Office of Personnel Management.

Schmidt, F. L., Hunter, J. E., McKenzie, R. C., & Muldrow, T. W. (1979). Impact of valid selection procedures on work for force productivity. Journal of Applied Psychology, 64, 609-626.

Steinberg, A. G. (1987, May). Using task analysis to identify Army leader job requirements. Paper presented at the Sixth International Air Force Occupational Analyst Workshop, San Antonio.

Steinberg, A. G., van Rijn, P., & Hunter, F. T. (1986, November). Leader requirements task analysis. Paper presented at the Conference of the Military Testing Association, Mystic, CT.

Taylor, H. C., & Russell, J. T. (1939). The relationship of validity coefficients to the practical effectiveness of tests in selection: Discussions and tables. Journal of Applied Psychology, 23, 565-578.

Toquam, J. L., McHenry, J. J., Corpe, V. A., Rose, S. R., Lammlein, S. E., Kemery, E., Borman, W. C., Mendel, R., & Bosshardt, M. (1986). Development and field test of behaviorally anchored rating scales for nine MOS (ARI Technical Report 776). (AD A194 271)

Torgerson, W. S. (1958). Theory and methods of scaling. New York: John Wiley & Sons.

U.S. Army, Headquarters. (1981). Soldier's Manual of Common Tasks: Skill Levels 2, 3, and 4 (FM 21-3). Washington: Author.

U.S. Army, Headquarters. (1983). Soldier's Manual of Common Tasks: Skill Level 1 (FM 21-2). Washington: Author.

U.S. Army, Headquarters. (1984). Enlisted Career Management Fields and Military Occupational Specialties (Army Regulation 611-201).

U.S. Army, Headquarters. (1985). Military Leadership (FM 22-100). Washington: Author.

U.S. Army Sergeants Major Academy. (1984, September). Primary Leadership Development Course (PLDC) Program of Instruction. Fort Bliss, TX: Author.

Wallis, M. R., Korotkin, A. L., Yarkin-Levin, K., Schemmer, F. M., & Mumford, M. D. (1986). Leadership job dimensions and competency requirements for commissioned and noncommissioned officers: Remediation of inadequacies in existing data bases (ARI Research Note 86-20). (AD A168 564)

Ward, J. H., Haney, D. L., Hendrix, W. H., & Pina, M. (1978). Assignment procedure in the Air Force procurement management information system (AFHRL-TR-78-30). Brooks Air Force Base, TX: Air Force Human Resources Laboratory.

White, L. A., Gast, I. F., & Rumsey, M. G. (1985, October). Leaders behavior and the performance of first term soldiers. Paper presented at the Conference of the Military Testing Association, San Diego. (In ARI Research Note 88-36). (AD A196 274)

Wise, L. L., Campbell, J. P., McHenry, J. J., & Hanser, L. M. (1986, August). A latent structure model of job performance factors. Paper presented at the convention of the American Psychological Association, Washington, DC. (In ARI Research Note 88-36). (AD A196 274)

Wise, L., McHenry, J., Rossmeissl, P., & Oppler, S. (November, 1986). ASVAB validities using improved job performance measures. Paper presented at the Annual Conference of Military Testing Association, Mystic, CT. (In ARI Research Note in preparation.)

Yukl, G. A. (1987, August). A new taxonomy for integrating diverse perspectives on managerial behavior. Paper presented at the Annual Convention of the American Psychological Association, New York.

Appendix A

PROJECT A TECHNICAL PAPERS FOR FISCAL YEAR 1987

Appendix A

PROJECT A TECHNICAL PAPERS AND REPORTS FOR FY 1987

I. Technical Papers Presented[1]

Arabian, J. M., & Mason, J. K. (1986, November). Relationship of SOI scores to Project A measures. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Barge, Bruce N. (1987, August). Characteristics of biodata items and their relationship to validity. Paper presented at the Annual Convention of the American Psychological Association, New York.

Campbell, C. H., Borman, W. C., Felker, D. C., Ford, P., Park, M. V., Pulakos, E. C., Riegelhaupt, B. J., & Rumsey, M. G. (1987, April). Development of Project A job performance measures. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

Campbell, C. H., & Rumsey, M. G. (1986, November). Skill requirement influences on measurement method intercorrelations. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Campbell, J. P. (1986, December). Validation analysis for new predictors (ARI RS-WP-86-09). Paper presented at the meeting of the Committee on Performance of Military Personnel, Baltimore.

Campbell, J. P., Hanser, L. M., & Wise, L. (1986, November). The development of a model of the Project A criterion space. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Campbell, J. P., McHenry, J. J., & Wise, L. L. (1987, April). Analysis of criterion measures: The modeling of performance. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta, GA.

Campbell, R. C., Campbell, C. H., & Doyle, E. L. (1986, November). Patterns of Skill Level One performance in representative Army jobs: Common and technical task comparisons. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

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[1]These papers are available in ARI Research Note ____ (in preparation), which supplements this FY87 Annual Report.

Ford, P., & Hoffman, R. G. (1986, November). Effects of test programs on task proficiency. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Gast, I. F., Campbell, C. H., Steinberg, A. G., & McGarvey, D. A. (1987, August). A task-based approach for identifying junior NCOs' key responsibilities. Paper presented at the Annual Convention of the American Psychological Association, New York.

Gast, I. F., & White, L. A. (1986, November). Effects of soldier performance and characteristics on relationships with superiors. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Harris, J. H., Campbell, J. P., & Campbell, C. H. (1986, November). The Project A concurrent validation data collection. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Hoffman, R. G. (1986, November). Post differences on hands-on task tests. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Hoffman, R. G., & Ford, P. (1986, November). Estimates of task parameters for test and training development. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Hough, L. M. (1987, August). Overcoming objections to the use of temperament variables in selection. Paper presented at the Annual Convention of the American Psychological Association, New York.

Hough, L. M., & Ashworth, S. D. (1987, April). Predicting soldier performance: Temperament constructs as predictors of job performance. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

McHenry, J. J., Harris, J. H., & Oppler, S. M. (1986, November). Using confirmatory factor analysis to aid in assessing task performance. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

McHenry, J. J., Hough, L. M., Toquam, J. L., Hanson, M. A., & Ashworth, S. (1987, April). Project A validity results: The relationship between predictor and criterion domains. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

McHenry, J. J., Wise, L. L., Campbell, J. P., & Hanser, L. M. (1986, December). A latent structure model of job performance factors: Appendix. Paper presented at a Data Analysis Workshop of the Committee on Performance of Military Personnel, Baltimore.

Mord, R., & White, L. A. (1987, August). Optimal job assignment and the utility of performance. Paper presented at the Annual Convention of the American Psychological Association, New York.

Olson, D. M., & Borman, W. C. (1986, November). Influence of environment, ability and temperament on performance in Army MOS. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Peterson, N., Hough, L., Ashworth, S., & Toquam, J. (1986, November). New predictors of soldier performance. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Peterson, N. G., Hough, L. M., Dunnette, M. D., Rosse, R. A., Houston, J. S., & Wing, H. (1987, April). Identification of predictor constructs and development of new selection/classification tests. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

Pulakos, E. D., Hanson, M. A., Borman, W. C., Hallam, G., Carter, G., & Owens-Kurtz, C. (1987, August). Developing behavioral rating scales to evaluate second tour performance in the Army. Paper presented at the Annual Convention of the American Psychological Association, New York.

Pulakos, E. D., White, L. A., & Borman, W. C. (1987, April). An examination of race and sex effects on performance ratings. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

Radtke, P., & Edwards, D. S. (1986, November). Effect of practice on soldier task performance. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Rumsey, M. G. (1987, August). Getting answers to the right questions: Job analysis strategy. Paper presented at the Annual Convention of the American Psychological Association, New York.

Shields, J. L., & Hanser, L. M. (1987, April). Designing, planning, and selling Project A. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

Smith, E. P., & Rossmeissl, P. G. (1986, November). Some conditions affecting assessment of job requirements. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Smith, E. P., & Walker, C. B. (1986, November). Short versus long term tenure as a criterion for validating biodata. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Wing, H., Hough, L. M., & Peterson, N. G. (1987, August). Predictive validity of noncognitive measures for Army classification and attrition. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

Wise, L. L., Campbell, J. P., & Peterson, N. G. (1987, April). Identifying optimal predictor composites and testing for generalizability across jobs and performance constructs. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

Wise, L. L., McHenry, J. J., Rossmeissl, P. G., & Oppler, S. H. (1986, November). ASVAB validities using improved job performance measures. Paper presented at the Annual Conference of the Military Testing Association, Mystic, CT.

Wise, L. L., McHenry, J. J., & Young, W. Y. (1986, December). Project A concurrent validation: Treatment of missing data (ARI RS-WP-86-08). Paper presented at the meeting of the Committee on Performance of Military Personnel, Baltimore.

Young, W. Y., Houston, J. S., Harris, J. H., Hoffman, R. G., & Wise, L. L. (1987, April). Large scale data collection and data base preparation. Paper presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Atlanta.

II. Reports Submitted to Army Research Institute

Campbell, C. H. (1987). Developing basic criterion scores for hands-on tests, job knowledge tests, and task rating scales (HumRRO IR-PRD-87-15).

Campbell, C. H., & Hoffman, R. G. (1987). Hands-on data collection during concurrent validation: Lessons learned (HumRRO IR-PRD-87-16).

Campbell, J. P. (1987). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1986 fiscal year (HumRRO IR-PRD-87-10). Issued as ARI Technical Report 792. (AD A198 856)

Hoffman, R. G. (1987). Clustering Army occupational specialties for Project A: Phase 2 (HumRRO IR-PRD-87-22).

Human Resources Research Organization, American Institutes for Research, Personnel Decisions Research Institute, and Army Research Institute. (1987). Improving the selection, classification, and utilization of Army enlisted personnel: Annual report, 1986 fiscal year - Supplement to ARI Technical Report 792 (HUMRRO IR-PRD-87-12). Issued as ARI Research Note 813704. (AD A198 856)

Kuhn, D. B. (1987). The assignment of knowledge test items to functional and cognitive categories (HumRRO IR-PRD-87-17).

Pulakos, E. D., & Borman, W. C. (1987). Developing the basic criterion scores for Army-wide and MOS-specific ratings.

Schultz, S. R., & Kuhn, D. B. (1987). Development of job-relevant knowledge tests for longitudinal validation (HumRRO IR-PRD-87-29).

Appendix B

COMPARISON OF VALIDITY AND SUBGROUP STATISTICS FOR CURRENT AND PROPOSED APTITUDE AREA COMPOSITES, BASED ON SQT CRITERIA

Definitions

AA Composite

AANEW - Proposed ASVAB Aptitude Area Composite
AAOLD - Current ASVAB Aptitude Area Composite

AACUT - Minimum qualifying score on the current AA Composite (relative to reference mean of 100 and SD of 20)

NTOT - Total number of SQT examinees analyzed

Estimated Validity

VNEW - Validity of the proposed AA composite, corrected for range restriction

VOLD - Validity of the current AA composite, corrected for range restriction

VCH - Increase in validity. A positive value means the proposed composite is more valid that the current one.

Blacks

NBLK - Number of black examinees analyzed

BPDN - For the proposed composite, the difference between the predicted performance based on the common regression expressed in standard deviation units. A positive value means that predicted performance is higher using the common regression line (i.e., blacks are overpredicted using the common regression equation).

BPDO - For the current composite, the same difference as for BPDN.

BPDCH - Difference in magnitude of the black prediction errors based on the current composite and on the proposed composite. A positive value means that the proposed new AA composite predicts more accurately for blacks than the current composite.

Females

NFEM - Number of female examinees analyzed

FPDN - Equivalent of BPDN for female differences

FPDO - Equivalent of BPDO for female differences

FPDCH - Equivalent of PBDCH for female differences

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-11 INFANTRY

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPDN	BPDO	BPDCN	NFEN	FPDN	FPDO	FPDCN
11B	Infantryman	MC	CO	CBT	90	31283	.60	.58	.01	6082	.06	.10	.05				
11C	Indirect Fire Infan	MC	CO	CBT	90	6837	.57	.56	.01	1124	.02	.07	.05				
11H	HV Anti-Armor WPN Infm	MC	CO	CBT	90	1865	.65	.65	.00	295	.10	.18	.08				
11M	FV Infantryman	MC	CO	CBT	.	.	.	.	.	.	.	.	.				

CMF-12 COMBAT ENGINEER

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPDN	BPDO	BPDCN	NFEN	FPDN	FPDO	FPDCN
12B	Combat Engineer	MC	CO	CBT	90	5490	.54	.53	.01	1071	.06	.08	.02				
12C	Bridge Crewmember	MC	MN	CBT	85	1135	.60	.59	.01	224	.02	.09	.07				
12E	Adm Specialist	MC	CO	CBT	.	.	.	.	.	.	.	.	.				
12F	Engr Trveh Crewmember	MC	CO	CBT	90	389	.39	.35	.04	120	.10	.09	-.02				

CMF-13 FIELD ARTILLERY

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPDN	BPDO	BPDCN	NFEN	FPDN	FPDO	FPDCN
13C	Tacfire Opns SP	NA	ST	CBT	95	268	.69	.68	.01	.	.	.	.				
13E	Cannon FD SP	NA	ST	CBT	95	1260	.62	.61	.01	236	.08	.00	-.07				
13F	Fire Support SP	NA	FA	CBT	100	3311	.65	.66	-.00	608	.31	.28	-.03				
13B	Cannon Crewmember	MC	FA	CBT	85	20619	.49	.47	.02	8246	.02	.05	.03				
13M	MLRS Crewmember	MC	OF	CBT	105	1963	.52	.51	.01	276	.12	.15	.03				
13N	Lance Crewmember	MC	OF	CBT	.	.	.	.	.	.	.	.	.				
13R	Firefinder Radar Op	MC	SC	CBT	100	404	.47	.45	.02	.	.	.	.				
13T	RPV Crewmember	MC	SC	CBT	.	.	.	.	.	.	.	.	.				
15E	Pershing MSL Crewmember	MC	OF	CBT	100	420	.66	.63	.03	58	-.13	-.10	-.03				
15J	MLRS/Lance OP/FD SP	MG	FA	CBT	100	175	.29	.21	.09	.	.	.	.				
82C	FA Surveyor	MG	ST	CBT	95	1329	.64	.61	.03	158	.07	.12	.05				
93F	FA Met Crewmember	MG	EL	CBT	95	163	.53	.52	.01	.	.	.	.				

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

---CNF=16 AIR DEFNS ARTILLERY---

MOS		AAWEW	AAOLD	MOSTYPE	AACUT	NTOT	VWEW	VOLD	VCH	NBLK	BPOW	BPOO	BPOCH	NFEM	FPOW	FPOO	FPOCH
16H	ADA OP-Intel Asst	MC	OF	CBT	100	159	.57	.53	.04	.	.	.	.				
16L	York Air Def Crewmember	MC	EL	CBT	.	.	.	.	.	.	.	.	.				
16P	ADA Short Rg MSL Crewmember	MC	OF	CBT	100	1275	.50	.46	.04	274	.23	.20	-.03				
16R	ADA Short RG Gnry Crewmber	MC	OF	CBT	100	1354	.55	.50	.04	319	.13	.24	.11				
16D	Hawk Missile Crewmember	MG	OF	CBT	100	483	.49	.44	.05	95	.20	.16	-.04	69	.40	.45	-.05
16E	Hawk FC Crewmember	MG	OF	CBT	100	576	.63	.61	.02	80	.31	.30	-.00				
16J	Def ACQ Radar OP	MG	OF	CBT	100	137	.42	.32	.11	.	.	.	.				
16S	Manpads Crewmember	MG	OF	CBT	90	2049	.50	.47	.03	833	.04	.00	-.04				
16T	Patriot MSL Crewmember	MG	OF	CBT	100	61	.72	.70	.02	.	.	.	.				

---CNF=19 ARMOR---

MOS		AAWEW	AAOLD	MOSTYPE	AACUT	NTOT	VWEW	VOLD	VCH	NBLK	BPOW	BPOO	BPOCH	NFEM	FPOW	FPOO	FPOCH
19D	Cavalry Scout	MC	CO	CBT	90	4883	.57	.55	.02	907	.01	.04	.03				
19E	M48-M60 Armor Crewmember	MC	CO	CBT	90	8371	.62	.61	.01	1780	.04	.08	.04				
19K	M1 Abrams Armor Crewmember	MC	CO	CBT	90	1496	.58	.56	.02	280	.05	.07	.02				

---CNF=23 AIR DEFENSE SYSTEM MAINTENANCE---

MOS		AAWEW	AAOLD	MOSTYPE	AACUT	NTOT	VWEW	VOLD	VCH	NBLK	BPOW	BPOO	BPOCH	NFEM	FPOW	FPOO	FPOCH
25L	ADA Cmd/Cont Sys Op/Repairer	MA	EL	CS	95	118	.67	.66	.02	.	.	.	.	.	.	.	.
26H	Air Defense Radar Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24C	IH Firing Sec Mech	MM	EL	CS	110	124	.54	.60	-.06	.	.	.	.	.	.	.	.
24E	IH Fire Con Mech	MM	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24G	IH Coord Cen Mech	MM	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24M	Vulcan Sys Mech	MM	EL	CS	110	101	.71	.63	.08	.	.	.	.	.	.	.	.
24N	Chaparral Sys Mech	MM	EL	CS	110	197	.39	.29	.10	.	.	.	.	.	.	.	.
24T	Patriot Sys Mech	MM	MM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24U	Hercules Elect Mech	MM	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24W	York Air Def Sys Mech	MM	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CNF=25 AVIO/VISUAL

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPDN	BPDO	BPDCH	NFEM	FPDN	FPDO	FPDCH
26T	RDO/TV Sys Sp	MT	EL	CSS	95	78	.61	.57	.05	.	.	.	.	.	.	.	.
41E	AV Equip Repairer	MT	EL	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.
81E	Illustrator	MT	ST	CSS	95	154	.65	.66	-.01	.	.	.	.	.	.	.	.
84B	Still Photo Sp	MT	ST	CSS	95	144	.69	.72	-.03	.	.	.	.	.	.	.	.
84C	MOPIC Sp	MT	ST	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.
84F	Audio/TV Sp	MT	ST	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.

CNF=27 LAND COMBAT/AIR DEF SYS MAI

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPDN	BPDO	BPDCH	NFEM	FPDN	FPDO	FPDCH
21G	Pershing Elct Mat Sp	ME	EL	CS	95	68	.73	.69	.04	.	.	.	.	.	.	.	.
23M	Hike Track Rdr Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
23U	Hike MP Rdr Sim Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
27P	York Air Def Rdr/Elec Rpr	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
46M	Persh Elec-Mech Supv	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
21L	Pershing Elect Repairer	MT	EL	CS	110	105	.58	.58	.00	.	.	.	.	.	.	.	.
22L	Hike Test Equip Repairer	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
22M	Hike-Herc MSL-Lnch Repairer	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24H	IH Fire Con Repairer	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
24J	IH Pulse Rdr Repairer	MT	EL	CS	110	70	.82	.78	.04	.	.	.	.	.	.	.	.
24K	IH CW Rdr Repairer	MT	EL	CS	110	83	.82	.82	.01	.	.	.	.	.	.	.	.
24L	IH Lnch/Mech Sys Repairer	MT	EL	CS	95	85	.70	.73	-.02	.	.	.	.	.	.	.	.
27B	LCSS Test Sp/Lance Repairer	MT	EL	CS	95	208	.68	.65	.01	.	.	.	.	.	.	.	.
27E	Tow/Dragon Repairer	MT	EL	CS	95	285	.56	.56	-.00	62	.02	.04	.03	.	.	.	.
27F	Vulcan Repairer	MT	EL	CS	100	55	.73	.73	-.00	.	.	.	.		.	.	..
27G	Chaparral/Redeye Repairer	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
27L	Lance Repairer	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
27M	MLRS Repairer	MT	EL	CS	95	50	.74	.70	.03	.	.	.	.	.	.	.	.
27N	FAAR Repairer	MT	EL	CS	110	83	.53	.46	.07	.	.	.	.	.	.	.	.
27Q	York Air Def Gun Sys Test Sp	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-28 AVIATION ELECTRONICS

MOS		AAMEW	AVOLD	MOSTYPE	AACUT	NTOT	VMEW	VOLD	VCW	NBLK	BPDW	BPDO	BPDOW	NFEM	FPDW	FPDO	FPDOW
35K	Avionic Mechanic	ME	EL	CS	95	69	.65	.65	.00	.	.	.	.	.	.	.	.
35L	Avionic Comm Eq Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
35M	Avionic MAV/Flt Con Eq Rep	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
35R	Avionic Special EQ Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.

CMF-29 COMM ELCTRNC MAINT

MOS		AAMEW	AVOLD	MOSTYPE	AACUT	NTOT	VMEW	VOLD	VCW	NBLK	BPDW	BPDO	BPDOW	NFEM	FPDW	FPDO	FPDOW
29E	C-E Radio Repairer	MA	EL	CS	110	576	.65	.61	.04	.	.	.	.	.	.	.	.
29F	Fixed Comsec Equip	MA	EL	CS	105	87	.76	.79	-.02	.	.	.	.	.	.	.	.
29J	Teletypewriter Equip Repairer	MA	EL	CS	110	863	.73	.72	.01	54	.19	.09	-.10	53	.35	-.26	-.09
29S	Field Comsec Equip Repairer	MA	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
39B	ATE Op/Maint	MA	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
26C	Target Acq Sys Rdr Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
29M	Admin Rep	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
29Y	Satellite Com Eq Rep	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
36L	Elct Switching Sys Repairer	ME	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
29G	Digital Comm Equip Rep	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
29H	TAC Sat/Mwave Repairer	MT	EL	CS	110	453	.66	.64	.02	.	.	.	.	.	.	.	.
29R	Tel Center Office Repairer	MT	EL	CS	100	229	.70	.68	.02	.	.	.	.	.	.	.	.
29V	Satellite Micro Eq Rep	MT	EL	CS	110	469	.71	.70	.01	59	.02	.07	.08	.	.	.	.
35E	SP Elec Devices Repairer	MT	EL	CS	95	112	.49	.53	-.04	.	.	.	.	.	.	.	.
35H	Calibration Specialist	MT	EL	CS	120	218	.64	.62	.02	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CNF=31 COMM ELECTRNC OPER

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPOW	BPOO	BPOCH	NFEM	FPOW	FPOO	FPOCH
32D	STA Tech Controller	NA	EL	CS	105	995	.65	.64	.01	254	.00	.04	-.04	202	.13	-.12	-.01
72E	Cmbt Telecom Ctr Op	NA	SC	CS	90	5271	.51	.53	-.02	1306	-.00	-.04	.03	824	.18	-.05	-.13
72G	Auto Data Telecom Cen Op	NA	SC	CS	90	958	.60	.56	.04	340	.10	.07	-.03	364	.16	-.07	-.09
26Q	TAC Sat/MW Sys Op	NE	EL	CS	95	878	.53	.55	-.02	190	-.02	.01	-.00	52	.46	.71	.25
31C	Single Channel Radio Operator	NE	SC	CS	100	7262	.63	.64	-.00	2410	.07	.04	-.04	884	.08	.19	.02
31K	Combat Signaler	NE	EL	CS	90	4546	.58	.55	.02	2017	.06	.08	.02	115	.44	.63	.19
31M	Multi-Chan Commo Equip Op	NE	EL	CS	90	5120	.68	.67	.01	1940	.01	.08	.07	976	.03	.16	.12
31N	Tactical CNT Con	NE	EL	CS	95	257	.54	.56	-.01	.	.	.	.	.	.	.	.
31V	TAC Comm Sysop/Mech	NE	EL	CS	95	1869	.59	.55	.01	431	-.02	.00	-.02	.	.	.	.
36M	Wire System Operator	NE	EL	CS	100	358	.30	.27	.03	161	.09	.15	.06	76	.28	.26	-.02
36C	Wire Sys Inst/Op	NE	EL	CS	90	2907	.54	.51	.03	1324	.04	.08	.04	521	.09	.17	.08

CNF=33 INTERCEPT SYSTEMS

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPOW	BPOO	BPOCH	NFEM	FPOW	FPOO	FPOCH
33P	EW/I Rcvr Equip Repairer	NT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
33Q	EW/I P/S Equip Repairer	NT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
33R	EW/I AVN Sys Repairer	NT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
33S	EW/I Tactical Sys Repairer	NT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
33V	EW/I Aerial Sensor Repairer	NT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.

CNF=46 PUBLIC AFFAIRS

MOS		AAN EW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPOW	BPOO	BPOCH	NFEM	FPOW	FPOO	FPOCH
71Q	Journalist	NA	ST	CSS	105	159	.80	.78	.02	.	.	.	.	63	.13	-.22	.09
71R	Broadcast Journalist	NA	ST	CSS	105	83	.76	.75	.01	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-51 GENERAL ENGINEER

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPDN	BPDO	BPDCH	NFEM	FPDN	FPDO	FPDCH
00B	Diver	MG	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
51B	Carpentry & Masonry Sp	MG	GM	CS	90	836	.69	.68	.01	194	.14	.22	.08	.	.	.	.
51C	Structures Specialist	MG	GM	CS	90	135	.55	.53	.02	.	.	.	.	.	.	.	.
51G	Materials Quality Sp	MG	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
51K	Plumber	MG	GM	CS	90	294	.60	.59	.01	108	-.00	.09	.09	.	.	.	.
51M	Fire Fighter	MG	GM	CS	90	72	.73	.72	.01	.	.	.	.	.	.	.	.
51R	Interior Electrician	MG	EL	CS	95	295	.55	.52	.04	.	.	.	.	.	.	.	.
52G	Trans & Distr Sp	MG	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
62E	HV Const Equip Op	MG	GM	CS	90	1203	.65	.64	.01	125	.23	.30	.07	.	.	.	.
62F	Crane Op	MG	GM	CS	90	382	.70	.68	.02	85	.20	.29	.10	.	.	.	.
62G	Quarrying Specialist	MG	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
62H	Conc/Asphalt Equip Op	MG	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
62J	Gen Const Equip Op	MG	GM	CS	90	572	.70	.71	-.01	125	.12	.16	.04	.	.	.	.
81B	Tech Draft Sp	MG	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
82B	Construction Surveyor	MG	ST	CS	95	87	.47	.49	-.02	.	.	.	.	.	.	.	.

CMF-54 CHEMICAL

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPDN	BPDO	BPDCH	NFEM	FPDN	FPDO	FPDCH
54C	Smoke Op Sp	MG	GM	CS	100	423	.64	.63	.02	.	.	.	.	.	.	.	.
54E	NBC Specialist	MT	ST	CS	95	475	.72	.72	.00	175	.06	.10	.03	.	.	.	.

CMF-55 AMMUNITION

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPDN	BPDO	BPDCH	NFEM	FPDN	FPDO	FPDCH
55R	Ammo Stk Con & Act	MA	ST	CS	100	110	.56	.51	.05	.	.	.	.	.	.	.	.
55B	Ammunition Specialist	MT	GM	CS	95	1687	.58	.54	.04	716	.06	.09	.03	118	-.09	-.34	.15
55D	EOD Specialist	MT	GM	CS	105	119	.64	.64	-.00	.	.	.	.	.	.	.	.
55G	NUC WPN Maint Sp	MT	EL	CS	100	228	.61	.64	-.02	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-63 MECHANICAL MAINT

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCH	NBLK	BPDW	BPDO	BPDCH	WFEM	FPDW	FPDO	FPDCH
45G	FC Systems Repairer	WE	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
45H	M60A1/A3 TRT Mech	WE	MM	CS	100	320	.74	.73	.01	57	.02	-.31	.29	.	.	.	.
63G	Fuel & Elec Sys Rep	WE	MM	CS	105	472	.63	.63	.01	.	.	.	.	.	.	.	.
41C	FC Instrument Repairer	WI	GM	CS	95	356	.61	.60	.00	141	.05	-.05	.01	56	.01	-.04	.03
41J	Office Machine Repairer	WI	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
44B	Metal Worker	WI	GM	CS	90	575	.72	.72	-.01	63	.25	.33	.08	.	.	.	.
44E	Machinist	WI	GM	CS	100	456	.73	.72	.01	.	.	.	.	.	.	.	.
45B	Small Arms Repairer	WI	GM	CS	90	181	.56	.55	.01	.	.	.	.	.	.	.	.
45D	SP FA TRT Mech	WI	GM	CS	100	350	.62	.62	-.00	.	.	.	.	.	.	.	.
45E	M1 Abrams TRT Mech	WI	MM	CS	100	60	.77	.73	.03	.	.	.	.	.	.	.	.
45K	Tank Turret Repairer	WI	GM	CS	100	550	.70	.69	.01	56	.09	.19	.29	.	.	.	.
45L	Artillery Repairer	WI	GM	CS	100	241	.71	.69	.03	.	.	.	.	.	.	.	.
45T	ITV/IFV/CFV Turret Mech	WI	GM	CS	95	79	.70	.71	-.02	.	.	.	.	.	.	.	.
52C	Util Equip Repairer	WI	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
52D	Pwr Gen Equip Repairer	WI	GM	CS	100	2491	.70	.72	-.01	534	.00	.01	.01	116	.12	.03	-.09
63H	Track Veh Repairer	WI	MM	CS	90	3075	.71	.71	-.00	711	.16	.12	-.04	.	.	.	.
63J	QM & Chem Equip Repairer	WI	MM	CS	90	551	.50	.59	.01	218	.02	.02	-.01	.	.	.	.
52F	Turbine Eng Repairer	WM	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
62B	Construction Equip Repairer	WM	MM	CS	90	1550	.76	.72	.03	297	.17	.33	.16	.	.	.	.
63B	Lt W Veh & Pwr Gen Mech	WM	MM	CS	90	9957	.67	.66	.01	2589	.03	.08	.04	641	.13	.34	.21
63D	SP FA Systems Mechanic	WM	MM	CS	105	1282	.66	.64	.02	.	.	.	.	.	.	.	.
63E	M1 Abrams Tank Sys Mech	WM	MM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
63M	M60A1/A3 Tank Sys Mech	WM	MM	CS	100	1580	.67	.63	.03	179	.10	.22	.12	.	.	.	.
63S	Hvy Wheel Veh Mech	WM	MM	CS	105	845	.75	.74	.01	.	.	.	.	.	.	.	.
63T	Bradley FVS Mech	WM	MM	CS	105	2308	.70	.66	.04	131	.29	.24	-.05	.	.	.	.
63H	Wheel Veh Repairer	WM	MM	CS	90	1840	.75	.72	.03	435	.02	.08	.06	73	.27	.46	.19
63Y	Track Veh Mech	WM	MM	CS	106	949	.62	.61	.01	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-64 TRANSPORTATION

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPDN	BPDO	BPDCN	NFEM	FPDN	FPDO	FPDCN
71M	Traffic Management Coord	MA	CL	CS	100	571	.55	.54	.00	304	.10	.09	-.00	221	-.08	-.11	.03
57M	Cargo Specialist	MG	GN	CS	90	982	.47	.46	.01	434	-.01	-.03	.02	186	-.02	-.02	.00
61B	Watercraft Operator	MG	MN	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
61C	Watercraft Engineer	MG	MN	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
64C	Motor Transport Op	MG	OF	CS	90	11440	.59	.59	.00	3024	.06	.06	-.00	1107	.01	.08	.07

CMF-67 AIRCRAFT MAINT

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPDN	BPDO	BPDCN	NFEM	FPDN	FPDO	FPDCN
67G	Airplane Repairer	ME	MN	CS	105	73	.81	.80	.01	.	.	.	.	.	.	.	.
67H	OBSN APIN Repairer	ME	MN	CS	105	71	.72	.72	.01	.	.	.	.	.	.	.	.
67M	Utility MEL Repairer	ME	MN	CS	105	1425	.61	.60	.01	.	.	.	.	.	.	.	.
67V	OBN/Scout Hel Repairer	ME	MN	CS	105	714	.72	.73	-.00	.	.	.	.	.	.	.	.
68B	ACFT Powerplant Repairer	ME	MN	CS	105	325	.72	.72	.00	.	.	.	.	.	.	.	.
68D	ACFT Powertrain Repairer	ME	MN	CS	105	306	.70	.64	.05	.	.	.	.	.	.	.	.
68F	Aircraft Electrician	ME	MN	CS	105	215	.68	.68	.00	.	.	.	.	.	.	.	.
68H	Aircraft Pneudraulics Repairer	ME	MN	CS	105	153	.74	.79	-.05	.	.	.	.	.	.	.	.
68J	Aircraft FC Repairer	ME	EL	CS	95	195	.62	.57	.05	.	.	.	.	.	.	.	.
68M	Aircraft Weapon Sys Repairer	ME	GN	CS	95	373	.61	.61	.00	.	.	.	.	.	.	.	.
67T	TAC Trans Hel Repairer	MG	MN	CS	105	219	.55	.54	.00	.	.	.	.	.	.	.	.
67R	AH-64 Attk Hel Repairer	MM	MM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
67S	Scout Hel Repairer	MM	MM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
67U	Medium Hel Repairer	MM	MM	CS	105	774	.60	.59	.01	.	.	.	.	.	.	.	.
67Y	Attack Hel Repairer	MM	MM	CS	105	731	.69	.67	.02	.	.	.	.	.	.	.	.
68G	Aircraft Structural Repairer	MT	MN	CS	105	672	.64	.58	.06	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CNF=71 ADMINISTRATION

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	NEW	VOLD	VCN	NBLK	BPON	BPOD	BPOCN	NFEM	FPON	FPOD	FPOCN
03C	Phy Activities Sp	MA	ST	CSS	105	116	.60	.53	.07	.		.	.	.	.	.	.
71L	Administrative Specialist	MA	CL	CSS	95	12743	.65	.64	.01	6773	.01	.02	.01	6863	-.17	-.17	.01
71M	Chapel Activities Sp	MA	CL	CSS	95	809	.51	.51	-.00	283	.17	.16	-.01	349	-.05	-.05	.00
73C	Finance Specialist	MA	CL	CSS	95	1655	.61	.60	.01	863	.04	.06	.02	673	-.10	-.10	.00
73D	Accounting Specialist	MA	ST	CSS	105	72	.75	.70	.06	.	.	.	.	.	.	.	.
75B	Personnel Admin Sp	MA	CL	CSS	95	2417	.66	.66	.00	1140	.07	.07	.00	638	-.01	-.03	.03
75C	Personnel Mgt Sp	MA	CL	CSS	95	1494	.67	.67	.00	794	.07	.09	.02	596	-.05	-.06	.02
75D	Personnel Rec Sp	MA	CL	CSS	95	2898	.65	.65	.00	1641	.00	.02	.02	925	-.04	-.05	.01
75E	Personnel Act Sp	MA	CL	CSS	95	1113	.67	.67	.00	510	.09	.11	.02	350	-.09	.00	-.01
75F	Pers Info Sys Mgt Spec	MA	CL	CSS	105	640	.68	.67	.01	295	.07	.09	.02	129	-.10	-.12	.02
71D	Legal Specialist	MG	CL	CSS	110	145	.34	.28	.06	.	.	.	.	.	.	.	.

CNF=74 DATA PROCESSING

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	NEW	VOLD	VCN	NBLK	BPON	BPOD	BPOCN	NFEM	FPON	FPOD	FPOCN
74D	Computer/Tape Writer	MA	ST	CSS	100	545	.68	.64	.04	55	.33	-.17	-.16	84	-.28	-.50	.21
74F	Programmer/Analyst	MA	ST	CSS	100	277	.73	.71	.02	.	.	.	.	.	.	.	.
34L	FA Digital Sys Repairer	ME	EL	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.
34T	Tactical Comp Sys Repairer	ME	EL	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.
34Y	FA Computer Repairer	ME	EL	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-75 SUPPLY AND SERVICE

MOS		AAMEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
76C	Equip Rec & PTS Sp	MA	CL	CSS	95	2592	.57	.56	-.01	1479	.07	.07	.00	591	.12	.02	.00
76P	MAT Ctl Actg Sp	MA	CL	CSS	90	2465	.54	.54	.00	1447	.00	.01	.01	799	-.12	-.12	.00
76V	Mat Stor & Hdlg Sp	MA	CL	CSS	90	4865	.54	.54	-.00	2644	.02	.02	.01	1246	-.04	-.05	.01
76X	Subsistence Supply Sp	MA	CL	CSS	90	539	.69	.62	-.00	354	.03	.04	.01	65	-.15	-.18	.03
76Y	Unit Supply Sp	MA	CL	CSS	95	9218	.55	.54	.00	4490	-.00	-.00	.00	2271	-.12	-.13	.02
43E	Parachute Rigger	MG	GM	CSS	.	.	.	.	.	.	.	.	.	.	.	.	.
43M	Fabric Repairer Sp	MG	GM	CSS	85	92	.57	.53	.04	60	.10	.08	-.02	.	.	.	.
57E	Laundry & Bath Sp	MG	GM	CSS	85	198	.47	.46	.01	135	.08	.10	.03	.	.	.	.
57F	Graves Reg Sp	MG	GM	CSS	90	78	.65	.65	-.00	.	.	.	.	.	.	.	.

CMF-77 PETROLEUM AND WATER

MOS		AAMEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
77F	Petroleum Supply Spec	MG	CL	CSS	90	2937	.62	.56	.06	1658	.04	.11	.07	398	-.02	.21	.19
77W	Water Treatment Spec	MG	GM	CSS	90	209	.59	.59	.00	99	-.01	-.02	.01	.	.	.	.
77L	Petroleum Lab Spec	MT	ST	CSS	95	55	.63	.64	-.00	.	.	.	.	.	.	.	.

CMF-81 TOPOGRAPHY

MOS		AAMEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
81C	Cartographer	MA	ST	CS	85	167	.53	.49	.04	.	.	.	.	.	.	.	.
41B	Topo Inst Repair Sp	MG	GM	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
83F	Photolithographer	MG	ST	CS	85	114	.49	.48	-.01	.	.	.	.	.	.	.	.
81Q	Terrain Analyst	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
82D	Topographic Surveyor	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
83E	Photo/Layout SP	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CNF-91 MEDICAL

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	BBLK	BPDN	BPDO	BPDCN	NFEM	FPDN	FPDO	FPDCN
42D	Dental Lab Sp	MA	GN	CS	100	202	.45	.31	.14	.	.	.	.	51	-.02	-.02	.00
71G	Patient Admin Sp	MA	CL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
76J	Medical Supply Sp	MA	CL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91E	Dental Specialist	MA	ST	CS	95	834	.63	.62	.01	219	.11	.16	.05	290	-.11	-.13	.02
91P	X-Ray Specialist	MA	ST	CS	100	242	.42	.39	.03	.	.	.	.	62	-.05	-.14	.09
91Q	Pharmacy Specialist	MA	ST	CS	95	522	.61	.60	.01	68	.39	.61	.21	159	-.13	-.08	-.05
91R	Veterinary Specialist	MA	ST	CS	100	551	.63	.63	.00	134	.44	.42	-.03	191	-.10	-.11	.00
91Y	Eye Specialist	MA	ST	CS	95	60	.78	.75	.04	.	.	.	.	.	.	.	.
92B	Medical Lab Sp	MA	ST	CS	95	1218	.38	.36	.02	264	.07	.09	.02	432	-.05	-.11	.06
35G	Biomed Eq Sp Basic	MT	EL	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
42E	Optical Lab Sp	MT	GN	CS	.	.	.	.	.	.	.	.	.	.	.	.	
91A	Medical Specialist	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91D	Operating Room Sp	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91F	Psychiatric Specialist	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91G	Behavioral Science Sp	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91H	Orthopedic Specialist	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91J	Physical Therapy Sp	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91L	OCC Therapy Sp	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91N	Cardiac Specialist	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91S	Environ Health Sp	MT	ST	CS	95	303	.58	.58	.00	67	.05	-.13	.09	94	-.00	.03	.03
91T	Animal Care Sp	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
91U	Ent Specialist	MT	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
94F	Hospital Food Service Sp	MT	OF	CS	100	243	.76	.76	.00	.52	.18	.11	.07	67	-.05	.10	.05

CNF-93 AVIATION OPERATION

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	BBLK	BPDN	BPDO	BPDCN	NFEM	FPDN	FPDO	FPDCN
93D	ATCSS Equip Repairer	MA	EL	SS	105	67	.85	.84	.01	.	.	.	.	.	.	.	.
93H	ATC Tower Operator	MA	ST	CS	100	410	.66	.65	.00	.	.	.	.	.	.	.	.
93J	ATC Radar Controller	MA	ST	CS	100	442	.77	.74	.02	.	.	.	.	.	.	.	.
93P	Flight Op Sp	MA	ST	CS	95	586	.72	.71	.02	91	.03	.03	.00	124	.11	-.11	-.00

Comparison of Validity and Subgroup Statistics
for Current and Proposed AA Composites Based on SQT Criteria

CMF-94 FOOD SERVICE

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
94B	Food Service Sp	MT	OF	CSS	90	8898	.57	.56	.01	3795	.09	.06	-.03	1799	.04	-.03	-.01

CMF-95 LAW ENFORCEMENT

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
95B	Military Police	MI	ST	CS	105	12831	.68	.68	.00	867	.07	.14	.07	1220	.05	.10	.04
95C	Correctional Sp	MI	ST	CS	85	612	.59	.58	.01	171	.04	-.13	.09	.	.	.	.

CMF-96 INTELLIGENCE

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
96B	Intelligence Analyst	MA	ST	CS	105	818	.73	.73	.01	.	.	.	.	104	.00	.03	-.05
96D	Image Interpreter	MI	ST	CS	95	50	.74	.71	.04	.	.	.	.	.	.	.	.
96H	AER SNS SP OV-1D	MI	SC	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
96R	GND Surv1 Sys Op	MI	EL	CS	85	781	.65	.62	.03	149	.04	.16	.12	.	.	.	.
97B	CI Agent	MI	ST	CS	105	87	.38	.31	.08	.	.	.	.	.	.	.	.
97G	SIGSEC Sp	MI	SC	CS	95	478	.64	.64	.00	.	.	.	.	.	.	.	.
96F	Psych Op Sp	MI	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.

CMF-98 CRYPTOLOGY

MOS		AANEW	AAOLD	MOSTYPE	AACUT	NTOT	VNEW	VOLD	VCN	NBLK	BPON	BPOO	BPOCN	NFEM	FPON	FPOO	FPOCN
05H	EW/Sigint Inter-TMC	MA	ST	CS	95	769	.58	.54	.04	83	.13	.23	.11	143	-.01	-.13	.13
05K	EW/Sigint M-M Intcp	MA	ST	CS	95	369	.53	.51	.01	.	.	.	.	119	-.11	-.17	.06
98C	EW/Sigint Analyst	MA	ST	CS	105	1192	.74	.74	.01	.	.	.	.	361	-.04	-.11	.08
98J	EW/Sigint MC Intecp	MA	ST	CS	.	.	.	.	.	.	.	.	.	.	.	.	.
05D	EW/Sigint Ident/LOC	MT	ST	CS	95	265	.74	.74	.00	.	.	.	.	53	.01	.07	.06

Appendix C

VALIDITIES FOR APTITUDE AREA COMPOSITES BY MOS AND SQT YEAR

CL - Clerical
CO - Combat
EL - Electronic Maintenance
FA - Field Artillery
GM - General Maintenance
MM - Mechanical Maintenance
NM - Mechanical Maintenance (New)
OF - Operators/Food
SC - Surveillance and Communication
ST - Skilled Technical

Validities for Alternative Composites by MOS and SQT Year

MOS	YR	N	CMF	AACLUS	CL	CO	EL	FA	GM	MM	MN	OF	SC	ST	MAX
03C	85	116	71	ST	.58	.51	.52	.56	.46	.43	.35	.50	.50	.53	.63
05D	83	50	98	ST	.67	.64	.63	.69	.60	.55	.45	.59	.59	.64	.72
05D	84	67	98	ST	.83	.79	.86	.81	.79	.76	.66	.78	.80	.82	.86
05D	85	148	98	ST	.73	.73	.73	.73	.71	.70	.62	.73	.74	.74	.76
05H	83	132	98	ST	.73	.65	.68	.70	.63	.60	.49	.66	.65	.68	.74
05H	84	265	98	ST	.39	.35	.41	.38	.38	.31	.30	.31	.36	.37	.45
05H	85	637	98	ST	.54	.48	.52	.52	.47	.45	.36	.48	.48	.51	.55
05K	83	164	98	ST	.56	.61	.56	.59	.54	.57	.48	.61	.53	.57	.64
05K	84	195	98	ST	.47	.47	.50	.48	.47	.48	.41	.48	.47	.47	.53
11B	83	10396	11	CO	.65	.64	.66	.64	.65	.62	.56	.64	.65	.67	.68
11B	84	3101	11	CO	.59	.58	.60	.59	.58	.56	.51	.59	.60	.61	.62
11B	85	17766	11	CO	.55	.5[illegible]	.57	.54	.57	.55	.51	.56	.57	.57	.58
11C	83	2295	11	CO	.63	.61	.63	.62	.61	.58	.52	.61	.61	.64	.65
11C	84	577	11	CO	.61	.58	.62	.58	.62	.58	.53	.61	.61	.64	.65
11C	85	3965	11	CO	.53	.54	.55	.52	.54	.53	.48	.55	.55	.55	.56
11H	83	1492	11	CO	.63	.64	.65	.63	.64	.63	.58	.65	.66	.66	.67
11H	84	373	11	CO	.67	.67	.70	.68	.68	.66	.58	.65	.66	.67	.72
11H	85	2730	11	CO		.54	.54	.51	.55	.53	.51	.54	.55	.54	.56
12B	83	2645	12	CO	.[illegible]	.43	.42	.42	.41	.41	.39	.41	.43	.42	.45
12B	84	990	12	CO	.52	.50	.54	.51	.52	.49	.45	.51	.52	.54	.55
12B	85	4508	12	CO	.51	.53	.54	.52	.54	.53	.50	.53	.55	.54	.56
12C	83	418	12	MM	.32	.36	.36	.34	.37	.37	.35	.36	.36	.36	.39
12C	84	83	12	MM	.57	.73	.63	.66	.67	.67	.64	.67	.66	.64	.79
12C	85	1052	12	MM	.49	.58	.55	.53	.58	.58	.58	.56	.58	.55	.60
12E	83	218	12	CO	.41	.45	.42	.44	.43	.42	.40	.43	.44	.43	.47
12F	85	389	12	CO	.28	.35	.34	.30	.38	.37	.43	.34	.37	.33	.42
13B	83	4610	13	FA	.53	.54	.55	.53	.55	.53	.49	.54	.55	.55	.56
13B	84	5335	13	FA	.47	.48	.49	.48	.48	.48	.44	.48	.50	.49	.50
13B	85	10674	13	FA	.43	.45	.46	.44	.46	.45	.43	.45	.47	.45	.48
13C	83	59	13	ST	.48	.37	.45	.48	.36	.34	.22	.37	.36	.43	.57
13C	84	63	13	ST	.77	.70	.78	.74	.74	.70	.59	.74	.72	.77	.84
13C	85	146	13	ST	.73	.72	.72	.72	.71	.69	.62	.73	.73	.74	.77
13E	83	814	13	ST	.57	.52	.57	.55	.54	.49	.43	.51	.53	.56	.58
13E	84	446	13	ST	.73	.69	.72	.72	.68	.65	.56	.68	.70	.72	.74
13F	83	1008	13	FA	.62	.58	.62	.61	.59	.56	.49	.58	.59	.61	.63
13F	84	410	13	FA	.68	.70	.70	.70	.69	.68	.62	.69	.69	.69	.73
13F	85	1893	13	FA	.67	.66	.69	.67	.67	.66	.57	.66	.67	.69	.70
13M	83	493	13	OF	.38	.62	.41	.40	.41	.40	.39	.39	.42	.40	.44
13M	84	477	13	OF	.52	.57	.54	.52	.56	.56	.55	.57	.59	.55	.59
13M	85	993	13	OF	.51	.53	.53	.51	.53	.52	.49	.54	.55	.53	.55
13R	83	159	13	SC	.23	.32	.34	.28	.38	.37	.39	.30	.32	.30	.49
13R	84	133	13	SC	.26	.25	.25	.26	.23	.20	.21	.24	.28	.30	.40
13R	85	197	13	SC	.60	.63	.61	.62	.62	.62	.55	.65	.62	.63	.67
13R	85	68	13	SC	.27	.20	.29	.26	.23	.15	.14	.14	.21	.25	.43

Validities for Alternative Composites by MOS and SQT Year

MOS	YR	N	CNF	AACLUS	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST	MM
15E	83	420	13	OF	.51	.63	.59	.55	.64	.66	.67	.63	.64	.59	.68
15J	83	75	13	FA	.25	.36	.35	.30	.40	.39	.40	.34	.34	.34	.50
15J	84	50	13	FA	.02	.15	.15	.06	.23	.20	.24	.13	.11	.08	.57
16D	83	87	16	OF	.24	.08	.20	.18	.11	.07	.03	.11	.10	.16	.45
16D	84	93	16	OF	.43	.48	.47	.45	.50	.4.	.51	.45	.51	.46	.59
16D	85	390	16	OF	.39	.47	.44	.43	.47	.46	.47	.44	.46	.43	.50
16E	83	87	16	OF	.31	.29	.32	.29	.31	.27	.28	.27	.32	.30	.38
16E	84	123	16	OF	.67	.69	.71	.70	.68	.67	.60	.67	.68	.68	.73
16E	85	453	16	OF	.59	.61	.62	.60	.61	.59	.55	.59	.61	.62	.63
16H	85	159	16	OF	.44	.54	.52	.47	.56	.57	.57	.53	.55	.50	.59
16J	84	131	16	OF	.19	.15	.19	.18	.16	.13	.10	.14	.14	.14	.26
16J	85	137	16	OF	.35	.38	.39	.38	.36	.35	.35	.32	.38	.36	.51
16P	84	313	16	OF	.43	.46	.46	.44	.46	.46	.44	.46	.47	.46	.48
16P	85	962	16	OF	.41	.48	.48	.43	.52	.50	.52	.47	.49	.46	.54
16R	84	616	16	OF	.42	.48	.47	.45	.48	.48	.47	.46	.49	.47	.51
16R	85	738	16	OF	.49	.55	.54	.50	.57	.55	.56	.54	.57	.54	.59
16S	84	779	16	OF	.47	.45	.47	.47	.45	.43	.39	.44	.46	.47	.48
16S	85	1270	16	OF	.47	.50	.49	.48	.49	.49	.47	.49	.51	.48	.52
16T	83	99	16	OF	.33	.44	.36	.39	.39	.46	.47	.44	.46	.39	.56
16T	85	61	16	OF	.71	.68	.76	.70	.75	.71	.63	.70	.70	.74	.78
19D	83	1281	19	CO	.58	.59	.58	.59	.57	.56	.51	.59	.59	.59	.61
19D	84	287	19	CO	.58	.63	.62	.60	.64	.62	.60	.60	.65	.61	.67
19D	85	3315	19	CO	.52	.53	.55	.51	.55	.53	.51	.53	.56	.55	.57
19E	83	2289	19	CO	.58	.62	.61	.59	.62	.61	.58	.62	.64	.62	.64
19E	84	2021	19	CO	.61	.65	.64	.63	.64	.64	.60	.65	.66	.64	.67
19E	85	4061	19	CO	.55	.59	.57	.56	.59	.58	.55	.59	.60	.58	.61
19K	85	1496	19	CO	.55	.56	.58	.55	.58	.56	.52	.57	.58	.58	.59
21G	83	68	27	EL	.66	.71	.69	.64	.73	.71	.71	.73	.74	.71	.77
21L	85	105	27	EL	.63	.53	.58	.57	.55	.51	.41	.59	.55	.61	.70
24C	83	66	23	EL	.42	.49	.47	.43	.53	.50	.57	.48	.54	.49	.64
24C	85	124	23	EL	.54	.57	.60	.56	.59	.58	.54	.55	.58	.57	.63
24G	85	80	23	EL	.36	.44	.40	.39	.44	.45	.46	.41	.43	.37	.50
24J	85	70	27	EL	.79	.78	.78	.80	.76	.74	.68	.78	.80	.82	.86
24K	85	83	27	EL	.83	.83	.82	.85	.77	.77	.65	.80	.80	.80	.87
24L	85	85	27	EL	.75	.68	.73	.72	.67	.63	.53	.66	.67	.69	.76
24M	84	100	23	EL	.43	.53	.56	.48	.51	.52	.51	.50	.52	.49	.55
24M	85	101	23	EL	.51	.64	.63	.55	.69	.68	.71	.62	.65	.59	.74
24P	84	121	23	EL	.22	.30	.25	.25	.30	.31	.37	.31	.33	.30	.49
24P	85	76	23	EL	.32	.38	.36	.34	.43	.42	.43	.40	.41	.39	.47
25M	85	118	23	EL	.68	.61	.66	.65	.62	.57	.50	.63	.64	.68	.70
25P	83	193	31	EL	.46	.38	.47	.42	.44	.36	.33	.38	.41	.46	.51
25P	84	178	31	EL	.62	.60	.64	.63	.61	.57	.51	.57	.60	.62	.65
26Q	85	507	31	EL	.51	.53	.54	.52	.53	.53	.50	.51	.54	.52	.58
26T	85	76	25	EL	.55	.65	.57	.57	.59	.64	.59	.67	.64	.57	.71

Validities for Alternative Composites by MOS and SQT Year

MOS	YR	N	CMN	AACELPS	CL	CO	FA	FF	GM	MM	MM	OF	SC	SI	MAX
27B	83	67	27	EL	.63	.62	.68	.60	.67	.62	.59	.62	.65	.63	.70
27B	84	64	27	EL	.64	.70	.66	.65	.69	.67	.60	.69	.73	.69	.75
27B	85	77	27	EL	.61	.65	.61	.64	.59	.61	.56	.63	.64	.62	.68
27E	83	285	27	EL	.61	.52	.56	.58	.52	.51	.40	.56	.53	.58	.63
27E	84	285	27	EL	.43	.40	.42	.41	.40	.40	.33	.43	.41	.42	.44
27E	85	399	27	EL	.44	.44	.44	.44	.42	.43	.36	.45	[illegible]	.44	.47
27F	83	69	27	EL	.37	.34	.36	.35	.33	.33	.31	.34	.38	.35	.40
27F	84	55	27	EL	.76	.63	.73	.73	.84	.57	.47	.61	.66	.74	.81
27M	85	50	27	EL	.80	.67	.78	.75	.63	.63	.65	.74	.68	.74	.89
27R	83	59	27	EL	.39	.56	.69	.48	.56	.53	.58	.58	.54	.52	.69
27R	84	57	27	EL	.30	.34	.36	.33	.37	.34	.30	.33	.31	.36	.45
27R	85	83	27	EL	.46	.53	.46	.51	.47	.55	.48	.57	.53	.51	.61
29E	83	162	29	EL	.60	.54	.55	.59	.58	.48	.38	.55	.53	.58	.64
29E	84	63	29	EL	.79	.80	.81	.79	.80	.81	.70	.84	.80	.80	.87
29E	85	351	29	EL	.62	.62	.60	.63	.57	.57	.49	.60	.61	.59	.67
29F	85	87	29	EL	.76	.78	.79	.76	.78	.77	.68	.81	.79	.81	.84
29J	83	156	29	EL	.64	.59	.63	.62	.60	.56	.50	.60	.62	.66	.67
29J	84	204	29	EL	.71	.65	.70	.70	.65	.63	.51	.67	.65	.70	.74
29J	85	493	29	EL	.76	.70	.75	.73	.72	.68	.58	.73	.71	.75	.79
29M	83	72	29	EL	.42	.52	.45	.51	.45	.52	.44	.50	.47	.44	.58
29R	84	102	29	EL	.72	.73	.71	.75	.69	.69	.58	.75	.72	.76	.80
29M	85	259	29	EL	.65	.67	.66	.67	.64	.63	.56	.66	.66	.68	.70
29N	85	229	29	EL	.71	.70	.68	.79	.65	.66	.55	.71	.69	.69	.76
29V	85	469	29	EL	.70	.67	.70	.68	.67	.64	.57	.68	.69	.71	.72
31C	83	922	31	SC	.60	.64	.65	.61	.67	.64	.62	.64	.66	.65	.68
31C	83	1779	31	SC	.52	.56	.57	.52	.59	.57	.57	.55	.59	.56	.60
31C	84	884	31	SC	.61	.64	.64	.62	.65	.64	.60	.64	.66	.63	.67
31C	85	3677	31	SC	.61	.64	.64	.62	.64	.62	.58	.63	.65	.65	.66
31K	83	1426	31	EL	.52	.56	.56	.53	.57	.56	.54	.55	.58	.56	.59
31K	84	681	31	EL	.40	.49	.45	.44	.47	.48	.47	.45	.47	.43	.51
31K	85	3120	31	EL	.49	.53	.54	.49	.56	.54	.54	.52	.56	.53	.58
31M	83	1545	31	EL	.63	.69	.70	.66	.73	.71	.70	.69	.72	.69	.74
31M	84	1756	31	EL	.62	.64	.64	.61	.65	.64	.60	.65	.67	.65	.67
31M	85	2819	31	EL	.63	.65	.67	.63	.68	.65	.62	.65	.67	.67	.69
31N	83	147	31	EL	.53	.55	.56	.56	.53	.55	.47	.54	.53	.54	.59
31N	84	110	31	EL	.56	.50	.55	.51	.55	.53	.45	.55	.52	.56	.59
31N	85	252	31	EL	.46	.40	.49	.43	.47	.41	.36	.42	.42	.47	.51
31V	83	613	31	EL	.50	.49	.52	.48	.52	.50	.45	.50	.50	.51	.53
31V	84	209	31	EL	.64	.62	.67	.61	.66	.64	.58	.65	.66	.66	.69
31V	85	1047	31	EL	.50	.51	.54	.49	.56	.54	.51	.56	.54	.54	.56
32D	83	396	31	EL	.69	.64	.68	.67	.64	.60	.53	.65	.66	.68	.70
32D	84	52	31	EL	.70	.61	.65	.66	.61	.57	.43	.65	.60	.68	.81
32D	85	549	31	EL	.62	.57	.62	.60	.58	.53	.47	.55	.58	.61	.63
35E	85	112	29	EL	.52	.48	.53	.51	.51	.48	.41	.48	.48	.50	.55
35N	85	218	29	EL	.60	.66	.62	.66	.63	.67	.61	.66	.65	.62	.79
35K	83	69	28	EL	.64	.65	.65	.63	.65	.64	.59	.65	.66	.64	.71

Validities for Alternative Composites by MOS and SQT Year

MOS	YR	N	CMF	AACLUS	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST	MAX
16C	83	1078	31	EL	.59	.61	.62	.59	.63	.62	.58	.62	.63	.62	.64
16C	85	1829	31	EL	.39	.47	.44	.41	.48	.49	.50	.45	.48	.44	.51
19K	85	358	31	EL	.23	.30	.27	.26	.30	.32	.33	.30	.31	.28	.35
41C	83	95	63	GM	.49	.46	.52	.48	.48	.42	.40	.41	.47	.47	.57
41C	84	135	63	GM	.61	.62	.62	.59	.63	.60	.59	.61	.65	.63	.66
41C	85	221	63	GM	.57	.56	.58	.55	.59	.57	.52	.59	.58	.58	.62
42D	83	59	91	GM	.13	.14	.09	.15	.09	.00	.02	.04	.07	.08	.58
42D	84	71	91	GM	.36	.32	.35	.38	.30	.24	.19	.26	.29	.33	.44
42D	85	131	91	GM	.47	.34	.42	.45	.32	.31	.17	.37	.35	.44	.60
43E	83	143	76	GM	.34	.28	.33	.32	.30	.26	.20	.29	.27	.32	.39
43E	85	613	76	GM	.35	.33	.33	.35	.32	.31	.26	.33	.33	.34	.36
43M	84	92	76	GM	.48	.50	.52	.49	.53	.49	.51	.48	.54	.52	.60
44M	85	167	76	GM	.42	.45	.45	.41	.48	.46	.46	.46	.48	.45	.50
44B	83	105	63	GM	.39	.50	.47	.43	.35	.55	.55	.52	.51	.47	.58
44B	84	183	63	GM	.65	.76	.72	.68	.77	.77	.76	.76	.79	.75	.80
44B	85	392	63	GM	.64	.69	.68	.64	.71	.70	.67	.70	.72	.70	.73
44E	83	79	63	GM	.56	.63	.64	.58	.68	.67	.69	.63	.66	.63	.73
44E	84	136	63	GM	.64	.67	.72	.66	.73	.70	.67	.66	.69	.69	.76
44E	85	243	63	GM	.60	.71	.68	.65	.72	.71	.72	.68	.72	.69	.77
45B	85	181	63	GM	.44	.49	.52	.45	.55	.49	.55	.45	.54	.50	.64
45D	83	174	63	GM	.30	.24	.31	.27	.16	.18	.12	.26	.25	.25	.42
45D	84	199	63	GM	.59	.59	.59	.57	.60	.61	.56	.63	.63	.61	.65
45D	85	151	63	GM	.48	.62	.57	.51	.66	.69	.72	.65	.66	.59	.74
45E	85	60	63	MM	.74	.71	.77	.70	.75	.73	.69	.74	.79	.77	.84
45K	83	142	63	GM	.51	.42	.50	.46	.46	.43	.35	.47	.47	.51	.54
45K	84	202	63	GM	.53	.60	.62	.52	.68	.64	.79	.60	.67	.61	.75
45K	85	356	63	GM	.63	.68	.67	.63	.69	.69	.67	.69	.71	.67	.72
45L	83	63	63	GM	.04	.16	.15	.06	.22	.22	.27	.16	.17	.12	.46
45L	84	101	63	GM	.77	.83	.82	.77	.84	.84	.82	.84	.87	.82	.88
45L	85	140	63	GM	.57	.63	.56	.60	.58	.59	.56	.61	.62	.59	.65
45M	83	106	63	MM	.42	.54	.45	.48	.47	.50	.48	.51	.51	.47	.56
45M	84	154	63	MM	.13	.07	.13	.11	.09	.03	.06	.03	.08	.10	.28
45M	85	320	63	MM	.69	.74	.73	.72	.74	.73	.68	.74	.74	.73	.76
45T	85	79	63	GM	.64	.70	.69	.65	.71	.66	.67	.66	.72	.69	.76
46M	85	116	27	EL	.45	.39	.44	.42	.42	.36	.32	.40	.40	.43	.49
51B	83	296	51	GM	.41	.45	.43	.42	.46	.46	.46	.46	.48	.44	.49
51B	84	289	51	GM	.62	.70	.68	.65	.72	.73	.70	.72	.73	.70	.74
51B	85	547	51	GM	.63	.66	.66	.64	.66	.63	.61	.65	.68	.67	.69
51C	83	61	51	GM	.56	.66	.66	.62	.68	.69	.62	.67	.63	.64	.77
51C	85	74	51	GM	.44	.50	.43	.48	.41	.41	.40	.44	.49	.46	.57
51K	84	52	51	GM	.11	.34	.17	.20	.25	.40	.43	.37	.35	.23	.66
51K	85	294	51	GM	.57	.57	.61	.56	.59	.56	.54	.56	.60	.60	.63
51M	85	72	51	GM	.70	.73	.72	.72	.72	.71	.66	.72	.73	.72	.77
51R	83	86	51	EL	.30	.39	.40	.32	.45	.41	.47	.36	.41	.37	.52
51R	85	295	51	EL	.49	.57	.52	.53	.54	.54	.53	.54	.56	.52	.59

Validities for Alternative Composites by MOS and SOI Year

MOS	YR	N	CNF	AACLUS	CL	CO	EL	FA	GN	MM	MM	OF	SC	ST	MAX
52D	84	458	63	GM	.60	.63	.66	.60	.67	.64	.64	.62	.66	.64	.69
52D	85	2033	63	GM	.67	.68	.72	.67	.73	.69	.65	.68	.71	.71	.73
54C	83	190	54	GM	.46	.55	.53	.51	.55	.56	.56	.52	.55	.51	.61
54C	84	125	54	GM	.63	.69	.72	.63	.77	.74	.76	.70	.74	.71	.79
54C	85	108	54	GM	.56	.61	.60	.61	.59	.57	.55	.56	.60	.59	.65
54E	83	475	54	ST	.70	.69	.72	.69	.70	.68	.62	.69	.72	.72	.76
55B	83	489	55	GM	.30	.33	.30	.31	.30	.32	.30	.33	.34	.31	.36
55B	84	556	55	GM	.64	.61	.61	.65	.56	.57	.44	.62	.60	.62	.67
55B	85	1133	55	GM	.56	.53	.55	.54	.53	.51	.45	.54	.55	.56	.57
55D	85	119	55	GM	.58	.64	.61	.59	.64	.65	.62	.66	.66	.63	.67
55G	83	138	55	EL	.60	.56	.63	.37	.59	.53	.49	.54	.58	.59	.66
55G	84	90	55	EL	.64	.62	.65	.64	.62	.59	.53	.60	.62	.63	.66
55G	85	172	55	EL	.51	.51	.50	.54	.45	.41	.34	.44	.45	.48	.63
55R	85	110	55	ST	.55	.44	.49	.52	.43	.38	.28	.44	.43	.51	.58
57E	83	80	76	GM	.49	.46	.47	.52	.41	.39	.28	.42	.41	.46	.56
57E	84	118	76	GM	.38	.50	.45	.43	.49	.51	.53	.47	.50	.43	.55
57E	85	328	76	GM	.18	.30	.25	.23	.30	.32	.34	.27	.30	.24	.37
57F	85	78	76	GM	.69	.65	.71	.67	.65	.57	.52	.59	.65	.68	.77
57M	83	265	64	GM	.00	.03	.02	.03	.02	.03	.05	.00	.03	.00	.25
57R	84	346	64	GM	.42	.45	.45	.43	.46	.45	.44	.44	.44	.45	.48
57M	85	637	64	GM	.45	.45	.47	.45	.46	.45	.41	.45	.47	.47	.48
62B	84	458	63	MM	.63	.78	.72	.68	.79	.80	.81	.76	.79	.72	.82
62B	85	1092	63	MM	.49	.64	.60	.53	.68	.69	.74	.63	.67	.59	.74
62E	83	233	51	GM	.44	.57	.52	.51	.55	.58	.57	.53	.55	.50	.62
62E	85	970	51	GM	.59	.67	.64	.63	.66	.65	.64	.65	.67	.64	.69
62F	85	382	51	GM	.61	.69	.66	.64	.68	.71	.68	.70	.71	.66	.72
62J	83	133	51	GM	.39	.42	.41	.39	.42	.44	.39	.44	.42	.40	.47
62J	85	572	51	GM	.62	.69	.68	.64	.71	.69	.68	.68	.70	.68	.72
63B	83	2354	63	MM	.33	.40	.38	.35	.40	.41	.42	.38	.41	.37	.43
63B	84	3028	63	MM	.64	.74	.71	.66	.75	.75	.75	.73	.75	.70	.77
63B	85	6929	63	MM	.48	.59	.56	.51	.62	.62	.64	.59	.61	.55	.65
63D	83	309	63	MM	.41	.40	.44	.41	.44	.41	.39	.40	.42	.44	.45
63D	84	383	63	MM	.63	.74	.70	.66	.75	.76	.77	.74	.76	.70	.78
63D	85	590	63	MM	.52	.64	.61	.54	.68	.69	.73	.64	.69	.61	.74
63G	83	103	63	MM	.15	.16	.17	.17	.15	.15	.13	.15	.16	.17	.23
63G	84	131	63	MM	.57	.70	.68	.61	.74	.73	.74	.69	.71	.68	.77
63G	85	238	63	MM	.69	.75	.74	.69	.78	.77	.74	.78	.78	.76	.81
63H	83	708	63	MM	.48	.51	.56	.49	.50	.50	.47	.51	.52	.50	.53
63H	84	916	63	MM	.69	.78	.77	.71	.81	.80	.80	.78	.81	.76	.83
63H	85	1451	63	MM	.63	.74	.70	.66	.74	.75	.74	.73	.75	.70	.77
63J	83	73	63	MM	.33	.36	.39	.33	.41	.34	.38	.30	.36	.33	.51
63J	84	120	63	MM	.58	.66	.64	.60	.67	.67	.66	.66	.69	.64	.70
63J	85	358	63	MM	.51	.60	.56	.54	.60	.61	.61	.59	.62	.57	.63
63M	83	450	63	MM	.25	.26	.26	.23	.27	.28	.27	.28	.29	.27	.31
63M	84	600	63	MM	.47	.55	.54	.48	.59	.59	.61	.56	.59	.54	.63
63M	85	980	63	MM	.47	.61	.56	.50	.63	.66	.70	.62	.65	.57	.71
63S	83	96	63	MM	.23	.38	.32	.25	.42	.44	.52	.39	.42	.32	.57

Validities for Alternative Composites by MOS and SQT Year

MOS	YR	N	CMF	AACLUS	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST	GMAS
63S	84	228	63	MM	.64	.70	.70	.64	.74	.71	.71	.70	.73	.69	.76
63S	85	617	63	MM	.60	.72	.69	.63	.74	.75	.76	.72	.74	.69	.77
63T	84	939	63	MM	.51	.63	.60	.53	.67	.66	.70	.63	.66	.60	.71
63T	85	1369	63	MM	.48	.61	.58	.50	.65	.65	.70	.61	.65	.57	.71
63W	83	456	63	MM	.41	.39	.40	.39	.39	.38	.34	.41	.41	.42	.43
63W	84	473	63	MM	.67	.79	.75	.70	.80	.81	.82	.78	.81	.74	.83
63W	85	1367	63	MM	.50	.65	.60	.54	.68	.69	.73	.65	.67	.59	.73
63Y	83	189	63	MM	.50	.51	.50	.50	.51	.51	.48	.53	.53	.53	.56
63Y	84	268	63	MM	.39	.48	.44	.39	.49	.48	.52	.44	.50	.44	.57
63Y	85	492	63	MM	.61	.71	.68	.63	.73	.74	.74	.71	.74	.68	.76
64C	83	3477	64	OF	.39	.42	.42	.40	.42	.42	.40	.41	.43	.41	.44
64C	84	3962	64	OF	.54	.56	.57	.54	.57	.56	.52	.56	.58	.57	.59
64C	85	7478	64	OF	.55	.60	.58	.56	.60	.60	.58	.60	.62	.59	.62
67G	83	73	67	MM	.77	.80	.81	.78	.81	.80	.74	.80	.82	.81	.86
67G	85	194	67	MM	.47	.59	.54	.52	.58	.61	.63	.57	.60	.52	.66
67H	85	71	67	MM	.58	.67	.67	.62	.72	.72	.71	.69	.70	.71	.78
67H	83	477	67	MM	.55	.63	.61	.58	.63	.62	.62	.61	.64	.60	.66
67H	85	948	67	MM	.51	.57	.56	.52	.60	.59	.60	.58	.61	.58	.63
67I	85	219	67	MM	.51	.55	.54	.54	.53	.54	.48	.54	.53	.53	.57
67U	83	277	67	MM	.61	.70	.64	.64	.68	.70	.68	.70	.71	.67	.72
67U	85	497	67	MM	.42	.53	.47	.46	.53	.54	.56	.52	.54	.49	.58
67V	83	207	67	MM	.41	.35	.40	.35	.41	.37	.37	.40	.42	.44	.49
67V	85	716	67	MM	.61	.72	.68	.64	.72	.73	.72	.71	.73	.68	.75
67Y	83	169	67	MM	.50	.66	.59	.55	.67	.69	.72	.66	.68	.61	.74
67Y	85	562	67	MM	.53	.66	.62	.58	.67	.67	.68	.64	.67	.63	.71
68B	83	74	67	MM	.43	.45	.44	.43	.42	.47	.40	.47	.46	.43	.53
68B	84	100	67	MM	.70	.73	.74	.70	.76	.71	.69	.73	.75	.74	.78
68B	85	225	67	MM	.66	.73	.69	.69	.71	.73	.69	.73	.74	.71	.75
68D	83	102	67	MM	.34	.26	.36	.35	.28	.19	.10	.22	.22	.34	.50
68D	84	112	67	MM	.81	.78	.82	.80	.79	.77	.66	.80	.79	.82	.84
68D	85	194	67	MM	.57	.57	.61	.54	.64	.57	.57	.59	.60	.62	.67
68F	83	63	67	MM	.55	.52	.59	.52	.59	.56	.53	.53	.55	.53	.65
68F	84	69	67	MM	.69	.63	.66	.65	.63	.63	.52	.69	.66	.68	.73
68F	85	146	67	MM	.64	.72	.70	.70	.70	.70	.66	.68	.70	.68	.74
68G	83	171	67	MM	.48	.38	.48	.42	.44	.39	.34	.42	.44	.47	.52
68G	84	173	67	MM	.71	.61	.67	.66	.61	.59	.50	.64	.65	.67	.73
68G	85	328	67	MM	.71	.69	.72	.70	.70	.67	.60	.69	.70	.71	.73
68H	84	51	67	MM	.40	.27	.27	.37	.18	.18	.05	.32	.27	.36	.73
68H	85	153	67	MM	.62	.77	.70	.69	.74	.79	.75	.76	.76	.69	.90
68J	83	160	67	EL	.08	.19	.11	.12	.14	.20	.24	.17	.20	.13	.35
68J	84	195	67	EL	.49	.58	.57	.52	.62	.61	.61	.59	.60	.59	.65
68M	83	134	67	GM	.30	.25	.30	.27	.30	.26	.24	.27	.27	.29	.37
68M	84	165	67	GM	.52	.56	.60	.53	.62	.59	.59	.56	.59	.59	.64
68M	85	208	67	GM	.47	.55	.55	.48	.61	.62	.61	.60	.59	.58	.65

Validities for Alternative Composites by MOS and CAT Year

MOS	YR	N	DIF	AACEUS	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST	MAX
71D	83	345	71	CL	.28	.32	.35	.33	.35	.27	0.31	.21	.29	.30	.53
71L	83	3450	71	CL	.66	.57	.62	.63	.56	.52	0.42	.58	.58	.62	.66
71L	84	3234	71	CL	.66	.57	.62	.63	.56	.52	0.43	.58	.58	.62	.67
71L	85	6059	71	CL	.62	.54	.58	.60	.52	.48	0.39	.54	.54	.58	.63
71M	83	285	71	CL	.53	.47	.51	.49	.48	.46	0.39	.52	.50	.53	.56
71M	85	526	71	CL	.51	.48	.51	.49	.49	.48	0.42	.50	.51	.52	.53
71N	83	138	66	CL	.46	.44	.45	.49	.40	.38	0.31	.38	.43	.42	.51
71N	84	198	66	CL	.60	.51	.57	.57	.49	.44	0.36	.47	.51	.54	.63
71N	85	373	66	CL	.52	.49	.51	.53	.47	.46	0.38	.48	.48	.51	.54
71Q	85	159	46	ST	.80	.68	.73	.73	.68	.63	0.53	.72	.73	.78	.84
71R	85	83	46	ST	.76	.67	.73	.68	.69	.64	0.54	.72	.71	.75	.82
72E	83	717	31	SC	.49	.54	.55	.50	.57	.56	0.55	.51	.54	.54	.58
72E	85	2554	31	SC	.53	.50	.53	.52	.51	.48	0.44	.50	.52	.53	.54
72G	85	958	31	SC	.61	.56	.60	.59	.56	.53	0.44	.56	.56	.60	.62
73C	83	660	71	CL	.74	.72	.71	.74	.67	.68	0.57	.74	.71	.72	.78
73C	84	635	71	CL	.69	.66	.69	.69	.64	.61	0.53	.64	.66	.68	.71
73C	85	760	71	CL	.46	.41	.43	.45	.38	.36	0.29	.39	.48	.42	.48
73D	85	72	71	ST	.75	.66	.71	.73	.64	.61	0.48	.66	.65	.70	.77
74D	83	139	74	ST	.47	.46	.44	.46	.43	.40	0.36	.46	.46	.47	.54
74D	84	80	74	ST	.69	.55	.62	.65	.51	.48	0.35	.54	.56	.60	.74
74D	85	326	74	ST	.75	.68	.70	.72	.65	.63	0.52	.69	.68	.72	.78
74F	83	89	74	ST	.76	.67	.77	.72	.73	.67	0.57	.70	.70	.77	.81
74F	85	188	74	ST	.71	.64	.68	.68	.64	.58	0.51	.63	.65	.69	.74
75B	83	707	71	CL	.70	.64	.67	.69	.62	.60	0.50	.64	.64	.67	.71
75B	84	716	71	CL	.61	.54	.59	.59	.55	.51	0.44	.54	.55	.58	.61
75B	85	994	71	CL	.67	.60	.64	.65	.59	.55	0.46	.60	.60	.63	.68
75C	83	354	71	CL	.64	.59	.65	.62	.60	.55	0.49	.57	.61	.64	.66
75C	84	446	71	CL	.75	.67	.71	.74	.64	.62	0.49	.67	.66	.71	.77
75C	85	694	71	CL	.63	.58	.61	.63	.55	.52	0.43	.55	.56	.59	.64
75D	83	760	71	CL	.67	.59	.65	.65	.59	.53	0.46	.57	.60	.64	.68
75D	84	799	71	CL	.69	.62	.67	.67	.61	.56	0.47	.60	.62	.65	.70
75D	85	1339	71	CL	.61	.55	.59	.60	.53	.50	0.41	.54	.55	.58	.62
75E	83	346	71	CL	.63	.61	.61	.64	.57	.57	0.49	.60	.61	.62	.65
75E	84	345	71	CL	.70	.67	.70	.71	.64	.60	0.51	.64	.65	.69	.72
75E	85	422	71	CL	.67	.57	.63	.64	.57	.51	0.42	.57	.58	.63	.67
75F	83	167	71	CL	.70	.67	.67	.72	.62	.60	0.50	.65	.65	.68	.72
75F	84	190	71	CL	.70	.63	.67	.69	.61	.58	0.47	.63	.64	.68	.71
75F	85	283	71	CL	.63	.59	.61	.63	.56	.56	0.45	.60	.59	.61	.65
76C	83	1307	76	CL	.54	.50	.53	.52	.53	.48	0.44	.49	.52	.53	.56
76C	84	1285	76	CL	.62	.54	.60	.59	.55	.50	0.42	.54	.55	.59	.62
76C	85	2887	76	CL	.45	.41	.44	.44	.41	.37	0.33	.38	.41	.43	.46
76P	83	865	76	CL	.63	.55	.60	.61	.54	.50	0.42	.54	.55	.59	.63
76P	85	1600	76	CL	.49	.43	.46	.48	.42	.40	0.32	.42	.43	.45	.50
76V	83	1356	76	CL	.59	.59	.60	.60	.58	.56	0.50	.57	.59	.60	.62
76V	84	1329	76	CL	.59	.56	.59	.59	.56	.53	0.47	.55	.57	.59	.61

Validities for Alternative Composites by MOS and SQT Year

MOS	YR	N	CHF	AACLUS	CL	CO	EL	FA	GM	MM	MM	OF	SC	ST	MAX
76V	85	2170	76	CL	.48	.47	.49	.48	.47	.43	.40	.44	.47	.48	.50
76X	83	155	76	CL	.46	.45	.48	.42	.49	.47	.48	.48	.53	.50	.58
76X	84	143	76	CL	.72	.69	.70	.72	.65	.63	.52	.68	.68	.71	.74
76X	85	241	76	CL	.65	.62	.62	.66	.57	.55	.46	.59	.60	.62	.67
76Y	83	3139	76	CL	.57	.53	.56	.56	.53	.51	.44	.54	.54	.56	.58
76Y	84	758	76	CL	.58	.53	.58	.55	.55	.52	.45	.54	.56	.57	.59
76Y	85	5321	76	CL	.52	.47	.50	.51	.46	.43	.36	.47	.47	.50	.53
77F	83	532	77	CL	.59	.61	.62	.59	.62	.59	.56	.60	.63	.62	.64
77F	84	370	77	CL	.63	.65	.65	.64	.64	.63	.59	.65	.67	.65	.67
77F	85	2035	77	CL	.53	.59	.59	.55	.60	.59	.58	.57	.61	.57	.62
77L	85	55	77	SI	.63	.59	.64	.62	.60	.56	.50	.57	.60	.64	.70
77W	85	209	77	GM	.59	.56	.60	.58	.59	.53	.49	.55	.58	.60	.61
81C	85	166	81	SI	.52	.49	.52	.54	.47	.44	.35	.45	.45	.49	.57
81E	85	154	25	SI	.65	.64	.66	.66	.63	.59	.53	.61	.63	.66	.68
82B	85	87	51	SI	.50	.42	.51	.48	.47	.42	.35	.43	.44	.49	.53
82C	83	518	13	SI	.58	.59	.60	.60	.58	.56	.51	.56	.58	.59	.62
82C	84	54	13	SI	.55	.67	.68	.62	.69	.69	.70	.60	.67	.60	.83
82C	85	757	13	SI	.65	.63	.66	.65	.63	.60	.54	.60	.63	.63	.68
83F	85	114	81	SI	.45	.48	.48	.48	.48	.45	.43	.45	.47	.48	.51
84B	85	144	25	SI	.71	.67	.71	.70	.69	.64	.57	.67	.68	.72	.74
84F	85	70	25	SI	.43	.45	.50	.45	.52	.43	.44	.44	.45	.49	.58
91E	83	254	91	SI	.39	.35	.39	.39	.37	.36	.28	.37	.35	.39	.43
91E	84	282	91	SI	.61	.56	.60	.59	.57	.52	.45	.56	.57	.60	.62
91E	85	552	91	SI	.64	.59	.61	.62	.57	.55	.46	.60	.60	.63	.66
91F	83	51	91	SI	.04	.09	.05	.10	.07	.00	.06	.00	.04	.06	.45
91F	84	56	91	SI	.34	.31	.29	.36	.25	.25	.20	.30	.31	.33	.43
91F	85	95	91	SI	.27	.27	.20	.29	.18	.18	.16	.25	.24	.25	.43
91J	85	80	91	SI	.28	.31	.28	.33	.26	.26	.21	.26	.26	.27	.38
91P	83	242	91	SI	.40	.38	.40	.42	.37	.39	.28	.40	.35	.39	.48
91Q	83	112	91	SI	.67	.62	.65	.65	.63	.63	.52	.67	.64	.68	.71
91Q	84	137	91	SI	.67	.69	.66	.70	.63	.62	.54	.66	.66	.66	.72
91Q	85	273	91	SI	.55	.50	.56	.57	.50	.46	.38	.47	.49	.55	.59
91R	83	191	91	SI	.42	.41	.40	.44	.38	.35	.28	.38	.37	.40	.48
91R	84	225	91	SI	.57	.52	.57	.54	.53	.49	.41	.53	.53	.56	.60
91R	85	326	91	SI	.67	.63	.66	.64	.64	.62	.54	.67	.66	.67	.70
91S	83	96	91	SI	.47	.50	.50	.48	.50	.51	.45	.51	.50	.48	.54
91S	84	113	91	SI	.50	.53	.51	.53	.50	.50	.43	.52	.51	.53	.56
91S	85	190	91	SI	.56	.56	.55	.57	.53	.53	.47	.56	.57	.57	.60
91T	83	60	91	SI	.78	.66	.73	.71	.68	.66	.53	.73	.70	.75	.83
91T	84	65	91	SI	.52	.36	.50	.43	.43	.34	.26	.39	.48	.48	.59
91T	85	108	91	SI	.50	.40	.45	.45	.42	.39	.32	.44	.45	.49	.52
92B	83	447	91	SI	.38	.32	.39	.35	.36	.31	.29	.30	.35	.36	.42
92B	84	553	91	SI	.55	.47	.55	.51	.51	.45	.38	.47	.49	.53	.57
92B	85	665	91	SI	.24	.22	.24	.24	.21	.20	.14	.20	.21	.21	.27
93D	83	67	93	EL	.83	.86	.84	.85	.82	.83	.73	.86	.84	.83	.90

Validities for Alternative Composites by MOS and SOI Year

MOS	YR	N	CMF	AACLUS	CL	CO	EI	FA	GM	MM	MM	OF	SC	ST	MAX
93F	83	72	13	EL	.41	.35	.40	.39	.39	.32	.34	.33	.39	.41	.58
93F	84	80	13	EL	.52	.53	.50	.55	.66	.47	.42	.49	.32	.51	.58
93F	85	83	13	EL	.52	.49	.55	.51	.52	.45	.44	.45	.51	.52	.59
93M	83	179	93	SI	.58	.51	.55	.55	.50	.48	.40	.51	.53	.55	.60
93M	84	231	93	SI	.72	.71	.75	.72	.72	.71	.62	.73	.72	.73	.76
93M	85	344	93	SI	.49	.47	.48	.49	.45	.43	.37	.46	.47	.48	.51
93J	83	74	93	SI	.75	.71	.67	.74	.61	.65	.51	.75	.71	.71	.84
93J	84	114	93	SI	.79	.75	.78	.78	.75	.73	.61	.78	.75	.78	.84
93J	85	254	93	SI	.74	.68	.73	.70	.71	.67	.58	.71	.71	.74	.79
93P	83	106	93	SI	.36	.31	.33	.33	.31	.30	.24	.33	.32	.33	.38
93P	84	166	93	SI	.64	.66	.64	.66	.61	.59	.53	.61	.64	.63	.69
93P	85	420	93	SI	.75	.71	.72	.73	.68	.66	.57	.72	.72	.74	.78
94B	83	2804	94	OF	.55	.56	.57	.54	.57	.54	.51	.55	.58	.57	.59
94B	84	87	94	OF	.37	.38	.40	.34	.40	.37	.39	.37	.43	.38	.49
94B	85	6007	94	OF	.55	.58	.58	.56	.58	.57	.53	.57	.59	.57	.60
94F	83	61	91	OF	.67	.71	.71	.69	.72	.71	.65	.74	.72	.75	.77
94F	85	182	91	OF	.77	.75	.75	.77	.72	.72	.62	.76	.76	.76	.80
95B	83	3781	95	SI	.63	.61	.62	.61	.61	.59	.53	.62	.63	.63	.65
95B	84	1937	95	SI	.46	.44	.45	.44	.44	.43	.38	.45	.45	.46	.47
95B	85	9050	95	SI	.68	.66	.68	.66	.66	.64	.58	.67	.69	.70	.71
95C	83	138	95	SI	.24	.21	.20	.22	.18	.18	.13	.22	.20	.20	.33
95C	84	193	95	SI	.66	.63	.60	.63	.58	.59	.50	.68	.65	.66	.74
95C	85	419	95	SI	.55	.53	.54	.55	.51	.50	.43	.53	.53	.54	.57
96B	83	186	96	SI	.71	.62	.70	.67	.64	.58	.49	.63	.64	.69	.73
96B	84	222	96	SI	.75	.70	.75	.73	.70	.65	.57	.69	.71	.74	.77
96B	85	410	96	SI	.74	.67	.72	.70	.68	.64	.55	.69	.70	.73	.76
96D	85	50	96	SI	.64	.67	.69	.62	.74	.67	.68	.68	.70	.71	.77
96R	83	256	96	EL	.50	.62	.53	.54	.58	.62	.60	.62	.62	.55	.65
96R	84	50	96	EL	.46	.52	.50	.53	.53	.54	.48	.54	.49	.54	.65
96R	85	475	96	EL	.65	.70	.69	.65	.71	.70	.67	.71	.73	.69	.73
97B	83	87	96	SI	.30	.32	.35	.30	.37	.34	.37	.30	.34	.31	.45
97G	83	142	96	SC	.63	.75	.64	.72	.65	.70	.63	.73	.71	.68	.78
97G	84	157	96	SC	.44	.54	.47	.52	.47	.50	.48	.49	.52	.50	.60
97G	85	179	96	SC	.67	.68	.68	.68	.66	.66	.59	.68	.68	.68	.71
98C	83	253	98	SI	.86	.78	.80	.84	.73	.69	.57	.77	.78	.83	.88
98C	84	323	98	SI	.77	.72	.75	.76	.70	.67	.59	.71	.74	.76	.79
98C	85	616	98	SI	.68	.65	.67	.67	.64	.60	.56	.65	.66	.69	.70

Appendix D

INSTRUCTIONS AND MATERIALS USED TO COLLECT WEIGHTING JUDGMENTS FOR INFANTRYMEN (MOS 11B)

JUDGING THE IMPORTANCE OF PERFORMANCE FACTORS IN ARRIVING AT TOTAL SCORES

Background

A number of different kinds of performance factors are being considered by Project A to assess the effectiveness of first-tour enlisted personnel. These various performance factors must be combined into one overall measure of MOS performance. This overall measure should be the best that can be obtained given the available component performance factors. The overall measure will be used as the performance measure against which the ASVAB and other predictor performance factors will be validated. To obtain the best overall measure for each MOS in our sample, Project A staff will be asking knowledgeable officers and NCOs to assign weights to the various performance factors in a manner that reflects the relative importance that the component performance factors should have in forming an overall measure for the MOS.

Today we would like to get your judgments about the relative weights that the factors should receive in deriving an overall performance measure for first-tour Infantryman (11B). The performance factors are

Task Proficiency: MOS specific technical skills--This performance factor represents the proficiency with which the soldier performs the tasks which are "central" to MOS 11B. The tasks represent the core of the job and they are the primary definers of the MOS. For example, the first tour Infantryman engages enemy target with hand grenades; installs and fires/recovers an M18A1 claymore mine; selects hasty firing positions in urban terrain; zeros an AN/PVS-4 to an M16A1 rifle; and uses weapons and other equipment in offensive and defensive combat operations.

This performance factor does not include the individual's willingness to perform the task or the degree to which the individual can coordinate his efforts with others. It refers to how well the individual can execute the core technical tasks the job requires, given a willingness to do so.

Task Proficiency: General soldiering skills--In addition to the core technical content specific to an MOS, individuals in every MOS are also responsible for being able to perform a variety of general soldiering tasks--for example, determines grid coordinates on military maps, puts on, wears and removes M17 series protective mask with hood, determines a magnetic azimuth using a compass, collects/reports information--SALUTE, recognizes and identifies friendly and threat aircraft. Performance on this factor represents overall proficiency on these general soldiering tasks. Again, it refers to how well the individual can execute general soldiering tasks, given a willingness to do so.

Exercise of Leadership, Effort, and Self Development- This performance factor reflects the degree to which the individual exerts effort over the full range of job tasks perseveres under adverse or dangerous conditions, and demonstrates leadership and support toward peers. That is, can the individual be counted on to carry out assigned tasks, even under adverse conditions, to exercise good judgment, and to be generally dependable and proficient. While appropriate knowledges and skills are necessary for successful performance, this factor is only meant to reflect the individual's willingness to do the job required and to be cooperative and supportive with other soldiers.

Maintaining Personal Discipline--This performance factor reflects the degree to which the individual adheres to Army regulations and traditions, exercises personal self control, demonstrates integrity in day to day behavior, and does not create disciplinary problems. People who rank high on this factor show a commitment to high standards of personal conduct.

Military Bearing/Appearance and Physical Fitness--This performance factor represents the degree to which the individual maintains an appropriate military appearance and bearing and stays in good physical condition.

Please assume that a total score will be derived for each soldier from the separate scores obtained from each of these factors. These total scores will be our best estimate of the overall effectiveness of the troops whose performance will be measured. We need the assistance of experienced Army personnel in determining how much weight should be given each factor in arriving at the total effectiveness scores.

Purpose

The purpose of this workshop is to obtain the weights to be assigned each of the performance factors. Two methods of assigning weights will be used. The methods differ in the kinds of judgments you will be required to make:

Method A: You will be asked to rank order the performance factors and then assign weights to them, assuming that the top ranked factor has a weight of 100.

Method B: You will be given performance profiles on 10 sets of 15 soldiers each and asked to rank order them. (The profiles will give the scores of the soldiers on two of the five performance factors at a time.)

Assumptions for Both Methods

(1) The type of soldiers for whom performance factor weights are being derived is first tour Infantryman (11B).

(2) As the weights you assign may be a function of the particular context in which the soldiers' performance is being evaluated, please assume the following military situation prevails:

> The world is in a period of heightened tensions. There is an increasing probability that hostilities will break out in Europe, Asia, the Caribbean, Latin America, and Africa. The Army's mission is to support U.S. treaty obligations and to help defend the borders of allied and friendly nations. Some of the potential enemies have nuclear and chemical capability. Air parity does exist between allied forces and potential hostile nations. U.S. Army training and other preparatory activities have been substantially increased. Most combat and associated support units are participating in frequent field exercises. Most units are being actively resupplied.

(3) Performance factor scores are available only on the factors given. Although there may be other factors that comprise overall performance, no scores are available for them at this time.

DIRECTIONS FOR METHOD A

Under this weighting method, the procedure for assigning weights to the performance factors is as follows:

1. Rank order the set of performance factors to be weighted by assigning a "1" to the most important, a "2" to the next most important, etc. Please refer to the "PERFORMANCE FACTORS FOR MOS 11B" handout for a complete description of the 5 performance factors.

2. After you have recorded the rank orders on the weighting sheet, assign 100 points to the factor you ranked as most important. Then ask yourself, "If I'm assigning 100 points to this performance factor, how many points should I assign to the next most important one." If, for example, you think that the second most important one should receive half the weight of the first, assign it 50 points. Continue assigning points in this manner until all the factors have been weighted.

3. In assigning the points, please keep in mind that the points represent how many times more (or less) important one performance factor is than another. For example, if you assign 30 points to one factor and 5 points to another, that means that you believe that the 30-point factor should receive 6 times the weight in the total score as the 5-point factor.

4. If you feel that two or more factors should be weighted equally, you may assign them equal weights. For example, if you feel that the factors ranked first and second are really tied in importance, then you can assign them both 100 points.

5. If you believe that a particular performance factor should not be used at all in arriving at the total score, you should assign it zero points.

6. When you are finished assigning points to all performance factors, please make sure that they are in the "right" ratio to one another. That is, the points assigned to all factors are in correct proportion to one another.

Thank you for your cooperation.

Name _____ Workshop _____

MOS 11B Performance Factor Weighting Sheet

Performance Factor*	Rank Order	Weight
1. Task proficiency -- MOS specific technical skills.	_____	_____
2. Task proficiency -- general soldiering skills.	_____	_____
3. Exercise of leadership, effort, and self development.	_____	_____
4. Maintaining personal discipline.	_____	_____
5. Military bearing/appearance and physical fitness.	_____	_____

* Please refer to the "PERFORMANCE FACTORS FOR MOS 11B" handout for a complete description of the 5 performance factors.

PERFORMANCE FACTORS FOR MOS 11B

1) Task Proficiency: MOS specific technical skills

This performance factor represents the proficiency with which the soldier performs the tasks which are "central" to MOS 11B. The tasks represent the core of the job and they are the primary definers of the MOS. For example, the first tour Infantryman engages enemy target with hand grenades; installs and fires/recovers an M18A1 claymore mine; selects hasty firing positions in urban terrain; zeros an AN/PVS-4 to an M16A1 rifle; and uses weapons and other equipment in offensive and defensive combat operations.

This performance factor does not include the individual's willingness to perform the task or the degree to which the individual can coordinate his efforts with others. It refers to how well the individual can execute the core technical tasks the job requires, given a willingness to do so.

2) Task Proficiency: General soldiering skills

In addition to the core technical content specific to an MOS, individuals in every MOS are also responsible for being able to perform a variety of general soldiering tasks--for example, determines grid coordinates on military maps, puts on, wears and removes M17 series protective mask with hood, determines a magnetic azimuth using a compass, collects/ reports information - SALUTE, recognizes and identifies friendly and threat aircraft. Performance on this factor represents overall proficiency on these general soldiering tasks. Again, it refers to how well the individual can execute general soldiering tasks, given a willingness to do so.

3) Exercise of Leadership, Effort, and Self Development

This performance factor reflects the degree to which the individual exerts effort over the full range of job tasks, perseveres under adverse or dangerous conditions, and demonstrates leadership and support toward peers. That is, can the individual be counted on to carry out assigned tasks, even under adverse conditions, to exercise good judgment, and to be generally dependable and proficient. While appropriate knowledges and skills are necessary for successful performance, this factor is only meant to reflect the individual's willingness to do the job required and to be cooperative and supportive with other soldiers.

4) Maintaining Personal Discipline

This performance factor reflects the degree to which the individual adheres to Army regulations and traditions, exercises personal self control, demonstrates integrity in day-to-day behavior, and does not create disciplinary problems. People who rank high on this factor show a commitment to high standards of personal conduct.

5) Military Rearing/Appearance and Physical Fitness

This performance factor represents the degree to which the individual maintains an appropriate military appearance and bearing and stays in good physical condition.

DIRECTIONS FOR METHOD B

Under this method, judgments of the overall performance scores for 10 sets of Infantrymen will be obtained. Each set will contain 15 Infantrymen. The performance scores of each of the 15 first tour Infantrymen have been recorded on 2 performance factor scales. (A different pair of performance factor scales are provided for each of the 10 sets). For each scale there is a description of high, medium and low levels of performance. Each of the 15 soldiers is rated on a 7-point scale that ranges from the lowest level of performance to the highest. Please refer to the "PERFORMANCE FACTORS FOR MOS 11B" handout for a complete description of the 5 performance factors. Also, please review the assumptions given in the General Instructions.

Specific Instructions

1. Rank the 15 Infantrymen in the first set in order of their overall performance. Give the "best" soldier a rank of "1", the second best soldier a rank of "2" and so on. Make comparisons between the soldiers on the basis of their overall performance as Infantrymen; do not consider how they might be used in other capacities.

2. When you are finished, please go over the rank order carefully making sure that, in your judgment, the ranks reflect the relative overall performance of the soldiers. Feel free to change any ranks.

3. When satisfied with your rank ordering, proceed to the next set of 15 Infantrymen.

Thank you for your cooperation.

(A sample sheet for one pair of performance factor scales follows.)

Name _____ Sheet No. 1

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Task Proficiency-- MOS Specific Technical Skills	Task Proficiency-- General Soldiering Skills	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

TASK PROFICIENCY—MOS SPECIFIC TECHNICAL SKILLS

Does not display the knowledge/skill required to perform many core technical skills.		Displays the knowledge/ skill required to perform most core technical tasks properly, but may need help for harder tasks.			Displays the knowledge/ skill to perform all core technical tasks properly.	
1	2	3	4	5	6	7

TASK PROFICIENCY—GENERAL SOLDIERING SKILLS

Does not display the knowledge/skill required to perform many general soldiering tasks.		Displays the knowledge/ skill required to perform most general soldiering tasks, but may need help for harder tasks.			Displays the knowledge/ skill to perform all general soldiering skills.	
1	2	3	4	5	6	7

Name _____ Sheet No. 2

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Military Bearing/ Appearance and Physical Fitness	Exercise of Leadership, Effort and Self Development	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

MILITARY BEARING/APPEARANCE AND PHYSICAL FITNESS

Maintains self in poor physical condition. Fails to meet military standards for dress or personal hygiene.	Meets Army standards of physical fitness. Dresses neatly and meets Army standards of personal hygiene.	Exceeds Army standards and expectations set for physical fitness. Maintains excellent personal hygiene and proper appearance.

1 2 3 4 5 6 7

EXERCISE OF LEADERSHIP, EFFORT AND SELF DEVELOPMENT

Fails to take charge when leadership is required in unit. Provides little or no assistance to other unit members. Seldom exerts effort in accomplishing many job assignments and tasks. Gives up easily under adverse conditions.	Performs satisfactorily in leadership situations where what is expected is well known. When asked, gives help and support to fellow soldiers. Usually exerts effort to perform most job assignments and tasks.	Takes charge when necessary to lead unit; leads the squad to outstanding performance. Does everything possible to assist other soldiers. Always exerts considerable effort in performing all job assignments and tasks.

1 2 3 4 5 6 7

Name _____ Sheet No. 3

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Maintaining Personal Discipline	Task Proficiency--MOS Specific Technical Skills	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

MAINTAINING PERSONAL DISCIPLINE

Occasionally shows disrespect towards superiors; often fails to follow Army/unit rules, regulations or orders. Creates disciplinary problems.		Rarely exhibits disrespectful behavior towards superiors. Almost always follows Army/unit rules, regulations or orders.			Always treats superiors with respect. Maintains high level of personal integrity. Obeys orders quickly and with enthusiasm.	
1	2	3	4	5	6	7

TASK PROFICIENCY--MOS SPECIFIC TECHNICAL SKILLS

Does not display the knowledge/skill required to perform many core technical skills.		Displays the knowledge/skill required to perform most core technical tasks properly, but may need help for harder tasks.			Displays the knowledge/skill to perform all core technical tasks properly.	
1	2	3	4	5	6	7

Name _____ Sheet No. 4

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Exercise of Leadership, Effort, and Self Development	Task Proficiency--General Soldiering Skills	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

EXERCISE OF LEADERSHIP, EFFORT AND SELF DEVELOPMENT

Fails to take charge when leadership is required in unit. Provides little or no assistance to other unit members. Seldom exerts effort in accomplishing many job assignments and tasks. Gives up easily under adverse conditions.		Performs satisfactorily in leadership situations where what is expected is well known. When asked, gives help and support to fellow soldiers. Usually exerts effort to perform most job assignments and tasks.			Takes charge when necessary to lead unit; leads the squad to outstanding performance. Does everything possible to assist other soldiers. Always exerts considerable effort in performing all job assignments and tasks.	
1	2	3	4	5	6	7

TASK PROFICIENCY--GENERAL SOLDIERING SKILLS

Does not display the knowledge/skill required to perform many general soldiering tasks.		Displays the knowledge/skill required to perform most general soldiering tasks, but may need help for harder tasks.			Displays the knowledge/skill to perform all general soldiering skills.	
1	2	3	4	5	6	7

Name _____ Sheet No. 5

MOS 11R OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Maintaining Personal Discipline	Military Bearing/ Appearance and Physical Fitness	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

MAINTAINING PERSONAL DISCIPLINE

Occasionally shows disrespect towards superiors; often fails to follow Army/unit rules, regulations or orders. Creates disciplinary problems.		Rarely exhibits disrespectful behavior towards superiors. Almost always follows Army/unit rules, regulations or orders.			Always treats superiors with respect. Maintains high level of personal integrity. Obeys orders quickly and with enthusiasm.	
1	2	3	4	5	6	7

MILITARY BEARING/APPEARANCE AND PHYSICAL FITNESS

Maintains self in poor physical condition. Fails to meet military standards for dress or personal hygiene.		Meets Army standards of physical fitness. Dresses neatly and meets Army standards of personal hygiene.			Exceeds Army standards and expectations set for physical fitness. Maintains excellent personal hygiene and proper appearance.	
1	2	3	4	5	6	7

Name _____ Sheet No. 6

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Soldier No.	Performance Level: Task Proficiency—MOS Specific Technical Skills	Performance Level: Exercise of Leadership, Effort, and Self Development	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

TASK PROFICIENCY—MOS SPECIFIC TECHNICAL SKILLS

Does not display the knowledge/skill required to perform many core technical skills.		Displays the knowledge/skill required to perform most core technical tasks properly, but may need help for harder tasks.			Displays the knowledge/skill to perform all core technical tasks properly.	
1	2	3	4	5	6	7

EXERCISE OF LEADERSHIP, EFFORT AND SELF DEVELOPMENT

Fails to take charge when leadership is required in unit. Provides little or no assistance to other unit members. Seldom exerts effort in accomplishing many job assignments and tasks. Gives up easily under adverse conditions.		Performs satisfactorily in leadership situations where what is expected is well known. When asked, gives help and support to fellow soldiers. Usually exerts effort to perform most job assignments and tasks.			Takes charge when necessary to lead unit; leads the squad to outstanding performance. Does everything possible to assist other soldiers. Always exerts considerable effort in performing all job assignments and tasks.	
1	2	3	4	5	6	7

Name _____ Sheet No. 7

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Task Proficiency—General Soldiering Skills	Maintaining Personal Discipline	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

TASK PROFICIENCY—GENERAL SOLDIERING SKILLS

Does not display the knowledge/skill required to perform many general soldiering tasks.		Displays the knowledge/skill required to perform most general soldiering tasks, but may need help for harder tasks.			Displays the knowledge/skill to perform all general soldiering skills.	
1	2	3	4	5	6	7

MAINTAINING PERSONAL DISCIPLINE

Occasionally shows disrespect towards superiors; often fails to follow Army/unit rules, regulations or orders. Creates disciplinary problems.		Rarely exhibits disrespectful behavior towards superiors. Almost always follows Army/unit rules, regulations or orders.			Always treats superiors with respect. Maintains high level of personal integrity. Obeys orders quickly and with enthusiasm.	
1	2	3	4	5	6	7

Name _____ Sheet No. 8

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Military Bearing/ Appearance and Physical Fitness	Task Proficiency-- MOS Specific Technical Skills	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

MILITARY BEARING/APPEARANCE AND PHYSICAL FITNESS

Maintains self in poor physical condition. Fails to meet military standards for dress or personal hygiene.		Meets Army standards of physical fitness. Dresses neatly and meets Army standards of personal hygiene.			Exceeds Army standards and expectations set for physical fitness. Maintains excellent personal hygiene and proper appearance.	
1	2	3	4	5	6	7

TASK PROFICIENCY--MOS SPECIFIC TECHNICAL SKILLS

Does not display the knowledge/skill required to perform many core technical skills.		Displays the knowledge/ skill required to perform most core technical tasks properly, but may need help for harder tasks.			Displays the knowledge/ skill to perform all core technical tasks properly.	
1	2	3	4	5	6	7

Name _____ Sheet No. 9

MOS 11B OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Exercise of Leadership, Effort, and Self Development	Maintaining Personal Discipline	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

EXERCISE OF LEADERSHIP, EFFORT AND SELF DEVELOPMENT

Fails to take charge when leadership is required in unit. Provides little or no assistance to other unit members. Seldom exerts effort in accomplishing many job assignments and tasks. Gives up easily under adverse conditions.		Performs satisfactorily in leadership situations where what is expected is well known. When asked, gives help and support to fellow soldiers. Usually exerts effort to perform most job assignments and tasks.			Takes charge when necessary to lead unit; leads the squad to outstanding performance. Does everything possible to assist other soldiers. Always exerts considerable effort in performing all job assignments and tasks.	
1	2	3	4	5	6	7

MAINTAINING PERSONAL DISCIPLINE

Occasionally shows disrespect towards superiors; often fails to follow Army/unit rules, regulations or orders. Creates disciplinary problems.		Rarely exhibits disrespectful behavior towards superiors. Almost always follows Army/unit rules, regulations or orders.			Always treats superiors with respect. Maintains high level of personal integrity. Obeys orders quickly and with enthusiasm.	
1	2	3	4	5	6	7

Name_____ Sheet No. 10

MOS 118 OVERALL PERFORMANCE SCORE SHEET

Performance Level

Soldier No.	Task Proficiency--General Soldiering Skills	Military Bearing/Appearance and Physical Fitness	Rank Order
1	6	2	____
2	5	5	____
3	2	6	____
4	5	3	____
5	2	3	____
6	6	5	____
7	4	7	____
8	1	4	____
9	5	6	____
10	7	4	____
11	3	5	____
12	3	3	____
13	4	4	____
14	4	1	____
15	3	2	____

Performance Scales:

TASK PROFICIENCY--GENERAL SOLDIERING SKILLS

Does not display the knowledge/skill required to perform many general soldiering tasks.		Displays the knowledge/skill required to perform most general soldiering tasks, but may need help for harder tasks.			Displays the knowledge/skill to perform all general soldiering skills.	
1	2	3	4	5	6	7

MILITARY BEARING/APPEARANCE AND PHYSICAL FITNESS

Maintains self in poor physical condition. Fails to meet military standards for dress or personal hygiene.		Meets Army standards of physical fitness. Dresses neatly and meets Army standards of personal hygiene.			Exceeds Army standards and expectations set for physical fitness. Maintains excellent personal hygiene and proper appearance.	
1	2	3	4	5	6	7

Appendix E

UTILITY WORKSHOP INSTRUCTIONS AND MATERIALS

Assigning Utility Values to Army Recruits

Overview

Many people have suggested that, all other things being equal, newly accessioned recruits differ in terms of their predicted overall value of utility to the Army for accomplishment of particular Army missions. This is not an argument that certain recruits are not needed. Rather, it is an assertion that, given some base line, adding certain recruits to some MOS has relatively greater utility to the Army than adding other recruits to other MOS.

In order to allow a computerized enlisted personnel selection and classification system to operate in the best interest of the Army, the decisions made by the system must reflect the best judgment of experienced Army officers. To inform the computerized processes involved in selecting and classifying applicants for enlistment, you will be asked to judge the relative priority that the system should place on filling different MOS with recruits having different predicted performance levels. This is not to imply that some MOS should have no newly assigned recruits or only low or high level recruits, but that the system should attempt to meet the most critical Army personnel needs first.

Purpose of Workshop

In order to determine how best to measure MOS personnel classification priorities, we are trying out various methods of obtaining judgments of experienced Army officers. In this workshop we will try out three methods. The methods call for increasingly complex judgments concerning the value or usefulness of classifying recruits into different MOS. In the first procedure, you will be asked to sort recruits into utility categories based on relative classification priorities. In the second procedure, you will judge the value of recruits relative to the value of a specified Infantryman (11B) recruit. The third procedure involves classifying groups of recruits of various predicted performance levels into a limited number of MOS. In making all the judgments called for, please consider the likely usefulness of the recruits at the given performance level in that MOS in helping achieve the Army's mission in comparison to other recruits at other performance levels in other MOS.

Assumptions

To help assure that all workshop participants are starting from the same place, we would like you to make the following assumptions when making your judgments:

(1) The military context for which the utility of the recruits is being considered is as follows:

The world is in a period of heightened tensions. There is an increasing probability that hostilities will break out in Europe, Asia, the Caribbean, Latin America and Africa. The Army's mission is to support U.S. treaty obligations and to help defend the borders of allied and friendly nations. Some of the potential enemies have nuclear and chemical capability. Air parity does exist between allied forces and potential hostile nations. U.S. Army training and other preparatory activities have been substantially increased. Most combat and associated support units are participating in frequent field exercises. Most units are being actively resupplied.

(2) The field strength of all MOS overseas is the same—70 percent.

(3) Troop replacement needs resulting from any anticipated wartime casualties will be handled separately by the computerized personnel selection and classification system. (That is, the relative priorities should reflect only the likely usefulness of recruits at given predicted performance levels in helping to achieve the Army's mission.)

(4) The measures used to predict performance include not only aptitude scores (taken from the Armed Services Vocational Aptitude Battery) but also tests of psychomotor skills, work history, interests, motivation, and other indexes that predict overall MOS performance.

(5) The overall MOS performance measure for each MOS represents an optimally weighted (for that MOS) combination of several performance factors. Thus, recruits at the highest predicted performance level (90th percentile) in each MOS are more likely to be dependable, proficient in MOS tasks, know the facts and procedures required to do their jobs, perform more effectively under adverse or difficult conditions, avoid disciplinary problems, provide support to fellow soldiers, and be more physically fit.

(6) The predicted performance levels for the recruits are accurate. That is, the recruits will actually perform at the predicted levels.

(7) The spread or amount of variation in predicted performance is equal in each MOS.

DIRECTIONS FOR PROCEDURE A: SORTING ARMY RECRUITS ON PRIORITY FOR FILLING STRENGTH REQUIREMENTS

In the first procedure to be tried out today you will be given a set of cards. On each card there is a short description of an MOS (first tour or Skill Level 10) taken from AR 611-201, which gives descriptions of all Army MOS. Also on each card is the predicted performance level in that MOS of the given recruit. The levels have been set at the 10, 30, 50, 70 or 90th percentile level and are based on the selection/classification measures available on the recruits. All percentiles are the predicted percentiles of performance of the recruits, if all recruits were rank ordered in terms of their predicted performance in the given MOS without regard to current cut-off scores. Note that a 10th percentile performance level signifies low performance and a 90th percentile performance level signifies high performance. Also please note that the percentiles refer to percentiles within all newly accessioned recruits assuming that the recruits were rank ordered in terms of their predicted performance scores for the given MOS.

The recruits on the cards have been tentatively assigned to 56 MOS without regard to current cut-off scores. The judgment task is to sort 280 cards (56 MOS X 5 predicted performance levels) into 7 piles or categories reflecting the relative utility of the recruits described on the cards. The categories are:

High positive utility would probably result if these recruits were placed in these MOS.

Between moderate and high utility would probably result if these recruits were placed in these MOS.

Moderate utility would probably result if these recruits were placed in these MOS.

Between low and moderate utility would probably result if these recruits were placed in these MOS.

Low positive utility would probably result if these recruits were placed in these MOS.

Advantages of placing these recruits in these MOS would probably be equal to the disadvantages (expected utility = 0).

Negative utility would probably result if these recruits were placed in these MOS. (Any positive contribution would probably be outweighed by problems associated with low levels of overall performance).

Specific Directions:

(1) Familiarize yourself with the MOS by examining the descriptions on the cards and with the above descriptions of the 7 piles. You will be provided with a set of label cards containing the pile descriptions.

(2) Then sort the cards (which are in random order) into the 7 piles. You are free to place as many cards as you like in any one pile. If you do not feel that you are familiar enough with any given MOS to make a comparative evaluation, place the cards for that MOS in an eighth, unrated pile.

(3) When you have finished your first sort, go through the piles carefully, making any changes in the sorting you feel are appropriate.

(4) When you are satisfied with your sorts, please place the appropriate label card on top of each pile and secure each pile with a rubber band. Then use a rubber band to bind the piles together with your Name Card on top.

Thank you for your cooperation.

DIRECTIONS FOR PROCEDURE B: SETTING THE UTILITY OF ARMY RECRUITS RELATIVE TO THE VALUE OF A 90TH PERCENTILE INFANTRYMAN -118

In the second procedure you will try out today, you will be given a set of 60 cards. These cards are a subset of the cards you sorted earlier. The cards cover 12 MOS, with recruits at the 5 predicted performance levels you evaluated earlier. The judgment task is to assign a numerical utility value to each of the 60 recruits. The values that you assign will be proportionate to the value assigned to a 90th percentile Infantryman recruit. In other words, the overall worth or utility of the 90th percentile Infantryman recruit will be used as a yardstick and the worth of all other recruits will be judged in relationship to this Infantryman recruit. (This is comparable to the use of a given platinum bar as the defined length of 1 meter or 100 centimeters in the metric system.) In this case the value of the 90th percentile Infantryman will be set at 100.

In making your judgments, please make the same set of assumptions as were made in the previous procedure. Please review these assumptions before beginning the judgment task.

Specific Directions:

(1) Familiarize yourself with the 12 MOS by examining the descriptions provided.

(2) Write the value, 100, on the 90th percentile Infantryman card which is on top of the deck you just received. (The other cards in the deck are in random order.)

(3) Then take each of the other cards and assign the soldier a utility value which reflects the worth of each recruit relative to the value of the 90th percentile Infantryman recruit which has a worth of 100. You may assign higher values than 100 or even negative values to one or more recruits if you wish (see scale provided on next page). In other words, you are free to assign any number that reflects the relative worth of the recruit being evaluated. Write the values you assign directly on the cards in the lower right hand corner.

(4) When you have gone through the deck once, please arrange the cards in numerical order from lowest to highest value.

(5) Then go through the cards once more and change any assigned value that you feel is out of line with the others (with the exception of the value of 100 assigned to the 90th percentile Infantryman). Please refer to the attached Utility Rating Scale to help resolve any scaling problems.

UTILITY RATING SCALE*

150 - Recruit is worth 50% more to the Army than an Infantryman (11B) recruit at the 90th percentile level of predicted performance.

125 - Recruit is worth 25% more to the Army than an Infantryman (11B) recruit at the 90th percentile of predicted performance.

100 - Utility to the Army of an Infantryman (11B) recruit at the 90th percentile level of predicted performance in the scenario described.

75 - Utility of this recruit is 3/4 that of an Infantryman (11B) recruit at the 90th percentile level of predicted performance.

50 - Utility of this recruit is 1/2 that of an Infantryman recruit at the 90th percentile level of predicted performance.

25 - Utility of this recruit is 1/4 that of an Infantryman recruit at the 90th percentile level of predicted performance.

0 - Advantages of having this recruit in the scenario described are equal to the disadvantages.

-25 - Use of this recruit would result in a net loss to the Army equal to the gain that would result from using a recruit with a utility value of 25.

-50 - Use of this recruit would result in a net loss to the Army equal to the gain that would result from using a recruit with a utility value of 50.

* Please note that values higher than 150 and lower than -50 can be assigned. Also, any value in between the scale points given can be assigned, that is, you are <u>not</u> restricted to the values appearing on the above scale.

Appendix F

AVERAGE RATIO SCALE UTILITIES FOR 273 MOS BY PERFORMANCE PERCENTILE

Average Ratio Scale Utilities by Performance Percentile

MOS	Percentile 10	30	50	70	90
008	-13.2	22.3	52.2	74.9	88.2
01H	-19.3	22.7	33.4	77.3	94.3
03C	12.7	35.0	57.1	63.0	67.1
05D	-9.8	29.4	53.7	79.2	113.5
05H	-19.0	27.3	52.5	84.7	112.6
05K	-3.2	19.8	53.1	88.1	110.7
11B *	4.5	38.7	61.7	82.3	100.0
11C	5.0	35.0	70.6	97.4	111.8
11H	13.6	49.0	65.2	93.3	117.9
11M	8.4	41.5	74.8	90.8	103.0
12B	5.1	47.2	63.3	86.8	112.6
12C	8.5	42.9	70.8	78.0	88.1
12E	-17.5	20.8	41.3	75.7	95.9
12F	6.5	33.1	66.2	85.5	101.9
13B	20.8	35.0	67.1	85.2	111.7
13C	-17.5	32.8	53.2	80.3	115.2
13E *	-3.3	35.7	64.6	90.5	111.9
13F	15.5	35.0	59.1	85.2	105.0
13M	16.9	33.4	59.3	89.1	97.0
13R	-11.2	21.7	55.2	83.0	116.9
13T	-13.2	18.7	56.2	66.4	79.3
15D	-7.5	35.5	55.8	81.5	105.6
15E	0.6	23.5	52.5	80.6	117.9
15J	-21.8	8.5	57.3	78.0	120.1
16D	0.5	28.2	51.3	85.2	101.9
16E	-3.1	26.4	50.5	81.9	91.7
16F	-0.1	29.5	58.2	92.7	106.9
16G	-7.5	27.3	57.8	68.3	93.1
16H *	-8.4	31.0	57.3	86.3	107.8
16J	-6.3	25.8	51.3	73.5	115.2
16P	-7.2	31.2	57.3	80.5	107.7
16R	15.5	32.8	49.3	80.3	93.1
16S	-8.2	33.4	40.3	77.3	105.6
16T	-11.6	22.3	60.2	92.7	116.8

* One of 12 MOS assigned actual ratio scales

	Percentile				
MOS	10	30	50	70	90
17B	-0.6	33.4	52.2	89.1	105.6
17C	-0.6	31.7	48.8	91.7	108.7
19D	1.6	35.0	62.3	92.7	111.8
19E	8.4	45.6	68.3	98.0	108.2
19K	5.1	47.2	72.7	95.6	110.0
21G	-21.8	8.5	51.0	80.5	110.7
21L	-17.5	28.2	51.3	75.7	111.7
22L	-8.2	24.5	52.2	84.2	84.2
22N	-13.2	20.5	50.2	83.7	106.9
23N	-22.2	25.3	45.6	66.2	103.0
23U	-16.3	17.6	59.7	70.8	107.5
24C	-13.3	16.0	59.5	93.5	113.8
24E	-13.6	30.5	45.3	85.2	111.7
24G	-13.6	26.4	45.4	81.9	99.8
24H	-11.6	25.8	54.2	85.9	111.8
24J	-14.7	23.2	49.6	68.3	103.0
24K	-19.0	17.6	56.1	80.6	110.0
24L	-19.6	12.3	42.9	78.0	116.9
24M	-17.5	25.8	53.8	80.3	108.3
24N	-5.6	24.5	52.2	81.9	121.8
24P	-6.3	20.8	47.3	78.0	115.2
24Q	-16.4	22.3	52.2	77.1	106.9
24S	-9.8	21.1	45.6	62.0	88.4
24T	-19.0	17.6	50.7	78.6	112.6
24U	-17.5	23.6	59.5	75.5	107.7
25L	-10.0	24.1	56.2	85.9	109.3
26C	4.1	33.4	47.1	84.2	99.8
26E	-14.8	20.5	56.2	77.1	95.0
26F	-12.2	29.4	49.6	77.0	98.0
26H	-13.8	23.5	49.0	80.6	112.6
26K	-13.3	23.6	44.9	80.5	113.8
26Q	-9.8	25.3	45.6	77.0	108.2
26T	-9.9	15.5	51.3	67.1	80.3
26V	-13.6	20.8	48.8	77.3	111.8
26Y	-13.2	20.5	48.3	74.9	109.3

	Percentile				
MOS	10	30	50	70	90
27B	-8.2	26.4	50.5	77.3	102.7
27C	-13.2	20.5	58.2	83.7	104.5
27D	-17.1	21.1	43.5	62.0	93.1
27E	-13.8	31.0	50.7	91.1	115.2
27F	-21.8	17.9	46.9	80.5	110.7
27G	-17.5	30.5	45.3	80.3	101.9
27L	-10.8	31.7	45.4	81.9	115.0
27M	-10.0	15.2	56.2	85.9	111.8
27N	-14.7	27.3	47.6	68.3	98.0
27P	-14.7	16.9	43.5	66.2	83.8
29E	-11.3	27.3	52.5	86.8	105.0
29F	-21.8	14.1	55.2	90.8	104.8
29J	-9.2	25.5	53.1	83.0	90.8
29M	-9.9	23.3	53.2	78.0	108.3
29N	-6.3	28.2	47.3	75.7	101.9
29S	-5.6	24.5	54.0	89.1	97.0
31C	-6.4	25.4	54.3	86.8	97.9
31K	-3.2	27.4	57.3	85.5	96.2
31M	-6.3	32.8	51.3	82.7	93.1
31N	-14.8	18.7	52.2	77.1	102.1
31V	-5.1	25.3	55.9	88.4	105.6
32D	-6.4	19.6	54.3	76.6	93.3
33P	-11.6	18.7	50.2	83.7	116.8
33Q	-17.1	10.5	45.6	79.2	108.2
33R	-24.4	21.6	52.5	84.7	105.0
33T	-11.2	21.7	48.9	80.5	110.7
34L	-15.4	19.8	53.1	78.0	116.9
34T	-13.6	28.2	49.3	80.3	108.3
34Y	-21.5	23.3	45.3	80.3	105.0
35E	-5.6	33.4	47.1	86.6	105.6
35G	-5.6	20.8	47.1	75.1	99.8
35H	-6.7	20.5	48.3	70.6	85.9
35K	-19.6	19.0	47.6	79.2	98.0
35L	-21.6	17.6	56.1	84.7	107.5
35M	-21.8	23.6	46.9	70.8	110.7
35R	-21.5	20.8	45.3	75.7	111.7
36C	4.6	40.9	48.9	75.5	83.0
36L	-3.2	28.2	61.2	66.9	99.8
36M	6.4	31.7	55.7	75.1	97.0
39B	-11.6	24.1	48.3	72.8	99.7

MOS	Percentile 10	30	50	70	90
41B	-14.8	22.3	44.4	72.8	81.5
41C	-19.3	28.2	52.2	81.9	105.6
41E	6.2	31.4	47.6	68.3	72.6
41J	0.6	27.3	50.7	68.9	76.6
42C	-5.6	26.4	47.1	63.1	86.6
42D	-13.2	22.3	48.3	74.9	83.7
42E	-2.8	25.3	45.6	68.3	83.8
43E	-19.6	14.8	43.5	72.6	110.8
43H	6.2	27.3	64.1	62.0	72.6
44B	0.8	35.0	57.3	70.8	90.8
44E	-9.9	35.0	51.3	80.3	98.9
45B	6.8	39.2	51.3	85.2	95.9
45D	6.4	33.4	55.7	75.1	97.0
45E	-13.2	29.5	60.2	90.4	114.3
45G	-11.6	24.1	58.2	90.4	116.8
45K	-7.5	27.3	59.9	79.2	108.2
45L	-1.7	31.0	59.7	86.8	115.2
45N	-7.2	31.2	63.9	83.0	116.9
45T	-13.6	25.8	47.3	85.2	115.2
46N *	-15.0	25.9	57.5	93.1	119.5
51B	22.7	36.9	54.0	66.9	59.3
51C	-8.3	20.5	46.4	72.8	83.7
51G	3.3	31.3	52.2	66.4	74.9
51K	10.5	25.3	59.9	66.2	70.5
51M	10.5	33.4	53.7	74.8	79.2
51N *	-7.6	29.3	51.5	69.6	81.5
51R	-1.7	19.6	47.2	67.0	84.7
52C	1.8	31.7	59.3	66.9	91.7
52D	-3.4	24.1	60.2	81.5	92.7
52F	-14.7	27.3	47.6	66.2	95.6
52G	-11.2	25.5	53.1	73.1	85.5
54C	9.8	35.0	55.1	80.3	87.7
54E	1.8	31.7	45.4	89.1	108.7
55B	0.6	40.1	61.5	82.6	100.2
55D	-13.2	20.5	54.2	70.6	97.4
55G *	-24.0	19.7	56.4	94.1	124.8
55R	-1.2	33.1	59.5	73.1	90.8

* One of 12 MOS assigned actual ratio scales

MOS	Percentile 10	30	50	70	90
57E	23.5	25.4	52.5	68.9	72.7
57F	2.7	35.0	63.9	75.5	75.5
57H	12.7	41.3	53.2	85.2	90.4
61B	8.6	38.6	42.0	75.1	89.1
61C	-1.7	17.6	49.0	65.2	88.9
62B	0.8	31.2	66.2	85.5	96.2
62E	-6.7	31.3	60.2	85.9	92.7
62F	-0.5	37.5	57.8	83.8	86.1
62G	0.6	27.3	45.4	63.3	80.6
62H	0.8	42.9	61.7	68.5	83.0
62J	0.5	28.2	57.1	71.3	82.7
63B	0.5	35.0	55.1	87.7	111.7
63D	-0.6	38.6	61.2	75.1	97.0
63E	-8.3	31.3	64.4	92.7	114.3
63G	-0.5	29.4	53.7	81.5	98.0
63H	13.6	43.7	65.2	88.9	110.0
63J	2.7	37.0	61.7	83.0	96.2
63N	-21.5	35.0	57.1	78.0	115.2
63S	-3.1	28.2	63.1	84.2	86.6
63T	-6.7	31.3	62.3	90.4	114.3
63W *	-0.6	32.3	60.5	85.5	102.7
63Y	6.2	35.5	62.0	88.4	105.6
64C	22.7	48.8	52.2	81.9	79.6
65B	2.9	27.3	49.0	61.5	72.7
65D	16.0	29.3	66.2	70.8	85.5
65E	-13.6	23.3	41.3	69.2	87.7
65F	-22.3	24.5	43.7	70.9	77.3
65G	-9.9	32.8	43.3	73.5	85.2
65H	-3.4	29.5	58.2	77.1	54.2
65J	12.7	29.4	51.7	68.3	81.5
65K	-8.8	25.4	47.2	67.0	93.3
67G	-12.2	19.0	53.7	70.5	103.0
67H	-24.4	21.6	49.0	80.6	110.0
67N	-24.0	8.5	46.9	80.5	107.7
67R	-25.7	20.8	47.3	82.7	115.2
67S	-22.3	20.8	52.2	91.7	108.7
67T	-1[illegible].8	18.7	48.3	83.7	114.3
67U *	-17.9	23.0	56.6	93.6	119.7
67V	-14.7	21.1	51.7	70.5	105.6
67X	-16.3	25.4	50.7	80.6	120.6
67Y	-24.0	21.7	48.9	85.5	113.8

* One of 12 MOS assigned actual ratio scales

MOS	Percentile 10	30	50	70	90
68R	-25.7	9.8	41.3	80.3	115.2
68D	-25.4	22.7	42.0	77.3	108.7
68F	-24.7	23.2	45.6	77.0	108.2
68G	-16.4	20.5	46.4	81.5	102.1
68H	-14.7	19.0	49.6	79.2	105.6
68J	-16.3	21.6	57.9	82.6	115.2
68M	-13.3	21.7	46.9	83.0	113.8
71C	-0.6	22.7	47.1	56.9	97.0
71D	-10.0	29.5	48.3	70.6	88.2
71G	-2.8	33.4	53.7	74.8	90.8
71L	0.6	27.3	54.3	70.8	86.8
71M	8.5	33.1	61.7	66.2	83.0
71N	-10.8	28.2	50.5	86.6	115.0
71Q *	-9.9	16.9	36.7	51.4	62.6
71R	-4.0	27.3	43.7	59.7	67.0
72E	-6.3	30.5	63.0	80.3	101.9
72G *	-5.6	31.1	55.1	82.6	98.8
72H	-19.3	24.5	35.2	73.0	105.6
73C	-6.3	37.1	49.3	78.0	101.9
73D	-22.3	20.8	38.6	68.9	89.1
74D	-5.6	18.9	47.1	79.6	105.6
74F	-16.4	18.7	44.4	70.6	104.5
75B	-0.1	24.1	56.2	72.8	85.9
75C	1.7	25.3	55.8	79.2	103.0
75D	0.6	23.5	59.7	67.0	86.8
75E	4.6	25.5	61.7	85.5	93.5
75F	-2.9	30.5	47.3	80.3	105.0
76C	-3.4	33.1	56.2	81.5	77.1
76J	-7.5	23.2	55.8	66.3	93.1
76P	-4.0	27.3	54.3	76.6	88.9
76V	-3.2	40.9	55.2	78.0	90.8
76W	15.5	39.2	59.1	73.5	82.7
76X	6.4	28.2	52.2	79.6	91.7
76Y	-5.0	33.1	66.4	81.5	92.7
81B	2.7	27.4	51.0	68.5	93.5
81C	0.5	23.3	55.1	78.0	98.9
81E	-6.7	22.3	60.2	66.4	62.3
81Q	1.7	35.5	59.9	81.5	110.8

* One of 12 MOS assigned actual ratio scales

MOS	Percentile 10	30	50	70	90
82B	-1.7	31.0	49.0	72.7	86.8
82C	-5.1	37.5	51.7	86.1	108.2
82D	-11.2	19.8	53.1	78.0	96.2
83E	-0.6	26.4	55.7	68.9	77.3
83F *	-6.0	23.4	37.8	54.7	67.7
84B	-0.5	31.4	49.6	70.5	86.1
84C	-4.0	21.6	41.9	52.5	59.7
84F	0.8	25.5	57.3	63.9	70.8
91A	-4.0	17.6	52.5	76.6	100.2
91D	-19.6	12.3	42.9	68.5	104.8
91E	-6.3	25.8	49.3	78.0	93.1
91F	-5.6	22.7	42.0	75.1	91.7
91G	-13.2	20.5	46.4	58.2	79.3
91H	-2.8	23.2	45.6	72.6	88.4
91J	7.3	13.6	41.9	65.2	72.7
91L	0.8	23.6	53.1	73.1	88.1
91M	-21.5	23.3	32.8	75.7	101.9
91P	-13.6	24.5	50.5	81.9	91.7
91Q	-18.0	15.2	4[illegible]	77.1	88.2
91R	-11.3	17.6	56.1	63.3	84.7
91S	-0.5	29.4	53.7	68.3	95.6
91T	-1.7	23.5	49.0	54.3	65.2
91U	-17.5	14.1	48.9	73.1	101.9
91V	-13.6	23.3	45.3	75.7	101.9
91W	-13.2	24.1	46.4	72.8	102.1
91Y	-5.6	10.7	42.0	70.9	89.1
92B	-2.8	29.4	55.8	74.8	103.0
92C	4.0	29.4	43.5	64.1	83.8
93D	-19.0	13.6	50.7	86.8	97.9
93E	-4.0	19.6	50.7	74.6	88.9
93F	0.8	27.4	61.7	73.1	101.9
93H	-14.8	17.0	48.3	70.6	104.5
93J	-17.1	14.8	49.6	72.6	105.6
93P	-11.3	21.6	54.3	80.6	107.5
94B	2.7	27.4	63.9	85.5	90.8
94F	3.7	32.8	51.3	73.5	82.7
95B	-8.2	38.6	63.1	84.2	108.7

* One of 12 MOS assigned actual ratio scales

MOS	Percentile				
	10	30	50	70	90
96B	-2.9	23.3	49.3	80.3	115.2
96D	-8.2	16.9	43.7	81.9	99.8
96F	-8.3	22.3	52.2	64.4	90.4
96H	-5.1	31.4	49.6	77.0	110.8
96R	-3.2	27.4	57.3	78.0	93.5
97B	-19.0	11.5	45.4	82.6	107.5
97E	-19.6	14.1	38.9	78.0	113.8
97G	-9.9	28.2	51.3	73.5	87.7
98C	-13.6	20.8	48.8	75.1	125.3
98G	-11.6	22.3	42.5	81.5	109.3
98J *	-7.8	24.6	59.5	90.0	114.3

* One of 12 MOS assigned actual ratio scales

Appendix G

INTERVIEW PROTOCOL FOR SECOND-TOUR JOB ANALYSIS FOR INFANTRYMEN (MOS 11B)

JOB ANALYSIS INTERVIEW

INSTRUCTIONS TO INTERVIEWER

1. The purpose of this interview is to quickly obtain information about the duty positions, activities, time spent on activities, and relative importance of the activities for E5 in the nine Batch A MOS.

2. The people to be interviewed are E5s (or E6s, if you can't get E5s) in the MOS. Try to get E5s with 36-60 months TIS. The format is designed for a group setting, with 5-10 E5s.

3. Following is a brief description of each of the items on the Interviewer's Forms. You will almost certainly need to improvise in order to tailor it to the different MOS. Just get the information, and make sure that all of the individuals who are in the group get a chance to be heard, and that their viewpoints are respected and recorded.

4. Specifics about the five interview items:

ITEM 1: PRIMARY DUTY POSITIONS
We compiled a list of the authorized duty positions for E5s from AR 611-201. In some cases the setting (eg., clinic vs. a'd station) is also listed. These are listed on Handout 1, for each MOS. In discussion, find out if the list is correct and complete. Find out what percent of E5s who are working in E5 slots in the MOS would be assigned to each position. Exact percents aren't necessary; we want a rough distribution. The positions with the highest concentration are what we consider "Primary Duty Positions" for the interview. Get the remaining information on the highest density position first, then go back and have them tell you how the information is different (or not) for each of the other positions.

ITEM 2: NORMAL WORK WEEK
Have them agree on and describe briefly the normal work week (or weeks) for the most primary (highest density) position (and setting, if necessary). If the unit goes through various cycles such as post support, maintenance, and field cycles, there might be several normal weeks, depending on the cycle. After you have the remaining information on one normal week, get it on the other normal weeks, if any, by discussing how they differ.

ITEM 3: ACTIVITIES
A list of 11 activities, drawn mostly from the Gast dimensions, is on Handout 2. For the normal week, for the E5 in this duty position, find out if the list is complete; if they want to add anything, first make sure it couldn't fit in one of the activities listed; then have them all add the activity on their lists. If any activities are NA for this position and week, everyone puts NA. If activites are required for the position, and in the normal week and setting under discussion, but are required only rarely, find out how often and so note.

ITEM 4: TIME SPENT
Ask them to note on their Handout 2 the number of hours that the E5 would spend on each activity during the normal work week under discussion, for the duty position and setting under discussion. Instruct them that the hours they assign should add up to 40, or to whatever they all agree is the normal. Then in discussion, and/or by averaging their assignments, arrive at a consensus about the number of hours spent on each activity.

ITEM 5: IMPORTANCE
Still on the same MOS, E5 working in same E5 duty position in same setting, during same normal work week. On Handout 3, have them add any activities that they all agreed on, and mark NA any that are not required for this position/setting/week. The question is "How important is it that the E5 perform each activity well, in order that the unit continue to function smoothly and accomplish its mission?" Have them rank order the activities from 1 - Most important. Discourage ties. Remind them that they already rated time spent, and importance may not depend on time spent; things that take little time or are not frequently required may be very important when they are required. Then in discussion or by averaging and then discussing, arrive at a consensus rank order. Ties permitted sparingly.

Remember to then go back and find out how the time spent and importance are different for other normal weeks, and then also for the normal weeks in other primary duty positions. Record it all on the interview forms.

JOB ANALYSIS INTERVIEW
SKILL LEVEL 2

Interviewer's Form

MOS___ Date_____ Location_____ Interviewer_____

Interviewees: _____ Paygrade:_____ TIS:____

_____ Paygrade:_____ TIS:____

_____ Paygrade:_____ TIS:____

_____ Paygrade:_____ TIS:____

_____ Paygrade:_____ TIS:____

_____ Paygrade:_____ TIS:____

INTERVIEWER'S FORM 1

1. PRIMARY DUTY POSITIONS - SKILL LEVEL 2 - 11B

Of 100 E5 in MOS, in E5 positions, how many are in this duty position?

Operations Sergeant _____

Fire Team Leader _____

Ammunition Section Leader _____

2. NORMAL WORK WEEKS (Describe briefly)

_____

_____

_____

_____

_____

INTERVIEWER'S FORM 2

DUTY POSITION DISCUSSED _____ NORMAL WEEK _____

ACTIVITIES

		HOURS
1.	Performing MOS-specific tasks (include exercises, simulations, etc.).	_____
2.	Performing Common Tasks (include exercises, simulations, etc.).	_____
3.	Training subordinates on MOS-specific tasks.	_____
4.	Training subordinates on Common Tasks.	_____
5.	Planning, organizing, and monitoring activities of subordinates.	_____
6.	Providing performance feedback to subordinates.	_____
7.	Informing subordinates about plans and activities.	_____
8.	Informing superiors and coordinating with other units about plans and activities.	_____
9.	Providing performance recognition and rewards to subordinates.	_____
10.	Counseling subordinates on personal problems.	_____
11.	Disciplining or punishing subordinates.	_____
12	_____	_____
13.	_____	_____
14.	_____	_____
	TOTAL	40

INTERVIEWER'S FORM 3

DUTY POSITION DISCUSSED _____ NORMAL WEEK _____

ACTIVITIES	RANK
1. Performing MOS-specific tasks (include exercises, simulations, etc.).	_____
2. Performing Common Tasks (include exercises, simulations, etc.).	_____
3. Training subordinates on MOS-specific tasks.	_____
4. Training subordinates on Common Tasks.	_____
5. Planning, organizing, and monitoring activities of subordinates.	_____
6. Providing performance feedback to subordinates.	_____
7. Informing subordinates about plans and activities.	_____
8. Informing superiors and coordinating with other units about plans and activities.	_____
9. Providing performance recognition and rewards to subordinates.	_____
10. Counseling subordinates on personal problems.	_____
11. Disciplining or punishing subordinates.	_____
12. _____	_____
13. _____	_____
14. _____	_____

HANDOUT 1

1. PRIMARY DUTY POSITIONS - SKILL LEVEL 2 - 11B

	Of 100 E5 in MOS, in E5 positions, how many are in this duty position?
Operations Sergeant	_____
Fire Team Leader	_____
Ammunition Section Leader	_____

HANDOUT 2

		HOURS
1.	Performing MOS-specific tasks (include exercises, simulations, etc.).	_____
2.	Performing Common Tasks (include exercises, simulations, etc.).	_____
3.	Training subordinates on MOS-specific tasks.	_____
4.	Training subordinates on Common Tasks.	_____
5.	Planning, organizing, and monitoring activities of subordinates.	_____
6.	Providing performance feedback to subordinates.	_____
7.	Informing subordinates about plans and activities.	_____
8.	Informing superiors and coordinating with other units about plans and activities.	_____
9.	Providing performance recognition and rewards to subordinates.	_____
10.	Counseling subordinates on personal problems.	_____
11.	Disciplining or punishing subordinates.	_____
12.	_____	_____
13.	_____	_____
14.	_____	_____
	TOTAL	40

HANDOUT 3

		RANK
1.	Performing MOS-specific tasks (include exercises, simulations, etc.).	_____
2.	Performing Common Tasks (include exercises, simulations, etc.).	_____
3.	Training subordinates on MOS-specific tasks.	_____
4.	Training subordinates on Common Tasks.	_____
5.	Planning, organizing, and monitoring activities of subordinates.	_____
6.	Providing performance feedback to subordinates.	_____
7.	Informing subordinates about plans and activities.	_____
8.	Informing superiors and coordinating with other units about plans and activities.	_____
9.	Providing performance recognition and rewards to subordinates.	_____
10.	Counseling subordinates on personal problems.	_____
11.	Disciplining or punishing subordinates.	_____
12.	_____	_____
13.	_____	_____
14.	_____	_____

Appendix H

TASK CLUSTE[illegible]FOR SECOND TOUR SOLDIERS

[illegible]E NINE MOS

For each of the nine MOS, a summary of the changes to the task cluster structure is given, along with short descriptions of the clusters.

11B Infantryman Task Domain

Of the 12 Skill Level 1 task clusters, 11 were retained for second tour; the cluster on Maintaining and Operating Vehicles was dropped at the request of the Proponent. All new second tour tasks were categorized into the 11 first tour clusters. Therefore no additional clusters were formed for second tour. Although clusters nearly always changed in size and in the specific tasks included, the general content of ten of the clusters was unchanged.

The one cluster that did change dramatically was the cluster entitled "Conduct Tactical Operations." For second tour, the cluster has nearly twice as many tasks (22 compared to 12), including 11 tasks on supervising and directing activities of the fire team, squad, or platoon, five tasks on leading patrols or missions, and two tasks on supervising weapons and combat operations. These are directly comparable to the two leadership/supervisory dimensions that emerged from the behavioral performance work.

The 46 Supervisory Responsibilities Questionnaire activities were categorized into eight supervision clusters. In addition, the domain included seven MOS-specific supervision tasks that were also categorized into those eight clusters. Specifically, four tasks pertaining to field reports and orders were placed in the cluster "Provide Information," and three MOS-specific training tasks are in the cluster "Train and Develop." Thus these two clusters, for the 11B E5, represent more than just generic activities of passing on information and providing training.

The task clusters for the 11B second tour domain are listed in Table 2, along with brief descriptions of the cluster content.

Task Clusters: 11B Infantryman

FIRST AID: Diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Moving over unknown terrain, reading maps, reading compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Operation, maintenance, and positioning of weapons (M16 rifle, M60 machinegun, LAW, SAW, grenades, grenade launcher, .45 cal pistol, .50 cal machinegun, dragon.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive situations.

COMMUNICATIONS: Installation and operation of radio and field telephone equipment, and communications security procedures.

DETECT AND IDENTIFY THREATS: Surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

NIGHTSIGHTS: Operation (mounting, zeroing, engaging targets) and maintenance of hand-held and weapon-mounted night sighting devices.

MINES AND DEMOLITIONS: Installing and disarming mines and booby traps, and constructing nonelectric and electric demolition systems.

MOVEMENT IN URBAN TERRAIN: Tactical operations in built-up areas.

CONDUCT TACTICAL OPERATIONS: Supervising and directing activities of the fire team, squad, or platoon, leading patrols or missions, supervising weapons and combat operations.

PLAN, ORGANIZE, AND MONITOR: Assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Passing on information concerning mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN, DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

13B Cannon Crewman Task Domain

Because the 11 first tour task clusters could not adequately absorb all of the new second tour tasks, three additional clusters were formed. Although clusters nearly always changed in size and in the specific tasks included, the general content of eight of the clusters was unchanged. In three cases, first tour clusters were split into two more homogeneous clusters by the addition of new tasks: Position/Lay/Fire Howitzer became Prepare Position and Gunnery--Lay/Fire Howitzer; the mines and demolitions tasks, formerly in a cluster with weapons, formed a separate Mines/Demolitions cluster; and tasks on tactical supervisory tasks, formerly in a cluster with movement and survival in the field, formed a new cluster.

This cluster, Conduct Tactical Operations, consists of 12 tasks on directing the cannon crew and supervising personnel on various activities, primarily maintenance. Only one of these tasks is not explicitly supervisory, and none of the tasks was included in the first tour domain.

The 46 Supervisory Responsibilities Questionnaire activities were categorized into eight supervision clusters. In addition, the domain included eleven MOS-specific supervision tasks that were also categorized into those eight clusters. Nine of these MOS-specific tasks were categorized in the cluster "Train and Develop" to cover instruction on tasks related to howitzer operation. Thus this cluster, for the 13B E5, represents more than just general delivery of training.

The task clusters for the 13B second tour domain are listed in Table 2, along with brief descriptions of the cluster content.

TABLE . Task Clusters: 13B Cannon Crewman

FIRST AID: Diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Moving over unknown terrain, reading maps, reading compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions: putting on protective mask/clothing, operating/ maintaining NBC equipment, reporting NBC conditions.

WEAPONS: Operation, maintenance, and positioning of weapons (M16 rifle, M60 machinegun, LAW, grenades, grenade launcher, .50 cal machinegun).

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive situations.

COMMUNICATIONS: Installation and operation of radio and field telephone equipment, and communications security procedures.

DETECT AND IDENTIFY THREATS: Surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

MINES AND DEMOLITIONS: Installing and disarming mines and booby traps, and constructing nonelectric and electric demolition systems.

DRIVE: Operating wheeled vehicles and equipment.

MAINTENANCE: Maintenance of howitzer and components and prime mover.

PREPARE AND STORE AMMUNITION: Loading and transporting ammo, preparing ammo for firing.

PREPARE POSITION: Prepare howitzer position and prepare howitzer for operation.

GUNNERY--LAY/FIRE HOWITZER: Boresighting, laying, loading and firing.

CONDUCT TACTICAL OPERATIONS: Supervising and directing activities of the cannon crew during tactical operations.

PLAN, ORGANIZE, AND MONITOR: Assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Passing on information concerning mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN, DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

19E Armor Crewman Task Domain

Because the 11 first tour task clusters could not adequately absorb all of the new second tour tasks, two additional clusters were formed. Although clusters nearly always changed in size and in the specific tasks included, the general content of nine of the clusters was unchanged. One first tour cluster, Movement and Survival in Field, was split into two more homogeneous clusters by the addition of new tasks: Movement/Survival in the Field and Detect and Identify Threats.

The other new cluster, Conduct Tactical Operations, consists of 16 tasks on controlling the movement and fire of the tank section or platoon. Although the AOSP frequency data indicated that all of the tasks are performed by 19E E5s, in fact most of the tasks are the responsibility of the Platoon Sergeant (E7, skill level 4).

Nearly one-third of the tasks in the resulting task domain are MOS-specific, skill level 1 tasks, including all of the gunnery tasks, because of the Proponent's decision to require all except the tank commanders' tasks to be designated for the skill level 1 (E1-E4) 19E.

The 46 Supervisory Responsibilities Questionnaire activities were categorized into eight supervision clusters. In addition, the domain included 23 MOS-specific supervision tasks that were also categorized into those eight clusters. Three of these MOS-specific tasks were categorized in the cluster "Train and Develop" to cover preparation for and evaluation of training, and six tasks on preparing orders and reports, were added to the cluster "Provide Information." Fourteen of the MOS-specific tasks were categorized into the cluster "Plan, Organize, and Monitor;" they include a variety of supervision, inspection, and monitoring tasks.

The task clusters for the 19E second tour domain are listed in Table 2, along with brief descriptions of the cluster content.

TABLE . Task Clusters: 19E Armor Crewman

FIRST AID: Diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Moving over unknown terrain, reading maps, reading compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions; also includes preparing the tank for NBC conditions.

WEAPONS: Operation, maintenance, and positioning of weapons (M16 rifle, M60 machinegun, LAW, grenades, grenade launcher, M3 submachinegun, .45 cal pistol).

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive situations, including tank positions.

COMMUNICATIONS: Installation and operation of radio, field telephone, and intercommunications equipment, and communications security procedures.

DETECT AND IDENTIFY THREATS: Surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

MINES AND DEMOLITIONS: Installing and disarming mines and booby traps, and constructing nonelectric and electric demolition systems.

PREPARE TANK AND TANK SYSTEMS FOR OPERATIONS: Maintenance and servicing of tank automotive systems (weapon systems excluded), stowing ammunition, preparing and securing stations.

OPERATE TANK (EXCEPT WEAPON SYSTEMS): Driving and recovering tank, operating non-weapon components, performing during and after operations checks.

PREPARE TANK WEAPON SYSTEMS FOR OPERATION: Maintaining and boresighting main gun and machineguns, performing firing checks.

OPERATE TANK WEAPONS SYSTEMS: Loading and unloading guns, engaging targets.

CONDUCT TACTICAL OPERATIONS: Supervising and directing activities of the tank crew, squad, or platoon during tactical operations.

PLAN, ORGANIZE, AND MONITOR: Assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Passing on information concerning mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN, DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

31C Single Channel Radio Operator Task Domain

Of the nine first tour 31C clusters, five were retained for second tour. Although these clusters changed somewhat in size and specific tasks included, the general content between first and second tour remained consistent. One first tour cluster, "Customs and Laws of War," was dropped because only one of the tasks included in the cluster appeared in the second tour domain.

The first tour clusters could not adequately absorb all of the new tasks in the second tour domain. Hence, three additional clusters were formed. Specifically, the first tour cluster, "Communications Procedures," was subdivided into two clusters titled "Communication" and "Administration." This was done to accommodate 23 new administrative functions. Similarly, the first tour cluster "Radios" was subdivided into "Radio Sets" and "Teletypewriters" to accommodate several new radio and teletypewriter related tasks. Finally, the first tour cluster titled "Combat Procedures" was subdivided into two common skills clusters, "Move/Survive in the Field" and "Detect and Identify Threats," again to accommodate several new tasks. A second reason for creating these two clusters was so that similar common task clusters would appear across all nine MOS.

In all, 11 nonsupervisory clusters were used to describe the second tour 31C job. Six of these are common skills task clusters and five are MOS-specific technical task clusters. The reason the 31C have only six common skills clusters as opposed to seven is because the "Communication" cluster (which is a common task cluster in the other eight MOSs) contains mostly job-specific tasks for this MOS.

The 46 Supervisory Responsibility Questionnaire (SRQ) items were categorized into eight supervision clusters proposed by Yukl. The domain contained 12 additional supervision tasks that were also categorized into these eight clusters. While most of the 12 additional tasks reflected more general Army-wide supervisory responsibilities and were similar in content to SRQ items, two of the tasks were very specific to the 31C second tour job. These were supervising subordinates in the installation, grounding, or removal of communications equipment and issuing instructions for installation of radio teletype equipment. These MOS-specific aspects of supervision also emerged from the critical incidents work and are contained in the MOS-specific behavioral dimension titled "Managing the RATT Rig."

TABLE . Task Clusters: 31C Single Channel Radio Operator

FIRST AID: Tasks that relate to diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Tasks related to moving over unknown terrain, reading maps, reading a compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Includes tasks on operation, maintenance, and positioning of M16 rifle, M60 machinegun, LAW, mines and booby traps, and grenades.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive positions.

COMMUNICATIONS: Tasks related to preparing and sending radio messages, operating radio sets, and installing antennas and other communications related equipment.

DETECT AND IDENTIFY THREATS: Covers surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

ADMINISTRATIVE FUNCTIONS: Involves tasks such as preparing forms and reports, conducting equipment inventories, and writing/reviewing/revising SOPs.

GENERATORS: Tasks involving installing/operating generators, troubleshooting generators, and performing PMCS on generators.

RADIO SETS: Includes tasks on installing radio sets, performing troubleshooting procedures, and conducting PMCS on radio sets.

TELETYPEWRITERS: Tasks related to installing and operating teletypewriters, troubleshooting teletypewriter sets, and conducting PMCS on teletypewriters.

PLAN, ORGANIZE, MONITOR: Tasks related to assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Covers performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Includes tasks related to passing on information concerning the mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN/DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

63B Light Wheel Vehicle Mechanic Task Domain

Of the 12 first tour 63B clusters, seven remained virtually identical in content for second tour, although there were some changes in cluster size and specific tasks included.

Because the first tour clusters could not adequately absorb all of the new tasks in the second tour domain, several additional clusters were formed. The first tour cluster, "Movement in the Field," was subdivided into two second tour clusters, "Move/Survive in the Field" and "Communication." This was done in order to accommodate several new communications and move/survive tasks that appeared in the second tour domain. Similarly, the first tour "Combat Procedures" cluster was subdivided into "Detect and Identify Threats" and "Land Navigation/Map Reading," again in order to accommodate several new tasks. A second reason for creating the clusters described above was that so similar common task clusters would appear across all nine MOS.

For the MOS-specific clusters, the first tour cluster "General Maintenance" was subdivided into "Administration" and "Preventive/General Maintenance." This subdivision was done to accommodate 20 new administrative tasks (the first tour domain contained only tow administrative tasks which were in the "General Maintenance" cluster). An entirely new cluster, "Generators, Small Engines, and Equipment," was also created. The tasks in this cluster were new additions to the second tour domain. Finally, two first tour clusters, "Brakes" and "Steering/Suspension Systems," were combined into one cluster for second tour. The main reason for this combination was that each cluster contained relatively few tasks, and these systems require similar troubleshooting approaches. Further, since we wanted to keep reasonable the total number of clusters from which SMEs would be asked to select tasks in a subsequent step, collapsing these two clusters seemed appropriate.

In all, a total of 15 nonsupervisory clusters were used to describe the second tour 31 job. Seven of these are common skills clusters and the remaining eight are MOS-specific technical task clusters.

The 46 Supervisory Responsibility Questionnaire (SRQ) items were categorized into eight supervision clusters proposed by Yukl. The domain contained 50 additional supervision tasks that were also categorized into these eight clusters. Eighteen of these were Army-wide supervisory activities and were similar in content to SRQ items. The remaining additional supervisory tasks reflected MOS-specific aspects of supervision and fell into the "Plan, Organize, Monitor" cluster. These tasks included established maintenance priorities, determining corrective action for maintenance problems, and supervising maintenance on brake systems, cooling systems, engines, exhaust systems, transmissions, steering assemblies, and other vehicle related parts/systems. Many of these aspects of supervision also emerged from the critical incidents work and are contained in the MOS-specific behavioral dimension titled "Checking Repairs Made by Other Mechanics."

TABLE . Task Clusters: 63B Light Wheel Vehicle Mechanic Task Clusters

FIRST AID: Tasks that relate to diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Tasks related to moving over unknown terrain, reading maps, reading a compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Includes tasks on operation, maintenance, and positioning of M16 rifle, M60 machinegun, LAW, mines and booby traps, and grenades.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive positions.

COMMUNICATIONS: Tasks related to preparing and sending radio messages, operating radio sets, and installing antennas and other communications related equipment.

DETECT AND IDENTIFY THREATS: Covers surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

ADMINISTRATION: Involves tasks such as reviewing maintenance requests, material condition status reports, operator's qualifications records, etc.; conducting equipment inventories, and writing/reviewing/revising SOPs.

GENERATORS, TRAILERS, SMALL ENGINES, AND EQUIPMENT: Tasks involving adjusting, replacing, inspecting, testing, and troubleshooting generators, trailers, small engines, and other equipment.

PREVENTIVE/GENERAL MAINTENANCE: Includes tasks dealing with performing general and preventive maintenance on vehicles.

BRAKES, STEERING, SUSPENSION SYSTEMS: Tasks related to adjusting, inspecting, replacing, repairing, and troubleshooting brakes, steering, and suspension systems.

ELECTRICAL SYSTEMS, TEST SYSTEMS: Contains tasks that involve adjusting, inspecting, replacing, repairing, and troubleshooting electrical and test system.

VEHICLE RECOVERY SYSTEMS: Includes tasks related to recovering vehicles as well as inspecting, servicing, and adjusting vehicle recovery equipment.

POWER TRAIN, CLUTCH, ENGINE SYSTEMS: Tasks related to adjusting, inspecting, replacing, repairing, and troubleshooting power train, clutch, and engine systems.

FUEL, COOLING, LUBRICATION, EXHAUST SYSTEMS: Covers tasks involving adjusting, inspecting, replacing, repairing, and troubleshooting fuel, cooling, lubrication, and exhaust systems.

PLAN, ORGANIZE, MONITOR: Tasks related to assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Covers performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Includes tasks related to passing on information concerning the mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN/DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

71L Administrative Specialist Task Domain

Of the nine first tour 71L clusters, eight were retained for second tour. Although these clusters changed somewhat in size and specific tasks included, the general content was consistent between first and second tour.

One first tour cluster, "Field Techniques" was subdivided into three common skills clusters as follows: "Communication," "Movement/Survival in the Field," and "Detect and Identify Threats." This subdivision was deemed necessary because there were several new task statements added for second tour that could not be adequately absorbed by the single first tour cluster. In addition, these particular clusters were used so that similar common task clusters would appear across all nine MOS. In all, a total of 11 nonsupervisory clusters, seven of which were common skills clusters and four of which were MOS-specific clusters, were used to describe the second tour 71L job.

The 46 Supervisory Responsibility Questionnaire (SRQ) items were categorized into eight supervision clusters proposed by Yukl. The domain contained 15 additional supervision tasks that were also categorized into these eight clusters. The majority of these 15 tasks reflected "Plan, Organize, Monitor" and "Train/Develop" activities. It should be noted, however, that the 15 additional tasks generally reflected common Army-wide supervisory responsibilities rather than MOS-specific components of supervision. Also, the content of most of these tasks was highly overlapping with SRQ items.

TABLE . Task Clusters: 71L Administrative Specialist

FIRST AID: Tasks that relate to diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Tasks related to moving over unknown terrain, reading maps, reading a compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Includes tasks on operation, maintenance, and positioning of M16 rifle, M60 machinegun, LAW, mines and booby traps, and grenades.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive positions.

COMMUNICATIONS: Tasks related to preparing and sending radio messages, operating radio sets, and installing antennas and other communications related equipment.

DETECT AND IDENTIFY THREATS: Covers surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

PREPARE AND MAINTAIN FILES/FORMS: Involves tasks such as identifying publications requiring changes and updating them, establishing and reviewing files, and preparing and reviewing forms/records.

CORRESPONDENCE: Involves typing, proofreading, and editing documents, assembling correspondence, dispatching documents, and routing incoming distribution.

CLASSIFIED MATERIAL: Tasks dealing with securing and maintaining classified materials as well as identifying, reporting, and correcting security violations.

OFFICE ADMINISTRATIVE FUNCTIONS: Includes planning office layout, maintaining office resources, selecting details, and writing/reviewing/revising unit SOP.

PLAN, ORGANIZE, MONITOR: Tasks related to assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Covers performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Includes tasks related to passing on information concerning the mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN/DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

88M Motor Transport Operator Task Domain

Although the 12 first tour task clusters represented most of the new second tour tasks, the cluster structures were realigned in some cases to form more homogeneous clusters. The general content of nine of the clusters was unchanged. Three first tour clusters, each of which included tasks on movement and survival in the field as well as tasks on communications and detecting threats, were reformed as Movement/Survival in the Field, Communications, and Detect and Identify Threats. Two clusters of NBC related tasks were combined.

One new cluster, Conduct Tactical Operations, was formed to represent tactical supervisory responsibilities. It consists of only three tasks, on the designation and construction of positions. None of the tasks was included in the first tour domain.

The 88M second tour task domain has only 22 tasks from the MOS Soldier's Manual, and 21 from the MOS-specific AOSP, compared with 103 Common Tasks. Additionally, the 88M Soldier's Manual does not distinguish between skill levels 1 and 2; a combined task list is presented.

The 46 Supervisory Responsibilities Questionnaire activities were categorized into eight supervision clusters. In addition, the domain included five MOS-specific supervision tasks that were also categorized into those eight clusters. One of these MOS-specific tasks was categorized in the cluster "Train and Develop" to cover training in loading/unloading procedures, and four tasks on vehicle inspections, motor pool operations, and fire/safety program were added to the cluster "Plan, Organize, and Monitor."

The task clusters for the 88M second tour domain are listed in Table 2, along with brief descriptions of the cluster content.

TABLE . Task Clusters: 88M Motor Transport Operator

FIRST AID: Diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Moving over unknown terrain, reading maps, reading compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions; also includes operating trucks under NBC conditions.

WEAPONS: Operation, maintenance, and positioning of weapons (M16 rifle, M60 machinegun, LAW, grenades, grenade launcher, mines, booby traps).

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive situations, including defensive driving procedures under ambush or attack.

COMMUNICATIONS: Installation and operation of radio and communications security procedures.

DETECT AND IDENTIFY THREATS: Surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

OPERATE VEHICLES: Driving under various conditions, coupling/uncoupling, loading and transporting cargo and personnel, and parking.

FILL OUT FORMS: Completion of operator, accident, and dispatch forms.

PMCS/PREPARE FOR MOVEMENT: Tasks related to vehicle maintenance and movement.

RECOVERY: Self-recovery of vehicles and recovery by other vehicles.

CONDUCT TACTICAL OPERATIONS: Supervising and directing activities in preparing positions.

PLAN, ORGANIZE, AND MONITOR: Assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Passing on information concerning mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN, DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

91A Medical Specialist Task Domain

Of the 10 first tour 91A clusters, seven remained virtually identical in content for second tour, although there were some changes in cluster size and specific tasks included. The "Vehicles" cluster from first tour was dropped because only three of the tasks from this cluster appeared in the second tour domain. These three tasks were recategorized into the "Prepare/Maintain Medical Facilities and Equipment" cluster.

Because the first tour clusters could not adequately absorb all of the new tasks in the second tour domain, three additional clusters were formed. The first tour cluster "Movement/Survival in the Field" contained two communications tasks. In the second tour domain, however, there were several additional communications tasks. Hence, a new cluster, "Communications" was formed. Beyond accommodating the additional communications tasks, another reason for breaking these items out and forming a new cluster was so that the same common task clusters would appear across all nine MOS. The first tour cluster "Patient Care and Treatment" was subdivided into two task cluster titled "Perform Medical Tests and Procedures" and "Patient/Casualty Care." This was done in order to absorb 17 new tasks that appeared in the second tour domain. Similarly, the first tour cluster "First Aid" was subdivided into "First Aid" and "Bandages, Splints, and Dressings" again to accommodate several new tasks relevant to these performance areas.

In all, 12 nonsupervisory clusters were used to describe the second tour 91A/B job. Seven of these are common skills task clusters and five are MOS-specific technical task clusters.

The 46 Supervisory Responsibilities Questionnaire items were categorized into eight supervision clusters proposed by Yukl. The domain contained 21 additional supervision tasks that were also categorized into these eight clusters. All but one of these 19 tasks reflected more general Army-wide supervisory responsibilities and were overlapping similar in content with SRQ items. The one supervisory task that was specific to the 91A/B job was supervise medical operations.

TABLE . Task Clusters: 91A/B Medical Specialist

FIRST AID: Tasks that relate to diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Tasks related to moving over unknown terrain, reading maps, reading a compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Includes tasks on operation, maintenance, and positioning of M16 rifle, M60 machinegun, LAW, mines and booby traps, and grenades.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive positions.

COMMUNICATIONS: Tasks related to preparing and sending radio messages, operating radio sets, and installing antennas and other communications related equipment.

DETECT AND IDENTIFY THREATS: Covers surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

BANDAGES, SPLINTS, AN DRESSINGS: Tasks involving dressing wounds, applying bandages, and immobilizing broken bones.

PERFORM MEDICAL TESTS AND PROCEDURES: Includes tasks dealing with administering injections, measuring/recording patients' vital signs, and performing various tests and medical procedures.

PREPARE/MAINTAIN MEDICAL FACILITIES AND EQUIPMENT: Tasks related to sterilizing equipment, inspecting and maintaining medical facilities, and preparing for patients to receive treatment.

ADMINISTRATION: Covers drafting, receiving, for filing medical charts, lab reports, and records as well as requesting, receiving and controlling medical supplies and equipment.

PATIENT/CASUALTY CARE: Assisting patients with personal hygiene, attending to casualties, and briefing, receiving, and escorting patients.

PLAN, ORGANIZE, MONITOR: Tasks related to assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Covers performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Includes tasks related to passing on information concerning the mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN/DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

95B Military Police Task Domain

The 95B domain changed dramatically since the first tour job analyses and criterion development effort. The second tour domain contained over twice as many tasks as the first tour domain, and many of these represented new activities/job requirements. The primary orientation of the 95B job is changing from garrison police activities to a more strictly infantry orientation. Because this change is not yet complete, first and second tour 95Bs are responsible for both major types of job tasks. In fact, 95Bs currently have four "missions" as follows: the two described above, battlefield circulation control, and processing enemy prisoners of war.

Of the 12 first tour 95B clusters, the content of seven was virtually identical for second tour. However, several new tasks were added to all of these clusters. Items from the first tour cluster "Movement/Survival in the Field" were recategorized into two clusters, one of which ("Movement/Control of Personnel") was first tour cluster and the other of which ("Contact with Hostile Personnel") was a new second tour cluster. This was done to accommodate 36 new tasks that dealt with these content areas. The first tour "Field Techniques" cluster was subdivided into "Fighting Positions" and "Detect and Identify Threats," again to accommodate 33 new tasks that appeared in the second tour domain.

Because the first tour clusters could not adequately absorb all of the tasks in the second tour domain, two new clusters were formed ("Security" and "Administration"). Also, three relatively small first tour clusters ("Respond to Crimes," "Make Apprehensions," and "Investigate Crimes") were collapsed into one cluster and then subdivided into two clusters titled "Activities Related to Crimes" and "Traffic Related Tasks." This was done to accommodate 19 new traffic tasks and 30 new crime tasks that appeared in the second tour domain.

In all, 14 nonsupervisory task clusters were used to describe the second tour 95B job. Seven of these are common skills clusters and seven are MOS-specific technical clusters.

The 46 Supervisory Responsibility Questionnaire items were categorized into eight supervision clusters proposed by Yukl. The domain contained 34 additional supervision tasks that were also categorized into these eight clusters. Approximately 20 of these 35 tasks reflected more general Army-wide supervisory responsibilities and were similar in content to SRQ items. The remaining additional supervisory tasks were specific to the 95B job and fell into two clusters: "Plan, Organize, Monitor" and "Train/Develop." The MOS-specific supervision tasks included activities such as planning/supervising patrols, organizing squads, supervising security force operations, preparing oral squad operations orders and fragmentary orders, and establishing/supervising crime prevention programs. Most of these MOS-specific aspects of supervision also emerged from the critical incidents work and are contained in the MOS-specific behavioral dimensions titled "Leading the Team in a Tactical Environment."

TABLE . Task Clusters: 95B Military Police

FIRST AID: Tasks that relate to diagnosing injuries, administering first aid, and transporting casualties.

LAND NAVIGATION AND MAP READING: Tasks related to moving over unknown terrain, reading maps, reading a compass, determining location, direction, and distance.

NUCLEAR, BIOLOGICAL, CHEMICAL (NBC): Tasks performed under NBC conditions, including putting on protective mask and clothing, operating and maintaining NBC equipment, and reporting NBC conditions.

WEAPONS: Includes tasks on operation, maintenance, and positioning of M16 rifle, M60 machinegun, LAW, mines and booby traps, and grenades.

MOVEMENT AND SURVIVAL IN FIELD: Tasks related to battlefield survival in defensive and offensive positions.

COMMUNICATIONS: Tasks related to preparing and sending radio messages, operating radio sets, and installing antennas and other communications related equipment.

DETECT AND IDENTIFY THREATS: Covers surveillance tasks, including search and scan procedures, and identifying threat vehicles and aircraft.

MOVEMENT/CONTROL OF PERSONNEL: Involves movement of personnel under combat and noncombat conditions to include processing and supervising the security of EPW/CI.

VEHICLE OPERATION AND MAINTENANCE: Tasks related to driving, recovering, and maintaining military vehicles.

CONTACT WITH HOSTILE PERSONNEL: Includes tasks dealing with individual and team battle techniques as well as civilian control measures.

ACTIVITIES RELATED TO CRIMES: Tasks related to interacting with crime suspects, collecting and handling evidence, and responding to criminal activities.

ADMINISTRATIVE: Contains a variety of administrative functions such as accounting for police activities, selecting details, preparing/maintaining reports, and writing/reviewing/revising SOP.

SECURITY: Tasks involving maintaining the accountability/security of classified documents and securing sites containing classified material.

TRAFFIC RELATED TASKS: Covers tasks relating to covering traffic flow, enforcing traffic regulations, and investigating traffic accidents.

PLAN, ORGANIZE, MONITOR: Tasks related to assigning work tasks, supervising performance of tasks, conducting inspections, and monitoring equipment condition and supplies.

CLARIFY ROLES, PROVIDE FEEDBACK: Covers performance monitoring and counseling of subordinates.

PROVIDE INFORMATION: Includes tasks related to passing on information concerning the mission and requirements.

RECOGNIZE, REWARD: Providing formal and informal rewards and recognition for good performance, recommending soldiers for promotion or awards.

TRAIN/DEVELOP: Planning and conducting individual and team training, providing career counseling, and providing opportunities for leadership.

SUPPORT: Listening to subordinates' personal problems, and counseling, assisting, or arranging assistance, as appropriate.

DISCIPLINE, PUNISH: Providing formal or informal disciplinary measures to subordinates.

ACT AS MODEL: Setting the example for subordinates.

Appendix I

MOS-SPECIFIC PERFORMANCE DIMENSIONS FOR SECOND TOUR SOLDIERS IN NINE MOS

For each of the nine MOS, a summary of the major changes to the MOS-specific performance dimensions is given, followed by a list of the dimensions and rating scales.

11B Infantryman Behavioral Performance Categories

The content of six of the 12 first tour performance categories was unchanged for second tour. Five categories were modified to reflect additional performance requirements/expectations (such as maintaining equipment even when not specifically told to do so, being able to demonstrate use of weapons in addition to being able to use the weapons expertly, and supervising subordinates in guard positions).

The greatest difference between first and second tour responsibilities is evidenced by the critical incidents pertaining to leadership responsibilities. The first tour category "Assisting and Leading Others" was divided into two second tour categories: "Leading the Team" and "Supervising Soldiers in the Field." These two categories include responsibilities for ensuring that troops have the required supplies and equipment, ensuring the safety and well-being of soldiers, briefing troops about the mission, ensuring that work is properly completed, using sound judgment to accomplish the mission, and leading by example.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Maintaining Supplies, Equipment, and Weapons	Maintaining and Accounting for Weapons and Equipment
Assisting and Leading Others	Supervising Soldiers in the Field
	Leading the Team
Navigation	Navigation
Use of Weapons and Other Equipment	Use of Organic Weapons and Equipment
Field Sanitation, Personal Hygiene, and Personal Safety	Field Sanitation, Personal Hygiene and Personal Safety
Fighting Positions	Fighting Positions
Avoiding Enemy Detection	Avoiding Enemy Detection
Operating a Field Phone/Radio	Operating a Radio Set
Reconnaissance and Patrol	Reconnaissance
Guard and Security Duties	Guard and Security Duties
Prisoners of War	Prisoners of War
Courage and Proficiency in Battle	Proficiency in Battle

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: INFANTRYMAN (11B)

A. Maintaining and Accounting for Equipment and Weapons

How effective is each soldier in ensuring that all equipment and weapons are well maintained and available for use in the field?

B. Supervising Soldiers in the Field

How effective is each soldier in ensuring the troops have necessary supplies/ equipment and ensuring the safety and well-being of soldier?

C. Leading the Team

How effective is each soldier when leading a team in a field environment?

D. Navigation

How effective is each soldier in using navigational equipment and navigating in the field?

E. Use of Organic Weapons and Equipment

How effective is each soldier in using organic weapons and equipment safely and proficiently?

F. Field Sanitation, Personal Hygiene, and Personal Safety

How effective is each soldier in maintaining sanitary conditions, personal hygiene, and personal safety in the field?

G. Fighting Positions

How effective is each soldier in preparing a fighting position, range cards, and sector sketches?

H. Avoiding Enemy Detection

How effective is each soldier in avoiding enemy detection during movement and in established defensive positions while in the field?

I. Operating a Radio Set

How effective is each soldier in putting a radio into operation and using it properly?

J. Reconnaissance

How effective is each soldier in performing reconnaissance activities?

K. Guard and Security Duties

How effective is each soldier in performing sergeant of the guard and security duties and manning observation posts?

L. Prisoners of War

How effective is each soldier in guarding and processing prisoners of war during field exercises or in combat?

M. Proficiency in Battle

How effective is each soldier in demonstrating proficiency in engaging the enemy during field exercises or in combat?

13B Cannon Crewman Behavioral Performance Categories

All ten of the first tour performance categories were retained for second tour. No explicitly supervisory/leadership performance categories were added to represent the 13B second tour job. Although most of the 13B E5s are gunners who rarely load or handle ammunition, set up communications, load or unload the howitzer, receive or relay communications, or keep records, the categories have been retained for those soldiers who are not yet gunners. The content of five categories was unchanged for second tour. Five categories were modified to reflect additional performance requirements/expectations (such as ensuring equipment is loaded and operational prior to field missions, and knowing the status of repair parts and following through to get them to the unit).

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Loading Out Equipment	Loading Out Equipment
Driving and Maintaining Vehicles, Howitzers, and Equipment	Driving and Maintaining Vehicles, Howitzers, and Equipment
Transporting/Sorting/Storing and Preparing Ammunition for Fire	Transporting/Sorting/Storing and Preparing Ammunition for Fire
Preparing for Occupation/Emplacing Howitzer	Preparing for Occupation/Emplacing Howitzer
Setting Up Communications	Setting Up Communications
Gunnery	Gunnery
Loading/Unloading Howitzer	Loading/Unloading Howitzer
Receiving and Relaying Communications	Receiving and Relaying Communications
Recording/Record Keeping	Recording/Record Keeping
Position Improvement	Position Improvement

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: CANNON CREWMAN (13B)

A. Loading Out Equipment

How effective is each soldier in drawing, inspecting, loading, and recovering equipment needed for field missions?

B. Driving and Maintaining Vehicles, Howitzer, and Equipment

How effective is each soldier in conducting inspections and maintenance checks; ensuring that routine service and repairs are performed; ensuring that vehicles and howitzers are operated properly?

C. Transporting/Sorting/Storing and Preparing Ammunition for Fire

How effective is each soldier in loading, storing, and securing ammunition on vehicles for transport; organizing and protecting ammo in field; preparing fuzes, charges, and projectiles for fire?

D. Preparing for Occupation/Emplacing Howitzer

How effective is each soldier in selecting location and approach route for howitzer; using hand and arm signals to guide howitzer; securing baseplate and spades?

E. Setting Up Communications

How effective is each soldier in laying, burying, and staking communications wire; connecting and checking radio telephones for operation; troubleshooting communication problems and making repairs?

F. Gunnery

How effective is each soldier in directing the emplacement of the collimator and aiming posts; obtaining sight picture; setting deflection, quadrant, and site to crest; boresighting?

G. Loading/Unloading Howitzer

How effective is each soldier in swabbing and checking bore for obstructions; loading projectile and charge, handling ammunition and loader/rammer?

H. Receiving and Relaying Communications

How effective is each soldier in monitoring radio telephone for commands; receiving commands from RTO or other crew members; orally relaying commands?

I. Recording/Record Keeping

How effective is each soldier in keeping gunner reference cards, range cards, and records of fire?

J. Position Improvement

How effective is each soldier in ensuring that fox holes are dug properly, camouflage net is erected and positioned effectively, and gun position is maintained in an orderly manner?

19E Armor Crewman Behavioral Performance Categories

All eight of the first tour performance categories were retained for second tour. The content of one category was unchanged, while the other seven categories were modified to reflect additional performance requirements/expectations (such as ensuring that weapons are loaded quickly and accurately rather than actually loading, performing prepare to fire checks, anticipating maintenance needs).

One leadership dimension entitled "Assuming Supervisory Responsibilities in Absence of Tank Commander" was added to cover performing supervisory functions and controlling movement of the tank when the tank commander is absent.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Maintaining Tank, Tank Systems, and Associated Equipment	Maintaining Tank, Tank Systems, and Associated Equipment
Driving/Recovering Tanks	Driving/Recovering Tanks
Stowing Ammunition Aboard Tanks	Stowing Ammunition Aboard Tanks
Loading/Unloading Guns	Loading/Unloading Weapons
Maintaining Guns	Maintaining Weapons
Engaging Targets with Tank Guns	Engaging Targets with Tank Weapon Systems
Operating Communication Equipment	Operating Communication Equipment
Preparing Tank for Field Problems	Preparing Tank for Field Problems
	Assuming Supervisory Duties in Absence of Tank Commander

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: TANK CREWMAN (19E)

A. Maintaining Tank, Tank Systems and Associated Equipment

How effective is each soldier in inspecting, cleaning, servicing, and performing minor repairs on tank hull, suspension system, and tank parts (e.g., batteries, turret/fire control system, and associated equipment) and in performing prepare-to-fire checks?

B. Driving/Recovering Tasks

How effective is each soldier in safely and efficiently operating, maneuvering, positioning, and recovering tanks?

C. Stowing Ammunition Aboard Tanks

How effective is each soldier in sorting, stowing, and securing ammunition aboard tanks; preparing and maintaining ammunition?

D. Loading/Unloading Weapons

How effective is each soldier in loading rounds for main gun, loading/unloading machine guns?

E. Maintaining Weapons

How effective is each soldier in cleaning, inspecting and performing minor repairs on weapon and weapon components (e.g., main gun breech block assembly)?

F. Engaging Targets with Tank Weapon Systems

How effective is each soldier in identifying targets, boresighting and calibrating weapons; operating main gun and fire controls; adjusting fire and firing on targets IAW commands; preparing and using range cards?

G. Operating Communication Equipment

How effective is each soldier in following proper communications procedures and acting as a radio monitor?

H. Preparing Tanks for Field Problems

How effective is each soldier in uploading tanks with equipment; preparing tanks for special operations or conditions (e.g., rail loading, nuclear attack, etc.)?

I. Assuming Supervisory Duties in Absence of Tank Commander

How effective is each soldier in performing supervisory functions and controlling movement of vehicle when TC is absent?

31C Single Channel Radio Operator Behavioral Performance Categories

All six first tour performance categories were retained for second tour. However, it was necessary to modify five of these to reflect additional second tour performance requirements/expectations (e.g., ensuring that equipment is serviced and parts replenished, enforcing safety rules, ensuring that messages are sent and received, inspecting logs). The sixth category, "Providing Safe Transportation," contains half of its original content covering reading maps and driving safely. The content relating to packing and preparing for movement was extracted and used in a new scale, "Preparing for Movement."

One MOS-specific supervisory category, "Managing the RATT Rig," was added for second tour. This dimension contains supervisory behaviors that are required of second tour soldiers in the position of team chief.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Inspect/Service Equipment	Inspect/Service Equipment
Installing Equipment	Installing Equipment
Operate Communication Devices	Operation Communications Devices
Preparing Reports	Preparing Reports
Maintaining Security	Maintaining Security
Providing Safe Transportation	Providing Safe Transportation
	Preparing for Movement
	Managing the RATT Rig

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: SINGLE CHANNEL RADIO OPERATOR (31C)

A. Inspecting and Servicing Equipment

How effective is each soldier in inspecting equipment, troubleshooting problems, pulling preventive maintenance, and ensuring that equipment is serviced?

B. Installing Equipment

How effective is each soldier in installing equipment and making it ready for operation?

C. Operating Communications Devices

How effective is each soldier in operating communications devices and providing for an accurate and timely flow of information?

D. Preparing Reports

How effective is each soldier in preparing reports, filing forms, inspecting logs, and recording incidents occurring while on shift?

E. Maintaining Security

How effective is each soldier in maintaining security of equipment and information?

F. Preparing for Movement

How effective is each soldier in preparing for the transport of equipment to sites?

G. Providing Safe Transportation

How effective is each soldier in locating sites and providing safe transport of equipment?

H. Managing RATT Rig

How effective is each soldier in monitoring and maintaining the overall effectiveness of the RATT rig equipment and team?

63B Light Wheel Vehicle Mechanic Behavioral Performance Categories

For four of the 11 first tour performance categories, there were no changes for second tour. Six categories were modified to reflect additional second tour performance requirements/expectations (e.g., conducting inventories, accounting for tools/test equipment, ensuring that soldiers follow unit SOP, always following appropriate troubleshooting procedures, proficiently diagnosing malfunctions, suggesting more efficient ways to accomplish work). One category, "Vehicle Operation," was renamed "Equipment Operation" since mechanics operate equipment other than vehicles (e.g., generators).

The MOS-specific supervisory responsibilities required for second tour 63B soldiers were captured by adding the dimension "Checking Repairs Made by Other Mechanics," which includes checking repairs to ensure that they were made correctly.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Inspect/Test Equipment Problems	Inspect/Test Equipment Problems
Troubleshooting	Troubleshooting
Performing Routine Maintenance	Performing Preventive Maintenance
Repair	Repair
Use Tools/Test Equipment	Use/Account for Tools/Test Equipment
Using Technical References	Using Technical References
Vehicle Operation	Equipment Operation
Safety Mindedness	Safety Mindedness
Administrative Duties	Administrative Duties
Recovery	Recovery
Determine Task Requirements	Determine Task Requirements
	Check Repairs Made by Others

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: LIGHT WHEEL VEHICLE MECHANIC (63B)

A. Inspecting and Testing Equipment Problems

How effective is each soldier in inspecting and testing equipment malfunctions?

B. Checking Repairs Made by Other Mechanics

How effective is each soldier in checking repairs made by other mechanics and ensuring that repairs are made correctly?

C. Troubleshooting

How effective is each soldier in determining the causes of equipment malfunctions?

D. Performing Preventive Maintenance Checks and Services

How effective is each soldier in carrying out scheduled maintenance tasks to keep vehicles operational?

E. Repair

How effective is each soldier in correcting malfunctions to make vehicles operational?

F. Using/Accounting for Tools and Test Equipment

How effective is each soldier in selecting, using maintaining and accounting for tools and equipment?

G. Using Technical References

How effective is each soldier in locating and using technical documents (e.g., TMs, LOs, etc.) when performing tasks?

H. Equipment Operation

How effective is each soldier in operating and securing equipment?

I. Safety Mindedness

How effective is each soldier in knowing and following safety precautions and ensuring that other soldiers follow safety precautions?

J. Administrative Duties

How effective is each soldier in completing paperwork and making disposition of paperwork?

K. Determining Task Requirements

How effective is each soldier in acquiring necessary materials before beginning tasks?

L. Recovery

How effective is each soldier in determining equipment and methods for recovering disabled vehicles?

71L Administrative Specialist Behavioral Performance Categories

One first tour performance category, "Posting Regulations" was deleted because SMEs felt that it was not sufficiently important to warrant its inclusion as a separate dimension. Three of the first four categories were unchanged for second tour. The remaining four first tour categories were revised to reflect increased requirements/performance expectations required of second tour soldiers (e.g., prioritizing own work, willingness/ability to use word processing equipment, ensuring that office equipment is properly maintained). The first tour category, "Keeping Records" was changed to "Correspondence Management" because SMEs felt that the new title would be more appropriate for the content of the dimension. Finally, the filing system used by the Army was changed since development of the first tour scales. The old filing system (TAFFS) was replaced by MARKS. No MOS-specific supervisory dimensions were added for the 71L job.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Prepare, Type, Proofread Documents	Prepare, Type, Proofread Documents
Distribute/Dispatch Documents	Process and Distribute Documents
Maintain Office Resources	Maintain Office Resources
Posting Regulations	
Establish/Maintain Files IAW TAFFS	Establish/Maintain Files IAW MARKS
Keeping Records	Correspondence Management
Safeguard Classified Material	Safeguard Classified Material
Provide Customer Service	Provide Customer Service

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: ADMINISTRATIVE SPECIALIST (71l)

A. Preparing, Typing, and Proofreading Documents

How effective is each soldier in preparing documents to meet scheduled deadlines; using the proper forms and formats; ensuring that completed copies contain no errors?

B. Processing and Distributing Documents

How effective is each soldier in processing and distributing documents in a timely manner; routing documents according to the command distribution plan; and sorting incoming documents properly?

C. Maintaining Office Resources

How effective is each soldier in ensuring that office equipment, supplies, and publications are properly maintained?

D. Establishing and/or Maintaining Files IAW MARKS

How effective is each soldier in using MARKS to ensure that all office documents are properly maintained?

E. Correspondence Management

How effective is each soldier in keeping accurate suspense logs and maintaining correspondence accountability?

F. Preparing and Safeguarding Classified Materials

How effective is each soldier in preparing, handling, storing, and destroying classified materials in accordance with Army regulations?

G. Providing Customer Service

How effective is each soldier in providing useful assistance to all customers, both in the office and over the telephone?

88M Motor Transport Operator Behavioral Performance Categories

Nine of the ten first tour performance categories were retained for second tour. The content of four categories was unchanged, while five categories were modified to reflect additional performance requirements/expectations (such as higher levels of driving proficiency, ensuring that maintenance has been performed before allowing vehicles to leave the motor pool, responsibilities for meeting commitments on time).

One first tour category, entitled "Loading Cargo and Transporting Personnel," was replaced by two categories, covering loading and transporting cargo separately from loading and transporting personnel. No MOS-specific supervisory category was added, as the behavioral examples suggested that the job is more technical than supervisory.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Driving Vehicles	Driving Vehicles
Vehicle Coupling	Vehicle Coupling
Checking and Maintaining Vehicles	Checking and Maintaining Vehicles
Using Maps/Following Proper Routes	Using Maps/Following Proper Routes
Loading Cargo and Transporting Personnel	Loading and Transporting Cargo
	Loading and Transporting Personnel
Parking and Securing Vehicles	Parking and Securing Vehicles
Performing Administrative Duties	Performing Administrative Duties
Self-Recovering Vehicles	Self-Recovering Vehicles
Safety-Mindedness	Safety-Mindedness
Performing Dispatcher Duties	Performing Dispatcher Duties

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: MOTOR TRANSPORT OPERATOR (88M)

A. Driving Vehicles

How effective is each soldier in operating Army vehicles (e.g., trucks, jeeps, tractors, and semitrailers) in a safe, effective, and lawful manner under various conditions?

B. Vehicle Coupling

How effective is each soldier in coupling/uncoupling trucks, tractors, and trailers according to standard operating procedures?

C. Checking and Maintaining Vehicles

How effective is each soldier in performing PMCS; checking vehicles for problems before, during, and after commitments; recognizing vehicle problems and taking appropriate action?

D. Using Maps/Following Proper Routes

How effective is each soldier in securing proper maps as needed; becoming familiar with routes ahead of time when appropriate; using maps effectively; following prescribed routes; and arriving at commitments on time?

E. Loading and Transporting Cargo

How effective is each soldier in supervising the loading of cargo; checking that cargo is properly distributed, secured, and blocked; following special instructions when hauling dangerous or hazardous cargo?

F. Loading and Transporting Personnel

How effective is each soldier in following appropriate procedures when transporting personnel?

G. Parking and Securing Vehicles

How effective is each soldier in setting the brakes and transmission properly when parking vehicles; securing vehicles when they are not in operation?

H. Performing Administrative Duties

How effective is each soldier in preparing forms completely, neatly, and accurately; obtaining needed forms before departing on commitment; turning in forms to proper persons?

I. Self-Recovering Vehicles

How effective is each soldier in taking correct action when vehicles are disabled; using winch or other equipment to perform vehicle self-recovery; following proper procedures when recovering or towing vehicles?

J. Safety-Mindedness

How effective is each soldier in knowing and following safety procedures; being alert to possible dangerous situations and taking steps to avoid them; using proper safety equipment?

K. Performing Dispatcher Duties

How effective is each soldier in dispatching other MTOs?

91A Medical Specialist Behavioral Performance Categories

The content of four first tour performance categories was unchanged for second tour. For the other four categories, modifications were made to reflect additional second tour performance requirements/expectations (e.g., ensuring that routine PMCS is performed, ensuring that adequate supplies were maintained, providing patient care without supervision, taking a leadership role in emergency situations). No MOS-specific supervision categories were added for the 91A/B MOS.

The first and second tour performance category names are shown below; the second tour performance category definitions are listed on the next page.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Maintain and Operate Army Medical Vehicles and Equipment	Maintain and Operate Army Medical Vehicles and Equipment
Maintain Accountability of Medical Supply/Equipment	Maintain Accountability of Medical Supply/Equipment
Keeping Medical Records	Keeping Medical Records
Arranging for Transportation/ Transport Injured Personnel	Arranging for Transportation/ Transport Injured Personnel
Dispensing Medications	Dispensing Medications
Preparing/Maintaining Field Site/Clinic Facilities	Preparing/Maintaining Field Site/Clinic Facilities
Respond Medical Emergencies	Respond Medical Emergencies
Provide Routine and Ongoing Patient Care	Provide Routine and Ongoing Patient Care
Responding to Emergencies	Responding to Emergencies
Provide Health Care and Health Maintenance Instruction	Provide Health Care and Health Maintenance Instruction

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: MEDICAL SPECIALIST (91A)

A. Maintaining and Operating Army Medical Vehicles and Equipment

How effective is each soldier in inspecting and maintaining Army medical vehicles and equipment to ensure that they are in mission-ready status, and operating vehicles in a safe and efficient manner?

B. Maintaining Accountability of Medical Supplies and Equipment

How effective is each soldier in keeping existing medical supplies/equipment well-stocked and properly stored and secured?

C. Keeping Medical Records

How effective is each soldier in completing and maintaining patients' records (e.g., medical history, current medication, treatment, etc.) and ensuring that all forms are accurate and up-to-date?

D. Arranging for Transportation and/or Transporting Injured Personnel

How effective is each soldier in transporting patients safety and properly and arranging for transportation of injured personnel?

E. Dispensing Medications

How effective is each soldier in determining or identifying the correct medication and administering medications as instructed or as required?

F. Preparing and Maintaining Field Site or Clinic Facilities in the Field

How effective is each soldier in preparing for the field, setting up and maintaining field facilities, and ensuring sanitary conditions?

G. Providing Routine and Ongoing Patient Care

How effective is each soldier in providing care for non-emergency injuries or illnesses, monitoring patients, and assisting the physical as required?

H. Responding to Emergency Situation

How effective is each soldier in responding quickly and immediately to life-threatening situations at accident sites, in the field, or in emergency rooms?

I. Providing Health Care and Health Maintenance Instruction to Army Personnel

How effective is each soldier in training other medics on proper injury or illness prevention techniques, and training soldiers on health maintenance procedures?

95B Military Police Behavioral Performance Categories

The content of seven (out of 11) first tour performance categories was unchanged for second tour. Three of the first tour categories were modified to reflect additional second tour performance requirements/expectations (e.g., planning the safe passage of equipment and personnel, only using the necessary degree of force, becoming familiar with more of the patrol area). One first tour performance category, "Courage and Proficiency in Battle" was dropped, because the content of this category seemed to be adequately covered by other second tour 95B dimensions.

Four new categories were added to the second tour scales. Three of these, "Fighting Positions," "Battlefield Circulation Control," and "Enemy Prisoners of War," were added to reflect changes in MOS doctrine since the time the first tour scales were developed. These categories would also be applicable to first tour performance. The fourth category addition was an MOS-specific supervision category, which contains behaviors such as briefing soldiers concerning the mission, leading teams in the field, and using appropriate strategies and tactics.

FIRST TOUR PERFORMANCE CATEGORIES	SECOND TOUR PERFORMANCE CATEGORIES
Traffic Control/Enforcement	Traffic Control/Enforcement
Providing Security	Providing Security
Investigate Crimes/Make Arrest	Investigate Crimes/Make Arrest
Patrolling	Patrolling
Promote Public Image of MPs	Promote Public Image of MPs
Interpersonal Communication	Interpersonal Communication
Respond Medical Emergencies	Respond Medical Emergencies
Navigation	Navigation
Avoiding Enemy Detection	Avoiding Enemy Detection
Use of Weapons/Equipment	Use of Weapons/Equipment
Courage/Profl in Battle	
	Fighting Position
	Battlefield Cir Control
	Enemy Prisoners of War
	Lead Team in Tact Environment

SECOND TOUR MOS PERFORMANCE CATEGORY NAMES AND DEFINITIONS FOR MOS: MILITARY POLICE (95B)

A. Traffic Control and Enforcement

How effective is each soldier in executing traffic control and enforcing traffic laws and parking rules?

B. Providing Security

How effective is each soldier in planning for and providing physical security and escort security?

C. Investigating Crimes and Making Apprehensions

How effective is each soldier in gathering information on criminal activity, making apprehensions, and reporting on crimes?

D. Patrolling

How effective is each soldier in detecting, responding to, and investigating suspected criminal activities while on patrol?

E. Leading the Team in a Tactical Environment

How effective is each soldier in leading the team and briefing subordinates on the mission?

F. Promoting the Public Image of the Military Police

How effective is each soldier in displaying professionalism, providing assistance, and otherwise promoting the public image of the military police while on-the-job and off-duty?

G. Interpersonal Communications Skills

How effective is each soldier in remaining calm and dealing effectively with disturbances and with individuals who are upset, angry, or potentially violent?

H. Responding to Medical Emergencies

How effective is each soldier in responding to medical emergencies and accidents?

I. Navigation

How effective is each soldier in using navigational equipment and navigating in the field?

J. Avoiding Enemy Detection

How effective is each soldier in avoiding enemy detection during movement and in established defensive positions while in the field?

K. Use of Weapons and Other Equipment

How effective is each soldier in using weapons and other equipment safely and proficiently?

L. Fighting Positions

How effective is each soldier in preparing a fighting position, range cards, and sector sketches?

M. Battlefield Circulation Control

How effective is each soldier in performing battlefield circulation control (BCC) in a tactical environment?

N. Enemy Prisoners of War

How effective is each soldier in processing enemy prisoners of war during field exercises or in combat?