

Technical Report 1224

**Future-Oriented Experimental Army Enlisted Personnel
Selection and Classification Project (Select21)
Summary Report**

Deirdre J. Knapp
Human Resources Research Organization

Trueman R. Tremble
U.S. Army Research Institute

Teresa L. Russell and Wayne S. Sellman
Human Resources Research Organization

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Deirdre J. Knapp
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Trueman R. Tremble
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Teresa L. Russell and Wayne S. Sellman
Human Resources Research Organization

Selection and Assignment Research Unit
Michael G. Rumsey, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
2511 Jefferson David Highway, Arlington, Virginia 22202-3926

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FUTURE-ORIENTED EXPERIMENTAL ARMY ENLISTED PERSONNEL SELECTION AND CLASSIFICATION PROJECT (SELECT21) SUMMARY REPORT

EXECUTIVE SUMMARY

Research Requirement:

The Select21 project was undertaken to help the U.S. Army ensure that it acquires Soldiers with the knowledges, skills, and other attributes (KSAs) needed for performing the types of tasks envisioned in a transformed Army. This transformation will involve development and fielding of Future Combat Systems (FCSs) to achieve dominance through a force that is responsive, deployable, agile, versatile, lethal, and fully survivable and sustainable under all anticipated combat conditions. However, Army leadership recognizes first and foremost the importance of its people – Soldiers – to the effectiveness of transformation. In this context, the ultimate objectives of the project were to (a) develop and validate measures of critical KSAs needed for successful execution of future force missions and (b) propose use of these measures as a foundation for an entry-level selection and classification system adapted to the demands of the 21st century.

Procedure:

Early in the Select21 project, we conducted a future-oriented job analysis (Sager, Russell, R.C. Campbell, & Ford, 2005) to support the development of criterion measures and experimental selection and classification predictor measures (Knapp, Sager, & Tremble, 2005). We then used a concurrent validation design in which we administered both the predictor and criterion measures to first-term enlisted Soldiers who had been in a unit for at least 12 months.

The criterion measures included (a) job knowledge tests, (b) a criterion situational judgment test (CSJT), (c) performance ratings (covering current performance and anticipated performance under explicitly defined future conditions) collected from supervisors and peers, and (d) surveys of current job attitudes (the Army Life Survey; ALS) and expected attitudes under defined future conditions. All Soldiers completed versions of these measures suitable for first-term Soldiers regardless of military occupational specialty (MOS). We administered job specific criterion measures to Infantrymen (11B) and Signal Support Systems Specialists (25U), but the 25U sample was too small to support planned classification efficiency analyses. Therefore, data analysis work focused primarily on the extent to which each of the experimental measures was related to Army-wide performance. These analyses included estimation of incremental validity beyond the predictive power of scores from the Armed Services Vocational Aptitude Battery (ASVAB).

The experimental predictors administered in the concurrent validation included (a) two temperament measures (Rational Biodata Inventory [RBI] and Work Suitability Inventory [WSI]), (b) a predictor situational judgment test (PSJT), and (c) two psychomotor tests (Target Shoot and

Target Tracking). There were also two measures based on person-environment fit models, the Work Values Inventory (WVI) and the Work Preferences Survey (WPS). The WPS is a measure of interests and the WVI asks respondents about the characteristics they value in a work environment (e.g., autonomy). Some measures developed in Select21 and described in Knapp et al. (2005) were not included in the concurrent validation because they were not suitable for administration to experienced Soldiers (e.g., the Pre-Service Expectations Survey).

Findings:

Our intent was to develop predictors that supplement the ASVAB for the prediction of performance and attitudinal criteria. We constructed five composite performance scores (based on a confirmatory factor analysis modeling exercise) and five attitudinal scores to use in the validation analyses. The five performance criteria were (a) General Technical Proficiency, (b) Achievement and Effort, (c) Physical Fitness, (d) Teamwork, and (e) Future Expected Performance. The five attitudinal scores were (a) Satisfaction with the Army, (b) Perceived Army Fit, (c) Attrition Cognitions, (d) Career Intentions, and (e) Future Army Affect.

Consistent with prior research, scores on the ASVAB were shown to be good predictors of can-do performance criteria (e.g., General Technical Proficiency) and to have lower validity for predicting will-do (e.g., Physical Fitness, Teamwork) and attitudinal criteria. ASVAB scores yielded significant correlations with Future Expected Performance. This is a new finding because the question of future performance (and attitudes) has never before been posed for entry-level Soldiers. ASVAB scores yielded small but significant negative correlations with Attrition Cognitions. Consistent with prior research, Soldiers with higher cognitive ability were less likely to think about breaking their enlistment contracts, although they were more likely to be planning to leave at the end of their enlistment term.

Scores on the ASVAB were in fact such good predictors of can-do performance criteria (e.g., General Technical Proficiency) that they left little room for improvement (“incremental validity”) with the addition of other tests. In contrast, many of the Select21 predictors showed notable levels of incremental validity over the ASVAB when predicting Achievement and Effort, Physical Fitness, and Teamwork performance. In addition, substantial levels of incremental validity were found for the RBI, WVI, and WPS for predicting the attitudinal criteria, with somewhat lower levels of validity for the WSI and PSJT. Such findings reinforce the notion that when judging the efficacy of predictors for incrementing the validity of the ASVAB, it is important to account for the multi-dimensional nature of job performance and job-related attitudes.

We performed subgroup analyses using type of MOS as the subgrouping variable to get an idea of the potential for the experimental predictors to improve classification efficiency. Soldiers were sorted into four MOS clusters for these analyses, which did suggest that some of the predictors have potential utility for classification.

Utilization and Dissemination of Findings:

Many of the new Select21 predictors are self-report indicators in which scores may be affected by experience in the Army and response distortion (whether intentional or not) in an operational setting. Therefore, it is particularly important to evaluate them in a longitudinal validation in which the predictors are administered to Army applicants or new recruits. A follow-on 5-year research program known as "Army Class" has been initiated to collect such data. Moreover, Army Class is designed to gather more MOS-specific data. This will allow a more definitive assessment of the classification potential of the experimental predictors. Army Class includes a concurrent validation as well as a longitudinal validation, so it will significantly build upon the foundation provided by Select21 for implementation of Select21 enlistment tests for both selection and classification decision-making.

A key ingredient to successful implementation of research findings is a strong interface between researchers and policymakers. This report describes steps taken over the course of the Select21 project and future activities needed to promote implementation of the Select21 selection and classification tests.

FUTURE-ORIENTED EXPERIMENTAL ARMY ENLISTED PERSONNEL SELECTION
AND CLASSIFICATION PROJECT (SELECT21) SUMMARY REPORT

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FUTURE-ORIENTED EXPERIMENTAL ARMY ENLISTED PERSONNEL SELECTION AND CLASSIFICATION PROJECT (SELECT21) SUMMARY REPORT

Introduction

The U.S. Army has undertaken far-reaching changes to transform the current force into one that is more responsive, deployable, agile, versatile, and lethal while being fully survivable and sustainable under all conditions. *New Predictors for Selecting and Assigning Future Force Soldiers (Select21)* is part of an Army research program focused on the personnel system by which the Army selects entry-level Soldiers and assigns these Soldiers to jobs. This research program is designed to help ensure that through this system, the Army will acquire new Soldiers with the knowledges, skills, and other attributes (KSAs) needed for performing the types of tasks emerging as part of the transformation. More specifically, the objectives are to develop measures of these KSAs and to evaluate their potential for integration into the Army's personnel acquisition system.

It bears noting that concurrent with the Select21 effort, the Department of Defense (DoD) sponsored a panel of measurement experts to review the current selection and classification test battery—the Armed Services Vocational Aptitude Battery (ASVAB)— and to recommend changes. As it turns out, the Select21 research approach is quite consistent with this panel's recommendations and may help to further progress on those recommendations (Dragow, Embretson, Kyllonen, & Schmitt, 2006).

Select21 Research Plan

Figure 1 shows a schematic overview of the Select21 project. It began with job analysis work to forecast future Army job requirements. This information served as the basis for development of criterion measures and a battery of experimental selection and classification tests. To obtain evidence of how well these experimental pre-enlistment tests would work, we administered them to a sample of Soldiers and then measured how well these same Soldiers fit with their jobs using measures of job performance and attitudes. Select21 used a “concurrent validation” design in which we administered the experimental tests to a sample of Soldiers with 12 to 36 months time in service and, at the same time, administered the criterion measures. Although not depicted in Figure 1, we were able to conduct attrition-related research using data from Soldiers who participated in early stages of the research in which they took draft versions of the experimental predictor tests as new recruits.

The original research plan included an Army-wide sample that comprised a mix of military occupational specialties (MOS), plus subsamples of Soldiers in six selected MOS. The plan called for collecting MOS-specific criterion data from Soldiers in the target MOS and using the information to evaluate the extent to which the experimental predictors would be useful for supporting personnel classification decisions. Deployment activity associated with the Global War on Terror, however, made it difficult for units to provide Soldiers for testing. Therefore, we scaled back to target two MOS (Infantry [11B] and Signal Support Systems Specialty [25U]). Even with this reduction, we were still not able to collect sufficient data from the 25U MOS to support the classification research planned. This work is thus being extended under a follow-on research effort, *Investigations into Army Enlisted Classification Systems (Army Class)*. In

addition to collecting more concurrent validation data, the Army Class research program will take the next step towards implementation and conduct a longitudinal validation that will involve administering the most promising experimental predictors to applicants (or new recruits) and tracking them over time to collect criterion data. This design will be the ultimate test of the new measures prior to final implementation decisions.

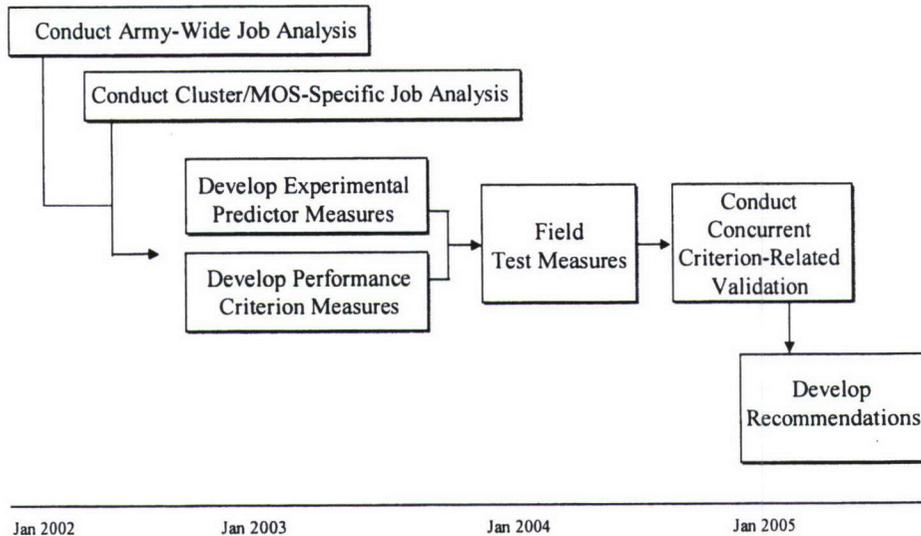


Figure 1. Schematic of the Select21 project plan.

Purpose and Organization of Report

The purpose of this report is to describe the objectives, approach, and findings of the Select21 research project in a manner suitable for a policymaking audience. It also offers insights into issues related to implementation of the research findings. Technical details of the research are provided in several companion reports, most notably Knapp, Sager, and Tremble (2005) and Knapp and Tremble (2006). For a complete listing of related documents, see the bibliography at the end of this report.

The remainder of this report is organized into six sections. The first four sections provide background information related to the following areas:

- Defining future entry-level Soldier requirements.
- Desired outcomes of an effective selection and classification system.
- Considerations that go into evaluating potential new pre-enlistment tests.
- Descriptions of the experimental tests developed in Select21.

We then move to describing what we know about the effectiveness of the ASVAB and the experimental Select21 tests and what other research questions we are asking in the follow-on Army Class project. The report concludes with a discussion related to maximizing the successful integration of research findings into operational programs.

The First Step: Identifying Future Requirements

At the beginning of the Select21 research effort, we took considerable care to identify future requirements for first-term Soldiers (Sager, Russell, R.C. Campbell, & Ford, 2005). This activity carried forth work previously done in support of a comparable research program focused on the enlisted personnel promotion system (NCO21) (Ford, R.C. Campbell, J.P. Campbell, Knapp, & Walker, 2000). While much had been written prior to the NCO21 project about directions for change, particularly as it regards weapons systems, little of this information discussed implications for the jobs of individual Soldiers. In short, we combined information from Army planning documents with information about the current force structure and job requirements and used this as a basis for projecting details about the Army's future force. Our target was 15-20 years into the future. We were aided by Army subject matter experts (SMEs) throughout this process and created the following products as a result of this effort:

- A set of 16 entry-level job clusters
- Future conditions for entry-level Soldiers
- Dimensions of entry-level Soldier job performance
- Entry-level Soldier job tasks
- Pre-enlistment KSA requirements

The job clusters were used as a basis for sampling MOS to include in the Select21 research. The future conditions, job performance dimensions, and job task information were used as a basis for (a) identifying the KSA requirements and (b) development of the criterion measures.

Defining Desired Selection and Classification Outcomes

In research of this nature, it is important to clearly define the criteria of interest. That is, how do we determine if selection and classification decisions are being made effectively? Currently, the primary tool for selection and classification for all the U.S. Armed Services (including the Coast Guard) is the ASVAB. The original goal of the ASVAB was to predict how well individuals would perform in technical training, so technical training performance has historically been the criterion of interest in validation research such as that conducted in Select21. In today's Army and certainly in tomorrow's Army, however, the criteria of interest are much broader in nature.

Although training performance is important, force readiness has more to do with performance in units in the field and with having Soldiers who stay in the Army than it does with schoolhouse performance. Therefore, we developed experimental pre-enlistment tests to predict the following criteria:

- Job performance (i.e., performance in units)
- Job-related attitudes (e.g., job satisfaction) related to attrition and retention behavior
- Attrition

Moreover, the Select21 research effort included the determination of future job requirements and conditions expected to characterize a transformed Army, and we used this information to develop variations of the criterion measures to try to capture the impact of those conditions on Soldiers' performance and attitudes. The specific indices used to evaluate the experimental predictor tests are briefly described below.

Performance Ratings

We developed performance rating scales to be completed by Soldiers' supervisors and peers. One set of rating scales was suitable for first-term Soldiers in any MOS and included sections on technical or "can-do" aspects of performance (e.g., common and MOS-specific task performance) and softer but no less important motivational or "will do" aspects of performance (e.g., adaptability, effort and initiative, supporting peers). A second type of rating scale was developed for selected target MOS to obtain ratings of performance areas specific to the MOS. Contents for the rating scales were based on the future-oriented job analysis conducted prior to development of all the Select21 measures. Figure 2 shows one of the Army-wide rating scales.

Demonstrates Professionalism and Personal Discipline on the Job						
The extent to which the Soldier exhibits selfless service orientation, exhibits integrity and discipline on the job, and follows instructions, rules and regulations						
<ul style="list-style-type: none"> - Fails to adhere to Army standards and values - Is disrespectful toward superiors; may ignore or refuse to follow orders - Usually displays poor military bearing - Does not put in effort to meet team goals, even when given encouragement - Takes part in prohibited activities - Exhibits little or no self-control or discipline on the job 		<ul style="list-style-type: none"> - Generally adheres to Army standards and values - Follows direct orders with little or no complaint and is usually respectful to superiors - Usually maintains good military bearing - Puts in effort to achieve team goals, but may need some encouragement - Usually resists temptation to take part in prohibited activities, but might succumb to peer pressure - Generally exhibits self-control and discipline on the job 			<ul style="list-style-type: none"> - Consistently adheres to Army standards and values - Follows orders willingly; is always respectful to superiors - Consistently maintains excellent military bearing - Willingly puts in required effort to ensure team goals are achieved - Resists even strong peer pressure to take part in prohibited activities - Exhibits strong self-control and discipline on the job 	
Below Expectations		Meets Expectations			Exceeds Expectations	
1	2	3	4	5	6	7

Figure 2. Sample Army-wide current performance rating scale.

After completing ratings describing Soldiers' current performance, raters in the Select21 research were given a briefing about changes expected to take place in the Army over the next 15-20 years. This briefing characterized future conditions in terms of five major areas of change relative to the current environment:

- Increased individual pace and intensity
- Need for more self-directed learning
- Greater requirement for disciplined initiative (functioning with less supervisor and peer support)
- Increased amounts of frequently updated information
- Increased survivability

The briefing also included information about the weapons and Soldier support systems expected to impact future conditions (e.g., future combat systems).

After the briefing, raters completed a set of “Expected Future Performance” rating scales that required them to predict how well each Soldier they were rating would perform under the future conditions. A comparable set of future-oriented rating scales also was developed for each target MOS. Figure 3 shows an example rating dimension from the Army-wide scales.

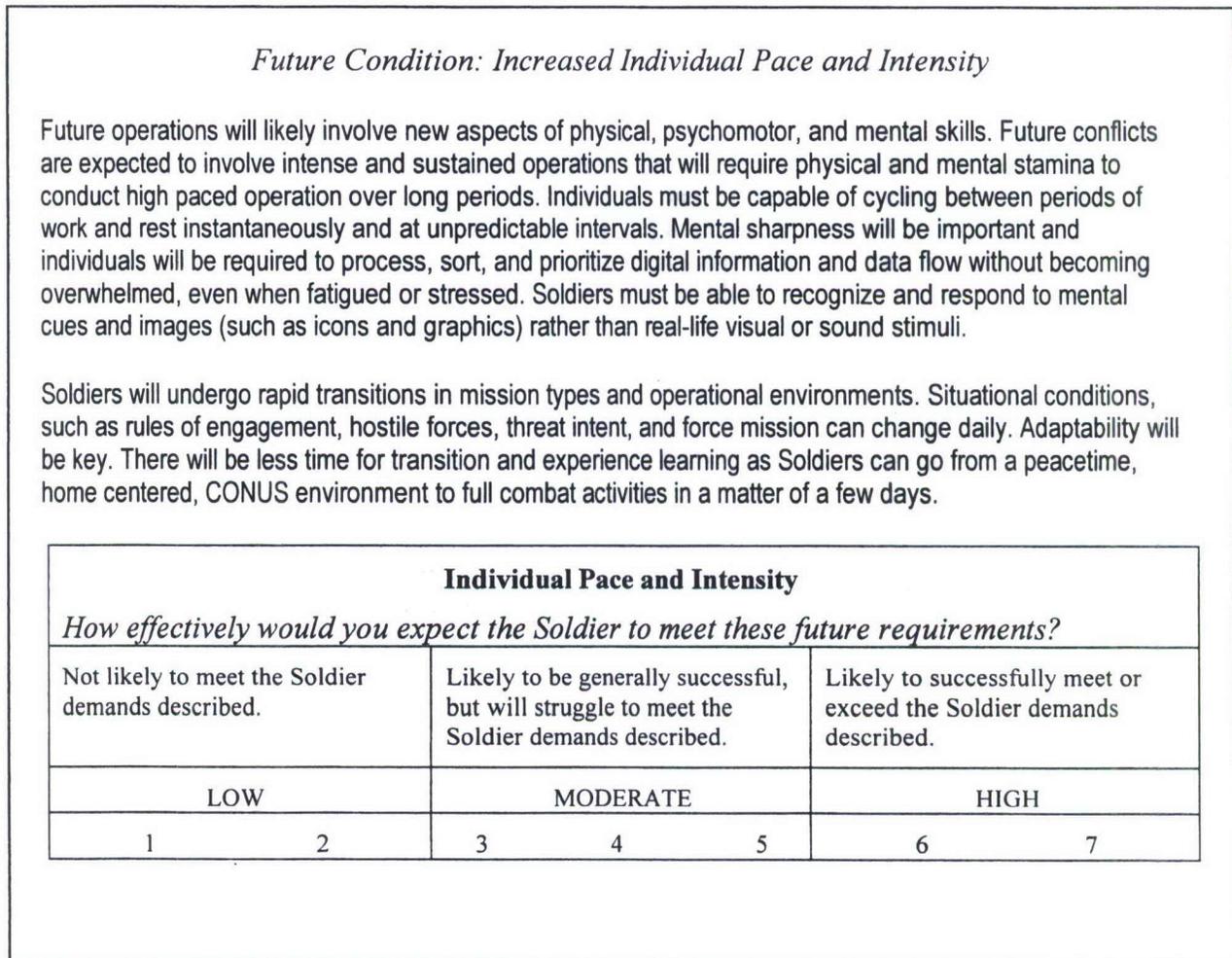


Figure 3. Sample Army-wide future expected performance rating scale.

Job Knowledge

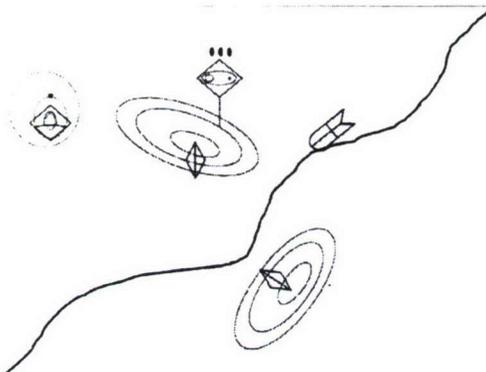
We developed an Army-wide job knowledge test as well as tests specific to the target MOS. The Army-wide test primarily captured knowledge of procedures associated with common tasks (e.g., evaluate a casualty; navigate using a compass, a map, and overlays). The test items are a blend of multiple-choice, matching, ranking, and drag-and-drop formats and make liberal use of visual aids (e.g., graphics and figures). As with the other performance criterion measures, test content is geared to first-term Soldiers. Sample items are shown in Figure 4.

Sample: Which MOPP level is shown in the figure below?



- A. MOPP 1
- B. MOPP 2
- C. MOPP 3
- D. MOPP 4

Sample: An enemy armor platoon (reduced strength) has established a strong point defense along an avenue of approach. The enemy commander has arrayed his forces to maximize his current assets to delay or stop an opposing light infantry company. What is the HVT?



- A. AT missile
- B. T-72 tank
- C. SA-missile squad
- D. Mortar platoon

Figure 4. Sample job knowledge test items.

Judgment

In addition to measuring job knowledge, it is important to determine how well Soldiers judge what should be done in problem situations, such as working with uncooperative peers to accomplish a task or determining when to handle a problem alone versus consulting a supervisor. The “Criterion Situational Judgment Test” contains problem scenarios and possible actions that had been generated by first-term Soldiers and their supervisors. A sample item is shown in Figure 5. The scoring key was developed using judgments provided by senior NCOs.

Instructions: Your task is to rate the effectiveness of each of these actions using a 1–7 rating scale, where 7 is highly effective and 1 is completely ineffective. Imagine that you are in the situation; use the scale to indicate how effective or ineffective you believe each action to be.

Sample Question: You are a member of second squad, First Platoon. You have noticed that a member of third squad has begun to let job performance and military appearance slip. Once very punctual, this Soldier has been late to two formations in the last week. What should you do?

- a. Tell the Soldier that the whole platoon will suffer if he/she doesn't change.
- b. Try to talk to the Soldier and see if he/she has a problem that you may be able to help with.
- c. Tell the Soldier's squad leader.
- d. Don't interfere. It's up to this Soldier's squad or chain-of-command to take care of this.

Figure 5. Sample Criterion Situational Judgment Test item.

Job-Related Attitudes

We developed the Army Life Survey (ALS) to collect information from Soldiers about Army/job-related attitudes. The ALS measures satisfaction with the Army (and various facets of the Army), organizational commitment, perceived fit with the Army, perceived stress, career intentions (i.e., plans to attrit or reenlist), and endorsement of the seven core Army values (e.g., loyalty, honor, selfless-service). Sample items are shown in Figure 6. We also developed the Future Army Life Survey (FALS), which asked Soldiers to indicate how various conditions expected to characterize the future Army would affect their attitudes and career intentions.

Attrition

Some individuals who participated in early research phases (e.g., in pilot or field tests) were new recruits, and we were able to track them via Army records and later determine who left the Army and when they did so. Specifically, we examined (a) attrition from Basic Combat Training (BCT), (b) attrition from Advanced Individual Training (AIT), and (c) in-unit attrition.

Instructions: The following survey includes several questions regarding your attitudes, impressions, and thoughts about life in the Army. Please read each set of instructions and questions carefully. Be assured that your responses will remain completely confidential and will be used for research purposes only. Your individual responses will not be reported. It is important that you respond to each question honestly.

Sample Items:

1. How satisfied are you with the way your supervisor(s) handle Soldiers in your unit?
2. How satisfied are you with the amount of challenge in your work?
3. I am proud to tell others that I am in the Army.
4. I find life as a Soldier to be stressful.
5. How confident are you that you will complete your current term of service?

Figure 6. Sample Army Life Survey items.

Considerations in Developing the Select21 Predictor Test Plan

Valid pre-enlistment tests help the Army select well-qualified Soldiers and minimize the costs associated with poor performance. While maximizing validity of the selection and classification process is a critical goal, validity was not the only factor we considered in planning Select21 predictor test development. With this perspective in mind we attempted to balance several goals in deciding what types of pre-enlistment measures to develop. These goals, intended to maximize potential for operational implementation, were to:

- Meet the Army's future manpower needs.
- Maximize the reliability and validity of selection and classification decisions.
- Minimize subgroup differences and maximize fairness of the system.
- Minimize administrative resource requirements for testing.

Developing the Select21 battery of pre-enlistment measures required balancing all of these goals, each of which is discussed briefly below.

Meeting the Army's future manpower needs means ensuring that selected Soldiers will have the aptitudes and skills they need to deal with the demands they will face. Given that the Army is a promote-from-within organization, it needs to select entry-level Soldiers who have the characteristics necessary to become successful leaders. Additionally, pre-enlistment tests need to identify Soldiers who are likely to be successful in tomorrow's Army—given likely changes in technology and jobs. Both of these facets affect decisions about the characteristics that should be measured by pre-enlistment measures. As described earlier, Select21 conducted a systematic, future-oriented job analysis to identify future performance requirements. The job analysis resulted in pre-enlistment (KSA) requirements that guided our predictor test development plans.

Maximizing the reliability and validity of pre-enlistment tests increases the likelihood that the Army will select Soldiers who will perform well in their MOS. Because several of the

Select21 predictors are assessments that do not have “right” and “wrong” answers like the ASVAB does, they may be subject to response distortion. This occurs when examinees give the answers they believe the Army is looking for rather than answers that reflect their true beliefs. Therefore, to maximize their validity, each of these measures was designed to minimize the potential for response distortion.

Evidence of validity can come from many sources—correlations between test scores and job performance, linkages between job content and characteristics measured on the tests, and documentation of validity of the tests for other similar jobs (AERA, APA, & NCME, 1999; SIOP, 2003). Correlational evidence is highly desirable, but also the most expensive to obtain. Soldiers must be tested and rated by their supervisors. Volumes of data must be processed and analyzed. For this reason, it was important in Select21 to invest resources in experimental pre-enlistment measures that had the best chance (based on the job analysis information and research literature) of showing useful increments in predictive power over the ASVAB in a criterion-related validation study.

The way in which the criterion-related validation investigation is conducted is important to consider when evaluating the validity evidence it reveals. A concurrent validation (i.e., involving experienced Soldiers) of measures designed for administration to applicants in a high stakes decision situation does not necessarily tell the whole story particularly with regard to the extent that efforts to minimize response distortion are effective.

Maximizing the validity of selection tools while minimizing subgroup differences is a challenge because cognitive ability measures with strong track records of validity also typically yield large differences among race subgroups (Sackett, Schmitt, Ellingson, & Kabin, 2001). One way to possibly minimize the differences while adding to the validity of cognitive measures is to focus on predictors of contextual criteria (e.g., effort expended on the job). Based on prior research, we anticipated that the Select21 non-cognitive predictors would yield smaller subgroup differences than those observed on cognitive aptitude tests such as the ASVAB.

Minimizing the administrative burden and costs of testing is important for successful implementation of pre-enlistment tests. Regardless of how it is done (computer-administered, proctored sessions, group administration), testing costs time and money. Pre-enlistment tests that require a special apparatus, one-on-one administration, or hand scoring can be overly burdensome, even if they have useful validities. Moreover, psychometric goals are often at odds with administrative ones. Longer tests are more reliable, but test length increases testing time.

Select21 Experimental Pre-Enlistment Tests

As mentioned previously, the ASVAB was designed to predict technical performance in training. There is considerable research evidence indicating the ASVAB does this quite well and that it also very effectively predicts technical aspects of job performance (Wigdor & Green, 1991). It is less effective, however, for predicting the so-called “will do” aspects of performance, job attitudes, and attrition (J.P. Campbell & Knapp, 2001). Therefore, the Select21 research focused on developing new experimental tests that would complement the ASVAB by predicting these latter criteria.

The experimental Select21 predictors are designed to measure temperament, work-related interests and values, judgment, psychomotor ability, and expectations about life in the Army. Specifically, the experimental predictor measures include the following:

- Rational Biodata Inventory (RBI)
- Work Suitability Inventory (WSI)
- Psychomotor Tests
- Predictor Situational Judgment Test (PSJT)
- Record of Pre-Enlistment Training and Experiences (REPETE)
- Work Values Inventory (WVI)
- Work Preferences Survey (WPS)
- Army Beliefs Survey (ABS)
- Pre-Service Expectations Survey (PSES)
- Army Work Knowledge Survey (AWKS)

In the remainder of this section, we describe and provide examples for each of the instruments. All of the instruments are computer-administered.

Rational Biodata Inventory (RBI)

The Rational Biodata Inventory (RBI) is designed to measure motivational/temperament characteristics identified as important to entry-level Soldier performance in the future. The RBI incorporates biodata scales from several existing Army tests designed to predict job performance and counterproductive tendencies. These existing tests are used, for example, for selecting Special Forces Soldiers.

Biodata items ask about past behavior and reactions to previous life events (e.g., “to what extent have you enjoyed thinking about the plusses and minuses of alternative approaches to solving a problem?”). The RBI items are written specifically to tap important motivational and temperament characteristics such as the following:

- *Achievement Orientation*: Working hard and giving one’s best effort.
- *Cognitive Flexibility*: Willingness to try new ways of getting work done. Embracing innovation and change. Comfort with uncertainty and ambiguity.
- *Peer Leadership*: Comfort with taking the initiative. Willing to make tough decisions and accept responsibility for the group’s performance.
- *Cultural Tolerance*: Willingness to accept and work closely with those from other cultural/religious/ethnic backgrounds.

Figure 7 shows an example of a rational biodata item.

How often have you put off doing a chore that you could have taken care of right away?

- A. Very often
- B. Often
- C. Sometimes
- D. Seldom
- E. Never

Figure 7. Example rational biodata item.

Work Suitability Inventory (WSI)

The Work Suitability Inventory (WSI) uses a self-report format to determine the types of work that respondents believe they would perform best. The WSI differs from many other tests in that it asks respondents to sort statements rather than answer questions. Specifically, this measure asks respondents to sort 16 statements describing different types of work requirements. Figure 8 shows an example of two of the statements that appear on the WSI.

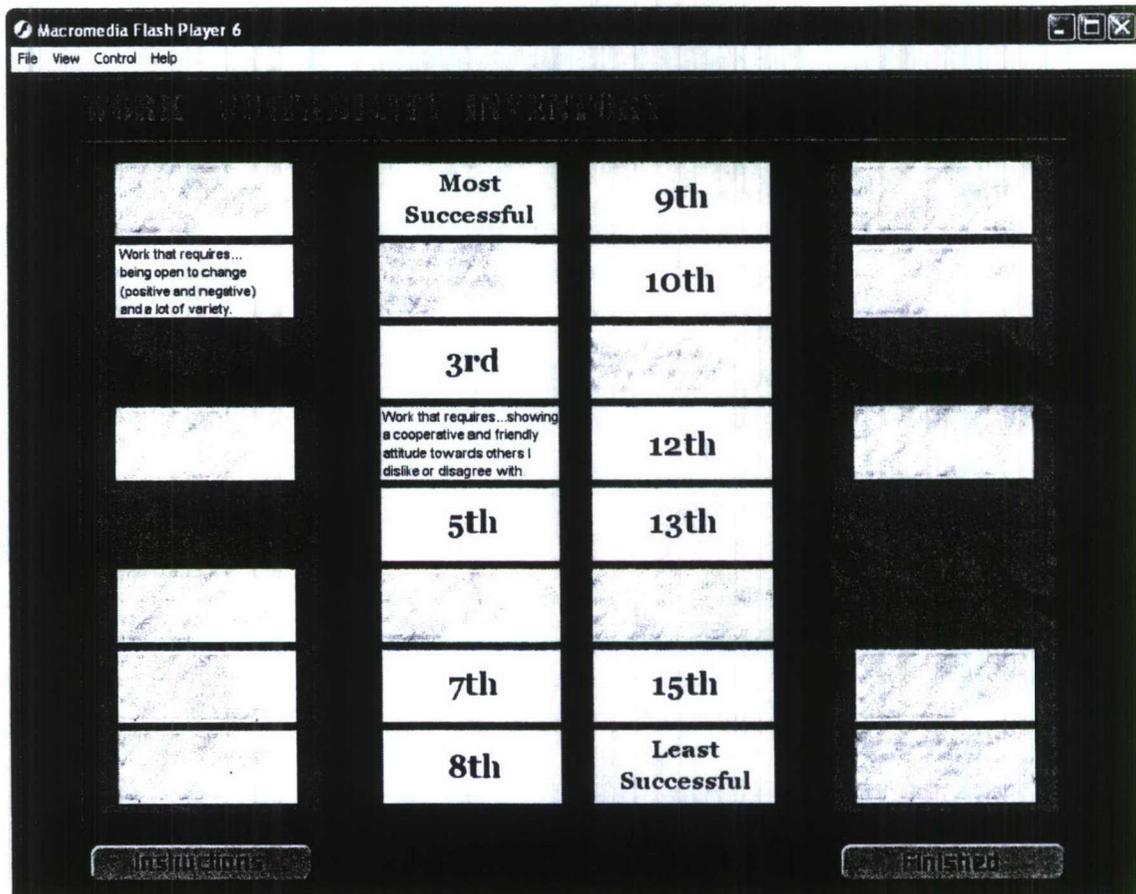


Figure 8. Screenshot of partial sorting of statements from the Work Suitability Inventory.

Each statement appears on its own rectangular block, or “card.” Respondents must rank the 16 statements in terms of how successful they think they would be at performing each type of work described—the highest ranked statement should describe work that respondents think they would be most successful at, and the lowest ranked statement should describe work that respondents think they would be least successful at. To rank the “type of work” cards, respondents use the computer mouse to position the cards on spaces labeled 1 (Most Successful) through 16 (Least Successful) (see Figure 8). Compared with other measures, WSI takes very little time to administer (less than 10 minutes).

An important feature of the WSI lies in its scoring approaches. The Army can score the WSI differently for each outcome of interest (e.g., job performance, attrition, person-Army fit). Unlike conventional tests having correct answers or a single set of keyed answers, no single ordering of the 16 cards will likely predict all outcomes of interest—a ranking that yields a high score on one outcome may well yield a low score on other outcomes. Therefore, respondents’ attempts to rank the statements the way they think the Army would like (rather than ranking them in the way that best describes themselves) will not be successful. As such, the WSI should be resistant to response distortion.

Psychomotor Tests

There is good reason to expect that tests of psychomotor ability might improve upon the validity of the ASVAB for predicting certain aspects of future job performance in entry-level Army MOS. Prior research has shown psychomotor tests to be good predictors of gunnery performance and certain other job performance criteria (J.P. Campbell & Knapp, 2001). Additionally, the Select21 job analysis data suggested that psychomotor skills were more important for performance in close combat jobs and therefore might be useful for classification purposes.

The Select21 psychomotor tests—Target Tracking and Target Shoot—were adapted from an earlier Army research project. They are designed to measure a person’s ability to adjust or position a machine control mechanism precisely. For both tests, the respondent uses a joystick to track a target.

Target Tracking Test

On each item of the test, a path consisting of vertical and horizontal line segments is presented. A sample item is shown in Figure 9. A target box appears at the beginning of the path. As the item begins, the target starts to move along the path at a constant rate of speed. The respondent’s task is to keep the crosshair centered within the target at all times using a joystick to control movement. The respondent’s score on this test indicates how accurately he or she tracked the target (i.e., the average distance from the center of the crosshair to the center of target across all items).

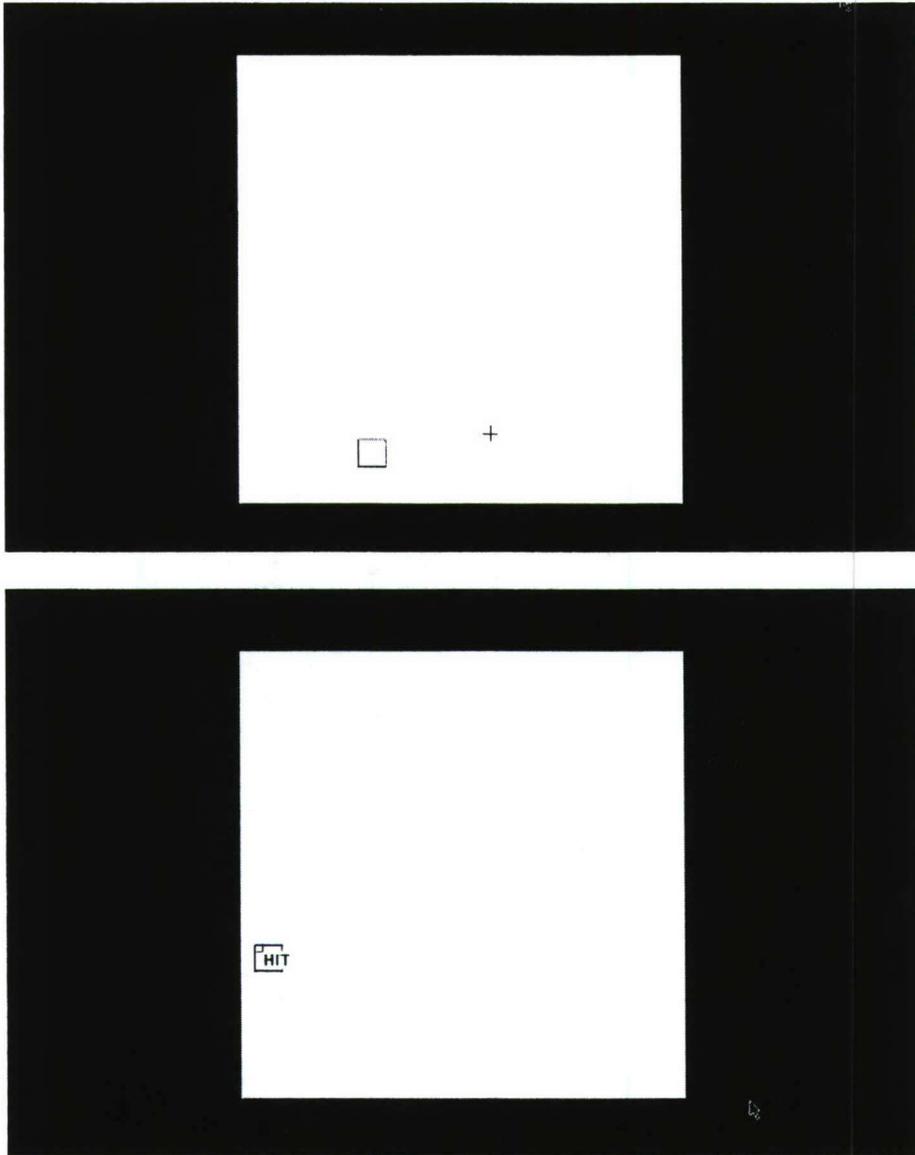


Figure 10. Example Target Shoot Test item.

Predictor Situational Judgment Test (PSJT)

Situational Judgment Tests have become popular in recent years because they have shown good validity for predicting job performance and incremental validity over general cognitive aptitude measures like the ASVAB. The purpose of Select21's PSJT is to predict future first-term Soldier job performance by simulating situations youth face prior to enlistment as a Soldier. Each item consists of a description of a problem situation and a list of four alternative actions that a person might take in that situation. A sample item is shown in Figure 11.

Instructions: You are to rate the effectiveness of each action using a 1–7 rating scale, where 7 is highly effective and 1 is completely ineffective. Imagine that you are in the situation; use the scale to indicate how effective or ineffective you believe each action to be.

Sample Item: You are a student working on a group project with your classmates. You are approaching your deadline and the project is not complete. One member of the group offers to take the project home and complete it over the weekend. How effective is each of the following actions you could take?

- a. Offer to take the project home and finish it instead of the other student taking it home.
- b. Plan a day for all the group members to get together and work on the project.
- c. Ask the student if he/she needs help.
- d. Let the student take it home and complete the project.

Figure 11. Example Predictor Situational Judgment Test item.

The PSJT measures a respondent's judgment in civilian situations that are similar to military situations experienced by Soldiers during their first few months in the Army. During development of the test, NCOs were asked to write actual situations that Soldiers have experienced during their first few months in the Army. Next, Soldiers in training and civilians wrote civilian situations that paralleled the military situation. In most cases, the situation involved either a student at a civilian school or an employee at a civilian organization. The test development process included several rounds of writing, editing, pilot testing, and analysis.

Record of Pre-Enlistment Training and Experiences (REPETE)

Historically, the Army has provided training on all required entry-level job skills for its enlisted personnel. By recognizing prior related training and/or experience, the Army could reduce training requirements (or at least help to ensure success in training). Additionally, applicants could benefit from their pre-enlistment training and experience through enhanced enlistment options (in terms of job choices and/or enlistment bonuses).

The development of the Record of Pre-Enlistment Training and Experience (REPETE) was a demonstration effort—one designed to illustrate what kind of instrument might be developed and how it might be used. The demonstration effort focused on computer skills, in part because although computer skills are not included on the ASVAB, inclusion of a computer skills subtest has been discussed for several years by the Services and DoD. Moreover, computer skills are at least somewhat important for all MOS and are particularly important for certain MOS (e.g., 74B—Information Systems Operator/Analyst).

The REPETE is a self-report measure designed to document the type of training and experience that entry-level Soldiers currently bring with them to the Army. It focuses on 10 computer skill categories that are listed in Figure 12.

The REPETE has three parts, each with multiple items. In the first part, respondents are asked to list courses they have taken related to computer skills and to indicate which of the 10 computer skill categories were addressed in each course. The second part is structured similarly

but asks about certifications. The last part asks respondents to rate themselves on each of 10 computer skill categories using a 5-point level-of-mastery rating scale.

-
1. Word Processing/Desktop Publishing Software—Create, manipulate, format, and print documents.
 2. Spreadsheet Software—Record, format, sort, analyze, and graph information.
 3. Database Software—Create, query, organize, analyze, graph, and report databases.
 4. Presentation/Graphics Software—Create presentation-quality slides or graphics.
 5. Internet Usage and Information Search—Send, receive, and save email; search the Internet.
 6. Basic Hardware and Operating Systems—Manage own pc files and folders using the operating system and hardware.
 7. Networking and Computer Service Support—Install, initialize, configure, and manage network software
 8. Computer Programming Principles—Develop algorithms, select programming languages, design program, use assembly language, and develop documentation.
 9. Basic Web Programming—Develop web pages using HTML and Javascript.
 10. Object-Oriented Programming Concepts—Create Object-Oriented Modeling using UML notation; use C++, Java, or Visual Basic.
-

Figure 12. Computer skills categories used in the REPETE.

Because the REPETE is not a predictor in the traditional sense and because it would require Soldiers to try to recall their pre-enlistment status with regard to the questions, it was not included in the concurrent validation effort. With additional research, however, the REPETE could be expanded and used to give credit for a broad range of pre-enlistment skills and experience. Indeed, we currently are adding a section on language skills for the Army Class project. Such a tool would supplement the current Army Civilian Acquired Skills Program (ACASP), which already offers enlistment bonuses, accelerated promotions, and/or abbreviated training for those enlistees who meet certain MOS-specific skills or certification criteria.

Work Values Inventory

People tend to value different things when it comes to work (e.g., physical activity, autonomy). Similarly, organizations tend to vary in the degree to which they offer characteristics of work that individuals value. The purpose of the Work Values Inventory is to assess respondents' preferences for various characteristics of work (e.g., On my ideal job, I would make decisions on my own.). It is based on the premise that not all respondents value characteristics of work offered by the Army and that a disconnect between what respondents value and what the Army offers can lead to undesirable outcomes. Specifically, past research suggests that individuals who value work characteristics that their employer provides are more satisfied and more likely to remain in the organization than those who value characteristics not provided by their organization.

The WVI yields an ordering of 28 work characteristics in terms of how important they would be in their ideal job, and distinguishes between important and unimportant characteristics (in an absolute sense). To make the rank ordering activity easier, respondents are first asked to sort the 28 work characteristics into four categories of varying importance (A-D). For example, respondents place their seven most important work characteristics in Category A and their seven least important work characteristics in Category D. Respondents then rank order the importance

of the work characteristics within each category. After completing their rankings within each category, respondents are presented with the full list of 28 work characteristics in the order they ranked them. Respondents are asked to review the list and to make a line through it such that the work characteristics important for their ideal job are above the line and the characteristics below the line are unimportant to have on their ideal job. Once a respondent completes the WVI, the Army can assess the similarity of his or her preferences for various work characteristics with what the Army actually offers.

Work Preferences Survey (WPS)

Occupations can be categorized into six types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (Holland, 1997). Individuals vary in the degree to which they are interested in these types of occupations. Research has shown that people are drawn to occupations that they think will satisfy their interests (e.g., D.P. Campbell & Hansen, 1981; Strong, 1955). For example, people who are creative and expressive tend to seek out Artistic occupations. Studies also have found that a good match between an individual's interests and the interests that his or her chosen occupation supports can lead to a variety of positive outcomes for both the worker and the organization. For the worker, a good match in terms of interests can result in higher job satisfaction (e.g., Tranberg, Slane, & Ekeberg, 1993). For the organization, more satisfied workers tend to work harder and are less likely to leave (e.g., Griffeth, Hom, & Gaertner, 2000; Judge, Thorenson, Bono, & Patton, 2001).

The Work Preferences Survey is designed to assess applicants' preferences for each of Holland's six interest areas. Respondents are asked to rate their interest in various work activities, work environments, and learning opportunities that reflect these occupations. The Army can then compare the interests of each respondent to the interests the Army supports to assess the match between the two. Figure 13 shows the instructions for the instrument and three items that are similar to those that appear on the actual survey.

Instructions: The purpose of this survey is to find out what your ideal job would be like. Please read each statement. Then, using the scale below, indicate how important each statement is to your ideal job.

1	2	3	4	5
Extremely unimportant to have in my ideal job	Not important to have in my ideal job	Not important or unimportant to have in my ideal job	Important to have in my ideal job	Extremely important to have in my ideal job

Sample Statements

1. A job that requires me to repair broken machinery.
2. A job in which I work by myself most of day.
3. A job in which I can learn more about running a business.

Figure 13. Sample Work Preferences Survey items.

Expectations Measures

The last three experimental measures are based on the premise that not all applicants have accurate beliefs about what it is like to be in the Army and that inaccurate beliefs can lead to undesirable outcomes. Specifically, past research suggests that people who have accurate beliefs about the organization to which they are applying tend to be more satisfied and less likely to attrit than those with less accurate beliefs. Each of the three instruments—Army Beliefs Survey, Pre-Service Expectations Survey, and Army Work Knowledge Survey—is based on content from previously described measures. In each of these measures, respondents are asked to indicate the extent to which each statement is descriptive of the Army environment. Responses are compared to the answers given by a sample of experienced NCOs. Because the items concern pre-service knowledge, they are not appropriate for administration to people already in the Army; therefore, they were not included in the Select21 concurrent validation data collection.

Army Beliefs Survey (ABS)

The Army Beliefs Survey (ABS) assesses respondents' knowledge about what work in the Army involves. The content of the ABS parallels the content of the Work Values Inventory. Figure 14 shows examples of what items on this survey are like. When respondents complete this survey, the Army can assess the similarity of their beliefs of Army life with the reality of Army life for first-term Soldiers.

Instructions: Using the rating scale below, indicate which category you believe best describes each statement.		
Few Will Experience	Some Will Experience	Most Will Experience
This statement describes an experience <i>few</i> Soldiers will have during their first enlistment.	This statement describes an experience <i>some, but not most</i> , Soldiers will have during their first enlistment.	This statement describes an experience <i>most</i> Soldiers will have during their first enlistment.
Sample Statements		
1. Soldiers will improve their physical fitness. 2. Soldiers will make decisions on their own.		

Figure 14. Sample Army Beliefs Survey items.

Pre-Service Expectations Survey (PSES)

The interest measure described previously (the Work Preferences Survey) assesses the respondents' degree of interest in each of six occupational areas (e.g., Artistic, Social). In contrast, the Pre-Service Expectations Survey (PSES) assesses the extent to which respondents believe the Army will provide work activities and training opportunities associated with each area. The Army can then determine how closely respondents' expectations match the realities of Army work.

Individuals completing the PSES are asked to read a brief description of each of the six work settings listed above and then rate the extent to which they think each type describes the Army work environment.

Army Work Knowledge Survey (AWKS)

The Army Work Knowledge Survey (AWKS) lists the same 16 statements that appear on the Work Suitability Inventory. In contrast to the WSI, respondents on the AWKS indicate the extent to which they agree with each statement using a 5-point scale. Following is a sample AWKS statement: "Work as a first term Soldier in the Army often requires showing a cooperative and friendly attitude towards others I dislike or disagree with."

What Do We Know about These Tests and What Else are We Asking?

We have summarized the criteria for evaluating pre-enlistment selection and classification tests and described the experimental tests that were developed in the Select21 project. In this section, we describe what we have learned about these tests and about the ASVAB.

What We Know

Our intent was to develop predictors that supplement the ASVAB for the prediction of performance and attitudinal criteria. We constructed five composite performance scores and five attitudinal scores to use in the validation analyses. Information from the rating scales, job knowledge tests, criterion situational judgment test, and the Army Life Survey was used to generate five performance criterion scores: (a) General Technical Proficiency, (b) Achievement and Effort, (c) Physical Fitness, (d) Teamwork, and (e) Future Expected Performance. We also used five attitudinal scores generated from the Army Life Survey and the Future Army Life Survey: (a) Satisfaction with the Army, (b) Perceived Army Fit, (c) Attrition Cognitions, (d) Career Intentions, and (e) Future Army Affect.

Entry-Level Selection Decisions

Consistent with years of prior research, scores on the ASVAB were shown to be good predictors of can-do performance criteria (e.g., General Technical Proficiency), but have less validity for predicting will-do (e.g., Physical Fitness, Teamwork) and attitudinal criteria. The ASVAB predicted General Technical Proficiency so well that it left relatively little room for improvement ("incremental validity") with the addition of other tests. Despite this finding, several of the experimental predictors showed small but statistically significant (and operationally useful) improvements over the ASVAB alone for predicting General Technical Proficiency scores.

On the other hand, many of the Select21 predictors showed notable levels of incremental validity over the ASVAB when predicting Achievement and Effort, Physical Fitness, and Teamwork performance. Such findings reinforce the notion that when judging the efficacy of predictors for incrementing the validity of the ASVAB, it is important to account for the multi-

dimensional nature of the performance and attitudinal criteria the Army is interested in predicting.

Substantial levels of incremental validity were found for the RBI, WVI, and WPS for predicting the attitudinal criteria, with somewhat lower levels of validity for the WSI and PSJT. ASVAB scores also yielded significant correlations with future expected performance scores. This is a new finding and one that bears emphasis—ASVAB has been predictive of “can do” performance historically and now we have evidence that it should continue to be useful well into the Army’s future. We also learned that the pattern of validity findings when looking at current versus future criteria was similar, suggesting that it is not necessary (at least at this point) to continue to try to measure future criteria in this program of validation research.

In addition to the criterion-related validity evidence, the Select21 predictors demonstrate sufficient content validity. That is, the measures were developed to assess psychological constructs that either emerged from the job analysis work or which were suggested by a large body of research on person-environment fit. More reliance on content validity evidence was one of the recommendations of the ASVAB technical review panel (Drasgow et al., 2006).

Entry-Level Personnel Classification Decisions

Currently, the nine operational ASVAB tests are combined in various ways to compute Aptitude Area scores that are used to classify new recruits into MOS. For the most part, these composites are based on criterion-related validity evidence that is becoming very dated because the primary source of data was Skill Qualification Test (SQT) scores that ceased being collected in the early 1990s. The Army is sponsoring research not only to identify new predictor tests that could contribute to classification decisions but also to update the empirical research on which the ASVAB Aptitude Area composites are based.

As mentioned earlier in this report, we did not collect enough MOS-specific criterion data to permit direct evaluation of the potential for the Select21 predictor tests to support effective classification decisions. We also did not have enough participants from individual MOS to examine prediction of Army-wide criteria at that level. Instead, we performed subgroup analyses using MOS type as the subgrouping variable to get an idea of the potential for the experimental predictors to improve classification efficiency. Soldiers were sorted into four clusters of MOS for these analyses, which did suggest that some of the predictors have potential utility for classification. Four predictors had scores that showed differences in validity estimates across clusters for three or more criterion composites: the RBI, WSI, WPS, and Target Tracking. Other predictors showed more targeted results focused on specific cluster comparisons or criteria.

What Else are We Asking?

How will the Tests Work with Applicants?

Select21’s concurrent validation research design fundamentally differs from an operational setting in which predictors would be administered to applicants instead of experienced Soldiers. There are several ways in which one might expect findings from a concurrent design to differ from

an operational setting, but here we focus on two factors that are of particular concern in the Select21 research—(a) the response distortion that is likely to occur when non-cognitive measures such as the RBI, WPS, and WVI are administered to applicants and (b) contaminant variation in predictor measures arising from their administration to experienced Soldiers.

With regard to the response distortion issue, Soldiers participating in a research effort have little motivation to make themselves look appealing to the Army in their responses to experimental measures because they know that the scores will not be used to make decisions about them. However, respondents who have not yet enlisted will be more motivated to look good and one can expect at least some applicants to be coached on how to do well on the pre-enlistment screening tests. The extent to which the effectiveness of the Select21 self-report temperament and interest measures would be compromised in an operational environment needs to be further investigated.

Another factor that may affect the generalizability of the concurrent validation results is that Soldiers' responses to predictor measures may be influenced by the experiences they have gained in the Army. For example, many of the items on the RBI ask about past behavior, but for experienced Soldiers, this includes post-enlistment behaviors likely influenced by the fact they have been in the Army. In applicant samples, respondents can only answer RBI items based on "pre-Army" behavior. Another example of this phenomenon occurs with the WSI which asks Soldiers what types of work they think they would be able to perform best. Their answers may be influenced by their Army experience. Moreover, there were several Select21 predictors that we did not include in the concurrent validation at all because it did not make sense to administer them to experienced Soldiers (e.g., the Army Beliefs Survey, the Pre-Service Expectations Survey). A longitudinal design is needed in which measures are administered to applicants or new recruits.

How will the Tests Work for Classification Decision-Making? How Should the Tests be Scored for Classification Purposes?

Another open question is the classification efficiency of the experimental predictors. Although Select21 yielded evidence suggesting several predictors have potential to improve classification decisions, more direct evidence is needed. With regard to classification applications, the accepted method for determining the precise way for scoring the ASVAB or other tests for classification purposes involves examining the relationships of test scores to MOS-specific criterion data. Given the large number of MOS, collecting the requisite criterion data needed to support this traditional approach is infeasible. Thus, yet another question is how can researchers provide the information needed to update the ASVAB Aptitude Area scores and operationalize new classification tests?

Army Class Project to Provide Answers

The Army has begun to address these questions in the follow-on Army Class project. Of particular relevance are three elements of this new project which are presented below in chronological order.

- Collection of more concurrent validation data.

- Development of alternate classification research strategies.
- Collection of longitudinal validation data.

Army Class researchers have collected additional concurrent validation data from Soldiers in five target MOS. Combined with the MOS-specific data collected from 11B and 25U Soldiers in Select21, this will allow for a more direct evaluation of the experimental predictors' utility for supporting classification decisions.

A six-member panel of leading technical experts was established in the Army Class project to identify realistic but effective strategies for conducting future classification research. It is doubtful that they will be able to offer strategies that eliminate the need for MOS-specific criterion data, but it is expected they will offer strategies for minimizing this requirement.

Finally, the follow-on project will include a longitudinal validation that will involve administering the most promising experimental predictors to either Army applicants or new recruits and then tracking those individuals through their first term of service to collect performance and attrition data. We expect that these findings will provide a more accurate forecast of how effective the predictors will be in an operational environment.

What Else Should We be Asking?

There are several questions of interest that would benefit from further research, but for which such research is not currently planned. They are offered here as suggestions for the Army's future research agenda.

Criterion Policy

“An organization's choice of criteria for personnel research significantly affects how research results will influence the design of the selection and classification system. In effect, criterion policy reflects the organization's intended definition for effective performance in that organization, and the types of predictors that are used in selection and classification decision making will depend upon the criteria against which they are compared. Systematic consideration of criterion policy is necessary so that informed decisions can be made about future predictor and criterion development” (J.P. Campbell, Russell, & Knapp, 1994).

Findings in Project A (J.P. Campbell & Knapp, 2001), NCO21 (Knapp, McCloy, & Heffner, 2004), and Select21 (Knapp & Tremble, 2006) all confirm that criteria matter and that validation results differ substantially by the criteria of choice. Recent research, supporting policy decisions, has sought to go beyond indices of training success by using SQT scores to validate ASVAB classification composites. SQT scores can be thought of as measures of technical proficiency, and the choice of their use in validation efforts could be taken to mean that MOS technical proficiency is the most important (if not, only) criterion for prediction by selection and classification personnel tests. However, future criterion policy issues facing the Army have to do with how overall job performance is construed, measured, and used in the selection and classification context. Is there a consensus within the Army about the goals of criterion

measurement? Should job performance be construed more broadly (perhaps reflecting organizational fit) and include non-technical aspects of job performance such as the individual's effort and achievement or ability to work with a team? Should prediction of such non-technical aspects of job performance play a more important role in selection and classification decisions? Research on criterion policy, conducted in collaboration with policymakers, could be used to develop or identify consensus. Moreover, decisions by policymakers about the merits of various criteria could be used to guide funding and resource allocations.

Selection and Classification Algorithms

Once a decision is made to include multiple criteria in selection and classification research, there are many ancillary questions to be addressed. How will it be implemented? How can the maximum potential gain from classification be estimated given that there are choices among predictor batteries, performance goals, and criterion measurement methods? There are a large number of permutations of predictors, criteria, and goals. How can we efficiently simulate the outcomes of different predictor/criterion/goal combinations? How successfully can operational job assignment procedures capture the potential classification gains?

Forecasting the Future

An important contribution of the Select21 research and the preceding NCO21 research was the emphasis on preparing Soldier selection and promotion systems to meet *future* needs. This focus is particularly relevant to military organizations that promote from within, but this focus is rare in either military or civilian settings. Moreover, our observation that Army future planning documents rarely contain information about implications of new weapons systems and other changes for individual Soldiers is unfortunate, given that Soldiers are the ones who must be able to operate effectively in the environment that planners are trying to create. In any case, a risk in forecasting the future is that the projections may not be accurate. Indeed, without a crystal ball, it must be assumed that some details are likely going to be off the mark.

Thus, we see at least two areas for additional research. One would be evaluating the accuracy of the forecasts that have been made in the Select21 and NCO21 research programs, particularly as they regard the conditions under which enlisted personnel will be operating in the next 15-20 years. Understanding where those predictions were accurate and where they were not could help hone the method for conducting future-oriented job analysis work. Second, it would also make sense to establish a research-based procedure for periodically assessing future conditions so the Army can continue to stay ahead of the curve in meeting future personnel requirements.

From Research to Implementation

If research is to make a difference in an operational or user system, the research, no matter how innovative, must address and inform relevant policy and operational issues. This is as true for military personnel research and as it is for research conducted in the civilian sector. Thus, if research is to make a difference, it needs help in transferring from the laboratory to the operational environment. What is needed is an “implementation” perspective—an approach that focuses on actions that convert research into policy and operational procedures. In the remainder of this report, we broaden our discussion to include all military personnel research programs, not just the Select21 effort.

What is Implementation?

Implementation can be defined as a specified set of activities intended to translate research findings into informed policies and operational practices. In other words, implementation means putting into place new policies and procedures with the adoption of research as the basis for those policies and procedures. In many cases, effective implementation is a bigger challenge than conducting innovative research. Desirable policy and operational outcomes are likely achieved only when the research includes activities intended to translate research findings into informed policies and operational practices. Research plans and activities need to ensure that the research is well connected to the operational world both in terms of the users’ needs for research innovations and in terms of where and how the innovative outcomes fit and can be placed into the user’s operational systems.

The Role of Researchers and Policymakers

Projects of high impact and value such as Select21 must be targeted from the beginning for aggressive implementation. To that end, researchers, policymakers, and other stakeholders together must plan and then broker implementation of research into the Army’s selection and classification system. Researchers must be connected to the operational world, asking research questions that reflect their appreciation for and understanding of its complexity. Researchers and policymakers must have two-way communications. Each group must value and listen to input from the other.

For example, for researchers to design and conduct meaningful and effective selection and classification research, they must be knowledgeable about recruiting and enlistment processing policies and procedures. From the earliest stages of research planning, researchers should establish rapport with relevant policymakers and stakeholders with a focus on learning more about contemporary issues such as recruit quality requirements, filling difficult and demanding MOS, and attrition-reducing initiatives. In the case of Select21, the research has had the added requirement of understanding the shape of these issues in the future. This rapport is critical for research on innovations that users want. This rapport and the prospect of useful products encourage policymakers to become liaisons for fitting research outcomes into the operational system.

Army and Joint-Service Players

In the context of Select21 research, there are several groups of policymakers and other stakeholders who should be involved in designing the research and planning for its implementation. Within the Army, policymakers include officials from the Offices of the Assistant Secretary of the Army for Manpower and Reserve Affairs, the Army G-1, and the Army Training and Doctrine Command (TRADOC). Other stakeholders comprise personnel from subordinate organizations such as the various TRADOC training schools, the Army Accessions Command, the Army Recruiting Command, and the Human Resources Command. Adding to this complexity is the fact that while each Service has its own recruiting procedures and enlistment standards, Army personnel selection and classification does not operate in a vacuum. Many aspects of the military enlistment process are common across the Services. To the extent the Army's system touches the other Services, changes to its selection and classification process must be coordinated with a variety of players within a Joint-Service environment. These players include officials in the Office of the Secretary of Defense (OSD), the other Services, and elements within DoD such as the US Military Entrance Processing Command (USMEPCOM).

To facilitate cooperation and coordination, the Joint-Service Manpower Accession Policy Working Group (MAPWG) addresses inter-service testing and enlistment processing issues and passes its deliberations to upper echelons for decision. The MAPWG comprises policy staff members from OSD and each of the Services as well as technical representatives from the Defense Manpower Data Center, USMEPCOM, and the Service personnel research establishments.

Developing and maintaining relationships for implementation is a special challenge in military organizations. Characteristic of such organizations is the periodic transfer of military personnel, to include senior military officers in policymaking positions. Policymakers have individual and career experiences that can lead to differences in the ways they consider the need for research. As experience in various assignments is gained, knowledge and skill improvements are accumulated by policymakers. When one policymaker is replaced by another, the accumulated knowledge is lost, and the perspective on research and implementation is altered to reflect the philosophy, approach, experience, and skills of the new policymaker. Moreover, the new policymaker is likely to be confronted with rapidly changing issues endemic to the military environment. Consequently, policymakers may not fully appreciate the importance of ongoing research since it may pertain mainly to issues of importance to their predecessors. Thus, it is incumbent on the researcher to establish a relationship with the new policymaker, to refine the relevant issues, to demonstrate how the research will positively affect the Army, and to develop mutual confidence and trust.

Select21 Implementation Activities

To define products with good chances of meeting user needs, Select21 was designed to take into account the history of earlier research projects. This history had shown the strengths of the ASVAB, supported inferences about the types of measures that would likely be most useful within this system, and highlighted methodological issues that needed to be addressed prior to transition into the operational setting. More specifically, this history was a basis for research

designed to (a) produce non-cognitive measures for augmenting the current ASVAB that would resist distortion in high-stakes testing situations and (b) examine the measures against a performance or criterion space that, in addition to technical job performance, included motivational and other outcomes indicative of an individual's fit into the organization. In other words, the goals for Select21 were to produce candidate measures and, in addition, evidence on their promise if integrated into the current enlisted personnel selection and classification system.

Dialogue with Army stakeholders was an integral feature of the research method. The earlier NCO21 research had shown that a future-oriented job analysis requires intense involvement of a few people with specific expertise and that individuals highly knowledgeable about the Army's future plans are not necessarily knowledgeable about the specifics of jobs and vice versa. In Select21, SMEs were carefully selected to provide the varying types of expertise needed, and they participated in a series of workshops to develop and review materials. These workshops provided Select21 the needed SME input but also made the project visible to stakeholders in offices concerned with the emerging future Army and with proponentcy for training Soldiers in the skills needed in operational units.

Many of the SME reviews took place in the context of meetings of two Army panels that remained involved with the research over the course of the future-oriented job analysis and through the initial phases of data collection on the Select21 measures. One panel was an Army Steering Committee. The Steering Committee was a policy advisory group composed of senior representatives from a number of stakeholder organizations concerned with the transformation toward the Army's future force. One of its roles was to provide top-down information and direction to ensure that Select21 plans and products remained consistent with the vision and needs of the Army. The second group, a senior Subject Matter Expert Panel (SMEP), was composed of personnel expert in particular MOS or in plans for specific aspects of the future. SMEP members provided essential bottom-up information about particular MOS and top-down information about ongoing efforts focusing on the Army's transformation. The SMEP worked closely with the project team on specific research products and troop support for workshops and other data collections.

Communications also occurred with Army stakeholders who were not connected directly to Select21 through the Steering Committee or the SMEP. This communication largely sought to stimulate support for continuation of research that requires a relatively long-term time horizon. The communication included briefings of top-level policymakers concerned with enlistment procedures, various research review panels, and system operators taking part in conferences and working groups regarding relevant issues. The Select21 research team also devised a type of report intended to describe research outcomes and encourage interest. These reports, called product reports, focused on the achievement to give potential sponsors and users a sense of progress toward products with promise.

Over the course of Select21, less dialogue occurred outside the Army with two notable exceptions. While not thoroughly familiar with the project, the MAPWG is aware of Select21 and has encouraged and endorsed the research on non-cognitive measures. In addition, the ASVAB review panel, mentioned earlier in the report, had access to Select21 findings and

reports, and these contributed to the panel's emerging recommendations to expand the use of non-cognitive measures in Service selection and classification programs.

Additional Observations

Implementation planning should profitably begin as a collaborative effort between researchers, policymakers, and other stakeholders to develop shared goals and support within the Army for achieving these goals. Such collaborative planning would include support for data collection to answer critical research questions. One such question concerns the robustness of "laboratory" findings and their transfer to high stakes operational settings. Policymakers and stakeholders may not support a study in which the new measures are administered in conjunction with the ASVAB because it complicates operational testing. However, policymakers and stakeholders might be more open to research in which new recruits, immediately after the decision to enter service, take the new Select21 measures for purposes of verifying the Army's assessment of their likely success in the MOS to which they have been assigned. This use of the new measures might create a type of high stakes motivation (e.g., needs on the part of test takers to demonstrate that they had made good decisions for their future) characteristic of individuals in an actual operational setting. Planning for support should also identify the players in DoD and the Services who may have a part in implementation. For those who dispute the need for implementation, Army researchers need to take steps to deal with their objections and to gain their understanding of the new measures' potential for enhancing policy and operational procedures.

Research other than Select21 also has made use of policymaker and SME advisory panels. Convening and retaining such panels over the course of a research project is resource intensive. However, experience has shown the payoffs of this investment can be considerable. Panels have the potential of overcoming the risks created by the periodic transfer of military personnel. That is, despite rotation of individual members, the group itself remains stable and can help to motivate new members and to incorporate their ideas into the framework of the ongoing effort. With the correct membership, panels might help to overcome gaps in the availability of resources for transitioning research products into practice. Implementation costs tend to fall outside the missions and funding of research organizations, and the organizational element that benefits from research innovations (e.g., selection and classification) is not necessarily the organization that must bear the costs of implementation (e.g., USMEPCOM). Panels initiated early in the research process and composed of policymakers and stakeholders motivated to support the research could help ensure that operational organizations impacted by the research have the budget and other resources needed for its implementation.

Recommendations for Implementation

As noted above, implementation is a crucial component in moving research to policy and operational practice. Accordingly, several recommendations are offered for consideration.

- *Greater attention must be paid to implementation planning.* Researchers and policymakers should develop an implementation plan as the research is conducted. Consequently, once the research is completed, implementation can begin in a timely way.
- *Funding for implementation should be built into relevant budgets.* Research organizations should be involved in implementing their findings consistent with their missions or mandates. Thus, funding for research implementation might be included in the Research and Development budget. On the other hand, funding for implementation, more often than not, should be included in the budgets of either the relevant policy office or the operational organization affected by the research. Nevertheless, no matter the source, sufficient funding should be available to cover the cost of implementation.
- *Enabling legislation and new regulations should be prepared as part of implementation planning.* Implementation strategies take time and resources; having authorizing directives available at the time of implementation will facilitate the process. While researchers can contribute to development of authorizing and other implementation directives, having such directives in place requires planning and vigorous promotion by the policymakers with interest in implementation.
- *Researchers should be sensitive to organizational and socio-political factors that directly influence implementation. They should solicit and monitor feedback from policymakers and stakeholders regarding early implementation and be prepared to change course as needed.* This includes identifying all parties who may have a part in the implementation. For those who have problems with implementation, it is necessary to overcome their objections and explain how the research can enhance policy and operational procedures. Such feedback can guide implementation by eliminating any barriers encountered.
- *Researchers should prepare technical reports containing sufficient detail to inform implementation.* Technical reports should be written for policymakers and stakeholders, not just for researchers. Authors should include and discuss results that will be highly relevant to implementation.

Concluding Comments

Half-hearted or ill-advised attempts at implementation are a waste of time and money, and may frustrate the application of cutting-edge research. Research, policy, and operational agendas related to implementation need to be nurtured, debated, studied, and translated into practical advice and procedures that can enhance operational systems. We are optimistic that Select21 can and will advance Army selection and classification as new principles and procedures are illuminated through research and the nexus of science, policy, and practice.

References

- American Educational Research Association, American Psychological Association, National Council on Measurement in Education (1999). *Standards for educational and psychological testing*. Washington, DC: Author.
- Campbell, D. P., & Hansen, J. C. (1981). *Manual for the SVIB-SCII*. Stanford, CA: Stanford University Press.
- Campbell, J. P., & Knapp, D. J. (Eds.) (2001). *Exploring the limits in personnel selection and classification*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Campbell, J. P., Russell, T. L., & Knapp, D. J. (1994). *Roadmap: An agenda for joint-service classification research (AL/HR-TP-1994-0003)*. Brooks Air Force Base, TX: Armstrong Laboratory.
- Drasgow, F., Embretson, S. E., Kyllonen, P. C., & Schmitt, N. (2006). *Technical review of the Armed Services Vocational Aptitude Battery (ASVAB) (FR-06-25)*. Alexandria, VA: Human Resources Research Organization.
- Ford, L. A., Campbell, R. C., Campbell, J. P., Knapp, D. J., & Walker, C. B. (2000). *21st Century soldiers and noncommissioned officers: Critical predictors of performance (Technical Report 1102)*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Griffeth, R. W., Hom, P. W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover: Update, moderator tests, and research implications for the next millennium. *Journal of Management*, 26, 463-488.
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed). Odessa, FL: Psychological Assessment Resources.
- Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction-job performance relationship: A qualitative and quantitative review. *Psychological Bulletin*, 127, 376-407.
- Knapp, D. J., Sager, C. E., & Tremble, T. R. (Eds.). (2005) *Development of experimental Army enlisted personnel selection and classification tests and job performance criteria (Technical Report 1168)*. Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Knapp, D. J., & Tremble, T. R. (Eds.). (2006). *Concurrent validation of experimental Army enlisted personnel selection and classification measures (IR-06-35)*. Alexandria, VA: Human Resources Research Organization.
- Knapp, D. J., McCloy, R. A., & Heffner, T. S. (Eds.) (2004). *Validation of measures designed to maximize 21st-century Army NCO performance (Technical Report 1145)*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

- Sackett, P.R., Schmitt, N., Ellingson, J.E., & Kabin, M.B. (2001). High-stakes testing in employment, credentialing, and higher education: Prospects in a post-affirmative action world. *American Psychologist*, *56* (4), 302-318.
- Society for Industrial and Organizational Psychology, Inc. (2003). *Principles for the validation and use of personnel selection procedures*. (Fourth Edition) College Park, MD: Author.
- Strong, E.K., Jr. (1955). *Vocational interests 18 years after college*. Minneapolis, MN: University of Minnesota Press.
- Tranberg, M., Slane, S., & Ekeberg, S. E. (1993). The relation between interest congruence and satisfaction: A meta-analysis. *Journal of Vocational Behavior*, *42*, 253-264.
- Wigdor, A.K., & Green, B.F., Jr. (Eds.) (1991). *Performance assessment for the workplace (Volume I)*. Washington, DC: National Academy Press.

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- Knapp, D. J., Sager, C. E., & Tremble, T. R. (Eds.). (2005) *Development of experimental Army enlisted personnel selection and classification tests and job performance criteria* (Technical Report 1168). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Knapp, D.J., & Tremble, T.R. (Eds.). (2006). *Concurrent validation of experimental Army enlisted personnel selection and classification measures* (IR-06-35). Alexandria, VA: Human Resources Research Organization.
- Sager, C. E., Russell, T. L., Campbell, R. C., & Ford, L. A. (2005). *Future Soldiers: Analysis of entry-level performance requirements and their predictors* (Technical Report 1169). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Putka, D.J., & Bradley, K. (2006). *Relations between Select21 predictor measures and first-term attrition* (IR-06-44). Alexandria, VA: Human Resources Research Organization.
- Product Report Series – These reports are intended for an Army audience and describe alternate applications of instruments, other tools, and findings generated by the research:*
- HumRRO (2005). *Future job clusters* (Research Product 2005-04). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- HumRRO (2005). *Future Army-wide soldier performance requirements* (Research Product 2005-05). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- HumRRO (2005). *Select21 experimental selection and classification instruments* (Research Product 2006-01). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- HumRRO (2005). *Select21 soldier job performance measurement tools* (Research Product 2005-07). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- HumRRO (in press). *Select21 validation results* (Research Product). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.