

ARI Research Note 2017-02

Evaluation of the Advanced Situational Awareness Training Pilot Program

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February 2017

**United States Army Research Institute
for the Behavioral and Social Sciences**

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REPORT DOCUMENTATION PAGE

| | | | | | | | | | | | |
|---|--|------------------------------|-------------------------|-------------------------------|--|--|--|------------------------------|--|--|--|
| 1. REPORT DATE (dd-mm-yy) February 2017 | | | 2. REPORT TYPE Final | | | 3. DATES COVERED (from. . . to) February 2012 – July 2015 | | | | | |
| 4. TITLE AND SUBTITLE Evaluation of the Advanced Situational Awareness Training Pilot Program | | | | | | 5a. CONTRACT OR GRANT NUMBER W5J9CQ-11-C-0040 | | | | | |
| | | | | | | 5b. PROGRAM ELEMENT NUMBER 633007 | | | | | |
| 6. AUTHOR(S) Clinton R. Irvin (U.S. Army Research Institute), William R. Bickley (U.S. Army Research Institute), John T. Miller (Consortium Research Fellows Program) | | | | | | 5c. PROJECT NUMBER A792 | | | | | |
| | | | | | | 5d. TASK NUMBER 360 | | | | | |
| | | | | | | 5e. WORK UNIT NUMBER | | | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 6000 6th Street (Building 1464 / Mail Stop 5610) Fort Belvoir, VA 22060-5610 | | | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | | | | | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 6000 6th Street (Building 1464 / Mail Stop 5610) Fort Belvoir, VA 22060-5610 | | | | | | 10. MONITOR ACRONYM ARI | | | | | |
| | | | | | | 11. MONITOR REPORT NUMBER Research Note 2017-02 | | | | | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited. | | | | | | | | | | | |
| 13. SUPPLEMENTARY NOTES COR: N/A | | | | | | | | | | | |
| 14. ABSTRACT <i>(Maximum 200 words):</i> The Advanced Situational Awareness Training (ASAT) program was evaluated for adoption into U.S. Army Maneuver Center of Excellence (MCoE) curricula in FY14. The ASAT curriculum trains students to cognitively evaluate highly complex environments and emphasizes interpretation of nonverbal behaviors as a means to increase situational awareness. ARI, working with the MCoE Directorate of Training and Doctrine, measured the effectiveness of ASAT training: (a) Soldier reactions to the course were measured at course end; (b) tests of declarative knowledge were developed and administered to measure Soldier learning of ASAT subject matter; and (c) video-vignette ASAT exams were developed and administered to evaluate changes in Soldiers' ability to interpret nonverbal predictors of threat after exposure to ASAT. All three measurement methods provided evidence that exposure to ASAT training increased Soldiers' ability to develop situational awareness through interpretation of nonverbal behavior, although the third method proved somewhat equivocal. | | | | | | | | | | | |
| 15. SUBJECT TERMS Advanced situational awareness, video-based assessment, nonverbal threat predictors | | | | | | | | | | | |
| SECURITY CLASSIFICATION OF | | | | | | 19. LIMITATION OF ABSTRACT Unlimited | | 20. NUMBER OF PAGES 36 | | 21. RESPONSIBLE PERSON Scott E. Graham, PhD Field Unit Chief 706.545.2362 | |
| 16. REPORT Unclassified | | 17. ABSTRACT Unclassified | | 18. THIS PAGE Unclassified | | | | | | | |

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ACKNOWLEDGMENTS

The authors would like to express their gratitude to the Maneuver Center of Excellence Directorate of Training and Doctrine and to the ASAT staff and cadre for their collaboration, support, and cooperation throughout the course of this evaluation.

EVALUATION OF THE ADVANCED SITUATIONAL AWARENESS TRAINING (ASAT) PILOT PROGRAM

EXECUTIVE SUMMARY

Research Requirement:

The Advanced Situational Awareness Training (ASAT) program was evaluated for adoption into the U.S. Army Maneuver Center of Excellence (MCoE) curricula in FY14. The ASAT curriculum is designed to train students to cognitively evaluate highly complex environments, focusing largely on the interpretation of nonverbal behaviors as a means of improving situational awareness. The MCoE Directorate of Training and Doctrine (DoTD) requested that the Army Research Institute (ARI) develop instruments by which Soldiers' reactions to ASAT, knowledge of ASAT principles, and application of ASAT principles might be measured to inform the decision to adopt ASAT into the curricula.

Procedure:

Three separate levels of course evaluation, loosely based on Kirkpatrick's (2009) evaluation model, were developed and administered to measure the effectiveness of ASAT training. Measures of trainee reactions, two separate parallel versions of academic-style tests of declarative knowledge, and two separate parallel video-vignette tests were used to evaluate trainee reactions, knowledge, and skill acquisition resulting from exposure to ASAT training. Each measure was designed, piloted, refined, and then implemented to both address performance standards and to explore changes in relevant Soldier skills as a result of the course.

Findings:

All three means of program evaluation yielded support for the effectiveness and relevance of the ASAT program. Soldier reactions exhibited a consensus that the ASAT program provided some of the most relevant and valuable training yet received for execution of missions in support of Operation Enduring Freedom. Soldier declarative knowledge of the ASAT subject matter increased significantly as a result of exposure to the ASAT course. ASAT-trained Soldiers appeared to, although not definitively so, exhibit an increased ability to interpret nonverbal behavior in order to identify imminent threats when viewing real footage of law-enforcement scenarios.

Utilization and Dissemination of Findings:

The findings support the assertion that the ASAT program improves Soldiers' ability to detect immediate threats and in that manner increases Soldiers' situational awareness in the operational environment. The findings were reported to MCoE DoTD to help inform future decisions regarding the continuation of this program. All materials were made available to DoTD for the purpose of continued quality control efforts.

EVALUATION OF THE ADVANCED SITUATIONAL AWARENESS TRAINING PILOT PROGRAM

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Evaluation of the Advanced Situational Awareness Training (ASAT) Pilot Program

Introduction

The asymmetric warfare environment encountered in the wars in Iraq and Afghanistan presented U.S. forces with an enemy that wears no uniform, has no official national affiliation, and operates from no centralized base of operations. In order for our forces to develop an accurate mental representation of the operational environment, they must be able to identify an enemy that hides in plain sight among the civilian population. The Advanced Situational Awareness Training (ASAT) program proposes teaching Soldiers to use subtle, nonverbal behavior in order to better recognize the enemy and to interpret cues that can reveal his or her intended course of action. This report outlines the principles taught in ASAT, the evaluation of change in Soldier performance that results from ASAT training, and recommendations regarding future efforts to instruct the subject matter included in the ASAT program.

Focusing on six general behavioral domains, ASAT (see Appendix A) diverges markedly from previous situational awareness training in that it focuses largely on the interpretation of nonverbal behaviors in these domains as a means of improving situational awareness. To date three versions of the course, a 4-hour version, a 5-day version, and a 22-day version, have been administered to Soldiers at Ft. Fort Benning by a team of contractor Subject Matter Experts (SMEs). The Ft. Benning Maneuver Center of Excellence (MCoE) Directorate of Training and Doctrine (DoTD) tentatively anticipates that the ASAT program will be conducted increasingly by Army cadre during 2014. This report details the U.S. Army Research Institute for the Behavioral and Social Sciences' (ARI) research in developing and assessing two separate measures of performance with which to evaluate the relevant skills of trainees having completed the contractor-conducted ASAT course and, upon its initiation, the Army-conducted ASAT course.

Situational Awareness

The Army defines situational awareness (SA) in FM 3-0 (Department of the Army, 2008) as "...immediate knowledge of the conditions of the operation, constrained geographically and in time." This awareness takes the form of mental representation of an individual's environment, informed by the perception and comprehension of the external world (Endsley, 2000). In a combat environment, a Soldier's SA is necessarily defined in terms of mission, enemy, terrain, troops, time available, and civilian considerations (METT-TC). The accuracy of this mental representation is a function of a Soldier's ability to perceive, comprehend, and make projections informed by the available information. Whereas the flow, control and organization of information using technological systems significantly impacts SA, human dimensions have equal impact on overall SA (Endsley, 1995).

ASAT is designed to teach Soldiers skills that enhance their understanding of the operational environment, most notably the identification of enemy combatants (insurgents) and anticipation of likely enemy behavioral courses of action. To illustrate the intended contribution to unit readiness of the ASAT program, it is necessary to consider ASAT techniques in the broader context of SA. Multiple models of SA have been developed (Adams, Tenney, & Pew,

1995; Fracker, 1988; Maggart & Hubal, 1999; Salas, Prince, Baker, & Shrestha, 1995; Smith & Hancock, 1995; Taylor & Selcon, 1994; see Endsley et al., 2000 for a review); however the three-level model (Endsley, 1995) is the most commonly cited and arguably most widely accepted model of SA (Salmon, Stanton, Walker, & Green, 2007). Specifically, the Infantry-Focused SA Model (IFSA; Endsley et al., 2000) couples the current conception of SA with the demands specific to ground combat forces and includes a specific focus on METT-TC. The Endsley IFSA will be used herein as a basis for discussing the role of ASAT skills in developing SA in a combat environment.

Endsley (1995) formally defines SA as “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future” (p. 36). The model focuses on the *product* of SA as opposed to the *process*, meaning that each level represents a complexity and comprehensiveness in the mental representation of the environment rather than describing the mental processes at work in achieving a specific level. Endsley outlines three levels (see below) of SA along with the internal and external influences related to each level. These levels are hierarchical in nature, meaning that lower levels are required in order to form higher levels of SA and that complexity and sophistication of an individual’s mental representation of the environment increase moving to higher levels of SA. At each stage, the mental representation of the situation can be influenced by either direct observation of events or organizational communication regarding events.

Level 1 SA – Perception. Perception is the most basic component of SA. In order to construct a mental representation of the environment, it is necessary to first observe and recognize relevant information. Relevant information must be both available for observation and attended to in order to facilitate perception. Previous investigations have indicated that up to 76% of SA errors are due to problems at the perceptual level (Jones & Endsley, 1996). Individual goals, expectations, training, ability and experience all influence the perception level of SA. In order to obtain Level 1 SA, a Soldier must be aware of the presence and nature of crucial information, and must have the opportunity to observe that information. At this level of SA, a Soldier might notice that an unfamiliar local is standing on a rise several dozen yards away from an upcoming curve in the road, taking note that he is wearing overly bulky clothes for the time of year, holding a small electronic device, and intently watching the Soldier’s convoy.

Level 2 SA – Comprehension. Level 2 SA occurs when meaning is correctly attributed to information perceived in the environment. Achieving Level 2 requires that a Soldier correctly interpret the information in the environment after becoming aware of its presence. Information collected must be correctly identified as significant or non-significant, and then used to synthesize a higher-level interpretation of the scenario. Twenty percent of all SA errors involve incorrect comprehension of the environment after the accurate perception of relevant information (Jones & Endsley, 1996). To obtain Level 2, the Soldier should be able to correctly conclude that the target in question is possibly an insurgent and that an attack could be imminent.

Level 3 SA – Projection of Future Status. This is the highest level of SA and requires that information has been correctly perceived and comprehended. Level 3 requires that a Soldier comprehends not only the immediate situation, but also, in the case of enemy forces, the enemy’s

motivations, limitations, and considerations with regards to that Soldier's own unit in formulating likely courses of action. This level of understanding generally requires a high degree of experience and/or training and is heavily reliant on the Soldier possessing an extensive collection of schemas against which to compare mental representations and simulations of future events. To obtain Level 3, the Soldier should be able to recognize that the curve in the road is a likely place for an ambush and that the target is probably either a trigger man or a spotter in a remote IED attack that could be initiated when that Soldier's convoy rounds the upcoming curve. It should be noted that to achieve Level 3 it is necessary to perceive not only the spatial but also the temporal relevance of projected events; our Soldier needs to be able to not only project the upcoming ambush, but to understand that it is imminent and contingent upon the convoy's movement into the intended kill zone.

Measuring SA. Numerous instruments have been developed and fielded as a means of measuring SA (see Salmon et al., 2007 for a recent review). Measurement approaches fall into four categories: process indices, behavioral measures, performance measures, and direct measures (Endsley et al., 2000). Process indices evaluate SA during the assessment process and focus on measures including eye tracking and intra-team communication that reveal to what information an individual's attention is directed. Behavioral measures focus on the actions, application of force, and communication of information that result from SA as a means of estimating the accuracy of the mental representation of the battle space. Performance measures focus on the doctrinal appropriateness of tactical maneuvers, relative lethality, and survivability of a unit as a means of assessing its SA in understanding the battlefield. Direct measures evaluate the state of a Soldier's understanding of the combat environment, through either an objective evaluation of knowledge of the environment or a subjective self or observer report of knowledge.

Direct measures of SA have most commonly been used in its evaluation. These measures focus on SA as a state, while largely ignoring the processes inherent in arriving at that state, and evaluate the accuracy and breadth of mental representations of the operational environment. Focusing on direct measures has allowed researchers to capture Soldiers' representation of the environment, the most critical aspect of SA and not specifically addressed by any of the alternative approaches. Direct measures fall into two broad categories, objective and subjective measures. Objective measures evaluate the extent to which mental representations match the environment, and include post-test queries, on-line queries, and "freeze" queries. Post-test queries introduce minimal interference with the scenario, but suffer from memory decay considerations. On-line queries eliminate memory issues, but by requiring responses during a scenario can intrude on task performance and alter SA by shifting attention. "Freeze" queries, including the Situational Awareness Global Assessment Technique (SAGAT; Endsley, 1988), stop a scenario at multiple points during execution in order to determine the accuracy of mental representations of the combat environment at multiple stages within the same context.

Subjective direct measures are based on either a Soldier's or an observer's impression of that Soldier's or unit's grasp of the environment. The advantage of subjective measures is the ease with which they can be used in Infantry field environment, particularly when the entirety of the state of the environment is not always known. The main disadvantage is that these measures use no objective standard for evaluation. Self-ratings, such as the Mission Awareness Rating

Scale (MARS; Matthews, Beal, & Pleban, 2002), the Situational Awareness Rating Technique (SART; Taylor, 1990), and the SA-Subjective Workload Dominance scale (SA-SWORD; Vidulich and Hughes, 1991) ask Soldiers to report perceived level of SA. These types of measures are quickly and easily administered, offer additional data that complement objective scenarios, and have been shown to correlate with performance measures in aircraft scenarios (Selcon & Taylor, 1990).

Evaluation Overview

This section summarizes the preliminary approaches taken to evaluate ASAT and introduces the final approach. The final approach is detailed in the “Methods” section below.

The methods used to evaluate the effectiveness of the ASAT program focused on the skill set taught during ASAT and not on its influence on global SA. The specific focus of these evaluations was ASAT’s effect on Soldiers’ interpretation of nonverbal behavior. Student evaluations addressed comprehension of course material and student ability to effectively apply course material in a combat profiling exercise.

Efforts to evaluate the effectiveness of the ASAT program were modeled after the first three levels of Kirkpatrick’s four-level framework of training effectiveness (Kirkpatrick, 1994). These three levels include:

1. Trainee reactions to the course,
2. Trainee learning during the course, and
3. Transfer of training to job relevant tasks.

Evaluation efforts emphasized Levels 2 and 3, while still providing basic evaluation of Level 1. Aspects of the ASAT evaluation efforts were informed by the previous evaluation of the very similar Border Hunter Program (Fautua et al., 2010), with intent to capitalize upon that testing effort. The evaluation team observing the Border Hunter Program administered eight separate evaluation instruments. Included in the program were a cognitive abilities battery, a declarative knowledge evaluation, reactions to photographs, situated judgment tasks (SJTs), perceptual aptitude evaluations, psychophysiological measurements (e.g., heart rate), behavioral observation of team performance during the field problem, and reaction surveys regarding the course. Relative to the Border Hunter evaluation, one of the objectives of the ASAT evaluation was to produce a more economically manageable set of measurement instruments.

The final set of measures used to evaluate the ASAT program effectiveness included reaction surveys, tests of declarative knowledge, and a video vignette based on a series of SJTs. One objective was to develop evaluations of the ASAT course that maximized the diagnostic value of the instruments while fitting all testing activities into an arbitrary 30-minute administration window. Considerations shaping the development of the three measures are described and explained below.

Level 1: Reactions. Trainee reactions to the course were evaluated by the Ft. Benning MCoE Office of Quality Assurance (QAO). The focus of these evaluations was student opinions regarding the quality of training and its perceived utility in increasing mission readiness. These

types of evaluations were used in the evaluation of both the USMC Combat Hunter program (Kobus, Palmer, Kobus, & Ostertag, 2009) and the Border Hunter program (Fautua et al., 2010) and were overwhelmingly positive. The QAO-developed evaluation consisted of a combination of Likert-type and open-ended items that asked students to indicate their reactions to numerous aspects of the ASAT program. Preliminary responses obtained from Army ASAT students at Ft. Benning were overwhelmingly positive, with high endorsement for the quality, relevance, applicability, and operational value of the ASAT program.

Level 2: Learning. In order to evaluate Soldiers' learning of the ASAT training objectives, ARI focused on the ability of ASAT graduates to demonstrate declarative knowledge of the subject matter. Previously administered tests of declarative knowledge used with similar training programs were utilized to inform the current ASAT evaluation efforts. Specifically, the methods of evaluation applied to the Border Hunter Program provided a starting point from which to develop short-answer evaluations for the ASAT program (Fautua et al., 2010). Initial versions of each test were piloted and refined to produce the final versions.

Level 3: Transfer to job relevant tasks. The evaluation of trainee ability to utilize and perform the skills taught in ASAT in order to interpret the operational environment underwent three stages of development. Tests using written SJTs, photograph-based exams, and video SJTs were considered, with video SJTs being the final selected test type. Consideration of the written SJTs and photograph-based exams and their disposition are summarized below; the video SJTs are also summarized below and then discussed in detail in the following sections.

Situated judgment task (SJT). A series of written SJTs heavily informed by the items administered in the evaluation of both the Combat Hunter and Border Hunter programs were piloted with trainees during the first 5-day ASAT course. For each SJT item, a written paragraph provided a description of a scenario in an operational environment. Each scenario was followed by a series of possible courses of action. Test takers responded with a Likert-type scale to indicate the perceived effectiveness of each suggested action. After the first pre-course administration of this measure, this method was abandoned with SME and ARI agreement that the task offered a poor, only marginally valid representation of unprompted real-time decision making in the operational environment.

Photograph exam. The second method of evaluating situational judgment piloted was that of presenting trainees with a series of four slide images containing subtle but significant pieces of information relevant to interpretation of the pictured operational environment. Trainees were asked to view these images and record any possible interpretations along with supporting evidence. A grading rubric was developed that awarded one point for each valid conclusion and piece of supporting evidence in response to a specific photograph. A similar method had been used as a means of evaluating the Border Hunter program, but instead focused on the use of descriptive vs. meaningful language in response to a series of photographs (Fautua et al., 2010). The assessment of the Combat Hunter course also used a picture presentation methodology, but focused on the quality and terminology of responses (Kobus et al., 2009).

A pre-training and a post-training photograph exam were administered to a pilot experimental ASAT class and to a comparable control group. There was no observed increase in

performance among ASAT trainees as compared to control participants. Also, written responses to the photographs tended to be terse and not easily categorized. For these reasons and due to agreement among both SMEs and ARI personnel that the still photograph exam was not a realistic representation of the dynamic decision making process in the operational environment, the use of the picture exam was abandoned.

Video SJT. Two video-based situational judgement tests designated SJT-A and SJT- B were developed to provide students with a higher-validity test of combat profiling. Video vignettes have been used in a variety of ways to include medical student assessment (Lievens, Buyse, & Sackett, 2005), selection of hospitality employees (Jones & Decotiis, 1986), the prediction of insurance agent turnover (Delassio, 1994), as courtroom evidence in cases of suspect confession (Lassiter, Ware, Ratcliff, & Irvin, 2009) and for assessing Army officer social competence (Schneider and Johnson, 2005). Video-based vignettes are also widely used in screening and training of law enforcement officers (Doerner & Nowell, 1999). Evaluations of video vs. written vignette formats indicate that whereas responses to written vignettes can better predict cognitive performance, responses to video-based vignettes are better able to predict interpersonally-oriented criteria (Leivens & Sackett, 2006). Video formats are less influenced by race and reading comprehension and have higher perceived validity among test takers when compared to paper and pencil tests (Chan & Schmitt, 1997).

Significant effort was initially focused on obtaining OEF and OIF combat footage from a variety of sources. However, most footage was post-event; no suitable footage was readily available that included pre-event indicators. Therefore, the content utilized for the product of both video exams was gathered from the public forum Youtube.com and included footage of two-person confrontations in public settings, convenience stores, and police stops, all from North or South America. The content was all related to daily law enforcement activities and deemed to be the closest proxy to a military operational environment for which stimulus material was available. Collection focused on obtaining video clips for scenarios that culminated in violence and scenarios in which no violence occurred. Details of evaluating the video exams follow below.

Method

Reaction Survey Development

During their pre-deployment training, 46 students completed reaction surveys following the ASAT class conducted for 4-73 CAV, 4th BCT, 82nd ABN DIV at Ft. Bragg, NC, in February 2012. The reaction survey comprised 12 demographic items including rank, billet, number of deployments, four items allowing responses on a Likert-type scale, four open-ended items specific to each scale item, and finally an additional open-ended remarks section. The four scaled items asked participants to rate the completed training relative to relevance, importance, quality, and deployment preparation (Table 1).

Table 1

Reaction Survey Items

| Item | Rating Scheme for All Items |
|--|-----------------------------|
| How would you rank the relevance of this training? | 5: Outstanding |
| How would you rank the importance of this training? | 4: Excellent |
| How do your rank the quality of the instructors? | 3: Good |
| In comparison to other pre-deployment training, how important do you feel ASAT training was in preparation for deployment? | 2: Average |
| | 1: Below Average |
| | 0: Poor |

Declarative Knowledge Test Development

The ASAT declarative knowledge tests were developed based on materials used to evaluate the USMC Combat Hunter program. Tests of declarative knowledge administered to Combat Hunter graduates were deconstructed and each test question was evaluated for relevance to the ASAT training objectives and for item integrity. Personnel from ARI, MCoE Directorate of Training and Doctrine, and the contractor team all inspected, revised, and selected items until two separate, nominally parallel twenty-item tests emerged for piloting.

The tests of declarative knowledge were designed to address each of the approved terminal learning objectives (TLOs) for the ASAT course, with items selected to ensure that each version covered comparable TLOs. The declarative knowledge tests covered all objectives in ASAT Unit 1B (cognitive processes) with the exception of requiring a detailed explanation of the steps involved in decision making. Test items covered objectives from Unit 1C (perception) including eye function and aberrations, change blindness, tunnel vision and focus lock, and the use of enhanced observation techniques. Test items covered objectives from Unit 2 (enemy decision-making) including urban masking and the seven-step terrorist planning cycle. Forty percent of the items on each test focused on the six domains of combat profiling, Unit 3. Both tests evaluated trainee knowledge of biometrics, kinesics, proxemics, geographics, atmospherics, symbolism/iconography, and heuristics. ASAT Unit 1A is an introductory session explaining the fundamental concepts of ASAT training that are too general for testing using multiple choice or fill-in-the-blank methods and were not evaluated by the tests. Likewise, Unit 4 focused on implementation of all learned skills during the field problem and was not evaluated by the tests of declarative knowledge.

Video Exam Development

The video SJT exams were developed as a means of capturing the event recognition skills that are the focus of training for the ASAT program. These exams incorporate content loosely related to course and consistent with prior SJT examinations, while increasing the validity of the test in attempting to replicate field observations. Two types of test items were produced: one intended to measure students' ability to correctly identify scene details and the other to interpret scenarios presented in each video clip.

Content. Several hundred clips were reviewed, and approximately 80 were retained for final consideration for inclusion in the exams. Prior to final selection, all clips were edited to a duration of at least 10 seconds, but no more than 2 minutes. Clips that culminated in violent events were edited to end immediately prior to the event, leaving the outcome to be predicted by the observer. Thematic pairs of clips, one clip with a violent ending and the other with a non-violent ending, were selected and non-systematically assigned to one of two exams (Table 2). "Store Footage" clips were taken from various security camera recordings, "Police Stop" clips were taken from various law enforcement dashboard camera recordings, and "Confrontation" clips were various recordings of two-person interactions. Exam A contained one "Confrontation" pair, one "Store Footage" pair, and two "Police Stop" pairs. Exam B contained one "Confrontation," one "Police Stop," and two "Store Footage" pairs. Each clip was preceded by a brief description of its setting to help orient test takers to the scene.

Table 2

Video Exam Composition by Clip Type

| Administration Order | Exam A | Exam B |
|----------------------|----------------|----------------|
| Clip 1 | Store Footage* | Confrontation |
| Clip 2 | Confrontation | Store Footage |
| Clip 3 | Police Stop | Store Footage* |
| Clip 4 | Police Stop* | Police Stop |
| Clip 5 | Police Stop | Store Footage* |
| Clip 6 | Store Footage | Confrontation* |
| Clip 7 | Police Stop* | Police Stop* |
| Clip 8 | Confrontation* | Store Footage |

*Indicates control clip (scenario did not escalate to violence).

Responses. The video clips were projected on classroom display screens mounted at the front of typical MCoE classrooms. The end of each clip was immediately followed by display, one at a time, of three multiple choice items pertaining to that clip. Students responded using prepared paper answer sheets that showed only question numbers and answers to be circled. Presenting question content via the administration video prevented students from previewing question content for cues about what in the clip content to attend to. Each multiple choice question contained between five and six possible statements about the clip and included the alternatives "None of the above" and "I don't know." Students were instructed to select all true

statements for the clip. Thirty seconds were allowed for each question, and a running timer was displayed in the upper left hand corner of the administration screen that counted down in five second increments. When the timer reached zero, the next question was displayed. After the timer reached zero for a clip's third question, the administration video proceeded to the next clip.

Response Content. For each clip, two of the three multiple choice items addressed identification of details (detail) contained within that clip and the third addressed understanding of the scenario (heuristic) playing out during a clip. For each test item, correct responses (hits) were awarded positive points and incorrect responses (false positives) were awarded negative points. The number of points (positive or negative) for any response were assigned relative to how important that response's information was in the interpretation of the scenario. For example, a heuristic question might accrue six positive points for correctly identifying that a stopped motorist was a serious threat and exhibiting immediate signs of aggression, but only accrue one point for correctly identifying that the motorist stopped because of a road barrier vs. a set police barrier. Likewise, negative scores indicated how serious the false positive responses were in misinterpretation of an overall scene, with misidentification of weapons and threats scored with the highest values of negative points. All items were balanced, so that the sum total of all an item's responses was equal to 0, or within one point of 0. Final scores were calculated by several alternative methods, including aggregation of all positive scores only, negative scores only, all scores, and breakdowns by heuristic and detail.

Results

Reaction Surveys

Thirty-three of the 46 students (72%) self-identified as E4-E6. Of E4-E6 respondents, 27 (82%) reported having served on one or more deployments. The second most represented group was officers, with seven (15%) identified as O1-O3, three of which (43%) reported having deployed. Collectively, all other rank identifications along with one non-response represented the remaining 15% of students (see Table 3).

Table 3.

ASAT Class Composition and Deployment History

| Rank | No Deployments | 1+ Deployments | No Response | Total |
|-------------|----------------|----------------|-------------|-----------|
| E1-E3 | 3 (75%) | | 1 (25%) | 4 (9%) |
| E4-E6 | 6 (18%) | 27 (82%) | | 33 (72%) |
| E7-E9 | | 1 (100%) | | 1 (2 %) |
| O1-O3 | 4 (57%) | 3 (43%) | | 7 (15%) |
| No response | | | 1 (100%) | 1 (2%) |
| Total | 13 (28%) | 31 (67%) | 2 (4%) | 46 (100%) |

Note. Percentages in either the total column or the total row represent marginal percentage scores. All other percentages are computed based on the relative percentage of deployment history response for each rank. Blank entries indicate that no responses fell into a particular cell.

Among all students, 31 (67%) reported having served on one or more deployments, 13 (28%) reported no deployment experience, and two (4%) failed to respond to this item. Among those who reported deployment experience, 18 (58%) reported having served on one deployment, eight (26%) as having served on two, four (13%) as having served on three, and one (3%) as having served on four deployments.

Overall, responses to the course were highly positive. Among previously deployed students, 88% of all responses to the scaled items were a five of five, or “Outstanding,” (Table 4). Similarly, among students with no deployment history, 82% of responses to all items were a five of five (Table 5). The lowest response to any item was, “Good,” indicated by one previously deployed student on item 4 and indicated once for item 2 and once for item 4 among students with no history of deployment.

Table 4

Previously Deployed Students’ Responses

| Rating | Item | | | | |
|------------------|-------------|-------------|-------------|-------------|--------------|
| | Relevance | Importance | Quality | Deployment | Total |
| 5: Outstanding | 28 (90%) | 28 (90%) | 28 (90%) | 25 (81%) | 109 (88%) |
| 4: Excellent | 3 (10%) | 3 (10%) | 3 (10%) | 5 (16%) | 14 (11%) |
| 3: Good | | | | 1 (3%) | 1 (1%) |
| 2: Average | | | | | |
| 1: Below Average | | | | | |
| 0: Poor | | | | | |
| Total | 31 | 31 | 31 | 31 | 124 |

Note. Two participants failed to respond to the deployment related item and were not included in the analysis. All students that indicated a history of deployment responded to every question item.

A series of analyses was conducted to determine if differences existed between students with a history of deployment and those with no history of deployment in their responses to the scaled items. Due to the observed ceiling effects on all scaled items, it was inappropriate to conduct parametric tests. A series of four Chi Square analyses were conducted to test for a relationship between scale response and deployment history on every scale item. There was no observed relationship between the responses to any scaled item and deployment history. The values remained non-significant even after removing the Holm correction for family-wise error.

Open responses to items. Student open responses both to the four reaction survey items and to the instruction in general were uniformly positive. Representative responses are given below:

Item 1: How would you rank the relevance of this training?

“I know we will be setting in OP’s in Afghanistan...in training we normally do, we just sit and stare at nothing...in this training, we actually observed things around us to interact with our environment.”

“Your tactics can be used to get to a reasonable conclusion of what is going on around my AO.”

Table 5

Responses for Students with No Deployments

| Rating | Item | | | | |
|------------------|-------------|-------------|--------------|------------|-------------|
| | Relevance | Importance | Quality | Deployment | Total |
| 5: Outstanding | 11 (85%) | 11 (85%) | 13 (100%) | 6 (55%) | 41 (82%) |
| 4: Excellent | 2 (15%) | 1 (8%) | | 4 (36%) | 7 (14%) |
| 3: Good | | 1 (8%) | | 1 (9%) | 2 (4%) |
| 2: Average | | | | | |
| 1: Below Average | | | | | |
| 0: Poor | | | | | |
| Total | 13 | 13 | 13 | 11 | 50 |

Note. Two participants failed to respond to the deployment related item and were not included in the analysis. Of those students that indicated no deployment history, two failed to respond to item 4.

“With the mission always changing, class gives you different ways to see things.”

“Anything that can better prepare us...especially taking into consideration our need for interactions with the locals...”

Item 2: How would you rank the importance of this training?

“Not knowing the language has smaller borders now.”

“Would be best used as a whole unit, i.e. platoons or whole squads.”

“It put all [of] the pieces together. Things you do all the time but never think of.”

Item 3: How do you rank the quality of the instructors?

[Multiple comments, all highly positive; the primary instructor was specifically named multiple times.]

Item 4: In comparison to other pre-deployment training, how important do you feel ASACD training was in preparation for deployment?

“Nothing will compare to the live tissue training we did prior to this deployment.”

“I feel that in the multi-dimensional COIN fight, ASAT is just as important as the other aspects of our training, kinetic action and react to contact, MEDEVAC and First Responder, and EA development.”

[Multiple comments expressing the desire that this training had been available earlier, before previous deployments.]

Additional Remarks

“I would recommend that 30–60 days after our deployment that a follow up is conducted to determine if this training was truly effective and sustainable in a combat environment.”

“...I would like a copy of the training material like PowerPoint’s, demonstrations, etc. That way I have visual reminders of this skill not only for refreshers, but for future training of my soldiers...”

“...Focus more towards boots on the ground – CPT and higher don’t need it as much as team and squad and platoon leaders...”

[Multiple students expressed a desire to attend the 22-day version of this course.]

Declarative Knowledge Tests

Pilot Administration Results. Pilot administration of the ASAT declarative knowledge tests was conducted using a counterbalanced design between the two separate exam versions. The classes included in this pilot analysis began on 21 February 2012 and 26 March 2012. Pre-

course administrations occurred prior to any classroom instruction the morning of the first day of ASAT. Post-course administrations were conducted after all classroom training at the end of Day 3, but prior to any field training.

The 21 February ASAT course administered the exams in order A then B (Order 1), and the 26 March course in B then A order (Order 2). A total of 37 students enrolled in the 21 February class completed both administrations, and a total of 57 students in the 26 March class completed all materials. Among all respondents three (3%) were female and the remainder were male. The majority of students included (over 90%) were 11 series MOS, with students drawn from the Infantry Advanced Leader Course (ALC) and from MCoE training support units. Student age ranged from 20 to 53 (mean = 29.98, $SD = 5.83$), and years of service ranged from one to 22 years (mean = 8.84, $SD = 3.87$). Total time deployed ranged from 0 to 48 months (mean = 27.67, $SD = 11.07$).

A two factor Analysis of Variance (ANOVA) was conducted to evaluate the effects of presentation order and test version on student performance. The results support that the two tests are comparable measures of student performance. Planned comparisons revealed that there was no observed difference in performance between Knowledge Test A and Knowledge Test B when administered prior to the ASAT course, $F(1, 92) = 3.52, p = ns$, or when administered after classroom instruction, $F(1, 92) = 2.27, p = ns$. A main effect was observed for test version that was qualified by a significant interaction between test version and administration order, $F(1, 92) = 212.68, p < .05, \eta_p^2 = .698$. Post hoc tests revealed that, within subjects, scores post ASAT instruction were significantly higher than were scores pre ASAT instruction and that, between subjects, for both test versions, scores were higher when the knowledge test was administered at Time 2 (Table 6).

Table 6

ASAT Test Performance

| Raw Scores | Exam A at Time 1 | Exam B at Time 1 |
|------------|------------------|------------------|
| Test A | 7.73 | 12.39 |
| Test B | 13.05 | 8.56 |

Cicchetti (1972) interaction post hoc tests were conducted. Table 6 values with matching superscripts exhibited no statistically significant difference. Values without matching superscripts exhibited statistically significant differences (Table 6). All scores are out of 20 possible points.

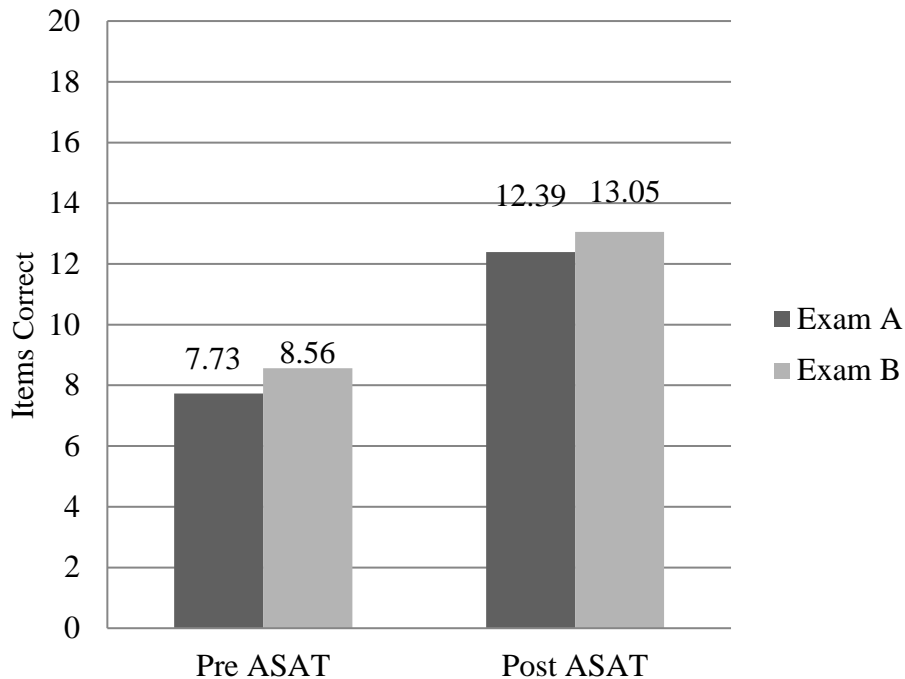


Figure 1. Pilot exam raw score performance before and after ASAT.

Reliability was calculated for each scale for Time 1 and Time 2 responses from all ASAT students. Both Test A, Cronbach's $\alpha = .71$, and Test B, Cronbach's $\alpha = .70$, exhibited an acceptable level of internal stability. A frequency analysis of both exams revealed only one item to be problematic:

Question: Setting up an observation point to watch a targeted individual in the hopes of gathering additional information on that individual's associates is an example of:

Answer: Tactical Patience

In both test administrations, only one trainee correctly answered the item. This item was ultimately retained in the final exam versions as it is included in the curriculum, and ARI and SME opinion was that this particular point had been passed over during instruction for these two test administrations. Minor editorial revisions were made to five items, and the exams were otherwise unchanged from pilot to final versions.

Final Version Administration Results. Final versions of the ASAT tests of declarative knowledge Tests A and B were administered pre- and post-course to 304 ASAT program participants. Versions were administered in a counterbalanced manner in order to simultaneously test for learning and equivalence of tests. All participants were male, and the majority were E5/E6 (52%) or O1 (45%). For all analyses, rank was coded as Enlisted (55%) vs. Officer (45%). Table 7 provides an Enlisted vs. Officer comparison of all relevant demographic variables.

Table 7

Officer and Enlisted Demographics

| Variable | Officer | | | Enlisted | | |
|------------------|--------------------|-----|-----|--------------------|-----|-----|
| | Mean (<i>SD</i>) | Min | Max | Mean (<i>SD</i>) | Min | Max |
| Age | 24.5 (3.47) | 21 | 39 | 29.3 (4.51) | 21 | 46 |
| Years in Service | 2.7 (3.27) | 0 | 19 | 8.3 (3.70) | 2 | 25 |
| Months Deployed | 2.7 (7.44) | 0 | 42 | 26.2 (11.4) | 0 | 56 |

Twenty-one Enlisted and 22 Officers reported having experienced some level of exposure to ASAT-related material prior to the course and were removed from further analyses, leaving 116 Officers (44%) and 145 Enlisted (56%) in the final sample (Table 8). The final sample comprised almost exclusively IN ALC (MOS 11B/C, 52%) and Armor Basic Officer Leader Course (ABOLC) students (CF 19A, 43%); thus MOS and CF were not included in further analyses.

Table 8

*Final Sample Distribution**

| | Administration Order | | Total |
|----------|----------------------|----------|-------|
| | A then B | B then A | |
| Enlisted | 105 | 40 | 145 |
| Officer | 32 | 84 | 116 |
| Total | 137 | 124 | 261 |

*Second exam versions

Note. Forty-three participants were removed who reported some prior level of ASAT exposure.

Three variables—age, time in service, and months deployed—were considered for inclusion as a covariate in further analyses. As all three variables were significantly related (bivariate Pearson r values ranging from .54 to .81), a single covariate was chosen for entry into the model. Time in service was negatively related to raw scores from both Exam A, $r = -.32$, $p < .01$, and Exam B, $r = -.12$, $p = .06$, but suffered from non-normality and multiple extreme outliers. A natural log transformation was conducted on time in service values after adding one to each value as a means of avoiding computational problems associated with values equal to zero. Post transformation values exhibited no outliers and acceptable skew and kurtosis values.

Both exams were analyzed for internal consistency using the final sample. Both Exam A ($\alpha = .76$) and Exam B ($\alpha = .61$) exhibited acceptable levels of internal consistency. Neither exam contained an item answered either correctly or incorrectly by all participants.

An analysis of covariance (ANCOVA) was conducted to assess learning that occurred between pre- and post-course test administrations after adjusting for time in service. Rank (Officer vs. Enlisted) and test administration order were entered as between subjects variables, test as a repeated measure, and log transformed time in service as a covariate. Mean scores are shown in Table 9.

Table 9

Estimated Marginal Means

| | Enlisted 10.29 (.25) | | | | Officer 11.75 (.30) | | | |
|------|-------------------------|--------|----------------------|--------|------------------------|--------|----------------------|--------|
| | <u>Exam A then B</u> | | <u>Exam B then A</u> | | <u>Exam A then B</u> | | <u>Exam B then A</u> | |
| | Exam A | Exam B | Exam B | Exam A | Exam A | Exam B | Exam B | Exam A |
| Mean | 7.13 | 13.68 | 9.73 | 10.95 | 8.26 | 14.05 | 11.44 | 13.26 |
| (SE) | .30 | .34 | .47 | .42 | .50 | .56 | .38 | .34 |

Six planned comparisons were conducted in order to test specific hypotheses regarding the nature of anticipated interactions. After collapsing across counterbalance administration order and rank, post-test scores (adjusted mean = 12.95) were significantly higher than pre-test scores (adjusted mean = 9.06), $F(1, 256) = 413.54, p < .05$. As shown in Figure 2, when administered as a pre-test, student scores on exam B (adjusted mean = 10.583) were significantly higher than were scores on Exam A (adjusted mean = 7.696). Similarly, post-test scores were higher when Exam B was administered as a post-test (adjusted mean = 13.707) than when Exam A was administered (adjusted mean = 12.105), $F(1, 256) = 124.31, p < .05$. Officers outperformed enlisted (Figure 3) on pre-tests (enlisted adjusted mean = 7.85; officer adjusted mean = 10.56), $F(1, 256) = 23.26, p < .05$, and on post-tests (enlisted adjusted mean = 12.70; officer adjusted mean = 13.48), $F(1, 256) = 38.27, p < .01$. There were no observed differences between enlisted and officers in learning from pre-course to post-course administration, $F(1, 256) = .032, p > .10$.

The covariate, log transformed time in service, was not significant among between subjects factors or within subjects factors. A main effect was observed for rank, with officers (adjusted mean = 11.75) scoring higher than enlisted (adjusted mean = 10.29), $F(1, 256) = 9.99, p < .01$. A main effect was also present for test, with higher test scores observed for Exam B (adjusted mean = 11.34) than for Exam A (adjusted mean = 10.70) when collapsed across all other factors, $F(1, 256) = 18.52, p < .01$. There was an observed main effect for counterbalance order, $F(1, 256) = 4.65, p < .05$, qualified by an exam by counterbalance interaction, $F(1, 256) = 326.87, p < .01$, in which exam scores depended upon administration order (Figures 2 and 3).

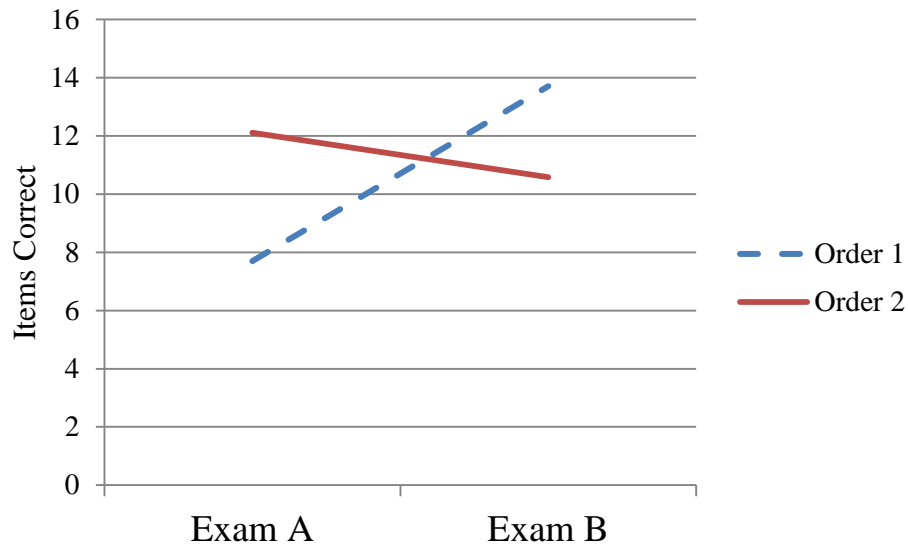


Figure 2. Performance on Exams A and B by administration order. Order 1 is A then B; Order 2 is B then A.

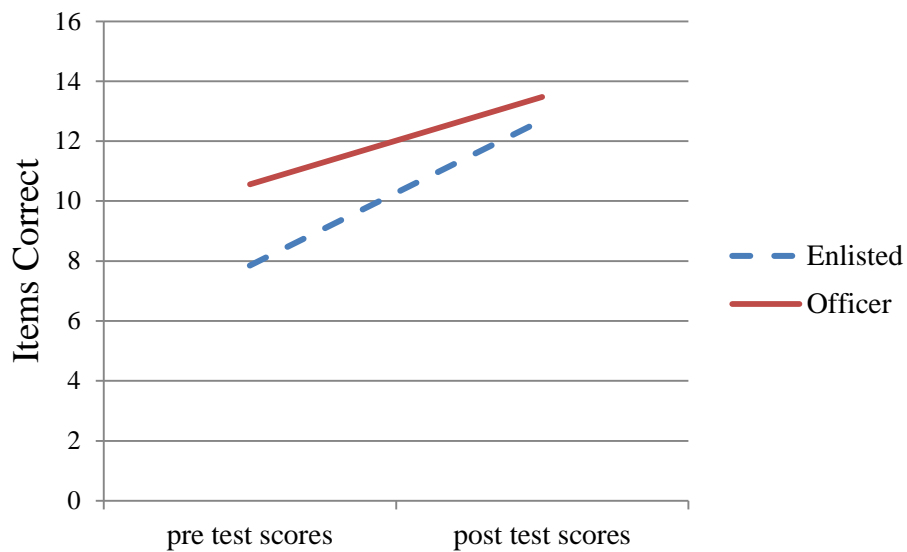


Figure 3. Pre- and post-test scores for Officer and Enlisted collapsed across exam versions A and B.

Video Vignette Situational Judgment Tests

A total of 175 Soldiers completed both pre-course and post-course administrations of the video vignette examination. The examinations were administered to two Infantry ALC classes and to two ABOLC classes, counterbalanced for order. The first ALC and the first ABOLC

classes received version A as pre-test and version B as post-test; the second ALC and the second ABOLC classes received version B as pre-test and version A as post-test.

ALC students comprised the majority of enlisted participants; 83 of the 84 enlisted participants were ALC students (99%). Among ALC students, order was roughly balanced: 45 were administered Exam A as the pre-test (54%) and 38 were administered Exam B as the pre-test (46%). Among ALC students, time in service ranged from 0 to 20 years, mean = 7.5 ($SD = 2.70$). Enlisted deployment frequency ranged from 0 to 6 deployments, mean = 2.5 ($SD = 1.05$). Among enlisted personnel, all but one held variants of the 11 series Infantry MOS, with the remaining enlisted NCO having been cadre within an ABOLC class. All NCOs were E5 and E6 rank. Enlisted age ranged from 22 to 39, mean = 27.9 ($SD = 3.24$). All enlisted participants were male.

ABOLC students accounted for all commissioned officer participants, with a total of 91 included in the study. Among ABOLC students, counterbalance order was nearly equal, with 45 administered Exam A as the pre-test (49%) and 47 administered Exam B as the pre-test (51%). Officer time in service ranged from 0 to 18 years, mean = 2.4, ($SD = 3.15$). Officer deployment frequency ranged from 0 to 4, with 82 officers (90%) never having deployed. Eighty-four (92%) officers held a variation of the 19 series (Armor or Cavalry) MOS, with one officer enrolled in Officer Candidate School, four 18 series Special Forces officers, one military intelligence officer, and one officer of unspecified MOS. All officers were of rank 1st Lieutenant or 2nd Lieutenant. Officer age ranged from 22 to 36, mean = 24.3 ($SD = 3.06$). All participating officers were male.

Test item characteristics. Responses to the video clips were evaluated for internal consistency looking at positive scores (hits), negative scores (false positives), and overall scores (cumulative scores) for each item. For the purposes of reliability analyses, data were included from all respondents who completed each exam. A total of 248 participants completed Exam A, and 246 participants completed Exam B.

For both exams, reliability was calculated when including the hit responses to each of the three questions associated with each of the eight vignettes, independent of false positive responses, resulting in a total of 24 items. Reliability was then calculated including false positive responses independent of hit responses. Finally, reliability calculations were conducted including all item responses. High levels of internal consistency were not necessarily expected (cf. Mallery, 2003), as the video vignette examinations were not designed to be a unidimensional measure of aggression detection abilities, but rather a cross-sectional capture of student ability to detect threats through the detection of numerous cues in a variety of contexts.

Exam A. Hits exhibited an intermediate level of internal consistency (Cronbach's $\alpha = .43$). Exam A false positives exhibited a similar level of internal consistency (Cronbach's $\alpha = .40$). Internal consistency did not substantively change when including both types of responses (Cronbach's $\alpha = .39$).

Exam B. Internal consistency levels within Exam B were roughly equivalent to those observed among Exam A. Hit items exhibited an "unacceptable" level of internal consistency

(Cronbach's $\alpha = .38$). False positive items exhibited similarly low levels of internal consistency (Cronbach's $\alpha = .40$), as did all items when considered simultaneously ($\alpha = .36$).

Overall performance. The primary analysis of performance collapsed across all response scores to all items for all vignettes, resulting in a single score for each participant for each exam. False positives were coded with their assigned negative values, and hits with their assigned positive values. An Analysis of Variance (ANOVA) was conducted in order to test for student improvement in video exam performance as a result of exposure to the ASAT course. Exam, including scores from Exam A and Exam B, was included as a repeated, within-subjects factor. Administration order (A or B pre-instruction) and rank (enlisted vs. officer) were both included as between subjects factors. Exam was significantly related to performance, Exam B scores (mean = 36.29, $SD = 11.97$) were significantly higher than were Exam A scores (mean = 22.12, $SD = 11.46$), $F(1,171) = 164.14$, $\eta_p^2 = .49$). The effect of exam was qualified by an exam by exam order interaction, $F(1, 171) = 21.38$, $p < .001$, $\eta_p^2 = .11$. Cicchetti interaction post-hoc tests revealed that, whereas Exam A scores reflected no difference between pre-course administration (mean = 21.48, $SD = 10.48$) and post-course administration (mean = 22.78, $SD = 11.46$), Exam B post-course administration scores (mean = 40.48, $SD = 11.41$) were significantly higher than pre-course scores (mean = 31.85, $SD = 10.96$, $p < .05$); see Figure 4.

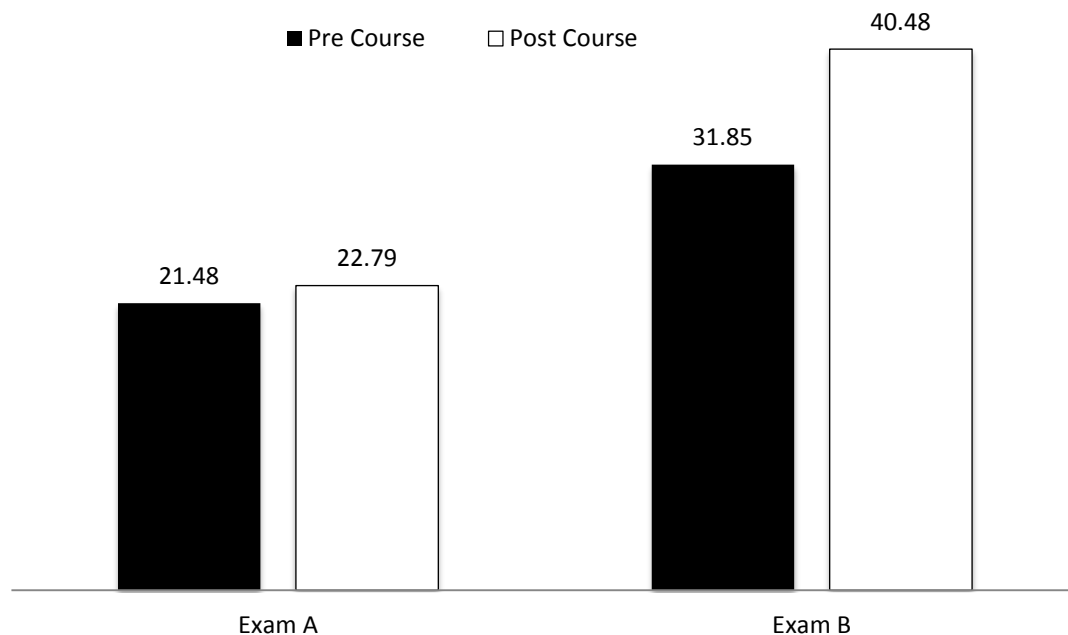


Figure 4. Video vignette overall performance. Scores reflect aggregate of hits and false positives.

Additional Analyses. A set of four ANOVAs was conducted to evaluate changes on exam performance from pre- to post-course. Aggregate scores for hits, false positives, heuristic items, and detail items were calculated and each used as dependent variables in the four separate

analyses. For each analysis, the independent factors mirror those included in the overall score analysis. The Holms-Bonferroni correction for familywise error was applied for the interpretation of all main effects, interactions, and post hoc tests. (Holms, 1979). All reported values include application of the Holms-Bonferroni correction. Only significant main effects and interactions are reported; significant interactions are presented in detail.

Hits. The analysis of positive responses revealed main effects for exam and exam order driven by two separate interactions. Significant interactions were observed between exam and exam order, $F(1, 171) = 67.37, p < .01, \eta_p^2 = .28$ and between exam order and rank (enlisted vs. officer), $F(1, 171) = 7.42, p < .05, \eta_p^2 = .042$. Cicchetti interaction post hoc tests were conducted to test for specific differences in the cases of both interactions. Post hoc tests of the exam by administration order interaction revealed that whereas there was no difference in scores by order within Exam A, Exam B responses were higher when administered post-course (mean = 55.03, $SD = 7.97$) than when administered pre-course (mean = 45.44, $SD = 9.87, p < .05$; Figure 2). Post hoc tests of the administration order by rank interaction identified a test base that, as a whole, performed more poorly than all other groups. The overall positive response performance of ABOLC officers who were administered Exam B pre-course and Exam A post-course (mean = 42.82, $SD = 1.01$) was significantly lower than scores of NCOs exposed to the same exam order (mean = 47.00, $SD = 1.10$) and officers who were administered Exam A pre-course and Exam B post-course (mean = 48.52, $SD = 1.02$).

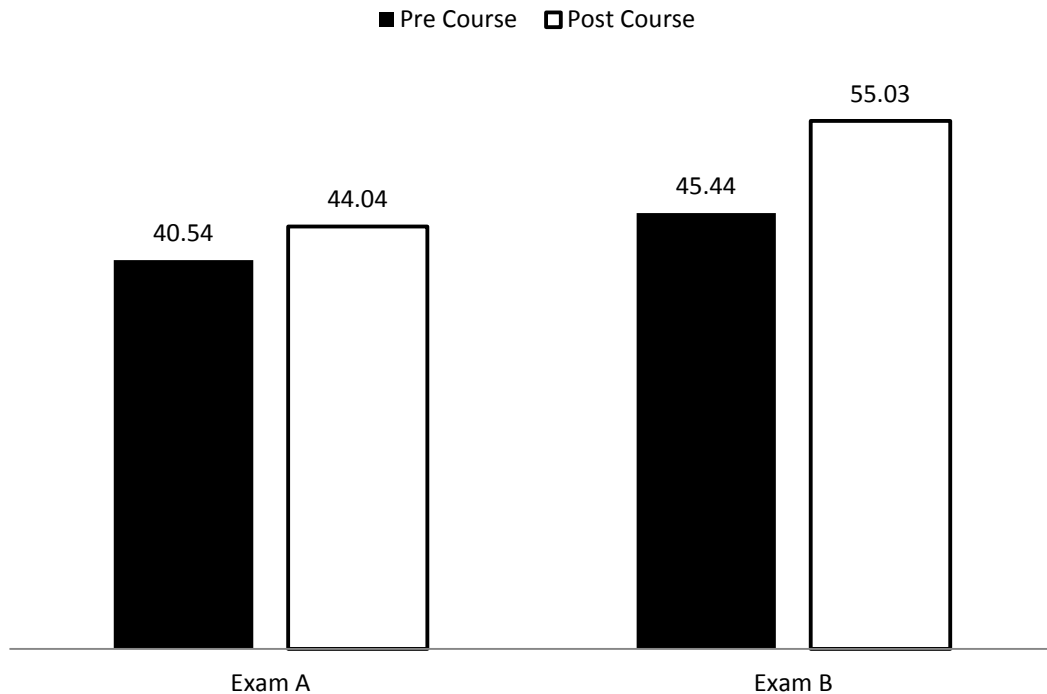


Figure 5. Hits performance; includes both officer and enlisted results.

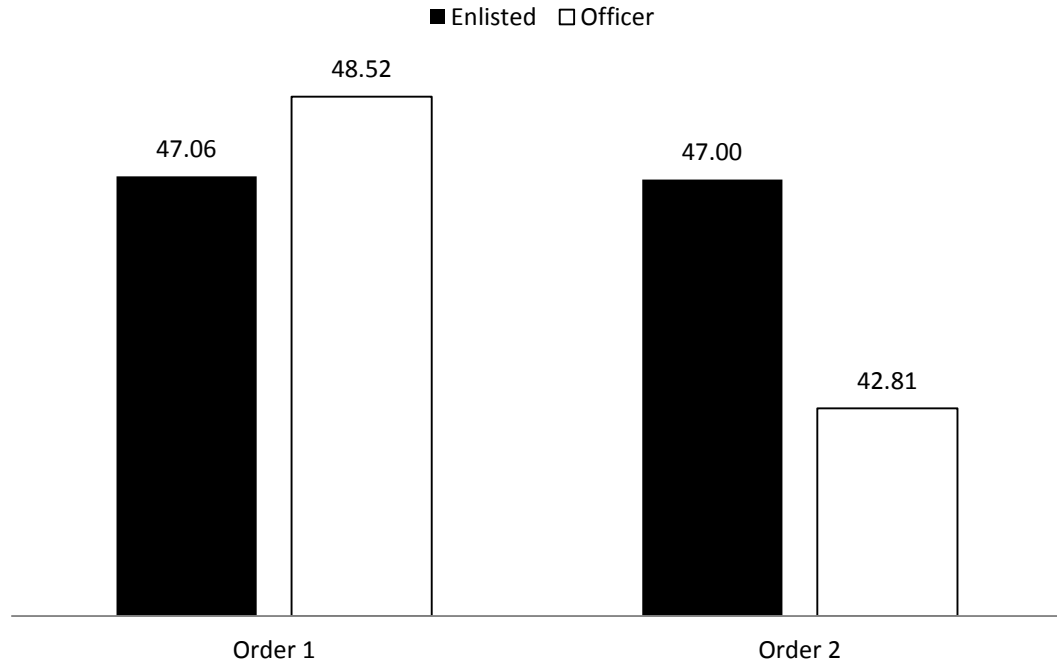


Figure 6. Officer vs. enlisted performance. Order 1 is A then B; Order 2 is B then A.

False Positives. The analysis of negative responses revealed a main effect for exam qualified by an exam by administration order interaction, $F(1, 171) = 6.58, p < .05, \eta_p^2 = .037$. Cicchetti interaction post hoc tests were conducted to test for specific differences between cells of the exam by administration order interaction. Post-tests for both administration orders indicated that the extent of false positive responses observed for Exam A was significantly greater than the extent of false positive responses for Exam B (Table 10). Whereas for both Exams A and B, false positive means were higher when the exam was administered as post-course in comparison to when that exam was administered pre-course, neither of these differences was significant.

Table 10

Negative Responses–Exam by Administration Order

| | Order A then B | Order B then A |
|--------|----------------|----------------|
| Exam A | –19.06 (6.15) | –21.25 (6.32) |
| Exam B | –14.55 (6.27) | –13.58 (5.95) |

Note. Cells with matching superscripts do not differ significantly; those without matching superscripts differ at the $p < .05$ level.

Heuristic performance. The analysis of performance on the heuristic exam subscales revealed main effects for both exam and administration order, qualified by an exam by order

interaction, $F(1, 171) = 14.23, p < .01, \eta_p^2 = .08$. Cicchetti interaction post hoc tests revealed that Exam B scores were significantly higher when the exam was administered post-course (mean = 22.02, $SD = 8.41$) compared to pre-course administration (mean = 15.07, $SD = 9.29, p < .05$). There was no observed difference in performance on Exam A on the heuristic subscale by administration order (Figure 7).;

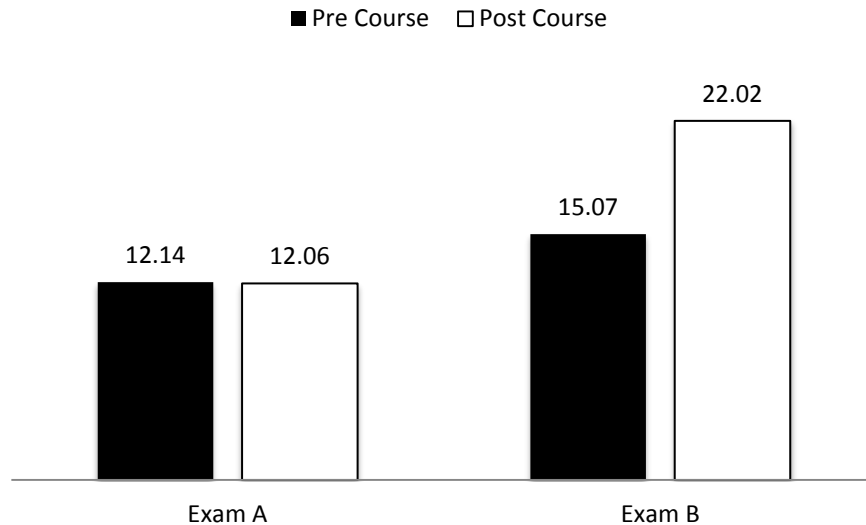


Figure 7. Performance for heuristic items.

Detail performance. The analysis of performance on the detail exam subscales revealed a main effect for exam qualified by an exam by administration order interaction, $F(1, 171) = 9.41, p < .05, \eta_p^2 = .052$. Post-tests revealed that, whereas there were no significant differences by administration order within each exam, Exam A and Exam B both exhibited higher means when administered post-course (Table 11 and Figure 8). Exam B scores were significantly higher than were Exam A scores in both administration orders.

Table 11

Detail Subscales–Exam by Administration Order

| | Order A then B | Order B then A |
|--------|----------------|----------------|
| Exam A | 9.34 (4.34) | 10.73 (5.28) |
| Exam B | 18.46 (6.10) | 16.78 (5.48) |

Note. Cells with matching superscripts do not differ significantly, those without matching superscripts differ at the $p < .05$ level.

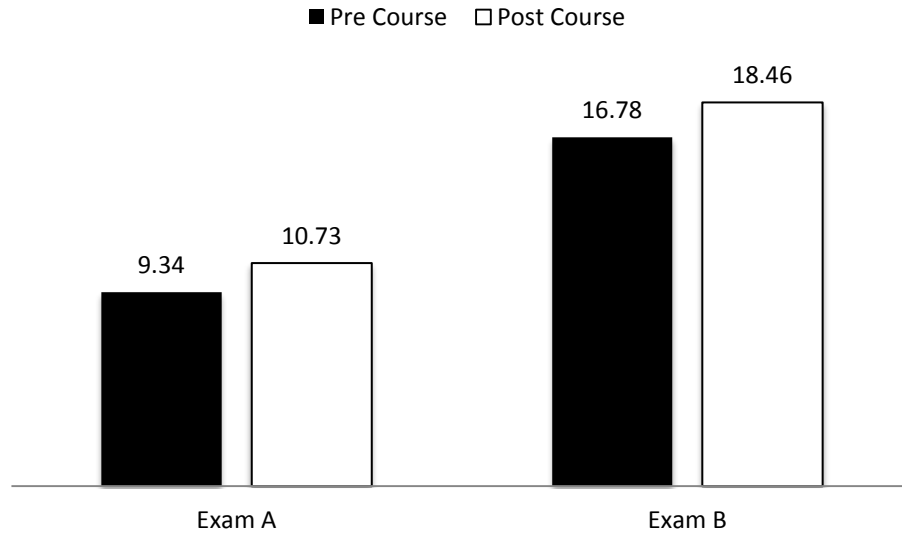


Figure 8. Performance on detail items. Performance was significantly greater on post-test for both Exam A and Exam B.

Discussion

The collective evidence viewed over all evaluations indicates that the ASAT program improves Soldier ability to identify pre-event indicators prior to violent action through the use of combat profiling techniques. Soldier AAR responses were overwhelmingly positive among both combat veterans and those Soldiers who have yet to deploy. The declarative knowledge tests demonstrated that student knowledge of ASAT curriculum significantly increases after exposure to the course. The video SJT examinations suggested that students are better able to identify details and scenarios from a law enforcement environment without a significant increase in false assertions after exposure to the course. However, the interpretation of the video SJTs' efficacy must be tempered by the fact that Exam A was, overall, more difficult than Exam B. This lack of parallelism between the two exams may have been due to their content: Exam A had over-representation of "Police Stops" while Exam B had over-representation of "Store Footage."

Evidence of the ability of ASAT to provide far transfer in detecting indicators of imminent aggression is provided by the results of the video examination. The video examination used short segments of law enforcement and surveillance scenarios, none longer than 2 minutes in length, to test student ability to engage in combat profiling and correctly identify scenarios and details. Clips were also of generally poor quality with regards to camera perspective and resolution. The nature of the test placed students at an immediate disadvantage in that:

- the tested subject domain significantly diverged from the Iraq/Afghanistan focus of the ASAT course;
- clip length prevented students from developing a scenario baseline as taught in ASAT;
- poor clip quality precluded highly detailed observation of some content; and

- video clips eliminated all sounds, smells, and other “atmospherics” taught as valuable observation tools in ASAT.

In spite of the handicaps introduced by the nature of the video exams, students still exhibited increases in their ability to accurately interpret the post-test video clip scenarios and exhibited only small, non-significant increases in false positives on this test when comparing pre and post-course administrations. The implication is that students did not engage in more guessing behavior, nor did they adopt a false confidence in their observations skills, but rather that the ASAT course gave the students the ability to more accurately observe the operational environment.

One of the more intriguing issues in the assessment of the ASAT program was to determine what skills are taught during ASAT versus what skills are learned. An extensive, in-depth review of the nonverbal behavior literature revealed no overlap with the majority of the content of the ASAT course. The most significant overlap witnessed was in the “gray literature,” among books written by former combat veterans and US Federal law enforcement agents. Interpretation of the content was further complicated by much of the ASAT curriculum that is possibly included not necessarily for its value in conveying fact but for means of general emphasis on the importance of observation. For example, the kinesics module of the course includes a component focused on the detection of deception. During this segment, ASAT instructors indicate that individuals about to provide truthful statements will “rub their foreheads, because their prefrontal cortexes heat up because they are thinking.” Whereas this point is based in the loosest interpretation of psychophysiology/neuroanatomy and incorrect, the teaching point is likely intended simply as emphasis on observing a target for external signs of cognition and/or anxiety.

It is clear that combat profiling is far more art than science, based on the collective experience of combat veterans, law enforcement personnel, and big game hunters. The underlying principles are mentioned in Army doctrine but generally scattered across multiple manuals and guides. The practices are relatively familiar to reconnaissance units and snipers, but generally foreign to most other Army personnel. Given the current understanding of the ASAT program, the most correct description of the program is that it facilitates Soldiers’ ability to interpret nonverbal indicators of imminent aggression.

The results, especially those of the video examination, support that ASAT teaches skills that are applicable across multiple domains of Army operations. Operation Enduring Freedom was almost exclusively a counterinsurgency operation, and the skills taught in ASAT are most valuable in counterinsurgency and policing operations. A continued emphasis on training Soldiers to accurately interpret nonverbal behaviors will prove valuable as US forces continue current and future counterinsurgency operations.

Consistent with previous limited work on video based SJTs, the research successfully produced and demonstrated the feasibility of video-based examinations of socially based tasks. The tests and procedures used in this investigation are in need of more refinement and would benefit greatly from higher quality stimuli. Despite their shortcomings, they still detected improvement in a domain that is very difficult to capture. We believe that the exams produced in

this investigation can serve as a precursor model for future efforts to test qualitative skills in a variety of settings.

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Appendix

Overview of ASAT Course Material

ASAT training does not teach a new approach to situation awareness (SA) information management or integration, nor does it espouse a new model of understanding SA. What ASAT training does attempt is to provide Soldiers with a set of goals, objectives, observation tools, and expectations with which to perceive the operational environment (Level 1) along with the knowledge base and cognitive skills necessary to comprehend incoming information (Level 2) and make projections (Level 3) that influence the military decision making process and subsequent actions. At its core, ASAT training is intended to provide Soldiers with the ability to interpret the “language” of nonverbal behavior in the context of the operational environment. The ASAT course includes instructional modules that focus on domains of combat profiling, combat multipliers, the terrorist planning cycle, and advanced observation techniques. The majority of the ASAT course focuses on combat profiling techniques.

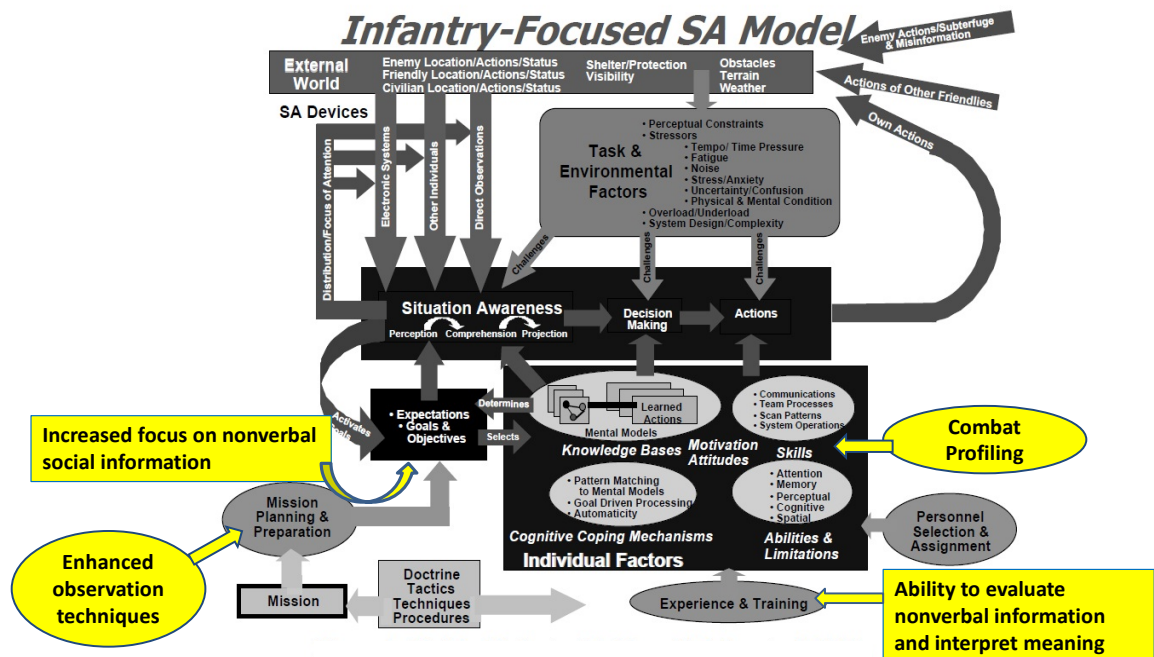


Figure A1. Model of Infantry SA (from Endsley et al., 2000)

Combat Profiling

Combat profiling refers to the ASAT system of observing and interpreting the nonverbal behaviors of combatants and civilians in an operational environment. The ASAT combat profiling module is divided into six distinct “domains,” each of which addresses a separate aspect of nonverbal behavior. These domains include biometrics, kinesics, proxemics,

geographics, heuristics, and atmospherics. The unifying theme of all six domains is the identification of “anomalies,” described as events standing out from the environmental baseline. Students are taught to focus on nonverbal behavior as a means of identifying shifts from baseline that can serve as pre-event indicators. All behaviors that are the focus of the ASAT curriculum are described as universally displayed and interpreted across cultures and difficult or impossible to intentionally control or manipulate.

The six domains are outlined below.

- a. *Biometrics*. Biometrics refers to observable physiological reactions that correspond to internal/mental states. The training focuses on pupil dilation, “histamine flush” (blushing), and sweating as a means of detecting arousal. Particular attention is paid to detecting these indicators among isolated individuals within an environment as a means of identifying individuals who are in a heightened state of arousal while those around them are not. Identifying individuals among which high levels of arousal do not correspond to that of those in the immediate vicinity can facilitate detection of pre-event indicators. The use of thermal sights to detect the thermal signatures of targets is included in the biometrics domain.
- b. *Kinesics*. Kinesics refers to culturally universal nonverbal behavior that corresponds to a target’s internal state. The kinesics domain focuses on four observable behavioral clusters: group inclusion cues, deception indicators, aggression indicators, and displays of dominance.

Group inclusion cues are a cluster of nonverbal behaviors that indicate both the focus of a target’s attention during a social interaction and if that interaction is open to others. Stance with regards to foot direction is taught as a significant indicator of the exclusivity of a conversation; in exclusive two-person conversations, each individual will point directly towards the other conversant forming a “box” which discourages other individuals from attempting to enter the conversation. Another sign of exclusion is “blading,” where conversants turn their backs (shoulder blades) to those that might attempt to join the conversation. Open conversations can be observed as each conversant has one foot pointed towards the other conversant and the other pointed out, opening a “triangle” as an invitation for others to join the conversation. Generally, throughout the conversation, posture and direction of foot pointing will indicate the target of attention. Other signs of inclusion include head nodding and hand gestures that sweep in towards the chest of the speaker.

Deception indicators are taught as a cluster of behaviors may be exhibited as a target speaks. These behaviors include a target looking down and to the left when talking, touching his or her nose, a significant increase in blink rate, automatic nodding of the head that indicates agreement or disagreement with a statement, licking of the lips, and rubbing the ears. Also, a “histamine flush” as discussed in the biometrics domain may accompany these indicators, as physiological arousal may accompany deception. Rubbing of the forehead is described as a pre-statement indicator that a target is about to tell the truth.

Aggression indicators are taught as a cluster of behaviors associated with an aggressive internal state and are often indicators of an impending attack. Facial indicators noted include flared nostrils, clenching of the eyebrows and closing of the eyes in disagreement during an interaction. Physical indicators include crossed arms and balled fists, along with histamine flush as an indicator of arousal.

Displays of dominance comprise several types of nonverbal behaviors. The most often discussed and most common is the target stance of hands on hips. This makes the individual appear larger, and emphasizes a target's sex through the placement of hands. Males and females are described as modifying this stance to point toward their respective reproductive organs: males towards the front of the pelvis, females towards the rear. During handshakes, the rotation of a target's hand a quarter turn counterclockwise, over the hand of the other individual is described as a sign of dominance. Crossed arms and balled fists are both cited as signs of aggression or discontent. A target turning his or her head to the side to reveal the jugular area is described as a sign of submission. Additionally, a readily recognizable "predatory look" is described that is often accompanied with a "mission focus" that can be used as a means of recognizing the precursors of an imminent attack.

- c. *Proxemics*. Proxemics is a focus on relative spatial distances between individuals as a means of evaluating targets within the environment. Training in the proxemics domain comprises three focus areas: High Value Individual/Target (HVI/HVT) indicators, the significance of proxemic pushes and pulls, and the tactical importance of standoff (distance from a target).

HVT identification is often the goal of surveillance efforts and necessary prior to a high proportion of aerial strikes and ground raids. Identification of an HVT is not always possible through facial recognition or the presence of a uniform, particularly when little intelligence is available regarding a target. ASAT teaches a cluster of indicant behaviors that, when conducted in close physical proximity to a target, indicate HVT or HVI status for that target. The acronym MADE, representing *mimicry*, *adoration* (positive or negative), *direction*, and *entourage* (the presence of) is taught to students as a mnemonic for identifying a target as a HVT. The observation of multiple indicators directed towards a single target signifies the possibility that a target is an HVT.

Proxemic pushes and pulls are described as natural approaches and repulsions towards individuals and objects in the environment that are visible during routine reconnaissance and patrolling. Simply described, individuals are naturally attracted to things that they like or feel comfortable around and repulsed from those things that they dislike or become uncomfortable in the presence of. Observing pushes is a particularly effective means of detecting shifts from baseline, as a local crowd will often exhibit a proxemic push and keep an unusual distance from an insurgent about to carry out an attack on coalition forces.

- d. *Geographics*. As taught in ASAT, geographics describes a means of perceiving the terrain in terms of the people and social groups that frequent an area. Three general concepts are communicated throughout this module—natural lines of drift, anchor areas, and habitual areas.

Natural lines of drift are described in multiple land navigation training courses and manuals as areas that are, by terrain characteristics, more easily traversed than are surrounding areas. In these areas, less thick underbrush, downhill slopes, or more even ground lead humans and animals traveling in the area to gravitate towards and stay in these natural lanes. In the ASAT curriculum, the natural line of drift is framed in terms of an urban or town setting and in identifying where people tend to move while they travel within an urban setting in order to better identify when an individual may be out of a baseline routine.

Anchor areas are frequented by members of a specific group. These areas are described as controlled and inhabited only by members and affiliates of a specific group and often marked by significant iconography (see atmospherics, below). Once identified, anchor points not only serve to designate individuals at a particular location as group members, but can help predict post-attack travel routes when considered along with natural lines of drift.

Habitual areas are described as areas frequented by many individuals from multiple groups. These areas include markets, roads, town centers, and other areas generally considered public and that frequently solicit crowds.

- e. *Heuristics*. Heuristics refers to a process of interpreting observations by matching them to mental models developed through experience, education, or shared knowledge. SMEs describe heuristic matches as, “tactical shortcuts,” through which enemy tasks such as reconnaissance, bounding overwatch, infiltration, and sniper emplacement can be quickly and efficiently identified. The use of the heuristics domain is described as a game of charades, in which observations of excerpts from a series of events can be used to extrapolate the entirety of a target’s actions and intentions.

Heuristics are described as used both as a means of detecting attacks and as a means of perpetrating attacks. Social camouflage is a method by which insurgents can use the local populace as a means of obscuring offensive operations. This technique is utilized when common dress and tasks, such as building maintenance carried out by laborers, are used to obscure items and operations. For example, an insurgent two-man sniper team using social camouflage would take on the dress and tools of men gathering firewood in order to scout possible positions and emplace while carrying their equipment hidden within these tools. A related technique, urban masking, is commonly used to conceal IEDs, and involves placing weapons in the environment that are cloaked as mundane items, such as roadside trash or a vehicle that has run out of fuel.

- f. *Atmospherics.* Atmospherics refers to the gestalt of the information present in an area at any given period of time. This information includes all five senses, with a focus on sights, sounds, and smells. Atmospherics is taught as a means of detecting pre-event indicators by establishing a baseline for events that occur within an area, such as call to prayer and the opening of storefronts. The process of “baselining” an area can allow trained Soldiers to detect when something unusual has occurred or is about to occur.

Iconography is included in the instruction for the atmospherics domain of combat profiling. Iconography includes all aspects of dress, adornment, and building or structure labeling (specifically including graffiti) that indicates group allegiance and ideology.

Five Combat Multipliers

Combat multipliers are defined as actions that can increase the likelihood of mission success in the absence of changes to the size of existing units (FM 101-5-1, 1997). ASAT curriculum includes instruction on the use of five “combat multipliers” that do not explicitly appear in Army doctrine. The ASAT “combat multipliers” are described as practices that maximize the impact of the skills taught during the course. In the following sections, each combat multiplier is described and discussed in terms of supporting doctrine.

1. *Tactical Cunning.* ASAT describes tactical cunning as the ability to “see the battle space through the enemy’s eyes” by using combat profiling techniques to recognize and correctly interpret pre-event indicators. Perspective taking is integral to this ability; students are taught to project enemy objectives and intentions in order to determine both intended final outcomes for an enemy operation and an operation’s current stage of execution in the terrorist planning process. Tactical cunning is defined in FM 3-24 (U.S. Army, 2006) Chapter 7, paragraph 6 as, “the art of employing fundamental skills of the profession in shrewd and crafty ways to out-think and out-adapt enemies.” Emphasis is placed on the training of all levels of leadership in this skill in FM 3-24.

2. *Tactical Patience.* ASAT describes tactical patience as “speeding up or slowing down the battlefield” to a unit’s advantage. The ASAT program teaches that increased situational awareness of an AO (tactical cunning) resulting from combat profiling allows combat leaders to anticipate significant events. Tactical patience is exercised when a leader waits for conditions to be favorable for mission success prior to initiating actions. As taught by ASAT, the improvements to small unit situational awareness resulting from combat profiling can be used to improve tactical patience; knowing enemy intent can lead to execution of well-timed operations that deny the enemy offensive operations and effective defensive positions. The term tactical patience is not explicitly defined within Army doctrine, but appears in Army FM 7-15 (U.S. Army, 2009) and is commonly used in numerous training environments.

3. *Geometry of Fires.* The ASAT program teaches “geometry of fires” as a metaphor to illustrate the concept of multi-faceted intelligence collection. Geometry of fires refers to overlapping sectors of fire—an integral concept in small unit tactics, particularly when occupying

defensive positions. ASAT applies the concept of 360° sector security and overlapping sectors of fire to intelligence gathering, stressing the importance of careful coordination of intelligence gathering efforts. ASAT teaches that every Soldier can gather information through combat profiling that may be integral to determining enemy actions, but that carefully planned intelligence sharing practices are necessary in order to consolidate this information and develop comprehensive situational awareness. ASAT training indicates that every Soldier should be taught combat profiling techniques and tasked with reporting perceived critical information when it is detected. Special emphasis is placed on the two-way vertical and horizontal flow of information, outlining the need for Soldiers to be able to share information with peers, subordinates, and superiors in real time.

ASAT training includes special emphasis on the use of Observation Posts (OPs) on the battlefield, traditionally conceived of as a tactical position intended for early warning and manned by a fire-team sized element (FM 3-21.8, 2007). ASAT teaches that OPs should exploit the capabilities of specialized optics and can be placed anywhere on the battlefield.

4. *Guardian Angel.* The ASAT concept of guardian angel directly corresponds to the bounding overwatch movement technique. ASAT emphasizes the use of overwatch (guardian angel) in all asymmetric warfare environments to enhance security and situational awareness. Overwatch positions are able to observe pre-event indicators that maneuver elements cannot, due to their perspective of the battlefield, offering the potential to detect enemy threats prior to execution. Overwatch positions also observe events that occur as a direct reaction to the presence of a maneuver unit and can often detect highly valuable diagnostic indicators that would otherwise go unnoticed.

5. *Good Shepherd.* The ASAT concept of good shepherd directly corresponds to the concept of winning the “hearts and minds” of the local populace. This is integral to counterinsurgency doctrine and is specifically addressed in FM 3-24 (U.S. Army, 2006). “Winning hearts” is described as convincing the local population that COIN success is in their best interests. “Winning minds” is described as convincing the local populace that COIN forces are both able to offer regional security and unable to be defeated. Sensitivity to the local populace and relationships with local leaders are essential to achieving both of these goals. ASAT also describes good shepherd as a means of positive mentoring within the small unit that facilitates the exchange of information regarding combat profiling techniques.

The Seven Step Terrorist Planning Cycle

The ASAT program teaches a seven step terrorist planning cycle to help Soldiers interpret information about the enemy perceived through combat profiling. After enemy forces are identified and their intentions determined, identifying the current stage of their efforts can help leaders to use tactical patience in order to maximize the effectiveness of counter operations. Additionally, knowledge of the seven step model may help Soldiers make an “heuristic match” when observing the enemy executing a step in the cycle. The ASAT model of the terrorist planning cycle directly corresponds to that included in Army doctrine (TRADOC G2 Handbook No. 1, 2007; *A Military Guide to Terrorism in the Twenty-First Century*). The following section provides a brief description of each step as described by the ASAT program. These descriptions are altogether consistent with Army doctrine and no content comparison is included.

1. *Broad Target Selection.* When planning an attack, terrorists will develop a list of potential targets. Potential targets are selected considering location, opportunities for attack, group associations, and symbolic value. Soft targets are the most desirable and most commonly chosen, as they maximize likelihood of mission success. Consideration is given to target criticality within the immediate social infrastructure, casualties that can be inflicted at the target site, and the likely public attention resulting from an attack on each target. At this stage of the planning process, media, internet, and other sources of background information are used to screen potential targets. Targets meeting the needs of the terrorist mission and with sufficient vulnerabilities will be more intensely investigated during the intelligence and surveillance step.

2. *Intelligence and Surveillance.* Once a list of targets is developed, terrorists will conduct surveillance and gather intelligence on each potential target. The information collected for each potential target includes a focus on routines, physical layout, security measures, and SOPs. This information may be gathered for a period of years and includes primarily passive means of intelligence gathering.

3. *Specific Target Selection.* Once intelligence collection efforts have yielded the necessary information regarding all potential targets, a specific target is selected for operational planning. This target is selected considering the effects of a successful attack with regards to a larger audience, media attention, consistency with the intended political statement, larger group objectives, demonstration of the group's capabilities, and a cost/benefit consideration. Once the most desirable target is selected, pre-attack surveillance and planning will begin, although continued surveillance of non-selected targets may continue if they are deemed to be potential targets for future operations.

4. *Pre-Attack Surveillance and Planning.* Pre-attack surveillance is often carried out by trained operatives for days or weeks prior to an attack. During this phase, target weaknesses and security procedures are better specified, type of attack is decided, recruitment of required specialized operatives takes place, and preparatory operations—including establishing a base of operations and escape routes—are conducted. This process results in a highly specific plan of attack, including the precise means and intended dates of plan execution. This specific attack plan is then rehearsed prior to execution.

5. *Attack Rehearsal.* The attack rehearsals conducted by terrorist groups are similar to those conducted by conventional military organizations. Terrorists rehearse transportation, employment of weapons systems, and coordinated execution of the mission. Target security reactions are often closely scrutinized during this phase as a form of advanced surveillance, with careful attention paid to security force reactions to specific scenarios. Often operatives are employed to probe security forces, rehearse infiltration and escape routes, and to confirm target information including physical layout, patterns of activities, and security force capabilities. Rehearsals provide the final preparation and plan revisions directly prior to execution. Careful observation on the part of security forces during this late phase of preparation can often detect an imminent terrorist attack and may even reveal the intended method of attack.

6. *Actions on Objective.* In a carefully planned terrorist attack, target selection, planning, and rehearsal will optimally exploit target weaknesses. The terrorist will possess all the advantages of initiative by employing the use of surprise, setting the conditions of attack (including time and location), retaining the ability to use both diversions and follow-up attacks, and by ensuring the opportunity to employ both security and support positions. After completing the attack, terrorist operatives will immediately execute the escape and evasion plan.

7. *Escape and Evasion.* Escape and evasion plans are universal to all attacks and generally well rehearsed. In the case of suicide attacks, the act of dying during the attack serves as its own escape plan for the attacker, but the personnel supporting the attacker will require their own escape and evasion plan. Knowing local habitual areas and group-specific anchor points can lead to the interception of terrorist operatives post-attack.