COACHING TECHNIQUES FOR ADAPTIVE THINKING

James W. Lussier, Ph.D.
U.S. Army Research Institute
Fort Knox, Kentucky

Karol G. Ross, Ph.D.
U.S. Army Research Laboratory
Fort Sill, Oklahoma

Bob Mayes
Booz, Allen, and Hamilton
Leavenworth, Kansas

ABSTRACT

The Adaptive Thinking Training Methodology was developed in a cooperative effort between the U.S. Army Research Institute (ARI) and the U.S. Army Research Laboratory (ARL) as part of the Army Experiment 6 program. It was successfully tested in 1999 in an experimental program of instruction as part of the Advanced Tactics Elective at the Command and General Staff College (CGSC) at Fort Leavenworth. The following year the methodology was applied in the Medium Brigade Course at CGSC under the auspices of the Training and Doctrine Command s (TRADOC) Army Transformation program. The methodology was also used in the Staff Leader Course provided by TRADOC to key personnel in the Initial Brigade Combat Team. The term Adaptive Thinking is used in both courses to describe the cognitive behavior of an officer who is confronted by unanticipated circumstances during the execution of a planned military operation. The training methodology involves performance-oriented, case-based training designed to promote the development of expert habits of thought, i.e., teaching the students how to think like experts. Repetitive performance under varying conditions is used along with carefully designed probes, which are inserted to set the conditions for student performance and to facilitate observation and measurement. A key element of the training program employs theme-based coaching, in which the coaches, alert for evidence of the student s adherence to the course themes, provide just enough guidance to facilitate student development while still leaving the performance requirement to the students. This aspect of coaching is termed scaffolding. ARI and ARL scientists combined to present training sessions for the military experts who served as coaches. Their approach to coaching presented a challenge to several traditions of Army training, especially for those who had served as observer/controllers (O/Cs) at a combat training center (CTC). The scaffolding process was in distinct contrast to hands-off observation style characteristic of CTC O/Cs. The Army maxim Tell them what you re going to tell them, tell them, tell them what you ve told them is contrary to the constructivist spirit of the coaching in which students must learn to guide their own activities with the least possible prompting. Train as you fight is another Army philosophy that is not strictly adhered to as the methodology is based on deliberate practice concepts with focus on normally unconscious elements of performance and frequent repetition. The culmination of the effort to identify coaching techniques is documented in the Army Transformation product, Leader's Guide for Mentoring Adaptive Thinking that was disseminated 2000 Convention of the Association of United States Army.

Dr. James Lussier currently holds a position at the Fort Knox Research Unit of the Army Research Institute (ARI). He previously worked as a psychologist at the Fort Leavenworth Research Unit of the Army Research Institute since 1984. Research interests include command and control, group planning and problem solving and battlefield thinking skills. He received an A.B. degree in Psychology from Columbia University and a Ph.D. in Experimental Psychology at Fordham University. Dr. Lussier served with the U.S. Army as an interrogator with the XVIII Airborne Corps. He holds the title of expert with the United States Chess Federation.

Dr. Karol Ross is a Research Psychologist for the U.S. Army Research Laboratory. She previously served as a Senior Research Scientist with Raytheon Systems Company, Inc. She is the principal investigator for Battle Staff Training research at the U.S. Army Depth & Simultaneous Attack Battle Laboratory, Fort Sill, Oklahoma. She earned her doctoral degree from the University of Tennessee in Experimental Psychology in 1984.

Mr. Bob Mayes is a retired Army officer working for the consulting firm of Booz, Allen, and Hamilton. He is currently working Army Transformation, the Initial Brigade Combat Team Senior Leaders Course, and Wargaming in the Joint arena.

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In 1999, Gen Abrams, commander of the Army Training and Doctrine Command (TRADOC) challenged the behavioral scientists who were participating in the TRADOC sponsored Army Experiment 6 (AE6) program: Find a method to train commanders and staff officers *how to think* rather than *what to think* and thereby increase their ability to think adaptively. Adaptive thinking was defined as follows. A unit has crossed the Line of Departure and is engaged in executing a planned military operation. Unanticipated events occur. The skillful commander will, performing adaptively, make adjustments within the context of the plan to either exploit the advantage or minimize the harm of the unanticipated event, in short, will *adapt* to conditions for a more successful outcome.

Adaptive thinking, as defined above, can be thought of as thinking on one s feet, framed in terms of the battlefield. In this viewpoint adaptive thinking is not so much a type of thinking like, for example, creative, lateral, or out-of-the-box thinking but rather it is based on the conditions under which it occurs. These are the conditions under which clear insightful thinking is very challenging. Consider the following vignette.

At the National Training Center a Battalion level breach is underway. The operation is progressing typically; the unit is at the obstacle, making progress towards accomplishing the task, but has been slowed and is taking heavy casualties, most from artillery. The commander is at the breach site. Suddenly he receives word on the radio. A reconnaissance section has reported a bypass. The commander orders his companies to maneuver right into the bypass. One, two, three, companies maneuver into the supposed bypass, in reality an enemy kill zone, and are destroyed.

The decision-making environment facing the military commander is challenging. He begins with a detailed plan but as he executes, he must constantly make adjustments, altering timing, taking advantage of unforeseen opportunities, and overcoming unexpected difficulties, in short, adjusting or adapting the plan. The thinking that underlies these decisions is not made in isolation or in a calm reflective environment. He must do this thinking while performing as commander: assessing the situation, scanning for new information, dealing with individuals under stress, monitoring progress of multiple activities of a complex plan. Multitudes of events compete for his attention. No easy guidelines can be applied. For example, mistakenly changing a plan midcourse is as common as stubbornly pursuing a failing plan. And typically there is the pressure of time, as all options become less prospective with delay.

Experts, in various fields, are those who can perform well under such conditions. The determining factor is usually not knowledge alone. The commander in the example above had no lack of understanding about the nature of obstacles and kill zones. Only two days earlier, he had planned a deliberate defense in which he had constructed an obstacle with the express intent of inducing the enemy into his kill zone. Tactical knowledge was not the problem; the difficulty lies in applying one s knowledge in complex situations which can overwhelm one s limited ability to attend to events and think through decisions while under extreme pressure or stress. Most intermediate level officers have considerable verbal knowledge about their field, but applying the knowledge during a real or simulated military operation requires great conscious attention and is often done poorly.

THE ADAPTIVE THINKING TRAINING METHODOLOGY

The solution reached by the AE6 adaptive thinking team (Ross & Lussier, 1999) is called the Adaptive Thinking Training Methodology (ATTM). ATTM is a combination of behaviorist and constructivist methods. On the behaviorist side, deliberate practice exercises are used to develop battlefield thinking habits characteristic of experts, for example, to model a thinking enemy, to see the battlefield from a larger perspective, and to visualize accurately, dynamically, and proactively. Thus the ATTM does not train adaptive thinking per se but focuses on creating the automatic habits that enables adaptive thinking during execution of military operations to flourish. A key component of ATTM is coaching, as subject matter experts (SMEs) observe and guide the students with regard to the expert habits. In this arena, the constructivist influence is felt strongly; coaching techniques are guided by the concept of scaffolding. Since its development, ATTM has been widely used at Fort Leavenworth, in 1999 in the Advanced Tactics course, and in 2000 in the Medium

Brigade course, and in the Senior Leader s Course for the Initial Brigade Combat Team. The TRADOC Training Initiatives Office for Army Transformation has prepared a draft training circular describing the concepts. The remainder of this paper addresses some aspects related to the coaching function of ATTM.

TRAIN AS YOU FIGHT

The maxim train as you fight has risen to such a level of familiarity in the .US. Army that the value of the notion goes almost unquestioned. Yet studies of the development of expertise clearly indicate that as you fight meaning performing in fully realistic simulated battles is neither the most effective nor efficient method of developing expertise. Such performances can help a novice become acquainted with applying military knowledge, and can reinforce existing knowledge in an experienced person, but will not in and of themselves lead to the development of expertise. In many fields where expertise has been systematically studied, including chess, music and sports, development beyond intermediate level requires large amounts of deliberate practice (Ericsson, Krampe & Tesch-R mer, 1993) and good coaching (Ericsson, 1996; Charness, Krampe & Mayr, 1996). The combination of long periods of study, relatively few chances to practice, and little or no deliberate practice with quality coaching has led to a situation in the army where most officers can talk an excellent battle command game, but reveal only an amateurish effort in actual performance.

How does deliberate practice differ from performance or from casual exercise? Here are some characteristics that distinguish deliberate practice.

1. **Repetition**. Task performance occurs repetitively rather than at its naturally occurring frequency. A goal of deliberate practice is to develop habits that operate expertly and automatically. If appropriate situations occur relatively infrequently or widely spaced apart while performing as you fight they will not become habitual as readily.

2. **Focused feedback.** Task performance is evaluated by the coach or learner during performance. There is a focus on elements of form, critical parts of how one does the task. During a performance these elements appear in a more holistic fashion.

3. **Immediacy of performance**. After corrective feedback on task performance there is an immediate repetition so that the task can be performed more in accordance with expert norms. When there is feedback during a performance, it is often presented during an after-action review (AAR) and there is usually not an opportunity to perform in accordance with the feedback for some time.

4. **Stop and start.** Because of the repetition and feedback, deliberate practice is typically seen as a series of short performances rather than a continuous flow.

5. **Emphasis on difficult aspects**. Deliberate practice will focus on more difficult aspects. For example, when flying an airplane normally only a small percentage of one s flight time is consumed by takeoffs and landings. In deliberate practice simulators, a large portion of the time will be involved in landings and takeoffs and relatively little in steady level flight. Similarly, rarely occurring emergencies can be exercised very frequently in deliberate practice.

6. **Focus on areas of weakness.** Deliberate practice can be tailored to the individual and focused on areas of weakness. During "train as you fight" performances the individual will avoid situations in which he knows he is weak, and rightly so as there is a desire to do one s best.

7. **Conscious focus.** Expert behavior is characterized by many aspects being performed with little conscious effort. Such automatic elements have been built from past performances and constitute skilled behavior. In fact, normally, when the expert consciously attends to the elements, performance is degraded. In deliberate practice the learner may consciously attend to the element because improving performance at the task is more important in this situation than performing one s best. After a number of repetitions attending to the element to assure that it is performed as desired, the learner resumes performing without consciously attending to the element.

8. **Work vs. play.** Characteristically, deliberate practice feels more like work and is more effortful than casual performance. The motivation to engage in deliberate practice generally comes from a sense that one is improving in skill.

9. **Active coaching**. Typically a coach must be very active during deliberate practice, monitoring performance, assessing adequacy, and controlling the structure of training. Typically in train as you fight performances there are no coaches. Instead there are observers/controllers who attempt to interfere as little as possible in the performance.

STRUCTURE FOR DELIBERATE PRACTICE OF BATTLE COMMAND

As can be seen from the above considerations, development of a trainer for deliberate practice in battle command entails construction of a specialized technology to provide the training and support the coaching. Such a development effort was undertaken by the center for Army Tactics of the Command and General Staff College, with the support of TRADOC Army Experiment 5 and Army Experiment 6 programs and the Army Transformation Program. The system, called the Digital Leader Reaction Course (DLRC), comprises a low overhead brigade level tactical simulator, which is capable of rapid stop and restart with some rewind capability into which probes can be inserted on-the-fly.

Themes

Three key elements of the methodology facilitate the interaction between the coaches and the learners. The first of these are what are called the themes. These are thinking behaviors (the how to think element) that are characteristic of high level tactical experts. They are the elements of expert tactical thinking form that the coaches are observing and the students are modeling. While well known to most officers at brigade staff level and understood at a conceptual level, these behaviors are often not exhibited by the officers during actual exercises. They have not been automatized and thus, when the officers attention is focused, as it should be, on the specific situation confronting them the behaviors are omitted. The themes for brigade tactical decision making that were used are:

- Model a **thinking** enemy.
- Keep a focus on **mission accomplishment** and **higher commander's intent.**
- Exhibit visualizations that are **dynamic, proactive and flexible.**
- Show rich **contingency** thinking.
- Consider where your fight fits into **the bigger picture** of what is happening/should happen both from friendly and enemy perspectives.
- Consider **all elements/systems** available to you and your enemy and their interactions.
- Include considerations of **timing**.

Sim-Huddle-Sim

The second methodological element that facilitates the coach learner interaction is called sim-huddle-sim. The procedure wherein the officers fight in the brigade constructive simulation for a short while (approximately 45-90 minutes) until they have passed a critical decision phase. The simulation is then stopped and the coaches hold a brief (15 minute) huddle or feedback session. Immediately afterward the officers return to the situation to employ the ideas from the huddle. The simulation may restart at a point earlier than they previously finished so that they can refight the critical phase of the battle.

Probes

The third important structural element that facilitates coaching of battle command thinking skills is the probe. Since thinking is unobservable it is not so simple for the coach to watch the learner and assess the extent to which the themes are part of his or her thinking. A probe is a specific preplanned event, inserted in the exercise, that is carefully designed to elicit a reaction that reveals the extent to which the themes are considerations.

STUDENT-MENTOR INTERACTIONS

This section described the structure of the exercises and how the interaction by the coach is facilitated. The remainder of this paper focuses on the qualities of the coach-student interaction, in particular on the ideal for the interaction, termed scaffolding.

Scaffolding

Scaffolding has been described as a process that enables a novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts (Wood, Bruner, & Ross, 1976, p. 90). The hallmark of scaffolded instruction is its interactive nature . Critical to the teaching-learning process is the role of dialogue; it is the means by which support is provided and adjusted . The relationship between the learner and the teacher in this supportive dialogue is to be contrasted with that observed when students are left to discover or invent strategies independently or when students are passive observers who receive demonstrations and are talked at regarding strategy use (Palincsar, 1986, pp. 74-75).

Scaffolding is not the same thing as tutoring. The difference is shown in this example from educational research. In an experiment with students at least one grade level below their peers in mathematics, a control group was given tutoring and an experimental group participated in a constructivist style of instruction (Bransford, Sherwood, Hasselbring, Kinzer, & Willams, 1990). The control group received one-on-one instruction, worked on a number of math problems, and each student was shown the correct solution strategy after each problem. The experimental group received

one-on-one instruction, feedback on the strengths and weaknesses of their approach to each math problem, and they were encouraged to create visual and symbolic representations of problems. Students in the control group showed very little improvement in math skills. Students in the experimental group showed a great deal of improvement on the problems and in generalizing to new problems in new contexts. Tutoring or coaching one-on-one attention can be approached in several ways. How it is carried out can make the difference between whether there is a change in performance or no change after instruction.

Observing students as they actively struggle with problems in the first step to good scaffolding. Scaffolding starts to be applied as soon as the students receive the challenge, and they start trying to understand what the problem is and how it can be approached. This stage in the learning process is the hypothesis generation stage.

Good hypothesis generation distinguishes successful and unsuccessful students, but students may lack the skills to know how to generate or manage a hypothesis about the problem situation they have been given. First, they may not know what a good hypothesis should look like. A good hypothesis consists of variables and a relation between them. For example, if we do this action using these resources, we can expect this outcome. To help them generate their analysis of what is going on in a situation and what effect will be generated by various actions, the themes can be used to help bring the situation in focus.

Second, students may not be able to adapt their hypothesis about a given situation as data are gathered. Learners who do not know how to relate new information to their first impression of a situation, resist changing their hypothesis in the face of anomalous data by ignoring it, reinterpreting it, or making only marginal changes to their hypothesis. As one instructor in the Field Artillery Captain s Career Course observed during a simulation-based student exercise, the students picked a bad road and continued down it regardless of what happened. The students seemed to be in a comfort zone by sticking to their plan regardless of new input. And then sometimes students just cannot think of another hypothesis. Third, learners may also err the other way and abandon their ideas because they just do not know how to relate new information to a hypothesis. They may jump to conclusions that a hypothesis is wrong based on one bit of conflicting information, for example. If they cannot adapt their hypothesis to emerging data that does not exactly fit their original concept of the situation, their performance will be less adaptive.

One way to deal with hypothesis generation problems is to encourage simple what if thought experiments as students analyze a problem. Help them close in on their hypothesis of what is going on and what effect certain actions would have. Again, using the themes to examine the situation from several perspectives can encourage deeper understanding. Some students only try to confirm their original hypothesis with initial exploration, and other learners will tend to look at variations in so many things at once that they do not know what is causing what or what effect some action will have. Scaffolding will help produce more successful hypothesis generation.

After hypothesis generation, during problem solving, the instructor may need to provide scaffolding by using the themes to help the students focus on relevant information as it comes in. The instructor may also need to demonstrate some basic method at a lower learning level, if a gap in learning is holding the students back from higher level problem solving. One example of this type of scaffolding is the let me show you something technique. In this example the instructor may demonstrate a computer technique to a small group of students, usually no more than three to four. The instructor intervenes while the students are working on the problem by stating, Let me show you something. (This technique requires that the instructor be closely monitoring the problem-solving process.) The instructor then demonstrates one technique to the students. If this is a new technique for the students, they will likely spontaneously try it out a few times. This immediate performance reinforces the skill and allows the student group to then quickly refocus on the tactical problem. The spontaneous practice will provide some immediate positive feedback as the students overcome a technical obstacle embedded in the challenge.

Asking Questions

Much of scaffolding depends on the instructor s ability to ask the right kind of questions. Good questions help the instructor to gain insight into the students thinking process and stimulates the students to reflect on their conclusions and methods. At the most basic level, good questions are respectful and thoughtful. It s okay to have fun during the learning process, but questions that offend students and put them on the defensive will turn off the learning process.

Good questions are sensitive to where the students are in the learning process. Questions have a purpose as an instructional tool. In the case of training for adaptive thinking, we want to promote

understanding of how to use information to improve an individual and a staff s situational awareness with a deeper understanding to promote more adaptive performance. Situational awareness includes three levels of understanding. The three levels are 1) awareness of where things are on the battlefield and what their status is; 2) building an understanding of what the meaning of the situation is; and, 3) what is likely to happen next based on that meaning and what effects those actions may have (Endsley, 1998). Good questions are based on an understanding of the cognitive level at which students are working (lacking some basic knowledge, analyzing to determine meaning, etc.), and insight into what level of situational awareness the students have developed.

Good questions stimulate thoughtful observation by the students, and help students attend to their own ideas, not the instructor s ideas. Good questions build good habits of thinking in such areas as drawing conclusions, observing, seeing issues from more than one perspective, and questioning assumptions. The instructor must leave responsibility to the students, and follow the rhythm of the problem solving process. Introduction of information that students are not ready for, in either the form of a question or a mini-lecture, will have little or no impact on the students thinking. Good questions invite response and build trust for continued interaction. Some students may have an initial resistance to the open forum of discussion used in this type of instructional approach. Instructors may have to work to learn to ask good questions, and students may need to learn how to respond.

Good questions:

- Focus on the big ideas and get students out of the weeds
- Make students search productively for an answer
- Bring up new perspectives
- Are clearly stated

Bad questions are:

- Disrespectful
- Trivial
- Too big in scope
- Closed ended (yes or no answer required)
- Trick questions
- Ones you are really anxious to answer yourself as an instructor
- Too abstract or general (Wasserman, 1992).

Things to remember as you learn to scaffold the thinking skills of others during training:

- Students often experience frustration during the early phases of a course, especially during the first 8 to 12 hours of tactical exercises.
- Intervention with scaffolding can alleviate student frustration and enhances the learning experience, but should not take away all responsibility from the students.
- Lack of or ineffective scaffolding leads to very high student frustration levels and an overall reduction in learning efficiency. Strike a balance between challenge and support.
- Students who learn how to state a problem well will be more successful. Problem definition requires its own period of scaffolding and may have to be re-visited during the problem solving phase.
- Feedback is more effective when used in conjunction with the student briefback of the solution to the problem after an effort has been made by the students rather than during the effort when scaffolding is more important.
- The only way to learn to facilitate other people s development, as described here, is to try it and reflect on your success.

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