Assessing Competencies and Proficiency of Army Intelligence Analysts Across the Career Life Cycle

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Preface

In a series of two interrelated research projects, "Assessing Analytic Proficiency" and "Proficiency Across the All-Source Analyst Career Life Cycle," the Deputy Chief of Staff, G-2, U.S. Army, asked RAND Arroyo Center to develop and implement a process to assess key analytic competencies and proficiency of enlisted personnel in the 35F military occupational specialty, intelligence analyst, and to design a protocol for ongoing evaluation.

This report describes the design and execution of the evaluation approach and presents results. The evaluation approach includes identifying key analytic competencies and career life-cycle factors that affect competency development, identifying and designing methods and measures to assess analysts' competencies and proficiency in training and on the job, and using these methods and measures to collect data from both entry-level and experienced 35F analysts. The report will be of interest to those seeking to develop and measure analytical competencies and proficiency in institutional training and on the job.

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Summary

The U.S. Army recruits, trains, and equips personnel to analyze information to produce military intelligence (MI). These intelligence analysts face challenges, such as ambiguous and unstructured problems, time pressure, and a lack of information regarding the accuracy of their judgments. To meet these challenges and work in increasingly complex and dynamic operational environments, analysts require intangible competencies, such as critical thinking (CT) skills and adaptability. However, intelligence analysts in the Army can face obstacles to maintaining and developing these competencies given that they often perform a variety of tasks in their units that might not relate to their core analytic duties.

Although tests and other instruments can assess analytic competencies, these measures have not been used in an operational Army context for enlisted all-source intelligence analysts (military occupational specialty [MOS] 35F). Consequently, the Deputy Chief of Staff, G-2, U.S. Army, asked the RAND Arroyo Center to develop and test a process to assess key analytic competencies and proficiency for this MOS and to design a protocol for ongoing evaluation. To do so, we addressed three key questions:

- What are key analytic knowledge, skills, abilities, and other characteristics of 35F analysts, and how might the 35F career life cycle affect the development and retention of key analytic competencies?
- What measures and methods can be used to assess analytic competencies and job proficiency?
- What is the association between key competencies, training proficiency, and job proficiency for 35F analysts?

To address our first question, we identified key competencies needed to perform analytic tasks in the 35F MOS by interviewing subject-matter experts (SMEs) and reviewing Army training regulations, U.S. Army Intelligence Center of Excellence 35F skill level 1 (35F10) programs of instruction, and empirical research. We also examined research on the association between these competencies and job performance.

To identify measures and methods to assess analytic competencies and proficiency, we reviewed research associated with each key competency, looking at measures with demonstrated reliability and validity that could be applied to the Army MI context. We also reviewed the literature for relevant proficiency measures, with the goal of identifying a work sample or practical exercise to assess analytic performance. Finding none that was practical to use for the study, we adapted a practical exercise used in 35F advanced individual training (AIT).

Assessing key competencies, life-cycle factors, and proficiency was the central task of our study. We designed and implemented a field study to test the association among these constructs and to provide a model for the Army to use for assessment on an ongoing basis. We conducted a predictive validity study in which we measured new (junior) analysts' competencies at the beginning of AIT, training proficiency at the completion of AIT, and analytic proficiency several months after first assignment. To better understand predictors of proficiency at more-advanced stages of analysts' careers, we designed a concurrent validation study focused on experienced (midgrade) 35F analysts in which we measured competencies and proficiency at the start of the Advanced Leader Course (ALC). For both junior and midgrade analysts, we obtained additional competency data from personnel records (e.g., entry qualifications) and assessed effects that training and career experiences can have on the relationships between competencies and proficiency. We also evaluated how junior and midgrade analysts compare in key competencies and proficiency, the extent to which analysts have sufficient opportunities to engage in MI work on the job, and how analysts perceive the value of MI training and experiences.

Key Competencies for 35Fs Consist of Both Cognitive and Noncognitive Factors

Army documents and SME interviews point to key cognitive and noncognitive competencies required for 35F analysts. Cognitive competencies include general mental ability (GMA), CT, and problem-solving skills; MI domain knowledge; and oral and written communication skills. Noncognitive competency requirements include adaptability, open-mindedness (which corresponds to an established personality trait, openness to experience), and achievement orientation and military discipline (which correspond to another established personality trait, conscientiousness). A substantial body of research documents the association of GMA, conscientiousness, openness to experience, and job knowledge and experience with performance across a range of jobs and work settings. Evidence suggests that CT skills, communication skills, adaptability, and grit are also important for performance, but the research on these topics is less extensive.

Training and Job Assignments Present Challenges to Developing and Maintaining Required Competencies

Although GMA and some noncognitive competencies are relatively fixed or not easily changed through training—and therefore are appropriate for personnel selection—several cognitive competencies (CT skills, domain knowledge, and communication skills) are more malleable, and 35F analysts are expected to develop these competencies upon graduation from AIT. Analysts reported that training prepared them for a variety of substantive tasks and to give briefings but that training was insufficient for analytic writing and preparing briefings for different audiences, CT and problem-solving skills (research techniques), and a range of domain knowledge.

Duty positions might not help sustain or develop analytical knowledge and skills. Analysts assigned to garrison duties, for example, might see their analytical skills atrophy quickly. Limited opportunities to work with other analysts or mentors, access to facilities and equipment, and time also hinder skill retention and development. Finally, pressures beyond institutional or operational unit control (e.g., changes in the operating environment and corresponding changes in strategy) influence opportunities to use and develop analytic competencies.

Understanding Development and Retention of Key Competencies and Proficiency Requires Measurement

Established written tests are available to measure GMA and CT skills, and there are many self-report inventories to measure personality traits. Assessing domain-specific competencies (e.g., job knowledge), however, might require creating customized tests. Developing and validating written tests and inventories can have high up-front costs but are relatively inexpensive to subsequently administer and score on a large-scale basis. Work-sample tests are especially appropriate to measure performance of demonstrable competencies. However, such tests can be costly to administer and score and therefore might not be feasible to use for large groups. Interviews can be appropriate to assess some competencies, (e.g., communication skills and job knowledge) but are also labor-intensive and not readily scalable for large groups.

Table S.1 presents common approaches to measuring relevant competencies, as well as specific measures used in our field study.

To measure analytic proficiency, we adapted a practical exercise (PE) used in 35F AIT to assess performance on the final step of the intelligence preparation of the battlefield process. To address substantive issues and logistical constraints, we shortened the AIT PE, removed the need for classified material, modified the PE scenario to differ from the AIT scenario, and converted the PE from a digital format to a paper-and-pencil format. To assess career life-cycle factors, we developed and administered a survey measuring analysts' work experiences and their familiarity with key MI tasks.

Field Study Findings

Junior and Midgrade Analysts Differ in Critical Thinking Skills but Are Similar in Other Competencies and Proficiency

Midgrade analysts had significantly higher scores on the Watson–Glaser test than junior analysts had, indicating that midgrade analysts, on average, have stronger CT skills. These differences could be a result of training and experience or due to initial differences between cohorts or selection effects (e.g., attrition of 35Fs with weaker CT skills). Differences between junior and midgrade analysts were marginally significant for two of the Big Five characteristics: agreeableness and extraversion. There were no differences between junior and midgrade analysts in other competencies.

Analysts Have Limited Opportunities to Engage in Military Intelligence Work on the Job

On average, analysts were familiar with nearly 90 percent of the job tasks at their skill levels. However, as shown in Figure S.1, they reported limited opportunities to perform MI tasks. In their most-recent assignments, they reported performing (on average) 77 to 80 percent of key tasks no more than a few times per year. There were no differences between junior and midgrade analysts in opportunities to perform key tasks.

Table S.1
Measures of Key Competencies for 35F Analysts

Competency	Type of Measure	Measure Used in RAND Arroyo Center Field Study
GMA	Common commercial or proprietary standardized tests include the SAT exam, GED test, and ASVAB.	ASVAB
CT skills	Publishing and testing companies offer commercial tests of CT skills and measures of dispositional aspects of CT. Some tests and dispositional measures are available for free to the public.	Watson–Glaser Critical Thinking Appraisal
Domain knowledge	Domain knowledge is typically measured through customized written tests or work samples (practical exercises) or through interviews.	Not applicable (not measured in the field study)
Communication skills	Interviews or work samples are appropriate for assessing communication skills. Some test-development companies offer tests of basic written communication skills that can be scored electronically. Some commercial tests provide automated scoring of more-advanced written communication skills, but little is known about test validity.	Not applicable (not measured in the field study)
Adaptability	A limited number of self-report inventories measure dimensions of adaptability or adaptive performance. Examples include the Individual Adaptability Measure and the Job Adaptability Inventory.	Not applicable (not measured in the field study)
Open-mindedness	Open-mindedness corresponds to openness to experience, which is one of the Big Five personality factors. The other Big Five factors are conscientiousness, emotional stability, agreeableness, and extraversion. There are many instruments, both free and paid, to measure the Big Five factors.	TAPAS
Conscientiousness	There are many instruments, both free and paid, to measure the Big Five personality traits. In addition, the grit scale measures related constructs of perseverance and consistency of interests.	TAPAS and the grit scale

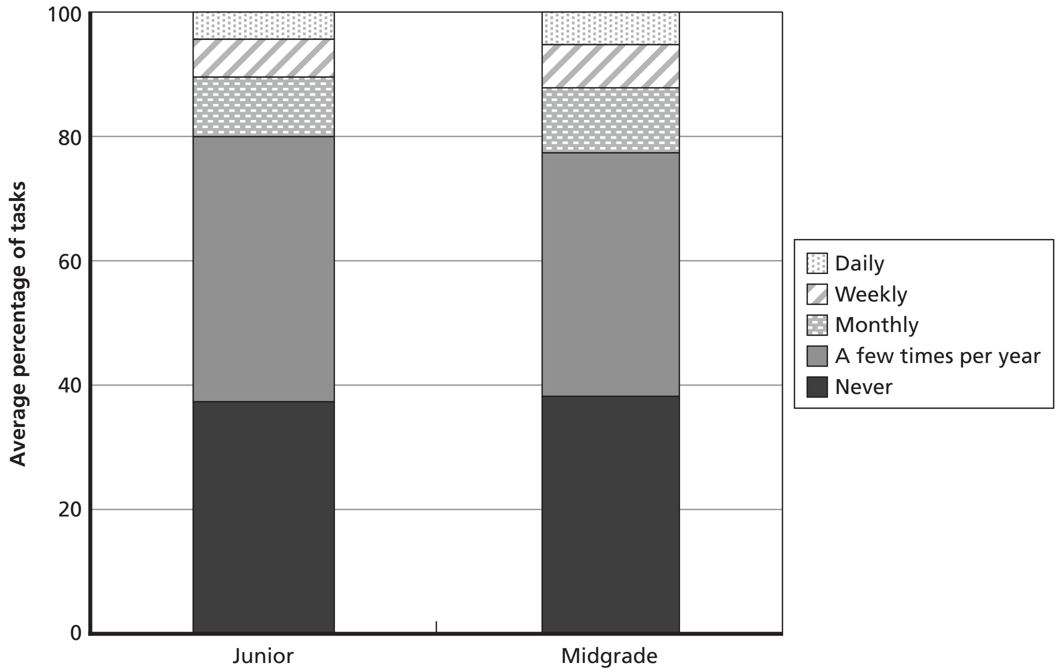
NOTE: The SAT exam, formerly referred to as the Scholastic Aptitude Test, is widely used for college admissions; the GED tests (sometimes called general equivalency or general education diploma tests) are used to award alternative credentials for those who do not complete high school. ASVAB = Armed Services Vocational Aptitude Battery. TAPAS = Tailored Adaptive Personality Assessment System.

Opportunities to perform analytic work varied by context, with most opportunities in deployment settings (see Figure S.2). For midgrade analysts, we also examined whether opportunities to perform analytic work varied by the type of MI assignments they had before attending the Advanced Leader Course. We compared the type of MI work reported by analysts with recent tactical MI assignments and that reported by analysts with recent strategic MI assignments. We did not find statistically significant differences in the types of MI tasks performed by midgrade analysts with tactical or strategic MI assignments.

Given that 83 percent of junior analysts and 67 percent of midgrade analysts reported spending most of their time in garrison, the actual percentage of their time engaging in MI activities in their jobs is much lower. Across all settings, approximately 72 percent of junior analysts' time and 69 percent of midgrade analysts' time was spent conducting non-MI tasks.

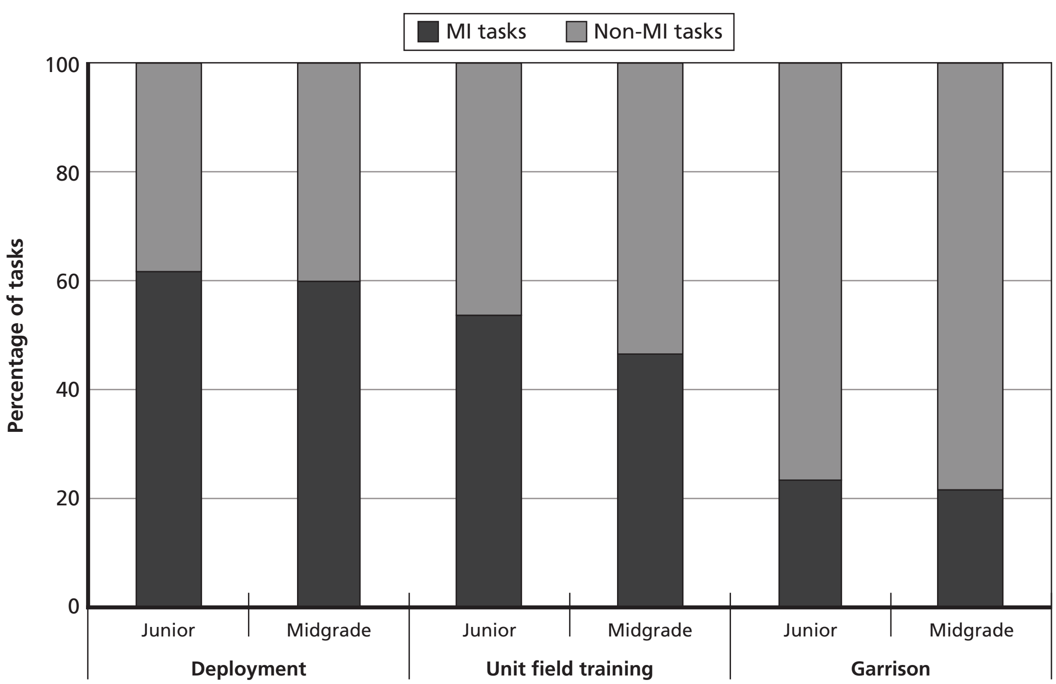
In response to questions assessing their self-efficacy for key analytic tasks for their skill levels, junior analysts reported being proficient on 43 percent of key tasks, on average; midgrade analysts reported being proficient on 53 percent of key tasks.

Figure S.1
Frequency of Performing Key Tasks



RAND *RR1851-S.1*

Figure S.2
Percentage of Military Intelligence and Non–Military Intelligence Tasks Performed in Job Settings



RAND *RR1851-S.2*

Most Analysts View Institutional Training as Valuable to Prepare Them for Their Jobs, Second to Deployment

Analysts reported that deployment was most effective in preparing them for their jobs, followed by AIT, foundry, unit field training, experiences in garrison, and other unit training or experiences.

Differences in Job Proficiency Between Junior and Midgrade Analysts Were Mixed

We assessed five aspects of performance on the PE: (1) number, differentiation, and prioritization of courses of action (COAs); (2) quality of COAs; (3) usefulness of named areas of interest (NAIs); (4) feasibility of NAIs; and (5) analytical points. Analytical points correspond to decisions that analysts should make in developing their COAs and NAIs and therefore reflect deeper CT.

Differences between junior and midgrade analysts in job proficiency were mixed, with junior analysts performing better on usefulness of NAIs and midgrade analysts performing better on analytical points. There were no differences between the two groups on COA number, differentiation, prioritization, or quality or on feasibility of NAIs. In addition, the PE scores for both junior and midgrade analysts indicate the need for improvement in most aspects of PE performance. For example, the average COA quality score was less than 3.0 out of 5.0, and average analytical points were 3.08 out of 15 possible points. These results could be due to a lack of proficiency or a lack of motivation to complete the PE or to perform at a maximal level.

Differences between junior and midgrade analysts on PE outcomes should be interpreted with caution because of apparent selection effects in attempting the PE. Midgrade analysts (98 percent) were more likely than junior analysts (69 percent) to attempt the PEs. Junior analysts who did not attempt the PE reported conducting MI tasks much less frequently than those who did attempt it. A lack of experience in conducting MI tasks might have contributed to low motivation to attempt the PE.

The Armed Forces Qualification Test Is a Consistent Predictor of Training Proficiency

We found that Armed Forces Qualification Test scores were a significant predictor of AIT grade-point average (GPA) and graduation for junior analysts. Including dispositional characteristics in the analysis improved model fit, although the factors that were associated with training proficiency varied somewhat, and the direction of some associations was unexpected. Students with higher GPAs were somewhat more conscientious but significantly less agreeable than those with lower GPAs. Students who graduated were significantly more conscientious but less open to experience than were students who did not graduate AIT.

Few Competencies or Life-Cycle Factors Consistently Predict Job Proficiency

Few competencies or life-cycle factors consistently predicted job proficiency. Surprisingly, cognitive competencies did not predict any of the PE scores. Grit was also not associated with job proficiency. Dispositional characteristics had varied associations with PE scores: Openness to experience predicted usefulness of NAIs and analytical points, and agreeableness was associated with feasibility of NAIs. Interestingly, the less agreeable analysts performed better on NAI feasibility. This finding appears to reflect a more general trend, including the negative association of agreeableness with GPA for junior analysts and lower average levels of agreeableness among junior than midgrade analysts.

Work experiences (frequency of and self-efficacy for performing key tasks) were not associated with PE scores, but this might be because these measures were associated with Big Five factors, particularly openness to experience for midgrade analysts. Also, as noted earlier, work experience for junior analysts was associated with the likelihood of attempting the PE.

For midgrade analysts, we also examined whether assignment history (deployment length and tactical or strategic assignments) of analysts' recent assignments predicted job proficiency. Overall, assignment history was not strongly associated with performance on the PE.

Lessons Learned Have Implications for Ongoing Assessment of Analytic Proficiency

The Testing Environment Likely Affected Analyst Motivation to Complete Assessments

Analysts' motivation was likely a major factor in completing the study assessments. In accordance with federal regulations governing human subject research, participation in the study was voluntary, with no negative consequences for nonparticipation. Like other research studies, this created a low-stakes setting—in contrast to high-stakes assessment settings, in which results directly affect employment, education, and other important outcomes. Low test-taking motivation can negatively affect the validity of test scores; thus, the true relationships between the predictors and PE performance might be underestimated. Establishing routine proficiency testing by the Army, coupled with feedback and incentives (e.g., bonuses tied to demonstrated proficiency), is likely to create a higher-stakes environment with greater participation and more-accurate proficiency scores.

Analysts' Recall of Intelligence Preparation of the Battlefield–Relevant Symbology and Terms Affects Performance on the Practical Exercise

In contrast to how 35F analysts typically conduct their work, analysts completed PEs on paper, without access to field manuals or other supporting materials. According to anecdotal responses from participants, it appears that at least some participants did not complete the PE because of knowledge decay, i.e., they could not recall symbology and terms. The finding that analysts who did not even attempt the PE reported performing key analytic tasks less frequently on the job than those who did attempt it supports this idea. These findings raise questions about what information is reasonable for 35F analysts to remember after AIT, particularly if they have limited opportunities to perform analytic tasks on the job. If the Army determines that reliance on written resources poses operational risks, it will need to train analysts to conduct the tasks in question without relying on reference materials and to provide ongoing training and work experience to ensure knowledge retention throughout analysts' careers.

Recommendations for Ongoing Assessment and Development

We propose that the Office of the Deputy Chief of Staff, G-2, U.S. Army, develop policy that provides support for ongoing assessment and development. We propose establishing a policy for routine assessment would be implemented in a phased approach consisting of several steps, as described in the rest of this section.

Establish Proficiency Standards for Analysts

The first step in this process is to determine required tasks, expectations for task proficiency, and related decisions pertaining to assessment methods, frequency, and consequences for failure to meet standards. The regulation governing proficiency standards for linguists might be a useful model given similarities with 35F analyst tasks, and the Deputy Chief of Staff, G-2, U.S. Army, already serves as the proponent for this regulation. The Army might also review efforts underway by the Under Secretary of Defense for Intelligence to develop a certification program for 35F analysts in the U.S. Department of Defense.

Develop and Implement Instruments to Assess Proficiency

Assessments might include PEs like the one used in this study, which could be developed to tap a wider range of critical skills for the MOS. Assessments could also consist of other kinds of tests with open-ended questions (e.g., essay tests) or objective tests (e.g., multiple choice), which are appropriate for assessing retention of declarative knowledge, such as understanding of symbology and analytic terms. The assessment process should use robust testing practices, including a well-defined and quantifiable rubric to evaluate PE responses, training for SMEs to ensure consistency in grading, development of alternative test forms to facilitate test security, and use of automated methods, where feasible, to foster efficiency in scoring.

To better understand factors that influence PE performance, we suggest collecting information about analysts, such as (1) unit type, skill level, and deployment history; (2) responses to a short questionnaire assessing work experiences (such as the survey used in this study) and factors that could affect motivation to complete the assessment (e.g., satisfaction with the assessment and incentives for proficiency); and (3) objective measures of MI activities, such as usage statistics from analytic systems.

Provide Analysts with Sufficient Opportunities to Maintain and Enhance Their Knowledge and Skills

Because of the variability of analyst experiences at units, we recommend providing analysts with enough training and other opportunities to practice performing MI tasks and that units consider providing analysts with protected time to do so. Opportunities for training and practice outside normal work assignments are especially important for analysts in garrison and those assigned to small MI units. The G-2 Foundry Program already provides a structure for MI training at the units.

Modify Resources to Support Changes to Assessment and Development Policy

Providing analysts with protected time for assessment and development will likely have resource implications. Adding training and assessment time to analysts' current requirements, and implementing a credentialing process, could necessitate modifications in the utilization of 35F personnel across units. Augmenting training in units might also increase resource needs for the Foundry Program to support development and assessment requirements.

Topics for Future Research and Practice

Although this study had many strengths (e.g., use of multiple methods to measure competencies, predictive validation approach for junior analysts, and testing a process for proficiency assessment), it also had limitations that point to areas for future research and practice. First, a more structured method for identifying analytic competencies than what we used in this study might identify additional competencies that are important for analysts in the 35F MOS. Second, future assessment of analytic competencies could include measures of competencies identified but not measured in our study (e.g., adaptability and communication skills). Third, our study focused on analytic proficiency of intelligence analysts completing tasks on their own. To the extent that analysis is conducted in teams, future research and practice could identify competencies important for team intelligence analysis and assess proficiency of MI analysis teams.

These limitations notwithstanding, the study demonstrates an approach that could be adapted to assess MI analyst proficiency on an ongoing basis. In particular, assessing proficiency after analysts leave the schoolhouse can help Army leadership understand the effectiveness of training and job assignment and develop corresponding policies to help analysts develop and maintain key cognitive and noncognitive competencies.

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Abbreviations

AFQT	Armed Forces Qualification Test
AIT	advanced individual training
ALC	Advanced Leader Course
AR	Army regulation
ASVAB	Armed Services Vocational Aptitude Battery
BDA	battle damage assessment
BN	battalion
COA	course of action
CT	critical thinking
CTSSB	Critical Task and Site Selection Board
DA PAM	Department of the Army pamphlet
DCGS-A	Distributed Common Ground System—Army
DoD	U.S. Department of Defense
DOTMLPF-P	doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy
ELO	enabling learning objective
FM	field manual
GMA	general mental ability
GPA	grade-point average
HQDA	Headquarters, Department of the Army
HVI	high-value individual
HVTL	high-value target list
I-ADAPT-M	Individual Adaptability Measure
ICC	intraclass correlation

INTREP	intelligence report
IPB	intelligence preparation of the battlefield
IPIP	International Personality Item Pool
IR	information requirement
ISR	intelligence, surveillance, and reconnaissance
KSAO	knowledge, skill, ability, or other characteristic
LSA	learning step or activity
M	mean
MI	military intelligence
MOS	military occupational specialty
MTOE	modified table of organization and equipment
MTT	mobile training team
NAI	named area of interest
NCO	noncommissioned officer
ns	not significant
OUSD(I)	Office of the Under Secretary of Defense for Intelligence
PE	practical exercise
PIR	priority intelligence requirement
POI	program of instruction
RFI	request for information
RIP	relief in place
S-2	intelligence staff
SD	standard deviation
SIR	specific information requirement
SITMAP	situation map
SL	skill level
SME	subject-matter expert
SOP	standard operating procedure
ST	skilled technical
TAPAS	Tailored Adaptive Personality Assessment System

TAPDB	Total Army Personnel Database
TIP	target intelligence package
TLO	terminal learning objective
TOA	transfer of authority
TTP	tactics, techniques, and procedures
USAICoE	U.S. Army Intelligence Center of Excellence
USDI	Under Secretary of Defense for Intelligence

CHAPTER ONE

Introduction

The U.S. Army employs enlisted soldiers, warrant officers, and commissioned officers to analyze adversary and contextual (e.g., terrain) information to produce military intelligence (MI) that will give the Army an edge on the battlefield (Headquarters, Department of the Army [HQDA], 2012b). Intelligence analysts, whether in the Army or the broader U.S. intelligence community, face constraints that present significant challenges for their work. Intelligence problems are ambiguous and unstructured, making it difficult to determine whether information to address the problems is adequate and accurate (Heuer, 1999), and they lack objective feedback, which is a key factor in monitoring performance and developing expertise (Horn and Masunaga, 2006; Kahneman and Klein, 2009; Shanteau, 1992). Analysts also work under time pressure and in a culture in which there is a fear of failure, which limits their ability to conduct analysis using deliberate, systematic thinking processes (Heuer, 1999; Johnston, 2005). Analysts therefore work under conditions in which cognitive biases can pervade analytic thinking and processes (Heuer, 1999; Johnston, 2005). To combat these biases, analysts require cognitive and noncognitive competencies that are largely intangible, such as critical thinking (CT) and adaptability. Senior Army leaders have emphasized the need for such skills (often referred to as 21st-century competencies) in the force at large, particularly in light of an increasingly complex and dynamic operational environment (e.g., U.S. Army Training and Doctrine Command, 2011; HQDA, 2012b, 2015b).

Although measures for assessing analytic competencies, such as CT, exist in the private sector and research literature, these tests have not been used for Army MI, with the exception of foreign language testing for Army cryptologic linguists (Army Regulation [AR] 11-6). Although the Army trains analysts on techniques for MI analysis and assesses proficiency in training through grades on assignments and practical exercises (PEs), it does not have measures and systematic processes to assess learning retention and analysts' abilities to implement MI techniques.

Challenges also exist for measuring analyst job performance. Chief among these is determining how analyst job performance ties to intelligence success or failure. Intelligence success often means that an adverse event was prevented. For example, intelligence that warns a commander of adversary plans could result in the commander emplacing defenses, which signal to the adversary that its plans are known and that attacking is no longer a viable option.[1] Thus, measuring intelligence success is akin to proving a null hypothesis. That is, one cannot deter-

[1] Joint Publication 2-0 describes this type of situation as the "paradox of warning" (U.S. Joint Chiefs of Staff, 2013, p. I-28).

mine whether an event did not occur because of good intelligence or because of some other reason (see, e.g., Treverton et al., 2006).

Even if intelligence outcomes can be adequately measured, tying an analyst's work product to those outcomes is not straightforward because analysts are not the final decisionmakers. Instead, analysts provide information or judgments to commanders and other leaders who decide what to do with the intelligence (George and Bruce, 2008). An analyst can therefore provide a good product, but that product might not be used in decisionmaking or it might be used incorrectly. Therefore, the link between analyst job performance and intelligence outcomes is indirect at best.

There are also Army-specific challenges to measuring analyst job performance. One challenge involves how analysts are assigned to units. MI analysts, especially those in the enlisted force, are assigned to a variety of units across the Army. While at their units, analysts perform a variety of tasks, some (or all) of which might not relate to their core analytic duties. If these analysts do not perform analytic tasks as part of their jobs and do not receive training to remain current in their analytic competencies, they might lose some of their analytic proficiency. Another challenge for measuring analyst performance relates to how soldiers are evaluated on their job performance more generally. If MI analysts are not performing MI tasks, their performance reports (i.e., noncommissioned officer [NCO] evaluation reports) will not capture their MI performance.[2] In addition, anecdotal evidence indicates that soldier performance ratings do not vary much; soldiers, regardless of the military occupational specialty (MOS) in which they work, generally receive high ratings. Performance reports therefore have limited utility for assessing how well analysts are performing their key analytic tasks.

Given the challenges in measuring analyst competencies and performance, the Deputy Chief of Staff, G-2, U.S. Army, asked the RAND Arroyo Center to develop and test a process to assess key analytic competencies and proficiency[3] of the Army's enlisted all-source analysts (MOS 35F, intelligence analyst) and to design a protocol for ongoing evaluation. To meet the study objectives, we identified three key study questions:

- What are key analytic knowledge, skills, abilities, and other characteristics (KSAOs[4]) of 35F analysts, and how might the 35F career life cycle affect the development and retention of key analytic competencies?
- What measures and methods can be used to assess analytic competencies and job proficiency?
- What is the association between key competencies, training proficiency, and job proficiency for 35F analysts?

In the next section, we outline the general approach we used to address these questions.

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2 Other criteria rated in annual evaluations include Army values (e.g., loyalty, duty, respect, and honor), physical fitness and military bearing, leadership, training, and accountability.

3 Although we reference analyst *performance*, analytic *proficiency* is a necessary part of analyst performance. Job proficiency reflects how well someone can perform the tasks required of the job (Campbell, 1990). Job performance covers not only proficiency at one's job tasks but also demonstrating effort and maintaining personal discipline, among other factors (Campbell, 1990). As we discuss in this report, measuring analytic proficiency is more tractable than measuring analysts' overall job performance.

4 Throughout this report, we use the term *competency* but, when appropriate, refer to one or more categories of KSAOs.

Study Approach

We performed several tasks to address our three main study questions. We describe our study tasks in the sections below.

Identify Key Analytic Competencies and Career Life-Cycle Factors Related to Development and Retention of Those Competencies

To address our first question, we relied on multiple sources of information. We reviewed Army documents that describe the key analytic tasks for 35F analysts and the associated competencies described in training publications. We also interviewed subject-matter experts (SMEs), including MI instructors, schoolhouse staff, 35F analysts, and 35F supervisors. Interviews addressed key tasks, training, and competencies for 35F analysts, as well as how assignments and training in the units affect development and retention of analytic competencies taught in advanced individual training (AIT), the first course that trains Army enlisted personnel for their chosen career fields. In addition to Army document reviews and interviews, we reviewed literature on competencies associated with intelligence analysis. In Chapter Two, we describe our approach and findings regarding 35F analysis tasks and competencies, as well as career life-cycle factors (i.e., selection, training, and job assignments) that affect those competencies.

Identify and Select Measures and Methods for 35F Competencies and Proficiency

Measures

We reviewed the research literature associated with each key competency identified in our first task. We looked for evidence of measures that have desirable scientific properties (i.e., have evidence demonstrating that they are reliable and valid measures) and could be applied to the Army MI context. We discuss our findings from this literature in Chapter Three.

We also reviewed the literature on intelligence analyst performance and Army MI instructional materials to identify potential proficiency measures. We focused our efforts on finding a work sample that the Army could use and that would overcome challenges we previously outlined in measuring analyst performance. Work samples are simulations of one or more specific job activities designed to approximate performance of an actual work situation or scenario (Lievens and De Soete, 2012). Work samples overcome some of the limitations of typical measures of job performance (e.g., supervisor ratings), such as difficulty in observing behaviors on the job, variability in job tasks across locations or assignments, and influences of external factors (e.g., coworker distraction) on job performance. Work samples also tend to be accepted by job incumbents and other stakeholders as job-related and fair because they resemble the job (Callinan and Robertson, 2000). As we describe in Chapter Four, we adapted a work-sample measure (a PE) that the MI schoolhouse uses in 35F AIT to measure analytic proficiency in this study.

Methods

A central task of our study was designing the methodological approach to measure the association between competencies and proficiency. This task was important both as an initial test of these associations and to provide a model for the Army to use for assessment on an ongoing basis. In this section, we describe two models for assessing analyst proficiency. The first model focuses on new 35F analysts, and the second model focuses on midgrade analysts.

We outlined a model for assessing new analyst proficiency using a criterion-related validation design. Figure 1.1 depicts this model for new analysts. Criterion-related validation involves analyzing the relationships between scores on predictor measures (e.g., competency assessments) and scores on criterion (i.e., outcome) measures (e.g., training grades or behavior on the job) (Wigdor and Green, 1991). Although criterion-related validation is typically used to choose tests for personnel selection, i.e., to provide evidence about the effectiveness of predictor measures on these tests, it can also be used to provide evidence of the relevance of the criterion measures.[5] Specifically, our model uses a longitudinal, predictive design in which new analysts' competencies were measured upon entry to the Army or at other times prior to training, measures of training proficiency (e.g., grades) were taken during and immediately after initial MI training (i.e., 35F AIT), and analytic proficiency was assessed several months after first unit assignment.

The model also includes the effects that training experiences and other career life-cycle factors, such as job assignments, have on the relationships between competencies and proficiency. By examining training factors, our model includes elements of training evaluation. Specifically, we assess analysts' attitudes about their training experiences, training grades and performance on PEs in training, and a transfer performance measure, i.e., a PE to measure analytic proficiency after analysts are assigned to their jobs.[6]

Figure 1.1
Model for Assessing Analytic Proficiency of New 35F Analysts

RAND *RR1851-1.1*

Our research timeline permitted us only to assess proficiency after new (i.e., junior) analysts were on the job for just a few months. To better understand predictors of proficiency at more-advanced stages of analysts' careers, we designed a concurrent validation study focused on midgrade analysts. The concurrent study was conducted with 35F analysts enrolled in the Advanced Leader Course (ALC), which provides training on leadership and technical skills to prepare soldiers who will lead squads or platoons. A concurrent validation design measures predictors and outcomes at or around the same time (see Figure 1.2). We also used data from personnel records (e.g., ASVAB scores) collected at earlier points in the analysts' careers.

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5 Criterion-related validation is not the only means of providing validity evidence for criterion measures. Indeed, criterion-related validity falls under the broader concept of validity, which involves the evaluation of scientific evidence for and consequences of the interpretation and use of results from a criterion measure (Messick, 1995). Examples of other sources of criterion validity evidence include evaluation by job experts that the criterion measure adequately covers job-relevant content and examination of empirical relationships among scores on measures of different criteria to determine whether the measures are related in theoretically expected ways.

6 To conduct a thorough training evaluation, the model would include pre- and posttraining assessments of competencies that training would be expected to develop (e.g., CT skills) and the use of a control group. We could not use a control group because it would require that some soldiers not receive the training they need to become analysts. In addition, some skills cannot be assessed before training because trainees do not have the basic knowledge needed to perform particular tasks.

Unlike the model for new analysts (in Figure 1.1), the model for experienced analysts does not capture effects of initial MI training or measures of training proficiency (see the dimmed arrows in Figure 1.2). The experienced-analyst model also differs from the new-analyst model in that time on the job for experienced analysts is on the scale of years (eight years of service, on average, for experienced analysts in our study), not months.

Figure 1.2
Model for Assessing Analytic Proficiency of Midgrade Analysts

RAND *RR1851-1.2*

Association Between Key Analytic Competencies and Proficiency for 35F Analysts

In sum, we collected data from junior analysts on their competencies at the beginning of AIT, their proficiency at the end of it, and their performance on a work sample several months after being placed in their first job assignments. For midgrade analysts, we collected competency and proficiency data over a two-day period at the beginning of ALC. For both junior and midgrade analysts, we obtained demographic, background, and entry qualification data from personnel records, and we administered a survey about their work experiences concurrent with completion of the practical exercise. In Chapter Four, we provide more details on our methods and samples.

We analyzed these data to address our three study questions, as well as subordinate questions, such as these:

- How do junior and midgrade analysts compare in key analytic competencies and analytic proficiency?
- To what extent do junior and midgrade analysts have opportunities to engage in MI work on the job? How confident do they feel conducting MI tasks?
- How do junior and midgrade analysts perceive the value of MI training in preparing them for their jobs?

We applied the lessons learned from our findings to develop protocols that the Army can use to evaluate analytic competencies and proficiency on an ongoing basis.

Organization of This Report

The remainder of this report is organized as follows:

- Chapter Two describes the methods we used to identify competencies required for 35F analysts and presents the key competencies we identified.

- Chapter Three reviews the research literature regarding how key competencies are associated with job performance and identifies available measures of these competencies.
- Chapter Four describes our approach to measuring analyst competencies and proficiency and presents answers to our research questions based on analyses of these data.
- Chapter Five presents conclusions, implications, limitations, and recommendations for future research and for ongoing assessment of 35F analytic proficiency in the Army.

In addition, we provide two appendixes to the report. Appendix A offers detailed results of our statistical analyses of factors predicting job proficiency. Appendix B provides more information, including sample questions, from our work-experience survey.

CHAPTER TWO

Identifying the Competencies Required of 35F Analysts

Identifying the competencies required of 35F analysts and designing training and education programs to develop these competencies are not straightforward tasks. The competencies that a 35F analyst needs to acquire and retain depend on many factors, including changes in the operational environment, deployment schedules, perceptions of threats and likely adversaries, mission breadth, and institutional changes occurring across the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) domains. Required competencies can also shift over time with changes in adversaries and organizational missions. For example, large mechanized unit battle tracking, a core analyst competency in 1999, was less relevant than improvised explosive device identification and emplacement detection in 2006. Although some analyst requirements are enduring (e.g., competencies supporting the conduct of intelligence preparation of the battlefield [IPB]), others are shorter-lived.

In this chapter, we discuss requirements for 35F analysts' competencies, as defined by Army regulations and 35F analyst training, as well as through interviews with MI stakeholders, including course designers, instructors, and junior and midgrade analysts. We discuss both cognitive and noncognitive skills that 35F analysts require. We conclude this chapter with a discussion of how training and job placement influence competency retention for 35F analysts.

Approach

To identify required 35F analyst competencies, we first identified what the Army considers to be analysts' core duties and responsibilities. For this task, we used Department of the Army Pamphlet (DA PAM) 611-21, *Personnel Selection and Classification: Military Occupational Classification and Structure*, which provides descriptions and basic requirements for all career management fields, MOSs, and associated skill levels (SLs).[1] DA PAM 611-21 provides lists of capabilities required of all MI analysts, regardless of SL, experience, or duty assignment. Using this document, we identified the minimal requirements for 35F analyst selection.

Next, we evaluated the 2012 U.S. Army Intelligence Center of Excellence (USAICoE) 35F10 program of instruction (POI) in order to categorize the competencies that USAICoE develops during AIT. Although the POI is designed principally to train analysts on how to perform IPB and supporting tasks, it is also constructed to meet the broad requirements posed by the array of potential duty assignments that 35F analysts might receive.

[1] DA PAM 611-21 is also known as the MOS Smartbook. It is an electronic resource available through milSuite. We also referenced the doctrine from which these requirements were derived, including Army Doctrine Reference Publication 2-0, *Intelligence*, and Army Doctrine Publication 2-0, *Intelligence*.

Finally, we conducted semistructured interviews of MI stakeholders to solicit their perspectives on required 35F analyst competencies, as well as factors affecting competency development and retention. Specifically, we conducted interviews of 42 soldiers, warrant officers, commissioned officers, and civilians holding institutional or operational positions in the MI branch.[2] Our interviewees included junior and senior job incumbents, instructors, supervisors, and training developers.[3] We asked participants open-ended questions regarding their experiences and responsibilities; analyst course development and requirements; analyst skills, activities, preparedness, and performance; the means of evaluating analysts; and analyst training and education. We identified key competencies as those that were discussed across multiple interviews and stakeholder groups. These responses supplement our understanding of requirements as documented in Army publications and training by highlighting key competencies as performed in the field and how these competencies are or should be developed and maintained through training and job experience.

Table 2.1 provides examples of the interview questions for each stakeholder group. Because of the length of our four interview protocols, we do not include them in the report.

Table 2.1
Examples of Interview Questions for Different Stakeholder Groups

Stakeholder Group	Example Question
Incumbents	• To what degree are you doing what you were trained to do as a 35F? • How do you get feedback about your performance as a 35F analyst?
Supervisors	• Are 35F10s adequately prepared for their duty position responsibilities upon arrival to the unit? • If 35Fs are not using particular skills in the performance of their duties, how do they maintain their skills?
Training developers	• What are the different means of instruction employed at the schoolhouse? Why are they employed? • To what degree is the development of 35F personnel expected to be based on institutional training? Operational? Self-development?
Instructors	• How is a soldier's analytic proficiency assessed in your courses (e.g., tests, practical exercises)? • Are there specific analytic techniques that 35Fs use (e.g., structured analytic techniques)? When and how are these trained?

35F Analyst Duties, Requirements, and Competencies

In this section, we discuss 35F analysts' core duties and requirements as described in Army doctrine and regulations and as identified by interview participants.

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[2] We did not use a specific elicitation technique, such as cognitive task analysis, for the interviews, and we did not identify weights for required competencies (or corresponding training objectives) in terms of importance or time spent engaged in the competencies on the job, which might be assessed in a more formal job analysis (e.g., see Hutchins, Pirolli, and Card, 2007; Pirolli, Lee, and Card, 2004). We also did not compare responses across stakeholder groups.

[3] We developed an interview protocol for each of these four groups. Team members who conducted interviews did not receive training specifically for these interviews but have extensive experience conducting interviews on similar topics and with similar populations. Industrial–organizational psychologists trained in job analytic and interviewing methods led the team, which also included one or more MI SMEs.

Analysts' Core Duties and Accession Requirements

DA PAM 611-21 describes the major duties of an MI analyst, 35F SL 1 (or 35F10) as follows:

> The intelligence analyst conducts all-source analysis, develops the threat situation, produces, fuses and disseminates all-source intelligence to support the military decision making process (MDMP). Performs, coordinates, and/or supervises the Intelligence Preparation of the Battlefield (IPB) process; planning requirements and assessing collection and support to targeting. Supports the command, staff, and advises on the use of intelligence resources at all echelons.

DA PAM 611-21 identifies seven specified duties for 35F10s:

- Prepare all-source intelligence products to support the command.
- Establish and maintain databases and automated intelligence systems.
- Receive and process incoming information.
- Perform initial IPB to define the operational environment, describe environmental effects on operations, evaluate the threat, and determine threat courses of action (COAs).
- Support initial threat situation development.
- Provide intelligence support to targeting.
- Analyze information and present intelligence products and findings.

DA PAM 611-21 specifies that those entering the 35F MOS should have a high-school diploma or equivalent before entering service. DA PAM 611-21 also specifies minimum requirements on the skilled technical (ST) subtest of the ASVAB, which determine the general mental abilities (GMAs) required of prospective analysts.[4] These requirements are comparable to those for other intelligence and signal MOSs but much higher than those for other MOSs, such as food service specialist.

Analysts Require a Wide Range of Competencies

Our POI analysis and interviews yielded a total of seven general categories of required competencies for the 35F analyst. Table 2.2 lists these categories, as well as whether the requirement reflects knowledge, a skill, an ability, or another characteristic.

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[4] The ASVAB, which is used by all the military services and is a particularly relevant example of a cognitive ability test, consists of ten subtests assessing verbal and quantitative skills, as well as applied science. Four subtests of the ASVAB—arithmetic reasoning, mathematics knowledge, paragraph comprehension, and word knowledge—are combined into a percentile score, collectively called the Armed Forces Qualification Test (AFQT), which is used to determine basic qualification for enlistment. Combinations of scores from the subtests are used to determine qualifications for different aptitude areas. Aptitude areas are clerical, combat, electronics, field artillery, general maintenance, general technical, mechanical maintenance, operators and food, ST, and surveillance and communications.

The ST aptitude area consists of word knowledge, paragraph comprehension, general science, mechanical comprehension, and mathematics knowledge. Since July 1, 2004, the requirement for 35Fs in the ST aptitude area is a minimum score of 101 (HQDA, 2015b).

Table 2.2
Required Competencies

Competency Identified	Source	K, S, A, or O
Domain knowledge: DOTMLPF-P, TTP, technical, and threat	POI	Knowledge
Oral and written communication skills	POI, interview	Skill
CT and problem-solving skills	POI, interview	Skill
GMA	Interview	Ability
Adaptability	Interview	Other characteristic
Open-mindedness	Interview	Other characteristic
Conscientiousness	Interview	Other characteristic

NOTE: TTP = tactics, techniques, and procedures.

Required Knowledge, Skills, and Abilities

Although the Army regulations establish the basic requirements for the 35F MOS, the 35F10 POI provides a more detailed view of the competencies needed for the 35F analyst position, especially the cognitive competencies required. To identify key cognitive competencies, we analyzed the learning objectives for the 35F10 MOS and extracted the underlying areas of knowledge or capabilities associated with each objective. As Table 2.3 shows, the 35F10 POI is divided into ten blocks of instruction that address ten terminal learning objectives (TLOs) and 39 subordinate enabling learning objectives (ELOs). Five of these TLOs pertain to the conduct of IPB, while the other five address additional functions and skills that analysts perform as specified in DA PAM 611-21. Overall, the POI's TLOs and ELOs suggest that 35F soldiers are expected to acquire a range of MI-specific knowledge and skills in AIT. Per Army institutional requirements, 35F soldiers are also expected to learn non-MI content (e.g., warrior skills). Combined, MI and non-MI training requirements for 35F AIT appear to be extensive.

Table 2.3
35F10 Terminal and Enabling Learning Objectives

TLO	Associated ELO
Conduct intelligence analysis field training exercise (RIP-TOA).	Prepare tactical operations center products for RIP-TOA. Perform tactical operations center operations.
Conduct situation development.	Apply the intelligence process. Construct a graphic intelligence summary. Use incoming message traffic to update information and intelligence gaps and RFIs.
Identify principles of protecting classified information, material, and media.	Annotate classified markings to documents and media. Apply procedures for protecting classified information. Complete distance learning information security training. Identify principles of intelligence oversight.
IPB 1: Define the operational environment.	Analyze aspects of the operational environment. Describe IPB. Determine RFI based on intelligence gaps. Identify significant characteristics of the operational environment.
IPB 2: Describe the environmental effects on operations.	Analyze the environment. Describe the effects on friendly and threat capabilities and COAs.
IPB 3: Evaluate the threat.	Develop a threat model. Develop the threat capabilities statement. Identify potential targets. Process information.
IPB 4: Determine the threat COAs.	Develop each COA in the time available. Evaluate and prioritize COAs. Identify a full set of COAs. Identify initial ISR requirements. Identify the threat likely objectives and end state. Update the target intelligence package.
Provide IPB support.	Demonstrate automation support capabilities. Discuss the history and culture of Afghanistan. Discuss the targeting process. Discuss U.S. joint and Army operational doctrine, tactics, organization, and equipment. Identify intelligence disciplines, assets, and capabilities. Interpret counterinsurgency theory. Perform map reading. Prepare military symbology overlays.
Provide intelligence security.	Compare MI historical activities and figures with those of intelligence soldiers serving today. Employ components of the personnel security system. Prepare an inspection of unit physical security (arms, ammunition, and explosives).
Present intelligence findings.	Conduct intelligence research. Prepare and deliver a military information briefing. Write an analytical paper.

SOURCE: USAICoE, 2012.

NOTE: RIP = relief in place. TOA = transfer of authority. RFI = request for information. ISR = intelligence, surveillance, and reconnaissance.

The 35F10 POI is further subdivided into individual teaching modules or instructional periods known as learning steps and activities (LSAs). LSAs are designed to substantiate the ELOs and, ultimately, the TLOs of the 35F10 POI. Many of the 35F10 LSAs are recorded in the POI as an action or process (e.g., "*Identify* methods of instruction," "*Know* the steps involved in creating an effective analytical paper," and "*Describe* the preparation for briefing"). To identify competency groups for analysts, we extracted all the verbs associated with the actions and processes contained in each LSA and categorized them into underlying groups of related competencies (or competency groups) developed during 35F AIT.

Table 2.4 shows the major cognitive competency groups that we identified and the activities associated with each group. Two of these competency groups reflect general knowledge, abilities, and skills that might apply across a range of jobs: (1) oral and written communication skills (e.g., brief, explain, or write) and (2) CT and problem-solving skills (e.g., identify, research, analyze, assess, evaluate, and solve). The third competency group consists of MI domain-specific knowledge and skills. These areas include knowledge of pertinent DOTMLPF-P and TTP, technical knowledge, and, threat knowledge.

Table 2.4
Cognitive Competency Groups Based on Categorization of 35F10 Learning Steps and Activities

LSA KSAO Category or Competency Group	Associated LSA Verbiage
Oral and written communication skills	Brief, build, conceptualize, create, deliver, demonstrate, depict, describe, develop, diagram, discuss, explain, illustrate, orient, present, teach, write
CT and problem-solving skills	Analyze, associate, collect, compare, define, determine, evaluate, fuse, identify, interpret, know, link, outline, prioritize, recognize, relate, research, review, solve, understand
MI domain-specific knowledge (DOTMLPF-P, TTP, technical, and threat)	Annotate, apply, conduct, construct, employ, format, manage, perform, prepare, process, request, submit, update, use

SOURCES: USAICoE, 2012; RAND Arroyo Center analysis.

During interviews, 35F analyst stakeholders also discussed required cognitive abilities and skills. Midgrade analysts who have or had leadership or supervisory positions emphasized, in particular, the need for GMA. They considered such ability to be important for managing challenging operational problems, often with incomplete information and while being subjected to compressed timelines. Interview participants also identified CT and writing and communication skills to be two of the most important skills for 35F analysts. Prior Army research has also identified cognitive ability (e.g., information processing speed and pattern recognition) and communication skills (oral and written comprehension and expression) as fundamental to the tasks that 35F analysts must perform (Bowden et al., 2012; Seven et al., 1991).

Although 35F analysts are expected to have developed all of the POI-designated competencies upon graduation from AIT, different duty positions and assignments stress different competencies to varying degrees. Unit mission-essential task lists, deployment status, echelon, commander preferences, and section chief leadership style all affect which competencies are emphasized. For example, in a unit in which a commander requires junior analysts to conduct briefings, the LSA competency category for oral and written communication skills might receive special emphasis. Alternatively, in a unit in which the section officers or officers in charge brief the commander, the analyst will likely focus more on CT and problem-solving skills or providing analysis to meet the needs of the section officers in charge.

Despite these differences in emphasis, 35F analysts typically need to exercise skills across all three competency groups.

Analysts' Other Required Characteristics

Stakeholder interviews supplemented our understanding of competencies by highlighting how they are or should be developed and maintained through training and job experience. We asked job incumbents and supervisors, based on their experiences, to identify the competencies or characteristics that they considered to be most important for a 35F analyst. Although interviews and discussions tended to focus on cognitive competencies, such as CT and communication skills, participants identified several other characteristics for MI analysts: adaptability, open-mindedness, and facets of conscientiousness. We discuss each of these below; identify and define corresponding constructs in literature on personality and organizational psychology that were used as a basis for measurement, as described in Chapters Three and Four; and provide examples from the interviews.

Stakeholders reported that adaptability is critical given that unit assignments, duty positions, and leader preferences have substantial bearing on what analysts are expected to do. Adaptability has been defined in numerous ways (Baard, Rench, and Kozlowski, 2014), and we find that the Army's definition, "an effective change in behavior in response to an altered or unexpected situation" (HQDA, 2015a, p. 5-7), captures key elements of other definitions. One analyst described adaptability as the ability to adjust to different surroundings, particular unit requirements, commander preferences, and task variety. Another analyst noted having been assigned to four different units as a 35F and that each unit stressed entirely different skill sets depending on its mission and commander preferences.

Open-mindedness is related to adaptability (HQDA, 2015a): Both constructs entail flexibility in one's thinking. In personality psychology, open-mindedness is reflected in openness to experience, which is one of the Big Five personality characteristics. The Big Five derives from the five-factor model, a predominant theory in personality research that specifies five broad personality domains: extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience (see, e.g., Digman, 1990). Each of the Big Five consists of multiple facets. Openness to experience consists of such facets as curiosity, ingenuity, and intellectual efficiency (Drasgow et al., 2012). One analyst described open-mindedness as being able to challenge convention and explore alternative hypotheses in preparation for and during the conduct of missions. Other respondents noted the need for analysts to be inquisitive or to "think outside the box."

Conscientiousness, which is another one of the Big Five characteristics, consists of such facets as achievement orientation, order, self-control, and nondelinquency (e.g., Drasgow et al., 2012; Roberts, Chernyshenko, et al., 2005). Interview participants stressed the importance of achievement orientation because it indicates analysts' willingness to put in the time and effort required to learn and improve their craft. Examples of respondents' comments reflecting achievement orientation include being proactive, having the desire to improve, being self-starters, not requiring "hand-holding," and taking pride in one's work. Similarly, Bowden et al., 2012, determined that perseverance is a key requirement for effective performance of Army 35F analysts. Respondents also identified characteristics associated with order and self-control, which reflect military discipline.[5] Several interviewees mentioned the importance of discipline or self-discipline. One interviewee stated that, if someone is not disciplined in the areas important to being an Army soldier, that person is not likely to be very effective as a 35F analyst.

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5 Military discipline is defined as "control of one's own behavior according to Army values" and "adherence to the orderly practice of completing duties of an administrative, organizational, training, or operational nature" (HQDA, 2015a, p. 6-3).

Whereas developing achievement orientation and military discipline are not explicitly addressed in AR 350-1, *Training: Army Training and Leader Development*, they are covered generally in the Army's values and are qualities that the Army tries to instill in soldiers as they progress through initial entry training and throughout their careers (HQDA, 2014a, 2015a).[6] Indeed, many of the "other characteristics" that stakeholders identified as important for analysts are likely to be important for success across all assignments and positions in the Army. However, unlike job-related knowledge and skills, "other characteristics" are not as amenable to development efforts via training for adults (e.g., see Thornton and Rupp, 2006).[7]

Competency Development and Retention

Interviews with 35F stakeholders also addressed how training—including determination of training requirements—and duty assignments affect development and retention of required competencies. These discussions focused on analyst knowledge and skills instead of other characteristics, which are more difficult to develop through training and assignments.

Training Focuses on Developing Knowledge and Skills

The type of training that 35F analysts receive throughout their careers will vary by unit assignment, career length, promotion schedules, available funding, and other factors. Table 2.5 provides a representative list of analyst training courses and resources. We note that informal training and resources can be variable in quality because they lack standardization.

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[6] AR 350-1 generically references discipline and self-discipline as characteristics that should be instilled in Army soldiers (see, for example, HQDA, 2014a, pp. 5, 19, 48, 51, and 55). Self-discipline applies both to analysts' achievement orientation (i.e., willingness to make the effort required to improve skills) and military discipline (i.e., analysts' behavior and conduct).

[7] We do not argue that other characteristics cannot change in adults. Indeed, research shows that major life events and formative work experiences predict personality change, especially in young adults (see, e.g., Roberts, Caspi, and Moffitt, 2003). However, it takes considerable effort and time to change characteristics associated with these other characteristics. As a result, organizations tend to focus development efforts (e.g., training) on job-related knowledge and skills rather than characteristics, such as achievement orientation.

Table 2.5
Representative List of Analyst Training Courses and Resources

Type of Training or Course	Location	Training Focus Area	When Conducted	Duration
Intelligence analyst AIT	Schoolhouse	Doctrine, organization, equipment, presenting intelligence findings, map reading, symbology, IPB, targeting, and DCGS-A	Following completion of initial entry training	16 weeks, 3 days
ALC	Schoolhouse	Scenario-driven training using DCGS-A, doctrine, analysis, operations, and situational training exercises	Prior to promotion to staff sergeant	7 weeks
Senior leader course	Schoolhouse	Leading and supervising soldiers, managing intelligence activities and resources, support to information collection and targeting, structured analytical techniques, and military decisionmaking	Prior to promotion to sergeant first class	6 weeks, 4 days
Foundry	Unit or installation	Technical training, individual intelligence certification, and functional and regional expertise	Varies	Varies
Training Brain Operations Center	Unit or installation	Live, virtual, constructive environment supporting unit exercises	Varies	Varies
New-equipment training	Unit or installation	Knowledge for operation, maintenance, and logistical support for new equipment	Varies	Varies
Intelligence and Electronic Warfare Tactical Proficiency Trainer	Unit or installation	Modeling and simulation of collection and reporting systems (e.g., unmanned aerial systems, DCGS-A, Prophet)	Varies	Varies
Intelligence MTTs	Unit or installation	Training gaps and common training shortfalls	Varies	Varies
Self-development	Unit or installation	Interactive multimedia instruction, virtual language training, Intelligence Knowledge Network and Warfighter Forum, University of Military Intelligence	Varies	Varies
Unit training	Unit or installation	Common MOS tasks, unit mission-essential task list, and analytic tradecraft (on-the-job training and experience)	Varies	Varies

SOURCES: HQDA, 2014a; Army Training Requirements and Resources System, undated.

NOTE: DCGS-A = Distributed Common Ground System—Army. MTT = mobile training team.

The analysts we interviewed stated that USAICoE training and education provided in AIT strongly affected their preparation for their initial duty assignments. Analysts said that they felt well prepared to conduct counterinsurgency, network analysis, and IPB and were well versed in the use of DCGS-A and in giving briefings. However, they reported that USAICoE training was insufficient for some work that their units required with respect to three general categories of cognitive competencies discussed earlier: communication skills (analytic writing and preparing briefings for different audiences), CT and problem-solving skills (research techniques), and a range of domain knowledge (e.g., MI branch knowledge; differences among strategy, operations, and tactics; classification levels; using ISR; the purpose of IPB; what soldiers with other MOSs do in their jobs; and force-on-force conflict).

One of the key feedback mechanisms USAICoE uses to assess the sufficiency of analyst training, performance, and required competencies is the Critical Task and Site Selection Board (CTSSB). The CTSSB asks unit commanders and other leaders throughout the MI branch to review core analyst tasks and comment on modifications in terms of continuance, deletion, or expansion of these tasks. The output of the CTSSB is evaluated at USAICoE and is then incorporated, as appropriate, into DOTMLPF-P and subsequent analyst course POIs. USAICoE also leverages the feedback it receives from returning students, the experiences of its cadre (i.e., instructors), and other surveys[8] to help shape POIs and other areas of training and education. Although valuable, student feedback and other unstructured input can be rather narrow, anecdotal, or piecemeal and might fail to capture a comprehensive picture of analyst requirements at the unit level.

Despite its potential utility, the CTSSB has some flaws that limit its use for identifying necessary changes to core analyst tasks (and associated competencies) or modifying POIs to better meet operational commander needs. Our interviewees indicated that the output that the CTSSB generates is incorporated into course POIs but that the POI revision process might take as long as two years. Additionally, interview participants at Fort Huachuca reported that response rates to CTSSB surveys and rates of participation in other aspects of the process are low (generally less than 10 percent) and that breadth of responses is limited in that respondents tend to identify analyst faults rather than indicating what tasks and procedures analysts are performing well. One interviewee suggested that this was due to the hasty process used to create the surveys, the reliance on open-ended questions, and a lack of detail in responses to diagnose problems (e.g., "analysts can't write"). This analyst suggested that a structured survey based on assessments of analyst competencies would provide greater value than the more-burdensome instruments currently in use.

In some cases, analysts indicated that they were able to overcome training shortfalls or supplement their competencies with training and education courses developed by their units or made available at their assigned installation (through, for instance, Foundry courses or training provided by MTTs). Although analyst course selection is limited by section and command discretion—typically because of costs or conflicts with other unit training—respondents indicated that a breadth of courses is made available to them. These courses cover such diverse topics as the use of the Joint Worldwide Intelligence Communications System, analytic and effective writing, counterterrorism, counterintelligence, asymmetric warfare, DCGS-A, and other training designed to introduce or improve competencies that analysts are not able to exercise regularly in their duty positions. These opportunities are made available through various sources, including MTTs, Foundry, and sergeants' time (fenced or protected time that NCOs can use to provide their soldiers with small-unit or collective training or professional development). Analysts indicated that these training modules, where and when available, are an important means of receiving new, additional, or refresher training.

Analysts reported that much of the training (and associated competencies) that they receive at USAICoE—and elsewhere—is perishable. They cited, for example, degradation in the skills needed to effectively operate DCGS-A and develop a situational template. The inter-

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[8] USAICoE sends a survey to course graduates and their supervisors 90 days after graduation. The core question that the survey asks is whether USAICoE training and education prepared the analysts for their jobs. Our interviewees indicated that the survey return rate is low (about 6 to 11 percent) and that most of the respondents tend to be critical in their evaluations.

viewees estimated that it takes approximately one month for soldiers to forget a lot of what they learned at USAICoE and 60 to 90 days for complex computer skills to degrade. One participant estimated that, at best, 50 percent of analysts maintain reasonable skill levels after they leave USAICoE. This participant reported that skill retention is even worse for analysts working in garrison environments, in which there typically are fewer opportunities to perform analytic tasks. Skill atrophy is often most apparent when analysts from different echelons of command are deployed with one another. The difference between soldier skills at division and brigade-and-below levels is noticeable, sometimes stark, and can cause difficulties for analysts working together to prepare for and conduct operations.

Duty Assignments Influence Competency Retention and Development

Duty assignments influence how and how often analysts use the knowledge and skills learned during AIT and affect further competency development. As noted above, analysts can be assigned to many different duty positions, including assignments outside their MOSs (e.g., recruiter).[9] Analysts' assignments can occur across the institutional and operational force and at nearly all echelons of command, including assignments at combatant command, Army service component command, corps, division, brigade, battalion (BN), company, detachment, platoon, and squad levels. At various echelons, analysts might support any of numerous unit types conducting manifold missions, including aviation, fires, infantry, reconnaissance and surveillance, intelligence, sustainment, special forces, military information support operations, airborne, ranger, maneuver enhancement, civil affairs, air and missile defense, armor, Stryker, or any other unit, organization, or agency in which analysts are on the modified table of organization and equipment (MTOE) or table of distributions and allowances.[10]

The way in which duty assignments can influence competency retention and development is illustrated in the following example, in which two different analysts from the same AIT cohort are assigned to very different types of operational units: Analyst 1 works in the intelligence section (S-2) shop of a sustainment BN while analyst 2 works in the MI company of a Stryker brigade combat team.[11] Analyst 1 will be required to understand how the sustainment branch works, the specifics associated with sustainment as a warfighting function, and possible threats to sustainment operations. Because the S-2 shop in a sustainment BN is small, analyst 1 will often have to work independently. In contrast, analyst 2 will be required to understand the complexities and nuances of maneuver warfare, intelligence collection plans and ISR synchronization, the targeting process, and battle damage assessment (BDA). Because the Stryker brigade combat team's MI company has many analysts and works hand-in-hand with the brigade's S-2 shop, analyst 2 will likely work within a larger analytical team. Although both analysts will be conducting MI work and both will be expected to retain and further develop the competencies they acquired in AIT, the expectations for each will be different—as will their formative experiences and the likelihood that they exercise and retain various competencies.[12]

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[9] Interview participants did not discuss assignments outside their MOSs.

[10] The MTOE or table of distributions and allowances prescribes the organizational structure, personnel, and equipment requirements and authorizations for units to perform assigned missions.

[11] *S-2* refers to the staff section responsible for intelligence and security.

[12] These differences could be greater still if one of the analysts is assigned to a deploying unit and the other analyst's unit remains in garrison.

Analysts often lack opportunities to apply knowledge and skills learned in AIT, leading to skill degradation. Interviewees noted that, particularly in garrison, analysts are often assigned to nonanalytic tasks. Garrison tasks include various motor pool duties; driver detail; gym detail; unit area maintenance and upkeep; and personnel, physical, and infrastructure security assignments. However, not all analysts serving in garrison are assigned garrison tasks. Some perform reach-back support, i.e., operations conducted at rear echelons to support units deployed forward. Such analysts conduct analysis from home station in support of the analysis cell, section, or unit that is organic or attached to a deployed unit. Analysts performing reach-back support indicated that they were expected to perform duties as they would if deployed. Because of the criticality of their work, they tended not to be pulled away from conducting analytic tasks except when required to perform HQDA-mandated training as stipulated by AR 350-1, e.g., antiterrorism training, Army substance abuse program, Army suicide prevention program, physical fitness training, and law of war and detainee operations (HQDA, 2009, pp. 147–150).

Analysts also lack opportunities for continued skill development through mentoring. Mentoring can occur as first-line supervisors shadow new analysts, as analysts get on-the-job or hands-on training from more-experienced analysts, or as MI warrant officers provide advice and counseling to analysts.[13] Through these experiences, analysts build their understanding of key knowledge and skills, especially as they relate to supervisor, commander, and unit needs. However, interviewees reported that, even when analysts are assigned to conduct MI tasks and mentors are available, challenges remain in sustaining analysts' SL 1 and 2 tasks due to a lack of time (the training schedule is full), facilities (which might not be available for MI training), or equipment (the mentor and analyst do not have access to the systems needed for training).

Many analysts we interviewed indicated that the type of unit to which they are assigned can affect opportunities for skill development. Analysts assigned to "pure" MI units are more likely to have opportunities to develop their skills because soldiers in these units—leaders, supervisors, and analysts—generally conduct what are considered to be MI analyst tasks and training, and the analysts are supervised by others who are familiar with these tasks. By contrast, analysts who are the only 35Fs on the MTOE and whose role is unclear to unit leadership have fewer opportunities to develop their skills on the job. Such analysts' supervisors are less likely to have detailed knowledge of what the analysts can or should be doing, and the analysts often have to convince unit leadership of the need for sustainment training or for taking advantage of mentorship opportunities with other units.[14]

Summary

In this chapter, we identified 35F analysts' core duties and responsibilities based on Army regulations, the 35F AIT POI, and stakeholder interviews. We classified these competencies into the broad categories of cognitive (GMA, oral and written communication skills, CT and

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[13] MI warrant officers, or 350Fs, are subject-matter and process specialists and typically spend more time in a particular assignment or role than other officer, NCO, or enlisted analysts.

[14] Although analysts who perform analytic work in pure MI units might have more opportunities to use their analytic skills than analysts who do not work in pure MI units, we do not expect that analysts would perform only MI duties throughout their Army careers. If properly managed, experience outside pure MI contexts could be beneficial to analysts and the Army.

problem-solving, and domain knowledge) and noncognitive competencies (adaptability, open-mindedness, and conscientiousness).

We also identified substantial and varied challenges affecting analysts' acquisition and retention of necessary and specific competencies once they leave AIT (and other analyst courses offered by USAICoE). Predominant challenges are related to unit assignments and duty positions, which influence opportunities to sustain and develop analytical knowledge and skills through practice, mentoring, and feedback. Even when the appropriate knowledge and skills are covered during AIT, unit training, and other MI-related courses, structural challenges remain, as do challenges stemming from pressures beyond institutional or operational unit control (e.g., changes in the operating environment and corresponding changes in strategy). We provide empirical data regarding analysts' opportunities to engage in MI work on the job and we recommend suggestions to improve analytic experience.

CHAPTER THREE

Linking Analyst Competencies with Job Performance

How are 35F analyst competencies associated with analysts' job performance? In this chapter, we briefly summarize the existing literature on each set of competencies, emphasizing the links between the competencies and job performance. We also describe common methods of measuring each set of competencies.

Competencies and Job Outcomes

General Mental Ability Has Substantial Predictive Validity for Success in the Workplace

Within the psychological literature, cognitive competencies are viewed broadly, encompassing the general concept of intelligence. A widely accepted view of intelligence is that there is a single factor, e.g., Spearman's *g*, representing an individual's collected knowledge and skills (see, for example, Humphreys, 1979), which is also referred to as GMA. Drasgow, 2003, cites many instances in which GMA has strong predictive power for both training proficiency and job performance. Within the military, there is substantial evidence of the association between cognitive skills—particularly as indicated by ASVAB and AFQT scores—and job performance (Hunter, 1986; McHenry et al., 1990; Ree, Earles, and Teachout, 1994). Cognitive measures have been found to predict performance in multitasking, infantry combat, and training in various military schools (e.g., Hambrick et al., 2011; Whitmarsh and Sulzen, 1989; Besetsny, Earles, and Ree, 1993).

Research on Critical Thinking Skills Emphasizes Antecedents Rather Than Consequences of Critical Thinking

Our analysis of the 35F POI, along with stakeholder interviews, revealed the importance of CT for effective 35F analyst performance. CT skills are related to but distinct from GMA (e.g., Klaczynski, Gordon, and Fauth, 1997; Toplak and Stanovich, 2002; West, Toplak, and Stanovich, 2008); however, the research literature lacks consensus about what CT is. Many definitions of CT reflect cognitive activities, such as reasoning, analysis, and inferential thinking. Other definitions focus more on behaviors, such as gathering information. Still others are more affective in nature, focusing on attitudes or dispositions, such as openness to experience and perseverance. For purposes of this review, we discuss CT as a cognitive construct, but we also recognize that it can have noncognitive factors.

There is also substantial disagreement in the literature regarding whether CT skills are general (transferable across subject areas) or domain-specific (e.g., see Abrami et al., 2008). Some scholars argue that CT skills are general, and many of the commercially available tests of CT skills, discussed later in this chapter, are based on this view. Others contend that CT skills depend on the subject matter; in that view, training and measuring CT skills need to be specific to the domain of interest.

Military literature stresses CT's importance for job performance in intelligence analyst fields, but the literature emphasizes teaching and using CT as an analytic tool, *not* on measuring soldiers' CT skills to predict job performance. CT is taught in MI schools, has been formulated into doctrine, and is identified as one of the most significant soldier attributes necessary for conducting Army 35F analyst tasks (HQDA, 2006; Smith, 2006; Bowden et al., 2012). CT's centrality to military analysis indicates that it could be an important predictor of performance for the 35F analyst.

However, research has emphasized the antecedents of CT rather than its consequences. For example, there are abundant studies of training's effects on acquisition of CT skills. Marvin Cohen and his colleagues have developed CT-skill training for military environments and have shown improvement in students' performance on decisionmaking tasks (Cohen et al., 2000). A meta-analysis (see Abrami et al., 2008) showed that CT training has a positive effect on CT skills but that the nature of the training also matters:[1] Explicit instruction on CT skills is associated with larger instructional effects, whereas immersing students in content that requires CT—but without explicit instruction on CT—has a small effect.

Some research has shown that CT skills are related to other outcomes that are likely to influence performance for MI analysts. People with high scores on CT assessments were less likely to show common biases in thinking "related to important real-world decisions in domains such as personal finance, employment, health, and public policy" (West, Toplak, and Stanovich, 2008, p. 931).[2] In some cases, CT skills are viewed as a proxy for learning or as a necessary step in developing job-related skills (Abrami et al., 2008; Arum and Roksa, 2011; Brunt, 2005). Surprisingly, however, we have not found studies of the association between CT skills and job performance.

Job Experience and Knowledge Have Substantial Predictive Validity for Job Performance

Job experience and knowledge are two interrelated constructs commonly used as predictors of job performance. Job experience has often served as an easily obtainable proxy for other constructs, such as job-related knowledge or expertise. And indeed, job experience does predict job performance. Several meta-analytic reviews show small to moderate estimates of the association between job experience and job performance (Hunter and Hunter, 1984; McDaniel, Schmidt, and Hunter, 1988; Quińones, Ford, and Teachout, 1995). Such association is stronger at lower levels (an average of two to three years) of experience and is nonlinear, similar to other learning curves (McDaniel, 1986; Schmidt and Hunter, 1992; Schmidt, Hunter, and Outerbridge, 1986; Schmidt, Hunter, Outerbridge, et al., 1988; Sturman, 2003). The association of job experience and performance also depends on job complexity: Complexity moderates the time needed to acquire job-relevant knowledge and skills. Sturman found that the association of experience and performance increased over time for jobs that are high in complexity, whereas the association of experience and performance was relatively constant for low-complexity jobs (Sturman, 2003). These results suggest that skill acquisition takes longer and experience remains predictive longer for more-complex jobs. Furthermore, intelligence

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[1] Meta-analysis statistically summarizes results from multiple empirical studies that have investigated the same topic.

[2] That study found that students who scored high on a CT assessment made fewer errors associated with biased thinking in such areas as probabilistic and causal reasoning.

analysis lacks conditions that are needed to develop expertise, which include opportunities for structured practice over extended periods of time coupled with immediate, objective performance feedback (e.g., Ericsson, 2006; Horn and Masunaga, 2006; Kahneman and Klein, 2009; Shanteau, 1992).

Job knowledge reflects a specific body of information necessary for the successful performance of a task. Such knowledge might be factual information (declarative knowledge) or the steps and techniques for implementing tasks (procedural knowledge) (Dye, Reck, and McDaniel, 1993). Job-knowledge tests are consistently moderate to strong predictors of performance (Schmidt and Hunter, 1998). The impact of job experience on performance occurs through the provision of work opportunities in which knowledge acquisition and skill development occur. That is, as someone spends more time on a job, the more opportunities that person has to acquire knowledge and skills, which, in turn, affect job performance. GMA exhibits relationships with job knowledge, work-sample performance, and job performance that are similar to the relationships between job experience and these outcomes (Schmidt, Hunter, and Outerbridge, 1986).[3] Higher GMA facilitates job performance by fostering the acquisition of job-relevant knowledge and skill development.

Given the challenges of the 35F MOS—decisionmaking with incomplete information, variability in task expectations by duty assignment, analyzing ambiguous information with compressed timelines, a lack of immediate and objective performance feedback, the need for CT and problem-solving—labeling the MOS as a "complex job" seems warranted. Job experience is likely to have a considerable impact on skill development and job performance. Moreover, Quińones, Ford, and Teachout, 1995, demonstrates that the nature of job experience matters. The extent to which someone performs relevant job *tasks* is more strongly associated with performance than time on the job is. The way in which performance is measured also matters; job experience is more strongly associated with objective performance measures (e.g., work-sample scores) than with subjective measures (e.g., supervisor ratings).

Communication Skills Have Modest Associations with Job Performance

Communication skills are basic skills consisting of the use of both oral and written communication to convey information based on the needs of the intended audience. Communication skills reflect a person's expertise in relating fluently to others, conveying clear meaning, and transferring information across audiences and communication platforms. Research finds that those with stronger communication skills exhibit somewhat greater job performance; however, the associations are modest. Meta-analysis indicates that ratings of communication skills assessed in structured interviews predict job performance, but the validity coefficients are small, comparable to those of many other constructs assessed through interviewing (Huffcutt, Conway, et al., 2001). Similarly, meta-analytic studies of assessment center tasks and dimensions consisting of "communication" and "influencing others" show small to medium criterion-related validity coefficients for job performance (Arthur et al., 2003).

Personality Traits, Such as Conscientiousness and Grit, Are Related to Job Effectiveness

As discussed in Chapter Two, participants in our interviews noted the importance of conscientiousness and openness to experience, which are two of the Big Five, for analyst proficiency.

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[3] However, Schmidt and his colleagues found that job experience has a stronger relationship to work-sample performance (skill acquisition) than GMA does (Schmidt, Hunter, and Outerbridge, 1986).

Although each of the Big Five can be linked to job outcomes of interest, conscientiousness in particular is a key predictor of job performance across a variety of occupations (e.g., Barrick and Mount, 1991; Hurtz and Donovan, 2000; Schmidt and Hunter, 2004). Openness to experience is also associated with job performance, particularly for jobs that are relatively unstructured or in which personnel have discretion to make decisions or have a strong requirement for innovation or creativity (Judge and Zapata, 2015).

Another relevant, recently developed construct measures long-term perseverance in the face of challenges. This construct, referred to as "grit," can be measured with a short, multiple-choice scale (Duckworth, Peterson, et al., 2007). Grit scores predict a wide variety of outcomes for children and adults, including educational attainment, grade-point average (GPA) at an elite university, completion of a rigorous summer training program at West Point, graduation from West Point, and performance at the Scripps National Spelling Bee (Duckworth, Peterson, et al., 2007; Duckworth and Quinn, 2009; Kelly, Matthews, and Bartone, 2014). Although it is related to conscientiousness, grit accounts for more variance in outcomes than conscientiousness does alone (Duckworth, Peterson, et al., 2007).[4]

Some studies of military personnel have examined the link between other noncognitive factors and military job performance. One notable example is Project A, led by the U.S. Army Research Institute for the Behavioral and Social Sciences in the 1980s (Campbell, 1990; Driskell et al., 1990). Results from Project A corroborate civilian-focused research that personality factors, such as facets of conscientiousness, influence nontechnical aspects of job performance that promote the psychological and social aspects of the work environment (e.g., assisting colleagues with their tasks when not required or asked). Other research has found correlations between test scores in military technical schools and personality traits, such as competition, motivation, and anxiety (after controlling for variation in ASVAB scores); this, too, is consistent with civilian research (Randel et al., 1992).[5]

Military Intelligence Stakeholders Identify Adaptability as Critical for Performance

Stakeholders in our interviews identified adaptability as a key requirement for 35F analysts. More generally, the Army has emphasized the need for soldiers to be adaptable. As defined in Field Manual (FM) 6-22, adaptability skills are cognitive, in part, such as rapidly assessing the situation, recognizing changes in the environment, and CT. Some aspects of adaptability are noncognitive, reflecting attitudes or dispositions, such as being open-minded, embracing change, and having a learning orientation.

Similarly, abundant theoretical and empirical research views adaptability as multidimensional. Elaine Pulakos and her colleagues developed and tested a taxonomy consisting of eight dimensions of adaptive performance that has been particularly influential in research (Pulakos, Arad, et al., 2000). The dimensions include

- solving problems creatively
- dealing with uncertain or unpredictable work situations
- learning new tasks, technologies, and procedures
- demonstrating interpersonal adaptability

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[4] See Duckworth and Quinn, 2009, for validation information.

[5] That study identified performance indicators in literature that map to intelligence analyst job skills, although no direct study of these indicators as performance predictors was conducted.

- demonstrating cultural adaptability
- demonstrating physically oriented adaptability
- handling work stress
- handling emergencies or crisis situations.

This taxonomy is a model of adaptive *performance*, i.e., its focus is on job or task performance. Stakeholders in our interviews identified adaptability as a job *requirement*, suggesting that it is an individual attribute or set of behaviors that contributes to job performance. Other theories about adaptability are consistent with this view. Notably, Ployhart and Bliese, 2006, using the Pulakos, Arad, et al., 2000, taxonomy, conceives of adaptability as a relatively stable yet somewhat malleable trait that is influenced by other constructs (e.g., cognitive ability and the Big Five), which, in turn, affect performance.

We have found only a small number of studies of the association between individual adaptability and task or job performance. Most of these studies measured only a subset of the dimensions of adaptability, with mixed results. Two studies found that dimensions of adaptability influenced performance indirectly through mediating variables, i.e., perceived organizational support (Cullen et al., 2014) and person–organization fit (Wang et al., 2011). Cades et al., 2010, shows that scores on the adaptability dimensions are not associated with performance, but the task studied (a tracking task) was quite narrow and one for which adaptability might not have a strong effect. Finally, Pleban et al., 2011, examines the association between three of the eight dimensions of individual adaptability and performance on Army tasks. The authors found moderate associations of adaptability scores and transfer performance, but the direction of the association was negative for one of the adaptability dimensions, and they did not report analyses controlling for other important individual differences.

Measuring Key Competencies

General Mental Ability Is Commonly Measured Using Standardized Tests

Many different standardized tests, such as the SAT exam, the GED test, and the ASVAB, measure cognitive competencies.[6] Extensive research links test scores from the ASVAB (e.g., AFQT scores) to various outcomes of interest and provides strong evidence that the tests serve as a reasonable measure of cognitive skills.[7]

Many Tests Measure Critical Thinking Skills

Many different tests measure CT skills; some of the tests consist of essay or open-ended questions, while others use multiple-choice questions. Some scholars argue that, in comparison to multiple-choice items, open-ended questions produce superior assessments of higher-order

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6 The SAT exam, formerly referred to as the Scholastic Aptitude Test, is widely used for college admissions; the GED tests (sometimes called general equivalency or general education diploma tests) are used to award alternative credentials for those who do not complete high school.

7 A sample of high school students takes the ASVAB; their scores are used periodically for norming purposes. Also, youths included in the National Longitudinal Survey of Youth 1997 data set took the ASVAB in 1980 when they were 15 to 22 years of age. See Neal and Johnson, 1996, on the ASVAB as a measure of cognitive skills.

cognitive processes and have higher external validity, i.e., they better reflect actual job tasks (see Zaccaro et al., 2000).

The Collegiate Learning Assessment is a widely used essay-based CT test; the test requires students to demonstrate analytic writing skills and to complete a performance task—typically examining a set of documents and writing a memo recommending a specific action or decision based on the information.[8] The Collegiate Learning Assessment has a well-developed grading rubric but requires significant labor to grade. Other essay tests also measure CT skills; examples include the ACT Collegiate Assessment of Academic Proficiency (ACT, undated), the Critical Thinking Assessment Test (Tennessee Technological University, 2017), and the Ennis–Weir Critical Thinking Essay Test (Ennis and Weir, 1985). These tests are most often used by postsecondary institutions for placement or to measure student learning (see, e.g., Saavedra and Saavedra, 2011).

The Watson–Glaser Critical Thinking Appraisal (Watson and Glaser, 1980) is a widely used multiple-choice test of general CT skills. This test is often used for employee selection. Other multiple-choice tests include the Cornell Critical Thinking Tests (Ennis, Millman, and Tomko, 1985) and the California Critical Thinking Skills Test (Insight Assessment, 2013). In contrast to essay-based tests, multiple-choice tests tend to require less classroom time to administer and are much more straightforward and economical to grade. The Halpern Critical Thinking Assessment (Halpern, 2010) includes both multiple-choice and open-ended questions. It can be administered using both types of questions or using only the multiple-choice questions.

Whereas the tests discussed above measure general CT skills, other tests measure specific aspects of CT skills. For example, some researchers have developed tests to measure cognitive biases and heuristics. West, Toplak, and Stanovich, 2008, assembles a battery of questions measuring biases, such as the base-rate fallacy, gambler's fallacy, and insensitivity to the law of large numbers. For Bruine de Bruin, Parker, and Fischhoff, 2007, the authors developed the Adult Decision-Making Competence index, which assesses other aspects of decisionmaking proficiency, such as resistance to framing, recognizing social norms, confidence (how well calibrated people are in understanding their own knowledge), understanding rules of probability, and resistance to sunk costs (see also Society for Judgment and Decision Making, undated).

Interviews and Tests Are Typically Used to Assess Job Knowledge

Although GMA influences job knowledge, knowledge is inherently domain-specific and can reflect numerous and diverse bodies of information. Therefore, measures assessing job knowledge depend on the specific competencies necessary for job performance rather than on more-general skills that transfer across jobs. For reasons of scalability, job knowledge is often assessed using tests of facts, principles, and procedures necessary for job performance rather than work samples or simulations.

Interviews represent another method that is frequently used to evaluate job knowledge. Meta-analytic evidence indicates that interviews assessing specific job knowledge and skills have moderate validity in predicting later job performance (Huffcutt, Conway, et al., 2001). Unfortunately, interviews are expensive and onerous to conduct at larger scales, and a lack of structure and standardization can dramatically reduce interview validity (Huffcutt and Arthur,

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8 Arum and Roksa, 2011, discusses the assessment in detail and presents information suggesting that many students' test gains are quite small during college.

1994). Conducting structured interviews—whereby questions are based on job analysis, interviewers are trained, they ask the same questions in each interview, and they evaluate responses using rating scales with clearly defined anchors—improves the reliability, and therefore the validity, of the assessment, whether for job knowledge or for other competencies.

If the content of job knowledge is broad or lends itself to short or routine items, or an assessment must be administered to a large number of people, a written test is likely preferable to an interview. Depending on the specificity of the job knowledge required, paid or free measures might already exist, or new measures must be developed based on a job analysis. Sound tests of job knowledge require resources to develop but are relatively inexpensive to subsequently administer, score, and track on an ongoing basis.

Different Approaches Are Used to Measure Communication Skills

Evaluating communication skills can be challenging because the nature of these skills is ambiguous and often overlaps with other constructs. For example, oral communication skills are related to personality characteristics, such as extraversion (Penley et al., 1991). This overlap makes measurement more challenging because it contaminates the measurement of the desired construct (oral communication) with another construct (extraversion), which is *not* hypothesized to be related to job performance for MOS 35F. Thus, validity of the measure is reduced because it cannot distinguish between the two constructs.

Interviews, by their social nature, are well suited to assessing communication skills. Indeed, as noted earlier, interviews are often used to assess oral communication skill, although the predictive validity of these assessments is modest, and the risk of subjective biases in interviews is well documented. Techniques to enhance reliability of interviewers' judgments of job knowledge discussed above—e.g., using a structured approach—also apply when using interviews to evaluate communication skills (Arvey et al., 1987; Huffcutt and Arthur, 1994).

Because communication skills are demonstrable, work-sample tests (e.g., asking personnel to write and deliver a briefing) can be particularly appropriate for assessment.[9] Indeed, assessment centers often include evaluations of oral communication skills as demonstrated in exercises, such as leaderless group discussions and providing a briefing or lecture (Anderson et al., 2006). Given the subjective nature of assessing communication, rater training and standardization of scoring across individuals is again important to enhance the reliability and validity of ratings (Blume, Dreher, and Baldwin, 2010; Schneider and Schmitt, 1992). Work-sample tests could be developed to assess aspects of communication that are specific to the 35F MOS. Like interviews, however, evaluating oral communication skills using work samples is costly and might not be feasible for assessing a large number of applicants or job incumbents.

Evaluating written communication can focus on content, style, or both. Measures of written communication on the job are often domain-specific or context-specific and are therefore rarely available off the shelf. Assessing content, particularly about complex topics, such as job knowledge, typically requires evaluation by SMEs who are trained to use a rubric or evaluation guidelines. Consequently, evaluating written communication skills can be quite labor- and resource-intensive and therefore difficult to scale.

Some tests of general written communication skills are available from large test-development companies. Conceptually straightforward and computationally simple electronic

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[9] In personnel selection and assessment, work samples can also be obtained by collecting past examples of candidates' or incumbents' work, such as written reports.

methods for evaluating the clarity of written communication have existed for decades (e.g., the Flesch–Kincaid readability tests; see Flesch, 1948). In fact, the Flesch–Kincaid readability formula is the U.S. Department of Defense (DoD) standard for assessing the reading difficulty or grade level of documents and is now a basic feature in off-the-shelf word processing software. Numerous alternative readability indexes can also summarize the clarity of writing. These typically use a formula based on such information as the average length of words, number of words per sentence, and number of syllables per word. Some companies, such as Wonderlic, offer proprietary tests with more-advanced analytics for evaluating the mechanics, organization, and content of a participant's responses to standardized writing prompts (see, e.g., Wonderlic, undated). The validity of these tests and their usefulness for assessing 35F analysts' skills are open questions. An off-the-shelf test might provide sufficient information about prospective (or current) analysts' writing skills. Alternatively, given the complexity of analytic work, automated scoring procedures might miss fundamental elements that define effective analytical writing: understanding the audience, adequately explaining technical and topical knowledge, and placing information into a meaningful context.

Other Key Competencies for Analysts, Including Big Five Personality Characteristics, Grit, and Adaptability, Are Typically Measured Using Self-Report Questionnaires

The general strategy in psychology for measuring the Big Five personality constructs involves self-report inventories, i.e., questionnaires that ask respondents to indicate the extent to which they agree with each of a series of statements. A variety of instruments are available to measure the Big Five constructs. For example, the International Personality Item Pool (IPIP) (IPIP, undated) is an inventory of items that measure the Big Five constructs. The IPIP is in the public domain and is freely available for research and commercial purposes (Goldberg, 1999). IPIP items consist of short phrases; respondents are asked to "describe how accurately each statement describes you" using five-point scales ranging from very inaccurate to very accurate. Examples of items include "am quiet around strangers," "am exacting in my work," and "have a vivid imagination." Items have been tested against and compare favorably with commercially available measures of the Big Five.

The Tailored Adaptive Personality Assessment System (TAPAS), developed for the military, is a measure of facets of the Big Five (Drasgow et al., 2012). TAPAS is distinct from many self-report instruments that use single-stimulus responses in that it uses paired comparisons, which are more resistant to faking good or socially desirable responding. As a result, it is particularly useful for high-stakes contexts, such as preemployment screening, in which candidates might be particularly motivated to present a favorable impression. Although TAPAS is relatively new, some validation has been conducted (e.g., Knapp and Heffner, 2010; Knapp, Heffner, and White, 2011).[10] With these results, the developers determined that, when combined with current measures, TAPAS scores could contribute meaningfully to soldier placement into an MOS (Nye et al., 2012). Moreover, analysis indicates that TAPAS scores have predicted several outcomes for first-term soldiers, including short-term attrition, AIT exam grades, graduation from AIT, adjustment to Army life, Army physical fitness test scores, and disciplinary incidents (Allen et al., 2010). Validation efforts for the TAPAS are ongoing (Stark et al., 2014).

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[10] TAPAS research builds on substantial earlier research aimed at determining which characteristics or skills could be used to predict aspects of attrition and first-term performance that are not related to cognitive skills or education credentials.

To measure grit, Duckworth and her colleagues have developed brief measures, including a 12-item scale (Duckworth, Peterson, et al., 2007) and an eight-item scale (Duckworth and Quinn, 2009). These grit scales consist of two subscales: perseverance and consistency of interests. An example of an item measuring perseverance is “I finish whatever I begin.” An example of an item measuring consistency of interests is “New ideas and projects sometimes distract me from previous ones” (reverse-scored). There are five response items from each item, ranging from “very much like me” to “not like me at all.” Duckworth, Peterson, et al., 2007, presents evidence of the psychometric properties of the grit scale along with several studies of its predictive validity. Other research, described earlier in this chapter, also used the grit scale (Duckworth, Peterson, et al., 2007; Duckworth and Quinn, 2009; Kelly, Matthews, and Bartone, 2014).

To measure adaptability, Ployhart and Bliese, 2006, developed a self-report inventory, the Individual Adaptability Measure (I-ADAPT-M), based on the eight dimensions of adaptive performance proposed by Pulakos, Arad, et al., 2000. The I-ADAPT-M consists of 55 items, such as “I believe [that] it is important to be flexible in dealing with others” (interpersonal adaptability), “I see connections between seemingly unrelated information” (solving problems creatively), and “I think clearly in times of urgency” (handling emergencies or crisis situations). Some studies have used items based on the I-ADAPT-M (e.g., Straus, Shanley, et al., 2014; Wang et al., 2011), but we have not found rigorous tests of the psychometric properties of this instrument.

Elaine Pulakos and her colleagues developed a self-report measure of adaptive performance, the Job Adaptability Inventory, which focuses on adaptive performance requirements (Pulakos, Arad, et al., 2000). Pulakos and a different mix of colleagues subsequently revised the Job Adaptability Inventory (Pulakos, Schmitt, et al., 2002); in the revised measure, respondents rate the frequency of performing adaptive behaviors, their self-efficacy for adaptability behaviors, and their interest in working in situations requiring adaptive performance. Analyses in both studies (which include data collected from Army personnel) confirmed that adaptive performance can be characterized by the eight dimensions of adaptive performance proposed in Pulakos, Arad, et al., 2000. The self-efficacy questions in the 2002 study might be viewed as reflecting an individual characteristic (as opposed to adaptability as task performance); however, the instruments developed by Pulakos and her colleagues are proprietary.[11]

Summary

To successfully perform their jobs, 35F analysts require a wide range of competencies. In addition to GMA, these can include CT skills (and their antecedents, such as reasoning, analysis, and inferential thinking), communication skills, conscientiousness, grit, adaptability, and substantive knowledge and skills (expertise). A substantial body of research documents the association of GMA, conscientiousness, openness to experience, and expertise with perfor-

[11] In addition to self-report, behavioral indicators are used as measures of noncognitive skills. For example, skipping classes, as well as alcohol and drug use in high school, are predictive of future educational attainment; time spent on homework and the number of disciplinary incidents in high school are predictive of college attendance (Heckman, Stixrud, and Urzua, 2006; Jacob, 2002). These findings suggest that waivers or behaviors requiring waivers for accession could be relevant when selecting personnel for MI occupations.

mance across a range of jobs and work settings. Evidence suggests that communication skills, adaptability, and grit are also important for performance, but the research on these topics is less extensive.

A variety of measures can be used to assess these competencies. Established tests are available to measure GMA and CT skills, but assessing domain-specific competencies (e.g., job knowledge) might require creating new tests. Developing written tests can be time- and resource-intensive, but they are relatively inexpensive to subsequently administer and score on a large-scale basis.

Work-sample tests are especially appropriate to measure hands-on performance or demonstrable competencies, such as oral and written communication skills. However, such tests can be costly to administer and score. Therefore, work-sample tests might not be feasible to use for large groups when the competencies being assessed require one-on-one testing (e.g., oral communication skills) or complex scoring mechanisms using SMEs. For written communication skills in particular, some organizations have developed automated approaches to scoring, but the efficacy of these approaches for assessing content, mechanics, and organization is not well established. Interviews might be appropriate to assess some competencies, e.g., communication skills and job knowledge, but interviews are also labor-intensive and are not readily scalable when assessing large groups.

Finally, there are many self-report instruments to measure personality traits and related constructs, such as the Big Five, grit, and adaptability. Like written knowledge tests, developing measures of dispositional traits can have relatively high up-front costs, but the measures are economical to use for large groups thereafter.

CHAPTER FOUR

Research Approach and Findings

In this chapter, we describe our research approach to testing the study questions posed in Chapter One regarding predictors of 35F analyst training and job proficiency. We then present results of the research.

Research Approach

For junior 35F analysts, we collected data on competencies at the beginning of AIT, their proficiency at the end of it, and each analyst's performance on a work sample several months after being placed in the first job assignment. We used a predictive design, whereby hypothesized predictors (e.g., GMA, CT skills, and personality characteristics) were measured prior to our outcome variables (training proficiency [grades collected at the end of AIT] and job proficiency [the work-sample test administered during graduates' first duty assignments]). Our design for junior analysts is depicted in Figure 1.1 in Chapter One. For midgrade 35F analysts, we used a concurrent design, whereby we measured hypothesized predictors and outcomes at the beginning of the ALC in which they were enrolled. The study design for midgrade analysts is depicted in Figure 1.2 in Chapter One.

Participants

Junior Analysts

Two hundred fifty-seven students across two 35F AIT classes (beginning September and October 2014) participated in the study. The participation rate was 96 percent at the beginning of training. Table 4.1 shows participants' demographic characteristics.

Table 4.1
Participant Demographic Characteristics

		Sex (%)		Grade (%)					
Group	**Sample Size**	**Male**	**Female**	**E-1**	**E-2**	**E-3**	**E-4**	**E-5**	**E-6**
Junior analysts									
Pretraining	257	76	24	41	36	18	5		
Postplacement only	60	75	25	3	8	25	64		
Midgrade analysts	115	84	16					13	87

Samples were substantially smaller for training proficiency and job proficiency measures. Approximately 30 percent of the AIT participants did not graduate with their entering cohorts;[1] thus, our analysis of training proficiency (AIT grades and graduation) is based on 178 students. Obtaining measures of job proficiency was particularly challenging because AIT graduates were assigned to locations all over the world and data collection occurred in person. Therefore, we selected field sites with a "critical mass" of AIT graduates; these included Camp Humphreys in South Korea; Fort Bragg, North Carolina; Fort Campbell, Tennessee–Kentucky; Fort Hood, Texas; and Yongsan Garrison in South Korea. Approximately 50 graduates were located across these sites.

Not all graduates at each site were available to participate because of training schedules or other commitments. Only 20 AIT graduates who participated in the initial phase of the study were available for the postplacement data collection. Consequently, we recruited an additional 60 35F analysts at the same skill level (level 1) from these field sites to participate during this phase.[2] Although we did not have the full set of predictor measures or grades in AIT for these analysts, including them yielded a larger sample for some of our research questions regarding work experience and job proficiency. However, although all of the junior analysts we recruited at postplacement completed the surveys, 31 percent did not attempt the PE.

Midgrade Analysts

One hundred fifteen students across two 35F ALC classes (beginning January and March 2015) participated in the study. Fifteen were SL 2, and 101 were SL 3 analysts. Unless noted in the results, there were no differences in competencies or proficiency between SL 2 and SL 3 analysts. The participation rate was 100 percent, although two students did not complete all of the measures.

Measures and Timing of Data Collection

We measured several competencies as predictors of training and job proficiency. These were (1) CT skills using the Watson–Glaser Critical Thinking Appraisal (Watson and Glaser, 1980), (2) GMA as measured by the ASVAB (measured during recruitment and obtained from the Total Army Personnel Database, or TAPDB), (3) facets of the Big Five personality traits using

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[1] Students who do not graduate with their entering cohort might have been "recycled" back to sections of training they did not pass. We do not have data on how many of the students in our original sample were recycled and graduated at a later date.

[2] Junior analysts who participated in all phases of the study or postplacement only varied in job experience $(t(61.77) = 9.26, p < 0.001)$, corresponding to their ranks. On average, analysts who participated in all phases of the study had been in their first assignments (i.e., after completion of AIT) for approximately 4.6 months (standard deviation [SD] = 1.12 months). Analysts who participated only during postplacement had been in their first assignments for approximately 19.69 months (SD = 12.47 months). In the results, we note where these groups differ in competencies or proficiency.

TAPAS (Drasgow et al., 2012),[3] and (4) grit (Duckworth, Peterson, et al., 2007). We also obtained demographic characteristics from TAPDB.[4]

To measure work experiences, we developed a survey based on key tasks derived from 35F CTSSB materials supplied by USAICoE. The survey consisted of 24 tasks for SL 1, 21 tasks for SL 2, and 26 tasks for SL 3 analysts. We based questions about each task in part on the format used in Pulakos, Schmitt, et al., 2002. Analysts rated their familiarity with each task, the frequency of performing the task on the job, and perceived proficiency or self-efficacy for performing the task.[5] The survey also included questions about analytic experience in different contexts (in garrison, deployment, and unit field training), attitudes toward the value of different types of analyst training (e.g., AIT, work experience in garrison, and Foundry), and Army assignment history (for midgrade analysts only).[6]

Job proficiency was measured with a work-sample test, which consisted of a revision of one of the PEs, IPB step 4 (determine threat COAs), used in the course. The job proficiency measure is described in more detail below.

For junior analysts who participated during AIT, we also collected measures of training proficiency as reflected by GPA in AIT and graduation from the course.

The timing of the data collection varied for junior and midgrade analysts. For junior analysts who participated during AIT, we administered the predictor measures at the start of AIT, and we administered the 35F work-experience survey and job proficiency measure following assignment to analysts' first duty position (three to six months after graduation in most cases). Because of course scheduling, we collected data from the September class one month after the beginning of the course. Analyses show some differences between classes, with higher scores from the October class on agreeableness, openness to experience, and grit; thus, we controlled for AIT class in our analyses. Training proficiency data were available at the end of AIT.

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3 The version of TAPAS we used in our study included 15 facets. Because we did not have sufficient sample sizes to include all facets in our predictive models, we combined facets to create the Big Five factors based on theory and research cited in Drasgow et al., 2012. We grouped the 15 facets into the Big Five factors as follows: conscientiousness (achievement, order, responsibility, nondelinquency, and self-control); emotional stability (adjustment, even-temperedness, and optimism); agreeableness (cooperation); extraversion (attention-seeking, dominance, and physical conditioning); and openness to experience (curiosity, ingenuity, and intellectual efficiency). We attempted to run our own factor analyses to confirm these groupings but could not achieve consistent results, at least in part due to our limited sample sizes. Therefore, some of the facets that should relate to each other in theory might not correlate as highly with each other in our data.

In addition to our sample-size limitations with respect to how we used the 15 TAPAS dimensions in our analyses, we could not estimate the reliability of TAPAS scores in our data because we did not receive scores for individual items from the test developers. There is limited information available about the reliability of TAPAS scores. If the scores in our data are not reliable, our ability to predict study outcomes is limited.

4 We did not measure some of the constructs discussed in Chapters Two and Three. We did not assess adaptability, both to limit response burden and because we did not expect adaptability to predict performance on our measure of job proficiency; however, we did measure openness to experience, which is an aspect of adaptability. We also did not measure oral and written communication skills because of the extensive labor and time required for assessment.

5 We asked analysts to indicate whether they were familiar with the task (yes or no). If yes, analysts were then asked how frequently they perform or performed the task in their most-recent analyst duty positions or assignments. Frequency ratings were made on a five-point scale (never, a few times a year, monthly, weekly, and daily). Analysts then indicated their proficiency using a four-point scale: I cannot perform this task, I can perform this task with assistance, I can perform this task with no assistance, and I can perform this task with no assistance and I can train someone to perform this task.

6 We asked midgrade analysts to provide the following information on each of their four most-recent assignments: echelon (corps, division, brigade, battalion, company, or other), unit name, unit type (S-2 or other), deployment status (deployed versus not deployed), number of months deployed (if applicable), and time spent in the assignment.

For the additional junior analysts who participated only during the postplacement phase, we administered the grit scale at the same time as the job proficiency and work-experience measures. We did not administer the Watson–Glaser test or TAPAS to these participants because of time constraints.

Midgrade analysts completed all predictor measures, the work-experience survey, and the measure of job proficiency during the first two days of ALC. We administered the predictor measures and work experiences on one day and job proficiency measures on the following day.

Table 4.2 shows the measures and timing of data collection for each group.

Table 4.2
Participant Groups, Timing, and Measures

Group	Pretraining	Posttraining	Postplacement
Junior analysts			
Pretraining	Watson–Glaser TAPAS Grit	Grades in AIT	Job proficiency (PE) Work experiences (survey)
Postplacement only	—	—	Job proficiency (PE) Work experiences (survey) Grit
Midgrade analysts	Watson–Glaser (day 1) TAPAS (day 1) Grit (day 1) Work experiences (survey; day 1) Job proficiency (PE; day 2)	—	—

NOTE: We obtained ASVAB scores and demographic data from TAPDB for all participants.

Measure of Analytic Proficiency

We adapted a PE used in 35F AIT to measure analyst proficiency at the final step of the IPB process, step 4 (determine threat COAs).[7] We selected this PE because IPB is a central component of 35F analytic work for both junior and midgrade analysts, and completion of step 4 demonstrates analysts' cumulative knowledge about and skill in the IPB process. To address substantive and logistical constraints, we shortened the AIT PE from four hours to fit within a 90-minute time period,[8] removed the need for classified material, modified the PE scenario

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[7] In addition to 35F AIT PEs, we considered intelligence scenarios from external sources. Through a review of the literature, we identified two intelligence scenario assessment tools, one developed by a private-sector organization and one developed by an instructor at a higher education institution. Although both assessments provided interesting approaches to measuring intelligence analysis skills, they had limitations, particularly the length of time required to complete each assessment (from days to weeks) and the limited relevance to Army intelligence with unclear mapping to critical 35F tasks. However, a limitation of the PE format we selected is that it is a one-shot assessment of analyst proficiency, i.e., does not assess analysts' reactions to changes in situations or feedback about their performance.

[8] Following discussions with units at home station and ALC course managers at Fort Huachuca, we did not anticipate having four hours of data collection with analysts. Soldiers at home station have other training requirements, and every hour of ALC time is scheduled months in advance.

to differ from the AIT scenario,[9] and converted the PE from a digital format to a paper-and-pencil format.[10]

The modified PE required study participants to review a hypothetical intelligence scenario and materials that provide intelligence on the hypothetical enemy's activity and other relevant information (e.g., weather reports). Because the PE was designed to assess analysts' understanding and retention of knowledge about the IPB process and needed to be appropriate for entry-level analysts, it was more structured than many intelligence analysis tasks (e.g., Heuer, 1999), and it had preferred or "right" answers. However, the PE contained elements of ambiguity in that participants would not necessarily be able to recognize that they provided correct or incorrect answers.

We asked participants to do the following:

- Identify and prioritize two threat COAs.
- Develop a named area of interest (NAI) overlay (i.e., a graphical depiction of NAIs—geographical areas where threat activities are anticipated—that can be laid on top of the graphical depiction of the threat COAs) (AR 350-1, 2014).
- Complete an event matrix (i.e., a table that matches each NAI with one or more indicators of activity or capability from the threat COAs) (AR 350-1, 2014).[11]

We also modified the grading rubrics and created three of our own rubrics: one for the COAs, one for the NAI overlays and event matrices, and one for analytical points that cover both COA and NAI products. Our rubrics are more detailed than the AIT grading rubric for the IPB step 4 PE. Not only do finer-grained assessments provide more proficiency data points to analyze; they also make it easier for different graders to evaluate PE products consistently.

Practical Exercise Rubrics

We rated COAs on six criteria: number, differentiation, and prioritization of COAs; operation type (specification of reconnaissance attacks in a southward direction); correctness of unit symbols; completeness of threat unit details; number of different types of warfighting functions or battlefield operating systems; and completeness of administrative data. Each criterion was rated on a 0-to-5 scale with higher scores reflecting higher-quality COAs.

We graded each NAI separately for its usefulness and feasibility.[12] For an NAI to be considered useful, it should cover threat activities on both COAs or identify unique COAs by

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9 We modified the PE scenario to limit the effects of junior analysts recalling details from the original PE completed during AIT on their performance on the study PE, which was completed two to four months following graduation from AIT. However, we did not directly ask junior analysts whether they recognized that the study PE matched the PE format used in AIT.

10 Converting to paper-and-pencil format avoided the need for Internet access at each data-collection location and removed differences in analyst skills in using digital systems that could affect PE performance.

11 The first data collection with midgrade analysts did not include an event matrix. We realized the need for the event matrices after grading the NAI overlays for this group. All subsequent participants were asked to complete event matrices.

12 Our NAI rubric was modified after the first data collection with midgrade analysts in order to delineate between NAI usefulness and feasibility. We rescored the NAI overlays from the first data collection and used the modified NAI rubric to grade NAI overlays for subsequent data collections.

covering a specific type of threat activity on one COA but not another.[13] For an NAI to be considered feasible, it has to be collectable,[14] appropriately sized for the collector indicated in the event matrix,[15] and nonredundant with other NAIs. We scored both usefulness and feasibility as 0 (not useful or not feasible) or 1 (useful or feasible). Because NAIs depend on COAs, the number of NAIs varied by participant.

Finally, we developed criteria to assess whether participants made analytical decisions that we would expect given the PE materials they were provided. To capture these types of analytical decisions, our MI expert (an MI officer on our project team) created a list of analytical points. There were a total of 15 analytical points for the COAs and two analytical points for the NAI overlay. We applied the analytical points to the entire set of COAs that participants provided (whether they produced one or multiple COAs). Participants received one point for each analytical point. Below are examples of analytical points, with their focus (COAs or NAIs) in parentheses:

- allocates selected elements from the brigade to support the attack (COAs)
- allocates elements along four axes of advance (COAs)
- allocates elements along multiple axes of advance (COAs)
- writes COA description (COAs)
- shows all elements of warfighting functions (COAs)
- identifies a priority intelligence requirement (PIR) (NAIs).

Practical Exercise Grading Procedures

Two graders, our MI expert and a novice, graded the PEs. To ensure that the two graders were consistent, we used an iterative process of independently grading PEs and discussing the grades to come to agreement on any discrepancies in judgments.[16] By the end of the iterative process, our novice grader was expert enough to grade AIT PEs on his own. The Army could adopt this process to develop PE graders and to assess that graders and instructors are consistent in grading practices.

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[13] For example, an NAI placed over an enemy mortar on COA 1 that also overlaps with an enemy mortar on COA 2 does not distinguish between the two potential scenarios but, because threat activities are covered on both COAs, the overlapping NAIs would still be considered useful. However, an NAI that covers nothing on COA 1 but covers an enemy mechanized infantry unit on COA 2 is considered useful because it provides a distinguishing look between the scenarios.

[14] In this context, *collectable* means that the type of intelligence asset identified in the event matrix must be able to detect the target identified in the event matrix. For example, an artillery radar will be able to detect units that shoot indirect fires, such as rockets and mortars. However, it will not detect infantry or vehicles moving on the ground. Therefore, an NAI placed in the location of a threat artillery or mortar unit with the assigned collector as an artillery radar would be considered collectable, whereas an NAI placed on a threat infantry unit would not.

[15] Because we needed the event matrix to grade one of the three criteria for NAI feasibility, participants who did not complete event matrices but did complete NAI overlays (i.e., our first group of 52 midgrade analysts) received grades for usefulness but not feasibility.

[16] To identify the level of reliability and agreement between the two graders on each set of PE grades, a third team member computed intraclass correlations (ICCs) on the ratings. ICCs measured the amount of variance in the grades due to systematic differences between sections of the PE rubric and the total variance in grades (LeBreton and Senter, 2008). The ICCs offered a way to identify which sections of the grading rubrics were problematic for the graders so they could focus on those sections in their discussions of discrepancies.

Our graders were not naïve to participant job level when grading the PEs, although we created more-detailed grading rubrics to help ensure consistency in grading. We do not know whether analyst job level should be taken into consideration when judging the quality of responses to a PE.

Analytic Approach

We conducted a series of quantitative analyses of both our study samples to address the following questions:

- How do junior and midgrade analysts compare in key analytic competencies, life-cycle factors, and proficiency?
  - How do junior and midgrade analysts compare in cognitive and noncognitive competencies?
  - To what extent do junior and midgrade analysts have opportunities to engage in MI work on the job? How confident do they feel conducting MI tasks?
  - How do junior and midgrade analysts perceive the value of MI training in preparing them for their jobs?
  - How do junior and midgrade analysts compare in performance on a work-sample test?
- What factors predict proficiency?
  - What factors predict training proficiency (i.e., performance in AIT)?
  - What factors predict job proficiency (i.e., PE performance)?

We used a combination of descriptive statistics and comparisons of means or distributions of responses to analyze differences between junior and midgrade analysts. We used multiple regression models to determine which factors predict training and job proficiency. However, we could not include all predictors in some of the models because of sample-size restrictions. In particular, junior analysts who participated only during postplacement did not having training proficiency data, nor did they complete the Watson–Glaser and TAPAS (see Table 4.2). Furthermore, 31 percent of junior analysts who could have attempted the PE at postplacement did not do so, further restricting sample sizes for analysis.[17] Sample sizes in our analyses also vary somewhat because of missing responses.

How Do Junior and Midgrade Analysts Compare in Analytic Competencies, Career–Life-Cycle Factors, and Proficiency?

Junior and Midgrade Analysts Differ in Critical Thinking Skills and Are Similar in Other Competencies

We analyzed the competency measures to determine whether junior and midgrade 35F analysts differ in key analytic competencies. Midgrade analysts had significantly higher scores on the Watson–Glaser test (mean [M] = 22.05, SD = 5.28) than junior analysts did (M = 20.01, SD = 4.66), indicating that midgrade analysts, on average, have stronger CT skills $\left(t(361) = -3.70, p < 0.01\right)$. This difference could be a result of training and experience, initial differences between cohorts, or selection effects (e.g., attrition of 35F analysts with weaker CT skills prior to promotion to E-5 or E-6). Junior and midgrade analysts did not differ in average AFQT scores, grit, or three of the Big Five characteristics: conscientiousness, emotional stability, and openness to experience. Differences between junior and midgrade analysts were marginally significant for two of the Big Five characteristics—agreeableness

[17] We did not attempt to impute responses (i.e., estimate values for missing responses) because of the complex nature of missingness in our data.

$\left(t(255.06)=1.7, p<0.10\right)$ and extraversion $\left(t(216.72)=1.85, p<0.10\right)$—with lower average scores for midgrade analysts.[18]

Analysts Have Limited Opportunities to Engage in Military Intelligence Work on the Job

We used responses to the work-experience survey to assess opportunities to engage in MI tasks on the job and confidence in performing the tasks. As described above, the survey listed key MI tasks for each skill level, and participants indicated their familiarity with each task, the frequency of performing the task in their most-recent analyst job assignments, and their self-efficacy for performing the task (labeled *proficiency* in Figure 4.1). An example item that appeared on the survey for all three levels is shown in Figure 4.1. Examples of other tasks in common to all three levels include evaluating the threat, determining threat COAs, conducting link analysis, identifying high-value targets, and conducting a military briefing. Examples of items that were associated with only one level include preparing intelligence reports (INTREPs) (SL 1), reviewing identified information gaps and discrepancies in threat holdings (SL 2), and developing a reconnaissance and surveillance plan (SL 3).

Figure 4.1
Example of a Survey Item Assessing Task Familiarity, Frequency, and Proficiency

Task	Familiarity	Frequency	Proficiency
Define the operational environment	___familiar ___not familiar	___never ___a few times a year ___monthly ___weekly ___daily	___I cannot perform this task ___I can perform this task with assistance ___I can perform this task with no assistance ___I can perform this task with no assistance and I can train someone to perform this task

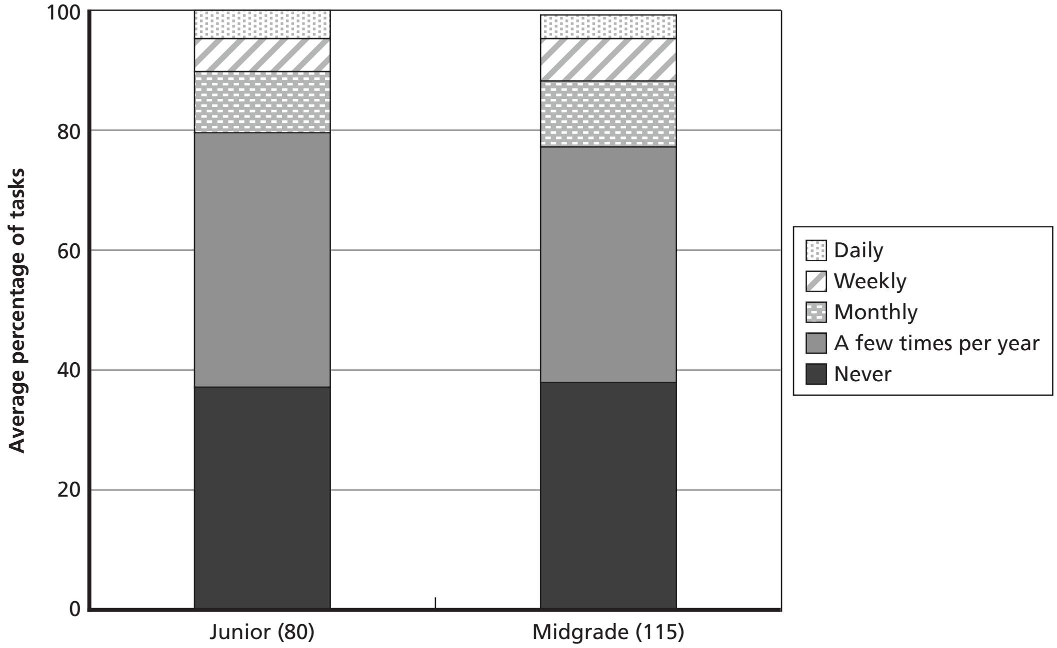
RAND *RR1851-4.1*

For familiarity, we calculated the percentage of tasks with which respondents reported being familiar. As noted earlier, there were 24 tasks for SL 1, 21 tasks for SL 2, and 26 tasks for SL 3. There were no statistically significant differences among analyst groups. Junior analysts reported being familiar with 88 percent of their tasks, and midgrade analysts reported being familiar with 90 percent of their tasks.

To assess the frequency of performing the tasks, we calculated the frequency of responses in each category (e.g., daily or weekly). For analysts who responded that they were not familiar with a task, we coded the frequency of performing it as "never." Figure 4.2 shows the distribution of response for opportunities to perform key tasks on the job. For example, on average, 35F30s did not perform 36 percent of key tasks in their last assignment, performed 41 percent of key tasks only a few times per year, 11 percent of key tasks monthly, and so on. As shown in the figure, both junior and midgrade analysts reported few opportunities to perform key tasks, performing 11 percent of such tasks daily or weekly. These frequencies did not statistically differ for junior and midgrade analysts.

[18] TAPAS scores are intended as predictors of other constructs or to compare groups but are not interpretable in and of themselves. Thus, we do not report descriptive statistics for TAPAS variables.

Figure 4.2
Frequency of Performing Key Tasks

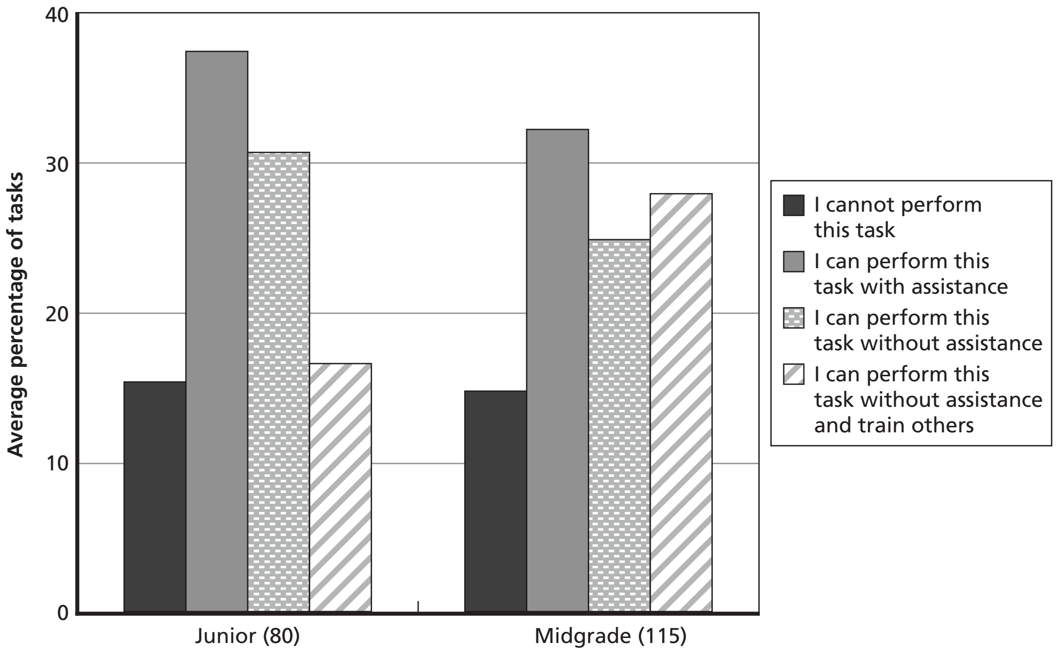


NOTE: Numbers in parentheses are the sample sizes used in the analysis.
RAND *RR1851-4.2*

We also calculated an average score across tasks such that we scored responses on a five-point scale ranging from 0 (never) to 4 (daily). There were no statistically significant differences between junior and midgrade analysts in average frequency of performance across tasks. On average, mean scores were 1 (a few times per year) for both groups.

We conducted similar analyses for self-efficacy. For analysts who responded that they were not familiar with a task, we coded self-efficacy as "I cannot perform this task." Figure 4.3 shows the results. On average, junior analysts reported that they are proficient (which we defined as being able to conduct the task without assistance or conduct the task and train others to perform the task) on 43 percent of key tasks. Midgrade analysts reported being proficient on 53 percent of key tasks. The distributions of responses differed between junior and midgrade analysts, particularly for ability to train others to perform the task, with lower scores from junior analysts. Analyses of mean scores on a four-point scale ranging from 0 (I cannot perform this task) to 3 (I can perform this task without assistance and I can train others to perform this task) also revealed differences between junior and midgrade analysts $\left(t(193) = -2.05, p < 0.05\right)$, with junior analysts reporting lower levels of proficiency (M = 1.40, SD = 0.61) than midgrade analysts did (M = 1.66, SD = 0.58).

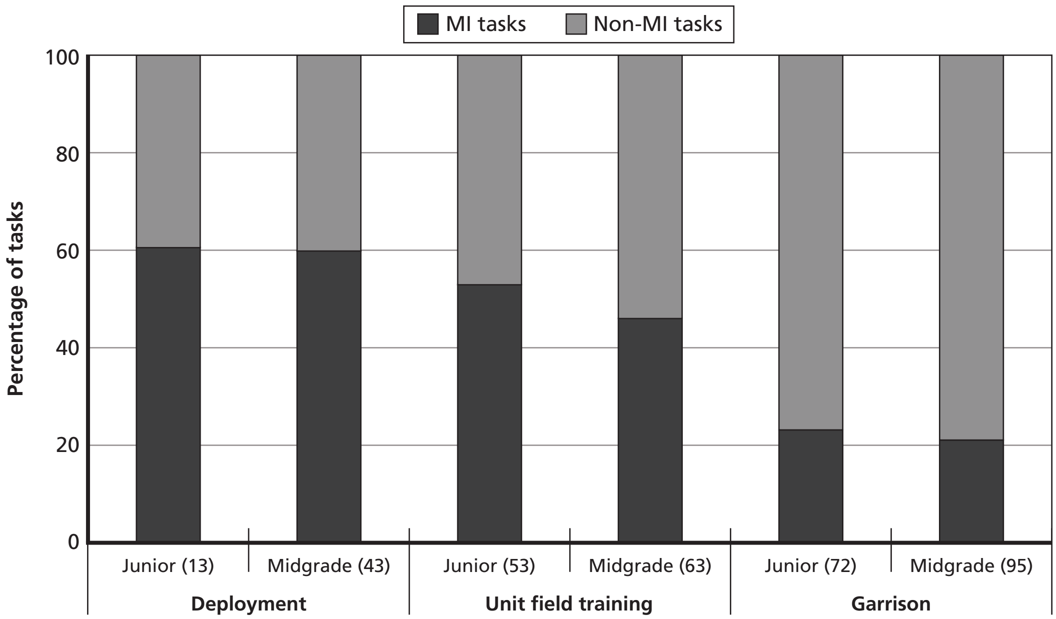
Figure 4.3
Self-Efficacy for Performing Key Tasks



NOTE: Numbers in parentheses are the sample sizes used in the analysis.
RAND *RR1851-4.3*

The survey asked the analyst to estimate the percentage of time spent in different settings (i.e., deployment, unit field training, and garrison) in the last assignment and the percentage of time conducting various MI and non-MI tasks in each setting. We asked analysts to estimate the percentage of time spent doing (1) intelligence analysis tasks or training; (2) non–MOS-specific unit-level training; (3) mandatory Army training (e.g., sexual harassment prevention); (4) physical training; (5) nonintelligence tasks (weapons and equipment, maintenance and motor pool, guard or charge of quarters or staff duty, personnel and physical security, and administrative requirements); and (6) other tasks. Figure 4.4 shows the average percentages of time spent in MI and non-MI tasks (we excluded from this analysis 16 respondents whose responses did not sum to 100 percent).

Figure 4.4
Percentage of Military Intelligence and Non–Military Intelligence Tasks Performed in Job Settings



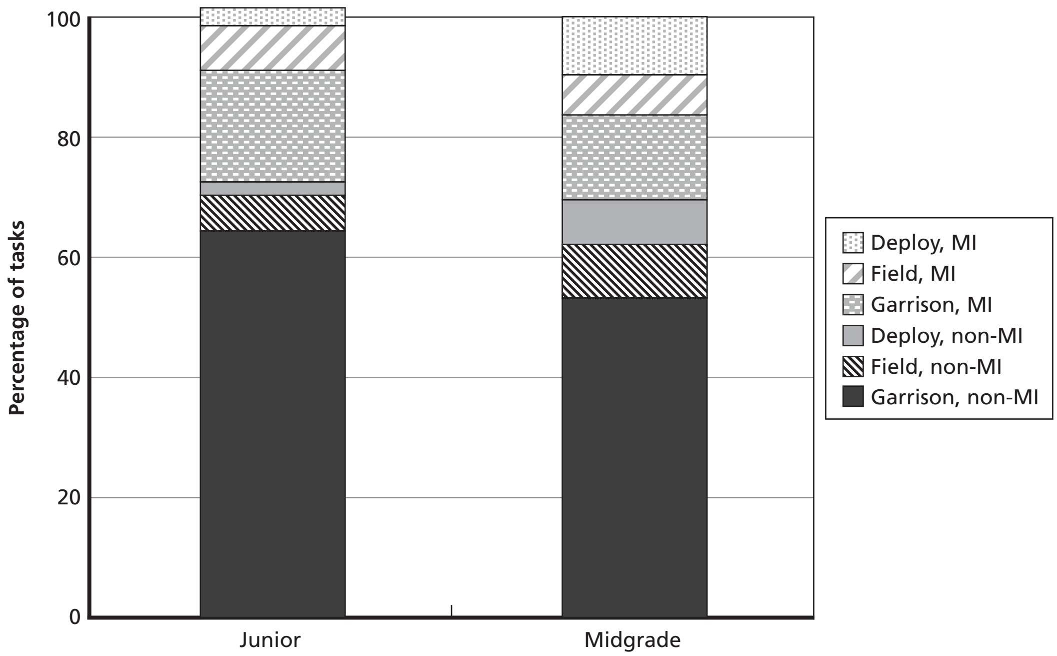
NOTE: Numbers in parentheses are the sample sizes used in the analysis. We excluded from this analysis 16 respondents whose responses did not sum to 100 percent.

RAND *RR1851-4.4*

Given that most analysts in the study reported working across settings, with the majority of their time spent in garrison (83 percent for junior analysts and 67 percent for midgrade analysts, on average),[19] the actual percentage of their time engaging in MI activities in their jobs is much lower. Figure 4.5 shows the percentage of analysts' time conducting MI and non-MI tasks in each setting, weighted by the average percentage of time that analysts reported spending in that setting. Overall, 72 percent of junior analysts' time and 69 percent of midgrade analysts' time is spent conducting non-MI tasks.

[19] Junior analysts reported spending 5.5 percent of their time deployed and 13 percent in unit field training; midgrade analysts reported spending 17 percent of their time deployed and 16 percent in unit field training.

Figure 4.5
Percentage of Military Intelligence and Non–Military Intelligence Tasks Across Job Settings, Weighted by Time in Setting



NOTE: We do not report sample sizes because they vary in each setting (see Figure 4.4).
RAND *RR1851-4.5*

We also examined differences in time spent on MI and non-MI tasks by assignment history for midgrade analysts. We were asked to determine, based on feedback from the G-2, whether there are differences between analysts who were most recently in tactical MI assignments (below division echelon) and analysts who were most recently in strategic MI assignments (echelon at or above division).[20] Although midgrade analysts with recent tactical MI assignments tended to spend more time on MI tasks than midgrade analysts with recent strategic MI assignments did, the results were not statistically significant. Because of the lack of statistical significance, we do not show the findings in the report.

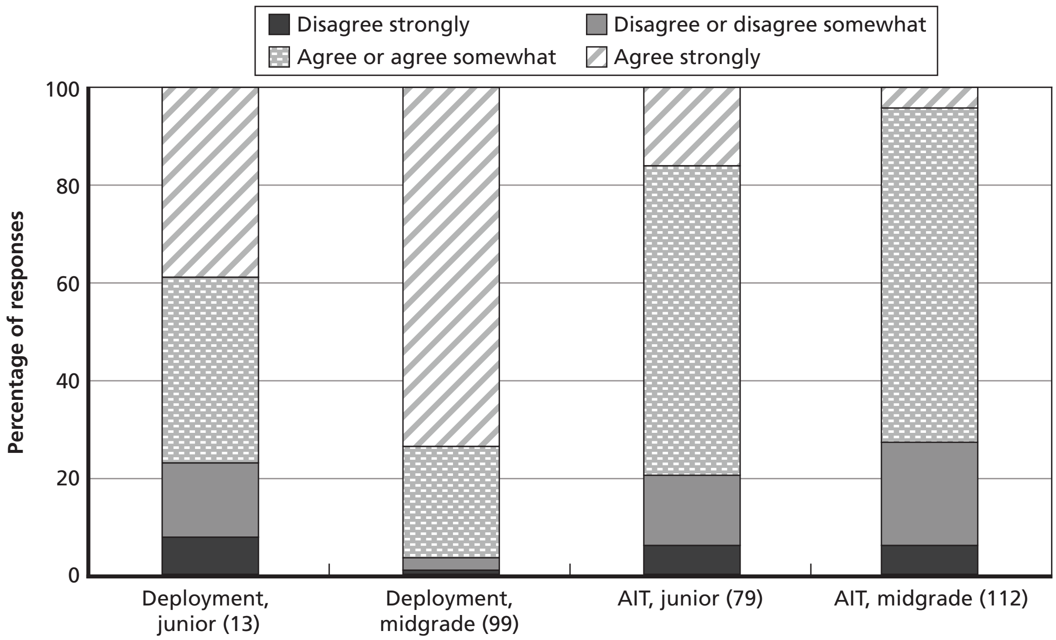
Most Analysts View Institutional Training as Valuable to Prepare Them for Their Jobs, Second to Deployment

Items in the work-experience survey asked participants to rate how different types of training or experience prepared them to perform their jobs as analysts. Rating scales consisted of six options, ranging from strongly disagree to strongly agree. Analysts reported that deployment was most effective in preparing them for their jobs, followed by AIT, Foundry, unit field training, experiences in garrison, and other unit training or experiences. Figure 4.6 shows the distributions of responses for which junior and midgrade analysts differed in their ratings, and

[20] A member of our team with MI expertise coded the midgrade analysts' assignments as "strategic" MI, "tactical" MI, or not MI. We used echelon, unit type, and section to code the assignments. Figure B.7 in Appendix B shows the survey questions about assignment history.

Figure 4.7 shows the responses for which there were no statistically significant differences by job experience (results are combined across junior and midgrade levels).

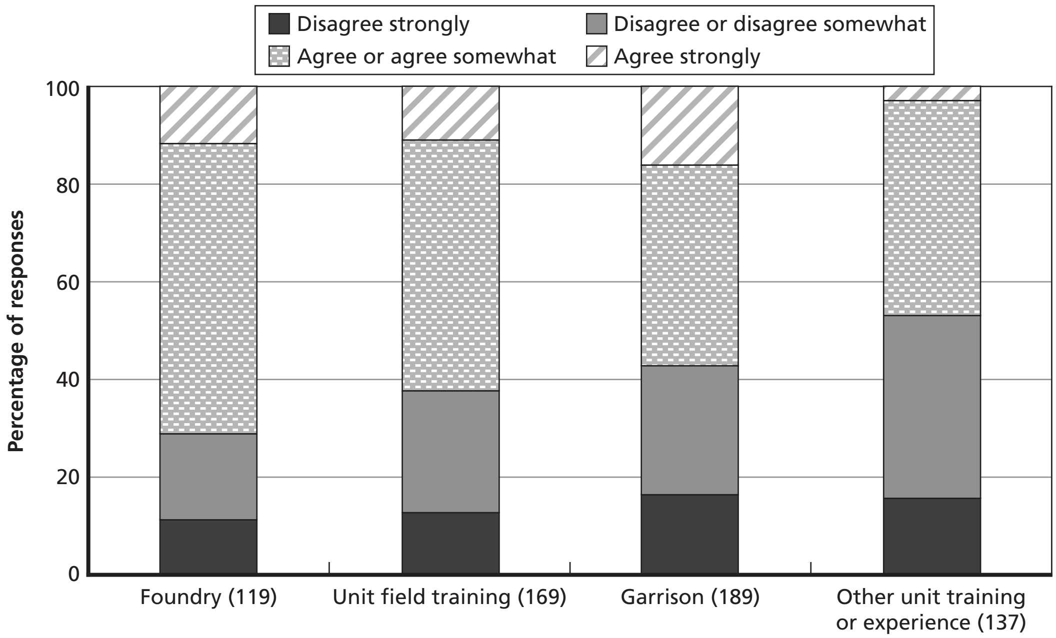
Figure 4.6
Reactions to Training That Differ Between Junior and Midgrade Analysts



NOTE: Numbers in parentheses are the sample sizes used in the analysis.

RAND *RR1851-4.6*

Figure 4.7
Reactions to Training That Are Similar Between Junior and Midgrade Analysts



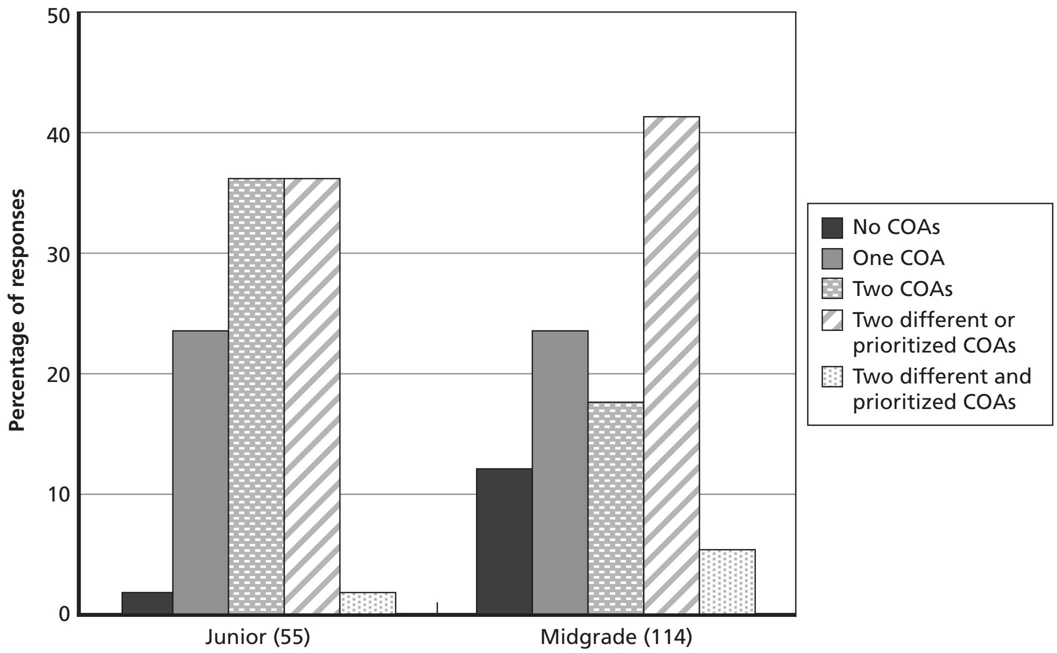
NOTE: Numbers in parentheses are the sample sizes used in the analysis.

RAND *RR1851-4.7*

Differences in Job Proficiency Between Junior and Midgrade Analysts Were Mixed

Figure 4.8 shows the distribution of scores on number, differentiation, and prioritization of COAs. These scores reflect ordered categorical judgments with mutually exclusive rating categories (e.g., producing two differentiated or prioritized COAs is superior to producing two COAs that are neither differentiated nor prioritized). On average, there were no statistically significant differences between junior and midgrade analysts in the number of COAs produced $\left(\chi^2_{(1)} = 1.87, ns\right)$ or in the number of COAs that were differentiated or prioritized $\left(\chi^2_{(1)} = 1.04, ns\right)$.

Figure 4.8
Number, Differentiation, and Prioritization of Courses of Action

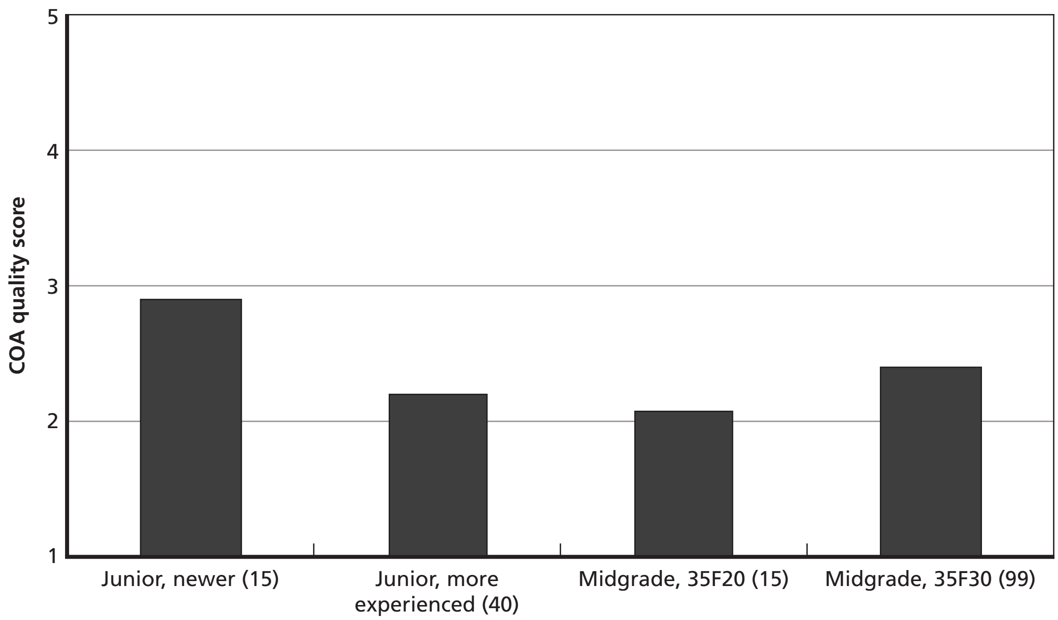


NOTE: Numbers in parentheses are the sample sizes used in the analysis.
RAND *RR1851-4.8*

We base quality of COAs on ratings of the five COA rubric criteria described earlier in the chapter. We combined and averaged ratings on the five criteria to create a scale score; internal consistency reliability of this scale (coefficient alpha) is 0.79.

Figure 4.9 compares scores on the quality of COAs for four groups: (1) junior and midgrade analysts, (2) new junior analysts (who participated pre-AIT and postplacement) and more-experienced junior analysts (who participated postplacement only), and (3) midgrade analysts at SL 2, and (4) midgrade analysts at SL 3. Overall, junior and midgrade analysts did not differ in average quality of COAs, nor did midgrade analysts at SLs 2 and 3. However, despite having much less experience, the newer junior analysts had higher scores than more-experienced junior analysts $\left(t(53) = -3.41, p < 0.01\right)$. A comparison of the four groups shown in Figure 4.9 shows significantly higher scores for the newer junior analysts than for all other groups $\left(F(3,165) = 4.35, p < 0.01\right)$. One possible explanation for this result is that the newer junior analysts had more-recent exposure (i.e., during AIT) to the type of task performed in the PE. This explanation also suggests the occurrence of skill atrophy among 35F analysts.

Figure 4.9
Course-of-Action Quality for Junior and Midgrade Analysts

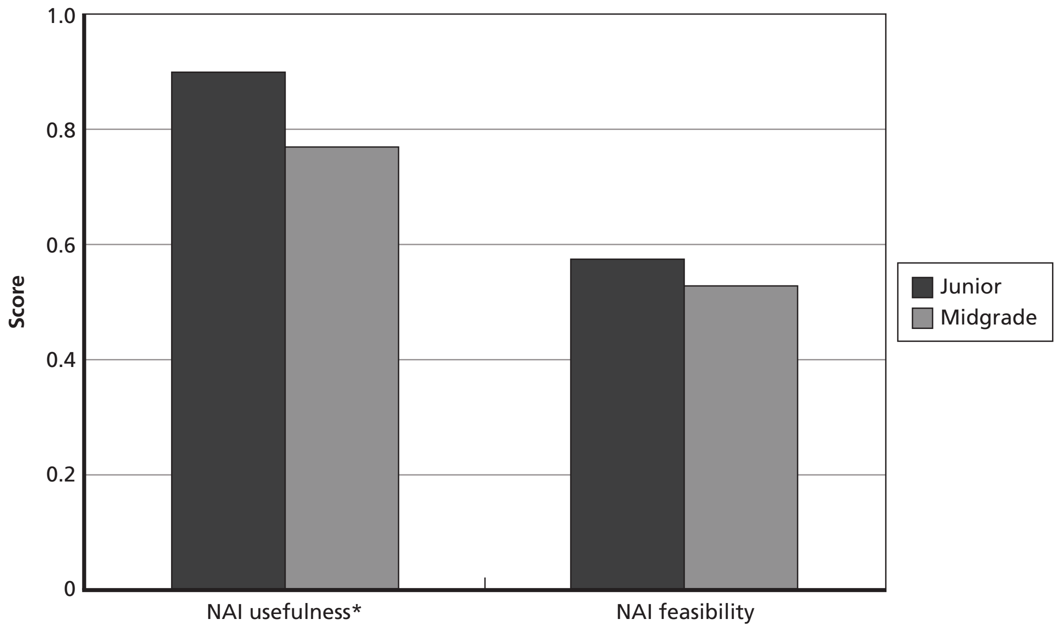


NOTE: Numbers in parentheses are the sample sizes used in the analysis. Midgrade 35F20 and 35F30 are SL 2 and SL 3 analysts, respectively.

RAND *RR1851-4.9*

Figure 4.10 shows average ratings of NAI usefulness and feasibility for junior and midgrade analysts. Results show that junior analysts produced more-useful NAIs than midgrade analysts did, on average. There were no statistically significant differences between junior and midgrade analysts in feasibility of NAIs produced.

Figure 4.10
Usefulness and Feasibility of Named Areas of Interest for Junior and Midgrade Analysts



NOTE: For junior analysts, sample sizes were 35 for NAI usefulness and 27 for NAI feasibility. For midgrade analysts, sample sizes were 85 for NAI usefulness and 62 for NAI feasibility. * = $p < 0.05$.
RAND *RR1851-4.10*

As noted earlier, analytical points reflect decisions that analysts should make in developing their COAs and NAIs and therefore reflect deeper CT than other aspects of the PE do. Results show that midgrade analysts received more analytical points than junior analysts did, $t(166) = 2.93$, $p < 0.01$. The average score was 2.48 (SD = 1.71) for junior analysts and 3.36 (SD = 1.87) for midgrade analysts.

In summary, differences between junior and midgrade analysts in job proficiency were mixed. Junior analysts performed better on quality of COAs and usefulness of NAIs. Midgrade analysts performed better on analytical points. There were no differences between groups on COA quantity, differentiation, prioritization, or feasibility of NAIs.

PE scores for both junior and midgrade analysts indicate the need for improvement in most aspects of PE performance. For example, across groups, the average COA quality score was less than 3.0 out of 5.0, and the average number of analytical points was 3.08 out of 15 possible points. These results could be due to a lack of proficiency or a lack of motivation to complete the PE or to perform at a maximal level, as we discuss in more detail below.

Differences between junior and midgrade analysts on PE outcomes should be interpreted with caution because there might be selection effects for attempting the PE. Midgrade analysts (98 percent) were more likely than junior analysts (69 percent) to attempt the PE. Junior analysts who did not attempt the PE reported on the work-experience survey conducting MI tasks much less frequently on the job $\left(t(72.313) = -2.63, p < 0.05\right)$ than those who did attempt it.

What Factors Predict Proficiency?

The Armed Forces Qualification Test Is a Consistent Predictor of Training Proficiency

We analyzed predictors of two aspects of training proficiency. First, we analyzed predictors of GPA for analysts who completed AIT (n = 167). Second, we analyzed what competencies predict graduation from the course (n = 225). To graduate, students must pass all tests and assignments within two attempts, where a passing grade is a minimum of 3.0 on a 5.0 scale.

Table A.1 in Appendix A shows the correlation matrix of the variables used in these analyses. Bivariate correlations show significant and positive associations of GPA with AFQT percentile scores, Watson–Glaser scores, openness to experience, and conscientiousness and a significant and negative association with agreeableness.

We ran a series of linear or logistic hierarchical regression models to examine how the competencies, when considered together, predict training outcomes.[21] In the first step of the model, we entered AIT class and cognitive competencies, i.e., AFQT percentile scores and Watson–Glaser test scores. In the second step, we entered dispositional characteristics, i.e., grit and scores on the Big Five from TAPAS.

Table 4.3 shows a summary of results (detailed results can be found in Appendix A).

Table 4.3
Summary of Results: Predictors of Training Proficiency

Predictor	GPA	Graduation
Class	ns	ns
AFQT	**+****	**+***
Watson–Glaser	ns	ns
Grit	ns	ns
Conscientiousness	**+†**	**+***
Openness to experience	**ns**	**–****
Agreeableness	**–***	**ns**
Extraversion	ns	ns
Emotional stability	ns	ns

NOTE: ns = not significant. + = positive association. – = negative association. † = $p < 0.10$. * = $p < 0.05$. ** = $p < 0.01$. Bold indicates that the result was statistically significant.

There were no statistically significant differences in GPA between the September and October AIT classes. Both AFQT scores and Watson–Glaser test scores of CT skills were significantly and positively associated with GPA, but only AFQT scores significantly predicted GPA when we included both variables in the model. Including dispositional variables in step 2 significantly increased the variance explained in GPA. Agreeableness was significantly and negatively associated with GPA; conscientiousness was marginally and positively associated

[21] Logistic, or logit, models are used when the outcome variable (e.g., AIT graduation) is binary.

with GPA. The association of AFQT scores with GPA remained significant after including dispositional variables in the model.

For our analysis of predictors of graduating from AIT, we found that AFQT score significantly predicted graduation from the course even after we added dispositional characteristics to the model, but Watson–Glaser scores did not predict graduation. Adding dispositional characteristics to the model significantly improved model fit. Conscientiousness positively and significantly predicted graduation, and openness to experience significantly but negatively predicted graduation.

Few Competencies or Life-Cycle Factors Consistently Predict Job Proficiency

We used a similar approach to analyze predictors of job proficiency. In the first step of the model, we entered experience level (i.e., junior or midgrade) along with cognitive predictors. In the second step, we added the dispositional measures. In the third step, we entered experience variables from our surveys, which included frequency of performing and self-efficacy for key tasks from the work-experience survey. These models exclude junior analysts who participated at postplacement only, however, because they did not complete the Watson–Glaser test or TAPAS. Thus, we ran a second set of models including only the predictors common to all participants who completed the PE. Tables 4.4 and 4.5 summarize the results.

Table 4.4
Summary of Job Proficiency Results, All Predictors

Predictor	COA Quality (117)[a]	NAI Usefulness (88)	NAI Feasibility (62)	Analytical Points (116)
Experience level (junior higher)	**	**ns**	**ns**	**ns**
AFQT	ns	ns	ns	ns
Watson–Glaser	ns	ns	ns	ns
Grit	ns	ns	ns	ns
Conscientiousness	ns	ns	ns	ns
Openness to experience	**ns**	**+***	**ns**	**+***
Agreeableness	**ns**	**ns**	**–****	**ns**
Extraversion	ns	ns	ns	ns
Emotional stability	**ns**	**–†**	**ns**	**ns**
Task frequency	ns	ns	ns	ns
Self-efficacy	ns	ns	ns	ns

NOTE: + = positive association. – = negative association. † = $p < 0.10$. * = $p < 0.05$. ** = $p < 0.01$. Numbers in parentheses are the sample sizes used in the analyses. Bold indicates that the result was statistically significant.

[a] The finding that junior analysts had higher scores on quality of COAs in the regression results differs from the mean differences reported earlier (showing no differences between junior and midgrade analysts) because the regression analysis is based on only those junior analysts who participated at pretraining and postplacement for whom we had all predictor measures (i.e., the new junior analysts). The analysis of mean differences includes the more-experienced junior analysts who participated at postplacement only and who had lower COA quality scores than the newer junior analysts had.

Table 4.5
Summary of Job Proficiency, Predictors Available for All Participants

Predictor	COA Quality (144)	NAI Usefulness (107)	NAI Feasibility (79)	Analytical Points (143)
Experience level	**ns**	**–†**	**ns**	**–***
AFQT	ns	ns	ns	ns
Grit	ns	ns	ns	ns
Task frequency	ns	ns	ns	ns
Self-efficacy	ns	ns	ns	**+***

NOTE: ns = not significant. + = positive association, senior or higher. – = negative association, junior or higher. † = $p < 0.10$. * = $p < 0.05$. Numbers in parentheses are the sample sizes used in the analyses. Bold indicates that the result was statistically significant.

In brief, we found few competencies or life-cycle factors that consistently predicted performance on the PE. Surprisingly, cognitive competencies did not predict any of the PE scores. Models in which we had all predictors (AFQT scores, Watson–Glaser scores, grit, Big Five factors, and work experiences) showed that junior analysts performed better than midgrade analysts on quality of COAs, openness to experience predicted usefulness of NAIs and analytical points, and agreeableness was associated with feasibility of NAIs. Interestingly, less agreeable analysts performed better on NAI feasibility. This finding appears to reflect a more general trend, i.e., agreeableness was negatively associated with GPA for junior analysts and midgrade analysts were less agreeable than junior analysts were. Work experiences (frequency of and self-efficacy for performing key tasks) were not associated with PE scores, but this might be because these measures were associated with Big Five factors, particularly with openness to experience for midgrade analysts (see Table A.2 in Appendix A). For example, dropping openness to experience from the models results in a marginally significant, positive effect for self-efficacy for key tasks in predicting quality of COAs, usefulness of NAIs, and analytical points.

For midgrade analysts, we also examined whether assignment history (deployments and tactical or strategic assignments) predicted performance on the PE. We ran two types of models, one focused on only the most recent assignment before ALC and one focused on the last four assignments combined. For both types of models, we included the predictors in Table 4.4 (except experience level). For models focused on most recent assignment only, we included an indicator of MI assignment type (tactical or strategic) and length of deployment in most recent assignment (if not deployed, deployment length was set to 0). For models focused on last four assignments, predictors included the number of tactical MI assignments, number of strategic MI assignments, and length of deployment (summed across all four assignments).[22] Overall, assignment history was not strongly associated with performance on the PE.

[22] Like in the models for both AIT and ALC students, we added predictors in steps, starting with cognitive measures (AFQT, Watson–Glaser), followed by personality (grit, factors from TAPAS), MI work experience (task frequency and self-efficacy), and finally assignment history (deployment length and tactical or strategic assignments). Across the models, we found very few statistically significant results. The tactical and strategic MI predictors were not significant in any models. Only in models focused on most recent MI assignment was deployment length a significant and negative predictor of two outcomes of the four outcomes: NAI feasibility and analytical points. The finding that longer deployments predict worse PE outcomes runs counter to expectation. However, the effects of deployment length on PE outcomes were very weak in our models. Therefore, we caution placing much emphasis on these results.

The second set of models consisting of predictors in common to all analysts who completed the PE (AFQT scores, grit, and work experiences) showed very few associations of competencies or life-cycle factors with proficiency.

Finally, an initial goal of the study was to examine the effect of training proficiency (e.g., GPA) on subsequent job proficiency. However, we had only 20 analysts from AIT who also participated in the postplacement phase. Five of these analysts did not attempt the PE, and some of the remaining 15 did not provide NAIs. Given the small sample, we calculated bivariate correlations between GPA and PE scores (see Table 4.6). Results show that GPA is strongly associated with COA score (number, differentiation, and prioritization of COAs). The correlation between GPA and the usefulness of NAIs is also large but not statistically significant (lack of statistical significance likely caused by the sample size). These results suggest that training proficiency predicts some aspects of job proficiency, but more research is needed to address this question.

Table 4.6
Correlations of Grade-Point Average with Practical Exercise Scores

COA Score (15)	COA Quality (15)	NAI Usefulness (12)	NAI Feasibility (7)	Analytical Points (14)
0.75**	0.36	**0.54†**	–0.28	–0.08

NOTE: Sample sizes in parentheses. † = $p < 0.10$. ** = $p < 0.01$. Bold indicates that the result was statistically significant.

Summary

Analyses of competencies, career life-cycle factors, and proficiency outcomes show the results in Table 4.7.

Table 4.7
Summary of Findings from Analyses of Competencies, Career Life-Cycle Factors, and Proficiency Outcomes

Factor	Result
Competency	In comparison to junior analysts, midgrade analysts demonstrated stronger CT skills and were somewhat less agreeable and extraverted.
Life-cycle factors	Both junior and midgrade analysts reported limited opportunities to conduct MI work on the job. Midgrade analysts reported higher self-efficacy to perform key analytic tasks.
Training proficiency	AFQT percentile scores and Big Five factors (conscientiousness, openness to experience, and agreeableness) predicted performance in or completion of AIT, although the direction of agreeableness and openness to experience was negative.
Job proficiency	• Junior and midgrade analysts varied in performance on different aspects of the PE, but scores on most aspects of the PE were low for both junior and midgrade analysts. • Competencies and life-cycle factors did not systematically predict job proficiency. • Junior analysts, particularly those with less job experience, were less likely to attempt the PE.

In Chapter Five, we discuss the implications of these results and provide recommendations for ongoing assessment of 35F analysts.

CHAPTER FIVE

Study Conclusions, Lessons Learned, and Recommendations for Ongoing Assessment and Development of Analytic Proficiency

The U.S. Army recruits, trains, and equips 35F analysts to provide all-source intelligence in support of the military decisionmaking process (HQDA, 2012b). To provide all-source intelligence, 35F analysts are expected to develop and maintain several key competencies. However, training, work environment, and organizational factors (e.g., assignment type, workload, and opportunities to practice skills in training and on the job) can affect the development and retention of key analytic competencies and, in turn, analytic proficiency. The goal of our study was to understand these factors and to develop and test a process to assess key analytic competencies and proficiency for 35F analysts.

In this chapter, we summarize our conclusions and provide directions for how the Army can assess analytic proficiency going forward. We discuss lessons learned from the study. A lessons-learned approach provides a useful way to convey factors that could affect assessment analytic competencies and proficiency. We conclude with our recommendations for the Army to develop and assess analytic proficiency on an ongoing basis. Our recommendations follow from the study findings and lessons learned.

Lessons Learned from Our Study

We identified two main lessons from this study that will affect how the Army would conduct ongoing assessments of analytic proficiency. These lessons pertain to the effect that the testing environment has on analyst motivation to complete assessments and to the effect that analysts' recall of IPB-relevant symbology and terms has on PE performance.

The Testing Environment Likely Affected Analyst Motivation to Complete Assessments

As described in the previous chapter, many of our participants did not complete parts of the PE or skipped the PE entirely. Although different factors can affect participant motivation to complete the PEs, we hypothesize that a major factor was the lack of consequences for not completing the study assessments. Specifically, in accordance with federal regulations governing research involving human subjects, we instructed the participants that the assessments were for research purposes, their participation was voluntary, and nonparticipation would not bear negative consequences for them. We did not directly assess participant motivation to complete the assessments, but our observations of participant behavior and comments from a few participants suggest that the lack of consequences factored into some participants' decisions not to complete or put much effort into the PEs.

Research studies are generally considered low-stakes settings for assessment. In contrast, high-stakes assessment settings are those in which assessment results directly affect employment, education, or other important outcomes for test-takers (Sackett et al., 2001). For example, the ASVAB is administered in a high-stakes setting because scores are used as part of entry requirements for the Army overall and MOSs specifically. Based on a review of low-stakes assessments in educational and employment settings, Wise and DeMars, 2005, reports that people tend to have lower test-taking motivation and performance in lower-stakes settings than in higher-stakes settings and that low test-taking motivation can negatively affect the validity of test scores. A main implication for our study is that the true relationships between the predictors (e.g., AFQT, Watson–Glaser CT test, and TAPAS) and PE performance are underestimated. Another implication is that, if the Army establishes routine proficiency testing and administers PEs on an ongoing basis, this would create a higher-stakes environment with greater participation and more-accurate proficiency scores. Analyst motivation to complete PEs might be further increased by offering incentives (e.g., bonuses) for demonstrating minimum levels of proficiency, which the Army provides for soldiers requiring foreign language proficiency (see AR 11-6).

Analysts' Recall of Intelligence Preparation of the Battlefield–Relevant Symbology and Terms Affects Practice Exercise Performance

In AIT and on the job, 35F analysts complete PEs on computers or otherwise have access to reference documents, such as FMs, that support their work. In our study, analysts completed PEs on paper, and we did not supply reference documents. At different locations where we collected data, we heard remarks or saw written comments on PE materials to the effect that the PE was difficult to complete without symbology guides and other reference materials. We therefore conclude that at least some participants might not have completed the PE because of knowledge decay, i.e., they could not recall symbology and terms. Our study results suggest that knowledge decay might have been a factor contributing to low motivation to complete the PE. Compared with analysts who did not attempt the PE, analysts who attempted the PE reported performing key analytic tasks more frequently on the job, and analysts who performed key tasks more frequently had higher task self-efficacy ($r = 0.47$, $p < 0.01$).

The possibility that some analysts did not complete the PE because they could not recall symbology and terms raises the question of what information is reasonable for analysts to remember after AIT or with limited opportunities to perform analytic tasks on the job. If the reference material can be readily obtained, what are the risks if analysts cannot remember all of the symbology and terms used in their analytic work (e.g., conducting IPB step 4) in an operational setting? If the operational risk is found to be high, the Army will need to train analysts to conduct the tasks in question without relying on reference materials and will need to provide ongoing training and work experience to ensure that analysts retain the knowledge after they leave the schoolhouse.

Recommendations for Ongoing Assessment and Development

To ensure that 35F analysts have needed skills, we propose that the Office of the Deputy Chief of Staff, G-2, U.S. Army, develop policy that provides support for ongoing assessment and development. Establishing routine monitoring, coupled with performance feedback and incentives for analysts to maintain and enhance their skills, will create a high-stakes setting that should motivate analysts' performance. Feedback from the assessment process could also be provided to the schoolhouse on an aggregated basis to inform the need for changes in institutional training content and processes.

We propose using a phased approach to create a policy for ongoing assessment, starting with establishment of proficiency standards, development and implementation of assessment instruments, and development of training to enable analysts to maintain and enhance their skills. Other considerations pertain to the implementation of these activities across the spectrum of agencies and echelons involved in producing a trained and ready intelligence force.

Establish Proficiency Standards for Analysts

The first step in developing an assessment process is to establish standards for proficiency. Proficiency standards exist for other Army career fields, such as aviators (AR 611-110) and linguists (AR 11-6). The regulation governing standards for linguists could be particularly useful as a model for 35F analysts given that there are numerous similarities between these two skill sets and the Deputy Chief of Staff, G-2, U.S. Army, already has extensive experience as the proponent for this regulation.

One aspect of setting standards involves determining what tasks 35F analysts are required to know. The CTSSB identifies these requirements, although, as noted in Chapter Two, stakeholders in the Army MI community have identified the need for greater participation in the process, more-comprehensive responses from stakeholders, and a more responsive revision process for these task lists. In addition to delineating core tasks, standards are needed for levels of proficiency, or expectations for how well analysts should execute core tasks. Cizek's 2001 review of setting proficiency standards in educational settings can provide guidance for this effort. Another consideration pertains to factors that influence proficiency standards. For example, proficiency standards for Army linguists are based on such factors as billet locations, skill level, and operational requirements. Establishing a process for setting standards also requires other decisions, such as how often assessment occurs, methods of assessment, responsibility for administering assessments, and consequences for analysts who fail to meet required levels of proficiency. The standards should be evaluated against performance on the assessments (described below) to ensure that they are appropriate and realistic (not too easy or too difficult), and standards should be reevaluated on a regular basis (e.g., annually) to ensure that they are consistent with operational needs.

To develop standards, the Army might also look to DoD efforts at developing certification for all-source analysts. In January 2009, the Under Secretary of Defense for Intelligence (USDI) signed DoD Instruction 3115.11, "DoD Intelligence Human Capital Management Office," which established nationally accredited certification programs for DoD intelligence and security personnel (USDI, 2011b). In 2011, the USDI cited the certification of all-source analysts as a priority for strategic management of the defense intelligence workforce. In November 2015, the level 1 all-source analyst certification program went operational.[1] To achieve level 1 certification, DoD personnel must pass a knowledge-based test on all-source analysis topics. Certification is valid for three years at the DoD enterprise level.[2] Although certification is not required of all-source analyst personnel at this time, the USDI encourages it. After

[1] According to the Human Capital Management Office expert we interviewed, there can be up to four levels of certification.

[2] According to the Human Capital Management Office expert we interviewed, services and agencies can choose to require their personnel to achieve certification on a more frequent basis (e.g., annually).

determining proficiency standards for its 35F analysts, the Army might consider implementing a certification process like the one advocated by the USDI.

Develop and Implement Instruments to Assess Proficiency

Like the PE used in our study, assignments used in USAICoE courses could serve as the basis for developing other PEs to assess analyst proficiency. Like we did for the PE adaptation used in the study, we recommend using assessments that can be completed over a period of hours (rather than over several days, which is the case for some PEs in AIT) given time constraints in many units and to protect test content. PEs could be developed to tap other critical skills for the MOS and to incorporate other elements of intelligence analysis problems per Heuer, 1999 (e.g., inclusion of discredited information or information with unknown reliability), as appropriate. Assessments could also consist of other kinds of tests with open-ended questions (e.g., essay tests) or objective tests (e.g., multiple choice), which are appropriate for assessing retention of declarative knowledge, such as understanding of symbology and analytic terms.

To ensure that PEs and other tests provide reliable and valid information about analytic proficiency, the Army should use robust testing practices. We highlight three practices, based, in part, on professional guidelines for employment testing, such as those outlined in *The Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education, 2014). We also describe a fourth practice to increase efficiency in scoring and reduce burden on graders.

First, to evaluate PEs or tests with open-ended questions, use quantifiable rubrics with clearly defined criteria and clear procedures for scoring responses. As we found in our study, our MI expert added detail to the rubrics to assist the novice grader in learning how to grade the PEs. Adding detail led to greater standardization, as evidenced by the increased levels of consistency between graders after changes were made. The standardization also helped our data analytic team understand what the PE scores mean.

Second, provide training to graders who, ideally, are SMEs. However, even SMEs need training on how to use rubrics and to ensure that they grade responses consistently and fairly. During training, interrater agreement should be assessed. This can be achieved like it was in our study by having two or more people independently grade the same responses and then compare their levels of agreement. If there is disagreement in the results, instructors or other SMEs should guide the graders through a discussion to understand the sources of disagreement and adjust the rubrics or grading process if needed to improve consistency in grading.

Third, enlist experts in test development to create alternative (parallel) forms of PEs and tests for test security purposes. As more analysts take the assessments, knowledge about the contents will likely become known. If the plan is to test large groups of analysts and to do so repeatedly, the Army will need alternative forms of the assessments. Per professional testing guidelines, alternative forms should measure the same underlying competencies and be similar in difficulty, reliability, and time limits for test-taking. We recommend conducting pilot tests of alternative forms to ensure that they are parallel before use on the larger analyst population.

Fourth, develop automated scoring of PEs where possible. Of course, automated scoring is straightforward for multiple-choice tests, but it has also been used to assess complex skills in a variety of domains, such as architectural design (e.g., Bejar, 1991) and physician patient management (e.g., Clauser et al., 1997). To use automated scoring, tests would need to be administered on computer systems (which also promotes scalability of test administration). Automated scoring systems for PEs or other open-ended assessments incur initial costs by requiring SMEs to help with development of the scoring system (e.g., to articulate decision rules and criteria for simulation responses) and programmers to implement and test application and validity of the decision rules. However, automated scoring can be more cost-effective than human scoring in the long term because organizations do not need to spend resources on training new graders and paying for graders' time (Williamson, Bejar, and Mislevy, 2006). For a comprehensive overview of automated scoring methods and applications, see Williamson, Mislevy, and Bejar, 2006.

In addition to developing and administering PEs and tests, there is a variety of information that could be used to better understand factors that influence analysts' PE performance, such as unit type, pay grade, and deployment history. Obtaining these from existing personnel, manpower, and training databases, where possible, reduces the assessment burden on analysts (as compared with collecting these data via a survey of analysts). Along with assessments of analytic knowledge and skills, we recommend that analysts complete short questionnaires, such as Section II of the survey used in our study (see Appendix B), to obtain information about analytic experience and perceptions that is not captured in existing databases. For example, questions about satisfaction with the PE or tests would help address factors that could affect analyst motivation to complete the assessments. Objective measures of MI activities, such as analytics generated by use of MI systems, can also be used. However, "objective" measures should be put into context because analysts have different assignments and, as a result, have different opportunities to perform analytic activities.

Provide Analysts with Sufficient Opportunities to Maintain and Enhance Their Knowledge and Skills

Our research indicates that the majority of 35F analysts' time is committed to non-MI tasks, creating challenges for the development and maintenance of perishable analytical skills. We would expect this to be the case for all MOSs, but it is particularly important for occupations with perishable skills.[3] In the absence of consistent, dedicated time for analysts to perform their core competencies and engage with mentors and peers, analysts might lose their familiarity with contemporary theater-specific information and highly technical data systems. Opportunities for practice outside normal work assignments are especially important for analysts in garrison and those assigned to small MI units in which access to MI mentors or peers is limited or not available.

We recommend that units consider providing protected time for analysts to maintain and enhance their proficiency through training. Without dedicated time, pressing day-to-day work will overtake training and development time. Unit commanders ultimately bear the responsibility of managing their soldiers' time, but other actors can provide appropriate assistance to make home station training more efficient and effective. For example, the G-2 Foundry Program already provides a structure for MI training at the units (AR 350-32).

[3] A comparison of skill decay across MOSs was beyond the scope of the current study. A cross-MOS analysis would help determine what types and amount of opportunities are needed for 35F analysts to maintain and enhance their analytic knowledge and skills relative to other MOSs.

Modify Resources to Support Changes to Assessment and Development Policy

Providing analysts with protected time for assessment and development will likely have resource implications. Adding training and assessment time to analysts' current requirements could necessitate modifications in the utilization of 35F personnel across units and in utilization of personnel to ensure completion of unit tasks. Implementing a credentialing process for the 35F MOS would also require special consideration regarding assignment of 35F analysts to non–MOS-related duties. Augmenting training in units could also increase resource needs for the Foundry Program to support development and assessment requirements.

Strengths, Limitations, and Additional Topics for Future Research and Practice

This study had several strengths. First, we used multiple methods to identify critical competencies for all-source analysts, and we used a variety of established assessments to measure those competencies. Second, we assessed the concurrent and predictive validity of many of the competencies for analytic proficiency. Conducting predictive validity studies, which require collecting data over time, is not common because of the time and resources they require. Third, we tested a process to assess analytic proficiency, and we provided guidance for the Army to use this process on an ongoing basis.

This research also had several limitations. Previously, we discussed some issues pertaining to research design and execution, including a possible lack of motivation for participants to perform well on the PE and small samples for some of our analyses. Here we note additional limitations and directions for research and practice.

First, as mentioned in Chapter Two, we did not conduct a formal job analysis. It is possible that a more structured approach to identifying critical KSAOs would produce different results, particularly for noncognitive competencies, which were mentioned less frequently than cognitive competencies were. A different approach to job analysis might also suggest the need to distinguish among dimensions of cognitive competencies, such as the fluid and crystallized intelligence dimensions of GMA, or might point to other cognitive competencies. For example, a small number of interview participants mentioned the need for metacognition, which is also hypothesized to be associated with CT skills (e.g., Halpern, 1998; Kuhn, 1999; Magno, 2010).[4]

Second, we did not measure all of the KSAOs that we did identify. As mentioned in Chapter Four, we did not assess oral and written communication skills in light of the considerable time and labor required to do so. Evaluation of communication skills and the degree to which MI training and job experience improve those skills are important topics to address in future investigations.[5] Interviews of our stakeholders emphasized the importance of written and oral (e.g., briefing) communication skills; in addition, interviews and prior job analyses

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[4] *Crystallized intelligence* refers to general experience, depth of vocabulary, and verbal comprehension. *Fluid intelligence* refers to abilities that are most associated with working memory, abstract reasoning, attention, and processing new information.

[5] Future investigations of communication skills can tease apart the influence of the quality of the intelligence content from the delivery (communication) of the content. For example, the same content could be evaluated with different communication methods (written or oral).

point to important aspects of communication, such as analytical writing and products that are objective, comprehensible, and usable or tailored for their intended audiences (Krizan, 1999; Hutchins, Pirolli, and Card, 2007). We also did not measure adaptability, because it would substantially increase response burden, and we did not expect adaptability to be related to performance on the PE. However, adaptability might be a useful predictor for longer-term studies of analyst proficiency, especially if measured with multiphase assessments that require analysts to respond to changes or feedback. For CT, we measured skills, but we did not measure dispositional aspects of CT, which reflect thinking styles or motivation to think critically (e.g., Ennis, 1985; Facione, Facione, and Giancarlo, 2000; Halpern, 1998; Klaczynski, Gordon, and Fauth, 1997). There are measures of such dispositions (e.g., Facione and Facione, 1992; Stanovich and West, 1998) that can be used in future evaluation efforts.

More generally, a topic to address in future research is the effectiveness of MI analysis *teams*. Collaboration provides benefits for intelligence analysis, such as bringing together diverse expertise and enhancing the likelihood of error detection, but it also presents challenges (e.g., Heuer, 2008; Johnston, 2005; Puvathingal and Hantula, 2012). Group intelligence analysis entails both cognitive and social processes (e.g., Hackman and O'Connor, 2005), requiring both technical and team skills. For example, when performing analytic work in team settings, common *process losses* (i.e., patterns of group interaction that inhibit optimal performance) can result in failures to adequately collect, share, integrate, or apply information (Straus, Parker, and Bruce, 2011). Moreover, as noted by Straus, Parker, and Bruce, characteristics of intelligence analysis tasks and contexts can make these teams particularly susceptible to common process losses. Analysts need to be knowledgeable about such processes and use strategies to inhibit their occurrence, detect when they are occurring, and apply appropriate remediating strategies.

Final Thoughts

With ongoing assessment of analyst proficiency, Army leadership will be better poised to develop and implement policies for effective training and assignment of 35F analysts. Proficiency assessment can help identify which competencies decay quickly without training or practice (training policy) and are most affected by work experience (assignment policy). Although ongoing assessment will require a sustained commitment from Army leadership, a systematic evaluation process will help analysts develop and maintain key cognitive and noncognitive competencies to meet the requirements of the current and future operational environment.

APPENDIX A

Detailed Results on Factors Predicting Proficiency

The tables in this appendix provide detailed results of the predictors of training and job proficiency reported in Chapter Four.

Table A.1
Correlations Among Predictors and Advanced Individual Training Proficiency Outcomes

Outcome	GPA	Graduation Status	AFQT	Watson–Glaser	Grit	Conscientious-ness	Openness to Experience	Agreeableness	Extraversion	Emotional Stability
GPA	1.00									
Graduation status	—	1.00								
AFQT	**0.34****	**0.17****	1.00							
Watson–Glaser	**0.17***	0.02	**0.31****	1.00						
Grit	0.04	0.01	0.04	0.03	1.00					
Conscientious-ness	**0.15†**	**0.11†**	0.06	0.02	**0.36****	1.00				
Openness to experience	**0.22****	**–0.12†**	**0.27****	**0.11†**	**0.20****	**0.13***	1.00			
Agreeableness	**–0.16***	0.01	**–0.12†**	–0.03	–0.02	**0.16****	–0.04	1.00		
Extraversion	–0.05	0.01	–0.05	–0.06	**0.21****	**–0.16***	**0.14***	**–0.11†**	1.00	
Emotional stability	–0.09	–0.03	0.01	0.09	**0.20****	0.08	0.02	**0.20****	**0.12†**	1.00

NOTE: Graduation status is 1 for graduated or 0 for did not graduate. There is no correlation between GPA and graduation because nongraduates do not have GPAs recorded in the AIT data. † = $p < 0.10$. * = $p < 0.05$. ** = $p < 0.01$. Bold indicates that the result was statistically significant.

Table A.2
Correlations Among Predictors and Job Proficiency Outcomes

Outcome	Quality of COAs	NAI Usefulness	NAI Feasibility	NAI Analytical Points	AFQT	Watson–Glaser	Grit	Conscien-tiousness	Openness to Experience	Agreeable-ness	Extraver-sion	Emotional Stability	Mean Task Frequency	Self-Efficacy
Quality of COAs	1.00													
NAI usefulness	**0.27****	1.00												
NAI feasibility	**0.23***	–0.11	1.00											
NAI analytical points	**0.58****	**0.15†**	0.07	1.00										
AFQT	0.09	0.03	0.03	0.01	1.00									
Watson–Glaser	0.02	–0.07	0.01	**0.18†**	**0.37****	1.00								
Grit	0.00	–0.05	0.01	–0.06	0.01	0.07	1.00							
Conscien-tiousness	0.00	–0.06	–0.02	–0.07	0.06	–0.01	**0.31****	1.00						
Openness to experience	**0.18†**	**0.23***	–0.02	**0.24****	**0.25****	**0.22***	**0.26****	0.13	1.00					
Agreeable-ness	–0.05	0.11	**–0.29***	0.06	0.09	0.05	–0.01	0.11	–0.06	1.00				
Extraversion	0.07	0.15	–0.06	0.03	–0.12	0.00	**0.26****	–0.12	**0.24****	–0.12	1.00			
Emotional stability	0.01	–0.05	0.00	0.09	**0.17†**	**0.19***	**0.19***	–0.04	**0.15†**	**0.20***	**0.19***	1.00		
Mean task frequency	**0.25****	0.04	0.06	0.13	–0.04	0.05	0.08	–0.01	**0.32****	0.02	**0.17***	0.08	1.00	
Self-efficacy, or mean task proficiency	**0.30****	0.10	0.04	**0.24****	**0.16***	**0.15†**	**0.18***	**0.15†**	**0.43****	–0.13	**0.27****	**0.15†**	**0.46****	1.00

NOTE: † = $p < 0.10$. * = $p < 0.05$. ** = $p < 0.01$. Bold indicates that the result was statistically significant.

Table A.3
Predictors of Training Proficiency in Advanced Individual Training: Grade-Point Average

	Coefficient		Adjusted R^2		
Predictor	**Step 1**	**Step 2**	**Step 1**	**Step 2**	**Change in R^2**
Class	0.14	0.15	**0.13****		
AFQT	**0.33****	**0.27****			
Watson–Glaser	0.08	0.09			
Grit		–0.01		**0.17****	**F(6, 157) = 2.18***
Conscientiousness		**0.14†**			
Openness to experience		0.13			
Agreeableness		**–0.17***			
Extraversion		–0.03			
Emotional stability		–0.06			

NOTE: † = $p < 0.10$. * = $p < 0.05$. ** = $p < 0.01$. Numbers in parentheses after *F* are degrees of freedom. Bold indicates that the result was statistically significant.

Table A.4
Predictors of Training Proficiency in Advanced Individual Training: Graduation

	Odds Ratio Estimate		Likelihood Ratio		
Predictor	**Step 1**	**Step 2**	**Step 1**	**Step 2**	**Likelihood Ratio**
Class	1.31	1.27	261.36		
AFQT	**1.03***	**1.04****			
Watson–Glaser	0.99	0.99			
Grit		0.85		233.30	**χ^2(6) = 28.06****
Conscientiousness		**3.02***			
Openness to experience		**0.41****			
Agreeableness		1.07			
Extraversion		1.79			
Emotional stability		0.88			

NOTE: * = $p < 0.05$. ** = $p < 0.01$. Bold indicates that the result was statistically significant.

Table A.5
Predictors of Course-of-Action Quality

	Coefficient			Adjusted R^2			
Predictor	**Step 1**	**Step 2**	**Step 3**	**Step 1**	**Step 2**	**Step 3**	**Change in R^2**
Experience level	**–0.25***	**–0.27****	**–0.27****	0.04			
AFQT	0.08	0.04	0.03				
Watson–Glaser	0.05	0.04	0.03				
Grit		–0.04	–0.03		0.04		$F(6, 107) < 1$
Conscientiousness		0.04	0.02				
Openness to experience		0.16	0.07				
Agreeableness		–0.13	0.11				
Extraversion		0.03	–0.01				
Emotional stability		–0.01	–0.02				
Task frequency			0.09			0.06	**$F(2, 105) = 2.45$†**
Self-efficacy			0.17				

NOTE: † = $p < 0.10$. * = $p < 0.05$. ** = $p < 0.01$. Numbers in parentheses after F are degrees of freedom. Bold indicates that the result was statistically significant.

Table A.6
Predictors of Named-Area-of-Interest Usefulness Ratings

	Coefficient			Adjusted R^2			
Predictor	**Step 1**	**Step 2**	**Step 3**	**Step 1**	**Step 2**	**Step 3**	**Change in R^2**
Experience level	–0.11	–0.06	–0.07	–0.01			
AFQT	0.00	–0.03	–0.03				
Watson–Glaser	–0.07	–0.16	–0.17				
Grit		–0.11	–0.08		**0.07†**		***F*(6, 78) = 2.24***
Conscientiousness		–0.02	–0.05				
Openness to experience		**0.29***	0.22				
Agreeableness		0.15	0.16				
Extraversion		0.23†	0.20				
Emotional stability		–0.20†	–0.22†				
Task frequency			0.00			0.06	*F*(2, 76) < 1
Self-efficacy			0.15				

NOTE: † = $p < 0.10$. * = $p < 0.05$. Numbers in parentheses after *F* are degrees of freedom. Bold indicates that the result was statistically significant.

Table A.7
Predictors of Named-Area-of-Interest Feasibility Ratings

	Coefficient			Adjusted R^2			
Predictor	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Change in R^2
Experience level	0.00	–0.13	–0.13	–0.05			
AFQT	0.07	–0.05	–0.06				
Watson–Glaser	0.01	0.14	0.16				
Grit		–0.04	–0.07		0.00		$F(6, 52) = 1.46$
Conscientiousness		0.05	0.09				
Openness to experience		0.06	0.11				
Agreeableness		**–0.39****	**–0.42****				
Extraversion		–0.15	–0.13				
Emotional stability		0.21	0.23				
Task frequency			0.02			–0.03	$F(2, 50) < 1$
Self-efficacy			–0.11				

NOTE: ** = $p < 0.01$. Numbers in parentheses after *F* are degrees of freedom. Bold indicates that the result was statistically significant.

Table A.8
Predictors of Analytical Points

	Coefficient			Adjusted R^2			
Predictor	**Step 1**	**Step 2**	**Step 3**	**Step 1**	**Step 2**	**Step 3**	**Change in R^2**
Experience level	–0.02	0.01	–0.01	–0.01			
AFQT	–0.05	–0.11	–0.13				
Watson–Glaser	0.15	0.11	0.09				
Grit		–0.16	–0.15		0.01		$F(6, 106) = 1.29$
Conscientiousness		0.01	–0.02				
Openness to experience		**0.24***	**0.23***				
Agreeableness		0.08	0.11				
Extraversion		–0.01	–0.05				
Emotional stability		0.03	0.03				
Task frequency			–0.12			0.01	$F(2, 104) = 1$
Self-efficacy			0.15				

NOTE: * = $p < 0.05$. Numbers in parentheses after *F* are degrees of freedom. Bold indicates that the result was statistically significant.

APPENDIX B

Details About 35F Work-Experience Surveys

This appendix details the 35F work-experience survey, which we developed and administered to both new and experienced 35F analysts as part of the data-collection phase. Table B.1 summarizes the survey portions and their purpose; detailed explanations follow in the sections below.

Table B.1
Summary of Survey Sections

Survey Section	Description and Purpose
Reclassification information	Identify respondents who have reclassified into 35F from another MOS (administered only to experienced analysts).
Common 35F tasks	Identify respondents' familiarity, frequency, and proficiency with common 35F analyst tasks. We provided separate task lists for SLs 1–3 (35F10, 35F20, and 35F30).
Work experience	For new analysts, confirm service entry, rank, and AIT graduation information. For both new and experienced analysts, determine proportion of time respondents spent on various analytic and nonanalytic tasks during deployment, while in garrison, and during unit field training.
Training preparation	Determine perceived value of training experiences and identify additional training that respondents would find useful.
Assignment history	Identify differences based on Army assignment history at different echelons and sections and with deployment experience (administered only to experienced analysts).

Section I. Reclassification Information (Experienced Analysts Only)

We included reclassification information questions to identify people who moved into 35F from other MOSs. We administered this section to experienced analysts only (i.e., respondents at ALC). Figure B.1 shows this section of the instrument.

Figure B.1
Reclassification Information Survey Questions (Experienced Analysts Only)

Section I: Please provide the following information about your background and experience.

a. Did you reclassify into 35F from another MOS? ___Yes ___No

If you reclassified from another MOS, answer Questions b–d. If you did not reclassify, proceed to the next page.

b. When did you reclassify? Please check the month and write in the year.

Month:
___January
___February
___March
___April
___May
___June
___July
___August
___September
___October
___November
___December

Year:___________

c. What was your prior MOS and rank? Enter the MOS number in the first blank, the letter in the second blank, and rank in the third blank.

____________ ______ _______
(numbers) (letter) (rank)

d. Approximately how long were you in this MOS? _______months

RAND *RR1851-B.1*

Section II. Common 35F Tasks

This portion of the survey allowed participants to self-report their *familiarity* with, *frequency* with which they perform, and *proficiency* at performing common 35F analyst tasks. We provided separate task lists and descriptions for 35F10, 35F20, and 35F30 analysts. Figure B.2 shows the instructions that we provided to analysts of all levels, while Table B.2, Table B.3, and Table B.4 list the common tasks and task descriptions evaluated by 35F10, 35F20, and 35F30 analysts, respectively. We provided task descriptions on a separate page of the survey.

Figure B.2
Survey Instructions for Common 35F Tasks

Section II: Common 35F Tasks.

On the following pages, we ask you to assess your conduct of common 35F tasks in your most recent analyst duty position/assignment. First, you will be asked whether you are familiar with each task. If you are familiar with it, please assess the task on two dimensions: frequency and proficiency. The dimensions are described below. Please think about the item carefully and give an honest assessment of how often you conduct each task and your ability to perform this task.

Familiarity. Have you heard of this task or is this a task that you have performed? If yes, indicate "familiar." If no, indicate "not familiar." **If you indicate "not familiar," do not answer the remaining questions for the task, but proceed to the next task.** If you are not sure what the task is, you can view task descriptions that were provided on a separate handout.

Frequency. **If you indicated that you are familiar with this task**, how often do you conduct this task as part of your job? Choose the response that most closely corresponds to how often you perform this task, i.e., never, a few times per year, monthly, weekly, or daily.

Proficiency. If you indicated that you are familiar with this task, indicate your proficiency in conducting each task by selecting one of the following statements:

1. I cannot perform this task
2. I can perform this task with assistance
3. I can perform this task with no assistance
4. I can perform this task with no assistance and I can train someone to perform this task

The example below shows responses for someone who is **unfamiliar** with the task. The respondent indicates "not familiar" in the Familiarity column and leaves the responses for Frequency and Proficiency blank.

Task	Familiarity	Frequency	Proficiency
Define the operational environment	___familiar _X_not familiar	___never ___a few times a year ___monthly ___weekly ___daily	___I cannot perform this task ___I can perform this task with assistance ___I can perform this task with no assistance ___I can perform this task with no assistance and I can train someone to perform this task

The following example below responses for someone who is **familiar** with the task, conducts the task approximately **once per month**, and **can perform this task with no assistance**.

Task	Familiarity	Frequency	Proficiency
Define the operational environment	_X_familiar ___not familiar	___never ___a few times a year _X_monthly ___weekly ___daily	___I cannot perform this task ___I can perform this task with assistance _X_I can perform this task with no assistance ___I can perform this task with no assistance and I can train someone to perform this task

RAND *RR1851-B.2*

Table B.2
Common 35F10 Tasks and Description, as Presented in the Survey Instrument

Task	Description
1. Define the operational environment	Describe the characteristics of the operational environment using graphic, written, and oral reports
2. Describe environmental effects on threat and friendly operations	Describe environmental effects from weather and terrain using graphic, written, and oral reports
3. Evaluate the threat	Develop incident overlay, SITMAP, and threat database. Evaluate threat capabilities and develop doctrinal template
4. Determine threat courses of action	Describe available threat courses of action (COA[s]) using graphic, written, and oral reports
5. Determine area of interest (AI)	Determine the geographical area from which information and intelligence are required for successfully conducting an operation
6. Develop a situation template	Develop a situation template depicting all effects of weather and terrain on threat and friendly courses of action (COA[s])
7. Determine weather effects on operations	Determine weather effects on threat and friendly operations
8. Develop the modified combined obstacle overlay (MCOO)	Depict aspects of the battlefield environment including obstacles, key geography, and military objectives
9. Develop the situation	Leverage incoming information to develop the current situation
10. Conduct link analysis	Perform and display analysis of threat associations and activities
11. Conduct pattern analysis	Perform and display analysis of threat activities in time
12. Conduct time event analysis	Analyze and display chronological records of threat activities
13. Conduct nodal component analysis of networks, commands, or organizations	Determine relationships between and within links and nodes in a network
14. Develop intelligence, surveillance and reconnaissance (ISR) products	Develop information collection products including indicators, specific information requirements (SIR[s]), and intelligence tasks for the collection plan
15. Determine satisfaction of priority intelligence requirements/information requirements	Assess incoming information to determine whether it satisfies information requirements
16. Determine information gaps and discrepancies in threat holdings	Identify and list intelligence gaps and discrepancies in operational variables using various analytical techniques
17. Develop initial specific information requirements (SIR[s])	Describe (a) the information needed, and (b) where the information can be collected to answer an intelligence requirement
18. Provide intelligence support to targeting	Categorize targets, draft target intelligence packet (TIP), link targets to sensors, and include targets in planning requirements
19. Determine the pattern of life of an HVI	Evaluate the HVI activities and associations to determine patterns in behavior
20. Identify high value targets	Determine targets that the threat requires for completion of a mission

Table B.2—Continued

Task	Description
21. Present intelligence	Prepare and present intelligence orally and in writing
22. Prepare intelligence reports	Create various intelligence reports as require and per unit SOP (e.g. SALUTE, SPOT, INTREP, interrogation reports, etc.)
23. Conduct a military briefing	Prepare and conduct a military briefing to a selected audience
24. Maintain a threat database	Catalogue intelligence data that qualif[y] and quantif[y] aspects of threat units

SOURCE: USAICoE, 2012.

NOTE: SITMAP = situation map. HVI = high-value individual. SOP = standard operating procedure. SALUTE = size, activity, location, unit time, and equipment. SPOT = spot.

Table B.3
Common 35F20 Tasks and Description, as Presented in the Survey Instrument

Task	Description
1. Define the operational environment	Describe the characteristics of the operational environment using graphic, written, and oral reports.
2. Describe environmental effects on operations	Describe environmental effects from weather and terrain using graphic, written, and oral reports.
3. Evaluate the threat	Develop incident overlay, SITMAP, and threat database. Evaluate threat capabilities and develop doctrinal template.
4. Determine threat courses of action	Describe available threat courses of action (COA[s]) using graphic, written, and oral reports.
5. Determine weather effects on operations	Determine weather effects on threat and friendly operations.
6. Develop of intelligence preparation of the battlefield (IPB) products	Develop required IPB templates and overlays to: identify the battlefield environment and the battlefield's effects, evaluate the threat, and determine threat courses of action (COA[s]).
7. Review identified information gaps and discrepancies in threat holdings	Evaluate for completeness lists of intelligence gaps and discrepancies in operational variables.
8. Determine threat capabilities and vulnerabilities to develop priority intelligence requirements (PIR[s]) and information requirements (IR[s])	In conjunction with the commander's information needs, develop PIR[s] and IR[s] that identify the critical information required to accomplish the unit's mission.
9. Conduct link analysis	Perform and display analysis of threat associations and activities.
10. Conduct pattern analysis	Perform and display analysis of threat activities in time.
11. Conduct time event analysis	Analyze and display chronological records of threat activities.
12. Conduct nodal component analysis of networks, commands, or organizations	Determine relationships between and within links and nodes in a network.

Table B.3—Continued

Task	Description
13. Determine significance of incoming information	Assess the significance of incoming information to determine if it satisfies Priority Intelligence Requirements/Information Requirements (PIR[s]/IR[s]), targeting requirements, or situation development in accordance with unit SOP.
14. Develop intelligence, surveillance, and reconnaissance (ISR) products	Develop information collection products including indicators, specific information requirements (SIR[s]), and intelligence tasks for the collection plan.
15. Determine satisfaction of priority intelligence requirements/information requirements	Assess incoming information to determine whether it satisfies information requirements.
16. Develop initial specific information requirements	Describe (a) the information needed, and (b) where the information can be collected to answer an intelligence requirement.
17. Provide intelligence support to targeting	Categorize targets, draft target intelligence packet (TIP), link targets to sensors, and include targets in planning requirements.
18. Determine the pattern of life of a[n] HVI	Evaluate the [H]VI activities and associations to determine patterns in behavior.
19. Identify high value targets	Determine targets that the threat requires for completion of a mission.
20. Conduct a military briefing	Prepare and conducts a military briefing to a selected audience.
21. Write an analytical paper	Develop a thesis, introduction, body, and conclusion that help to build upon knowledge or to inform an issue.

SOURCE: USAICoE, 2012.

Table B.4
Common 35F30 Tasks and Description, as Presented in the Survey Instrument

Task	Description
1. Define the operational environment	Describe the characteristics of the operational environment using graphic, written, and oral reports.
2. Describe environmental effects on threat and friendly operations	Describe environmental effects from weather and terrain using graphic, written, and oral reports.
3. Evaluate the threat	Develop incident overlay, SITMAP, and threat database. Evaluate threat capabilities and develop doctrinal template.
4. Determine threat courses of action	Describe available threat courses of action (COA[s]) using graphic, written, and oral reports.
5. Determine weather effects on operations	Determine weather effects on threat and friendly operations.
6. Determine threat capabilities and vulnerabilities to develop priority intelligence requirements (PIR[s]) and information requirements (IR[s])	In conjunction with the commander's information needs, develop PIR[s] and IR[s] that identify the critical information required to accomplish the unit's mission.

Table B.4—Continued

Task	Description
7. Develop a threat model	Per unit SOP and commander's guidance, portray the enemy by incorporating battlefield geography, environmental conditions, enemy doctrine and activities, and friendly forces considerations.
8. Determine intelligence requirements based on mission	Determine appropriate intelligence products, collection assets, and personnel in accordance with mission requirements and unit SOP.
9. Develop the situation	Leverage incoming information to develop the current situation.
10. Conduct link analysis	Perform and display analysis of threat associations and activities.
11. Conduct pattern analysis	Perform and display analysis of threat activities in time.
12. Conduct time event analysis	Analyze and display chronological records of threat activities.
13. Determine the pattern of life of a[n] HVI	Evaluate the HVI activities and associations to determine patterns in behavior.
14. Conduct nodal component analysis of networks, commands, or organizations	Determine relationships between and within links and nodes in a network.
15. Perform intelligence, surveillance, and reconnaissance synchronization	Synchronize the development of indicators, specific information requirements (SIR[s]), and intelligence tasks connecting collection to the scheme of maneuver in time and space.
16. Develop a reconnaissance and surveillance plan	Review priority intelligence requirements (PIR[s]) and Intelligence Requirements (IR[s]), determine intelligence gaps, identify assets available for tasking, and coordinate missions with the unit S3.
17. Recommend priority intelligence requirements (PIR[s]) and information requirements (IR[s])	Review developed PIRs, write PIR in a question format, recommend PIR to supervisor/commander.
18. Conduct intelligence support to targeting	Categorize targets, draft target intelligence packet (TIP), link targets to sensors, and include targets in planning requirements.
19. Identify high value targets	Determine targets that the threat requires for completion of a mission.
20. Nominate targets	Critique the targeting process and products, integrate intelligence targeting with operations, and validate prioritization of targets.
21. Review high value target list (HVTL)	Refine the HVTL using the analytic techniques of [Quality] of Information Check, Key Assumptions Check, and Outside-In Thinking.
22. Conduct battle damage assessment (BDA)	Direct the BDA roll-up to include known or estimated threat unit strengths, significant threat systems degraded or destroyed, and all known captured, wounded, or killed threat personnel during the reporting period.
23. Coordinate target function(s)	Establish and complete the target list by tasking subordinates to analyze and update the target priority list.
24. Write an analytical paper	Develop a thesis, introduction, body, and conclusion that help to build upon knowledge or to inform an issue.

Table B.4—Continued

Task	Description
25. Determine significance of incoming information	Assess the significance of incoming information to determine if it satisfies Priority Intelligence Requirements/ Information Requirements (PIR/IR), targeting requirements, or situation development in accordance with unit SOP.
26. Conduct a military briefing	Prepare and conduct a military briefing to a selected audience.

SOURCE: USAICoE, 2012.

NOTE: S3 = operations staff.

Section III. Work Experience

To match personnel records of the new analysts in our study with their survey responses, the 35F work-experience survey for new analysts included questions about the respondent's service entry date, current rank, and date of AIT completion. These questions are shown in Figure B.3.

Figure B.3
Service Entry and Advanced Individual Training Completion Survey Questions (New Analysts Only)

25. What is your service entry date? Please check the month and write in the year.

Month:
___January
___February
___March
___April
___May
___June
___July
___August
___September
___October
___November
___December

Year:___________

26. What is your current rank?
___E1
___E2
___E3
___E4
___Other (please specify): ________________________

27. When did you complete AIT? Please check the month and write in the year.

Month:
___January
___February
___March
___April
___May
___June
___July
___August
___September
___October
___November
___December

Year:___________

RAND *RR1851-B.3*

We administered the remainder of the work-experience portion of the survey to respondents in both samples (new and experienced analysts). We designed it to determine the proportion of time respondents spent on various analytic and nonanalytic tasks during deployment, while in garrison, and during unit field training in their most recent assignments.

First, we asked respondents to estimate the proportion of time spent in each of these three settings (deployment, in garrison, in unit field training). Figure B.4 illustrates this question as posed to respondents in the experienced-analyst sample; we posed a similar question to participants in the new-analyst sample with wording appropriate to their work experience.[1]

Figure B.4
Percentage of Time Spent in Deployment, Garrison, and Unit Field Training

22. In your most recent assignment prior to ALC, what percentage of your time has been spent in the following settings? Your response should sum to 100%.

	Percentage
Deployed	_______
In garrison (includes reach-back support to deployed units)	_______
In unit field training	_______
Total:	100%

RAND *RR1851-B.4*

Next, for each of the three settings, we asked respondents to estimate the proportion of time they spent performing a variety of analytic and nonanalytic tasks. If a respondent did not spend time in a particular setting, we asked the respondent to explicitly indicate so. Figure B.5 shows the questions posed for the deployment setting; we posed similar questions for garrison and unit field training settings (the task list was identical for each setting).

1 For new analysts, the question was phrased, "Since completing AIT, what percentage of your time . . . ?"

Figure B.5
Percentage of Time Spent on Tasks During Deployment

22. If you were not deployed in your most recent assignment, check the box below and skip to Question 25.

☐ I did not deploy (Please skip to Question 25.)

23. If you were deployed, what percentage of your working hours did you spend doing each of the following types of tasks? To answer these questions, think about your typical work day. Your response should sum to 100%.

	Percentage
Intel Analysis Tasks/Training	_______
Non MOS-Specific Unit-Level Training	_______
Mandatory Army Training (EO, SHARP, etc.)	_______
Physical Training	_______
Weapons and Equipment Maintenance/Motorpool, Guard/CQ/Staff Duty, Personnel/Physical Security, or Administrative Requirements	_______
Other (Please list in space below)	_______
Total:	100%

24. If you selected "Other" please describe it here:

____

____

____

NOTE: EO = equal opportunity. SHARP = sexual harassment and assault response and prevention. CQ = charge of quarters.

RAND *RR1851-B.5*

Section IV. Training Preparation

The training preparation portion of the survey determines the perceived value of training experiences and elicits suggestions for additional training that analysts believe would help their performance as analysts. These questions are shown in Figure B.6.

Figure B.6
Training Preparation Survey Questions

Section V: Please rate how each of the following types of training or experience prepared you to perform your job as an analyst. Rate each type of training or experience by indicating the extent to which you agree with the following statement. If you did not participate in the type of training listed, select "N/A."

[Type of training] prepared me for my job as an analyst.

	Type of training	Disagree strongly	Disagree	Disagree somewhat	Agree somewhat	Agree	Agree strongly	N/A
30.	AIT	☐	☐	☐	☐	☐	☐	☐
31.	Deployment	☐	☐	☐	☐	☐	☐	☐
32.	Job experience in garrison	☐	☐	☐	☐	☐	☐	☐
33.	Foundry	☐	☐	☐	☐	☐	☐	☐
34.	Unit field training	☐	☐	☐	☐	☐	☐	☐
35.	Other unit training	☐	☐	☐	☐	☐	☐	☐
36.	Other training or experience (describe below)	☐	☐	☐	☐	☐	☐	☐

37. If you selected "Other training or experience" please describe it here:

____

____

____

____

38. Are there specific tasks or topics in which you would like additional training: If so, please list them here:

____

____

____

____

RAND *RR1851-B.6*

Section V. Assignment History (Experienced Analysts Only)

For experienced analysts, the final portion of the survey requested information about their most recent prior assignments (up to four) (see Figure B.7).[2] This purpose of this survey section was to identify differences between analysts based on their experiences at different echelons, sections, and deployments.

[2] We did not include this section for new analysts because the overwhelming majority of the new analysts would not have assignments prior to 35F AIT.

Figure B.7
Assignment History Survey Questions (Experienced Analysts Only)

Please tell us about your Army job history by providing the following information about each of your prior assignments (for the last 4, maximum). **Start with your most recent assignment.**

For unit (second column), please provide full unit ID. Two unit ID examples at different echelons:

- Company echelon: A Co., 2nd Battalion, 23rd Infantry Regiment,1st Brigade, 25th Infantry Division
- Battalion echelon: 1st Battalion/505th PIR, 82 ABN

Echelon	Unit (Full unit ID)	Section	Did you deploy with this unit?	Length of time in this unit
☐ Company ☐ Battalion ☐ Brigade ☐ Division ☐ Corps ☐ Other (list) __________		☐ S2 ☐ Other (list) __________	☐ yes ☐ no If yes, where? __________ If yes, how many month? ______	______months
☐ Company ☐ Battalion ☐ Brigade ☐ Division ☐ Corps ☐ Other (list) __________		☐ S2 ☐ Other (list) __________	☐ yes ☐ no If yes, where? __________ If yes, how many month? ______	______months
☐ Company ☐ Battalion ☐ Brigade ☐ Division ☐ Corps ☐ Other (list) __________		☐ S2 ☐ Other (list) __________	☐ yes ☐ no If yes, where? __________ If yes, how many month? ______	______months
☐ Company ☐ Battalion ☐ Brigade ☐ Division ☐ Corps ☐ Other (list) __________		☐ S2 ☐ Other (list) __________	☐ yes ☐ no If yes, where? __________ If yes, how many month? ______	______months

NOTE: *PIR* here stands for parachute infantry regiment. ABN = airborne.
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U.S. Army military intelligence (MI) analysts work in increasingly complex and dynamic operational environments requiring intangible competencies, such as critical thinking (CT) and adaptability. This report describes the development and implementation of a process to assess key analytic competencies and proficiency of the Army's analysts in the 35F military occupational specialty and the design of a protocol for ongoing evaluation. The study included subject-matter expert interviews and document review to identify key analytic tasks for 35F analysts; a review of research regarding competencies associated with intelligence analysis and measures of those competencies; and a field study assessing competencies, life-cycle factors, training proficiency among junior analysts, and job proficiency among junior and midgrade analysts. Analysis of training proficiency results shows that analysts with greater general mental ability had higher grade-point averages and better odds of graduating from initial skill training than other analysts had. Results comparing junior and midgrade analysts indicate that both groups have few opportunities to perform MI tasks on the job. Both groups were similar in most competencies, but midgrade analysts demonstrated higher CT skills than junior analysts did. Differences between junior and midgrade analysts in job proficiency were mixed; junior analysts performed better on some criteria and midgrade analysts performed better on others. However, job proficiency scores were relatively low across groups, and few competencies predicted job proficiency; these findings could be a result of skill decay or low motivation of study participants.

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