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Critical Thinking as Dialogue: A New Approach to Training Critical Thinking

Why Train Critical Thinking?

Our world is becoming increasingly complex with change arriving at a faster and faster rate. Our military troops are facing situations which they haven't encountered before and for which they haven't been trained. As Lieutenant General William Wallace noted immediately after the invasion of Iraq in 2003, this was a different enemy than the one we had wargamed. The ability to critically think through new problems and unexpected situations is not only desirable, it's essential. This means the acquisition of critical thinking skills is too important to leave to chance; these skills should be systematically and deliberately trained and developed.

A New Approach to Training Critical Thinking

Critical thinking has traditionally been conceptualized as taking place within the consciousness of a single individual, who rationally evaluates the reasons for beliefs and choices by means of universal (e.g. logical) standards. Richard Paul, in his book *Critical Thinking*, defined critical thinking as "A unique kind of purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards on thinking." Traditionally, training for critical thinking has focused on the use of tools, such as logic and probability, to evaluate the reasons for beliefs and choices.

But questions arise about the usefulness of training such skills for use in real world domains like the Army tactical battlefield: Will critical thinking take too much time, undermine the will to fight, supplant experience and even expertise, stifle innovation, or disrupt team *esprit de corps*?

Based on an analysis of current approaches to critical thinking and research in both cognition and communication, a new framework emerged that answers these challenges and is more likely to deliver the thinking skills required in real world contexts. The theory conceptualizes critical

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DIRECTORY

U.S. Army Research Institutefor the Behavioral and Social Sciences
Website: www.ari.army.mil

Director: 703.602.7798 • DSN: 332.7798
E-mail: ARI_DIR@ari.army.mil

Acting Technical Director
703.602.7766 • DSN: 332.7766
E-mail: ARI_TECHDIR@ari.army.mil

Advanced Training Methods Research Unit
703.602.5948 • DSN: 332.5948
E-mail: ARI_ATMRU@ari.army.mil

Armored Forces Research Unit (Fort Knox)
502.624.2613 • DSN: 464.2613
E-mail: ARI_AFRU@ari.army.mil

Army Personnel Survey Office
703.602.7858 • DSN: 332.7858
E-mail: ARI_APSO@ari.army.mil

Army Trends Analysis Research Unit
703.602.7852 • DSN: 332.7852
E-mail: ARI_ATAG@ari.army.mil

Basic Research Office
703.602.7935 • DSN: 332.7935
E-mail: ARI_BRO@ari.army.mil

Force Stabilization Research Unit (Boise)
208.334.9390 • DSN: None
E-mail: ARI_RCTRU@ari.army.mil

Fort Bragg Scientific Coordination Office
910.396.0874 • DSN: 236.0874
E-mail: ARI_BRAGG@ari.army.mil

Infantry Forces Research Unit (Fort Benning)
706.545.5589 • DSN: 835.5589
E-mail: ARI_IFRU@ari.army.mil

JFCOM Scientific Coordination Office
E-mail: ARI_JFCOM@ari.army.mil

Leader Development Research Unit (Fort Leavenworth)
913.684.9753 • DSN: 552.9753
E-mail: ARI_LDRU@ari.army.mil

Occupational Analysis Office
703.602.7826 • DSN: 332.7826
E-mail: ARI_OAO@ari.army.mil

Research Support Group
703.602.7999 • DSN: 332.7999
E-mail: ARI_RSG@ari.army.mil

Rotary-Wing Aviation Research Unit (Fort Rucker)
334.255.9318 • DSN: 558.9318
E-mail: ARI_RWARU@ari.army.mil

Selection and Assignment Research Unit
703.602.7763 • DSN: 332.7763
E-mail: ARI_SARU@ari.army.mil

Simulator Systems Research Unit (Orlando)
407.384.3981 • DSN: 970.3981
E-mail: ARI_SSRU@ari.army.mil

TRADOC Scientific Coordination Office
757.788.5623 • DSN: 680.5623
E-mail: ARI_TRADOC@ari.army.mil

From the Director

This issue of the *ARI Newsletter* focuses on some recent research findings on training and leader development as well as examples of useful research products.

Several articles highlight the importance of specifically designing training and education to cause learning in individuals and teams. For example, the article beginning on page 5 on training lessons learned in the *America's Army Game* looked at some factors which contributed to learning while playing the game. This popular game was designed, in part, to inform potential recruits about the Army. What we learned is that although the game does a good job teaching what we tested, procedural information was remembered better than factual information, and information presented in graphic mode was remembered better than printed text. From these and other findings, the researcher developed a number of recommendations to improve learning and motivation of players when designing new training games.

In the article on measuring situational awareness in radio communications, we describe a checklist of leader awareness (pages 9 and 10) that can be copied and used to assess the situational awareness of squad leaders in field settings.

Other articles contain examples of research we are performing to improve Army training and leader development as well as products that might be useful to the field. *Read on.*

Zita M. Simutis
Director and Chief Psychologist
of the United States Army

Critical Thinking as Dialogue (continued)

Continued from page 1

thinking as a dialogue. In general, a dialogue is any type of communicative exchange (verbal or non-verbal) between two or more people, such as a negotiation, deliberation, or expert interview, that has a characteristic structure of roles, constraints, and objectives. Critical thinking is a special type of dialogue whose purpose is to determine the acceptability of a belief or action, which proceeds by means of questions and answers about alternative possibilities, and which can be conducted both among different individuals and among different perspectives in a single person's head. One person (the opponent) or perspective asks questions in order to cast doubt on the belief or action, while another (the proponent) provides answers in order to defend or improve it. A third (the referee) keeps an eye on the external situation, decides which type of dialogue (if any) is appropriate, keeps the discussion on track, and determines when it must stop. In some circumstances, especially where time is very limited, intuitive or recognitional processes may be more reliable than conscious deliberation. Dialogue rules, roles, and purposes are not necessarily universal, but may be adapted to specific circumstances, such as the stakes, available time, the domain, or level of expertise of the participants. Logic and probability are means rather than ends, and may or may not be useful in challenging or defending a position and creatively generating alternatives. Ultimately the value of a dialogue is determined by its success in achieving real world goals under the relevant conditions.

A Theory of Critical Thinking As Dialogue

According to the dialogue approach, critical thinking is a process of asking and answering questions about alternative possibilities for situation understanding or action in order to achieve some objective. A critical thinking dialogue presupposes three different roles (but not necessarily three different persons): a proponent who defends a hypothesis or action, an opponent who challenges it, and a referee who regulates the dialogue so that it achieves the participants' objectives within the available time.

Figure 1 shows the dialogue model in terms of three levels. The first represents a dynamically evolving set of mental models of the situation or plan. These are the alternative possibilities that are under consideration by the proponent and opponent at any given time. Their contents include hypotheses about the situation and plan and assertions about the significance of evidence and goals. The number of alternative possible models and the ways in which they vary represent uncertainty. At the second level, these mental models are embedded in the give and take of a critical

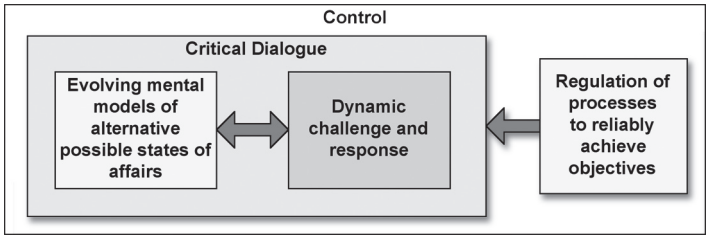

Figure 1. Overview of the theory of critical thinking as dialogue

thinking dialogue, in which the opponent tries to expand the number of possibilities and the proponent tries to reduce them. As questions are asked and answered, the critical dialogue continually increases the detail and depth with which the models are understood. The third level represents an external control process corresponding to the role of the referee. He monitors the relevance of the moves by each player to the goals of the dialogue as well as the contribution of the dialogue as a whole to achieving the larger task or purpose within the available time.

A critical dialogue should improve the participants' understanding of the situation and plan, help them learn more about one another's beliefs, assumptions, and interests, and generate more successful decisions.

Training Critical Thinking Through Dialogue

Based on these ideas, the training package, *Critical Thinking Through Dialogue*, was developed. Training takes trainees through four phases of a critical dialogue: (1) identifying a disagreement, (2) deciding how to resolve it, (3) challenging and defending positions, and (4) resolution. In recent tests, training classes consisted of groups of 2-4 participants with instruction presented via slides and handouts by an instructor. Training begins with a discussion of the concept of critical thinking with the instructor describing the three roles (proponent, opponent, and referee) and the associated rules.

The four phases of critical thinking dialogue are then described (See Table 1 on next page). The presentation of each phase is accompanied by a discussion of the tasks and principles associated with each phase, guided dialogue practice using tactical decision games, and feedback from the instructor. Participants are taught specific rules as well as more general principles for critical dialogue, common ways in which a rule tends to be violated ("fouls"), and examples of each kind of violation. Two of these rules are shown in Table 2 (next page). The high-level objectives of the training include leading participants to surface and make effective use of information not previously shared and to seek creative solutions rather than settle for premature compromises.

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Critical Thinking as Dialogue (continued)

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Preliminary evaluation results

Fifty-four active duty Army officers from four Army installations participated in the evaluation. Initial data analyses suggest that dialogue training leads to improved performance in real world tasks and improved collaborative problem solving. Results showed that trained groups were more likely than untrained groups to recognize and set aside areas of agreement and to focus on areas of disagreement. They were also more likely to ask for and give reasons and less likely to prevent one another from expressing their views by interrupting. In addition to these process improvements, dialogue training led to an increase in new solutions that first emerged in the group discussion itself.

Table 1. Phases of a critical discussion and associated tasks

Stage	Tasks
1: Confronting opinions	a. Individuals think about problem separately. (Group is more effective after members have thought about issues independently, even for a short time.) b. Express own views. c. Learn what others' positions are and why. Ask for clarification if not clear. d. Recognize and expand areas of agreement (e.g., settling minor differences). e. Recognize and understand significant disagreements.
2: Planning discussion	a. Determine what disagreements are important enough to discuss; prioritize them. If there is no disagreement, determine most critical issues or uncertainties. b. For high priority issue(s): Decide approximately how much time you have. Decide who plays primary roles of defender and challenger. (If players have competing claims, each plays both roles.) If there is no referee, appoint someone for first issue. If not enough or too many people double up or share roles.
3: Point-counterpoint	a. Parties take turns. b. Proponent must respond directly to each challenge by the other side. Each response must defend position with reasons, modify the position, or concede. c. Opponent must either challenge the other position or concede. A challenge can demand a defense, question the truth of a reason, question the sufficiency or relevance of a reason, or present an alternative coherent viewpoint (e.g., a better explanation of the observations). d. Referee watches time, keeps discussion going, and makes sure rules are followed.
4: Decision	a. End discussion when parties agree, or referee declares time is up. b. Identify recommendation or decision of the group: Whatever parties agree to, or whatever the referee decides. c. Summarize strengths and weaknesses of each side, and explain why decision was made.

Table 2. Basic rules for critical dialogue

Rule	Fouls to avoid	Examples of foul
A Don't suppress disagreement, or prevent each other from defending or challenging positions.	No intimidation by use of authority or expertise Don't distort others' views (create a strawman) No personal attacks on competence or motives No appeals to sympathy of other party	If I want your views, I'll ask for them. So, you cowards just want to cut and run? Give me a break! No one ever accepts my ideas. Just go along with me this one time!
B Whoever makes a claim has to defend it if asked to do so.	Don't rely on personal guarantee that your view is right. Don't declare your conclusion to be obvious. Don't turn the tables. Don't bargain. Settle issues on the merits.	I'm the expert here. I don't have to defend my views. Everybody knows that… Well, I'd like to see you prove that I'm wrong. I'll let you have your way on the 1st platoon if you'll accept my suggestion on the tanks.

These results suggest that dialogue training improves both the efficiency and effectiveness of group discussion. By focusing on disagreements, interrupting less, and asking and offering reasons more, trained participants overcame an experimentally confirmed tendency of groups to focus on information that all members already posses at the expense of valuable information they do not share. In addition, trained groups worked together to create genuinely novel solutions rather than simply choosing among the ones already championed by members of the group.

A second phase of this research will allow a more prominent role for recognitional as distinct from deliberative processing during dialogue. It will also extend the dialogue theory to the interpersonal skills needed by team members and leaders when using critical thinking in teamwork.

Conclusion

Dialogue theory studies reasoning and decision making as they actually occur in multi-person interactions rather than as a static set of logically related premises and conclusions. It seeks to identify the different types of argumentation that are observed in conversation and the kinds of errors to which they are subject. Dialogue blends descriptive and normative concerns. It is concerned with how effective a par-

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Instructional and Motivational Features of PC-Based Game

Training Lessons from America's Army Game

Games are increasingly used for training purposes. They can be effective training tools that motivate players to engage in learning exercises for longer periods than standard training material. But for games to be effective for training, they need to be both motivating and instructional. While some research has addressed the motivating features of games, little research has focused on the instructional features of games that lead to learning. Therefore, ARI initiated research to assess the instructional and motivational features of a PC-based game as part of an effort to develop guidelines for creating effective training games.

The game used for this research was the "America's Army" game. It was developed by the Office of Economic and Manpower Analysis at the United States Military Academy as a recruiting tool to inform potential recruits about the U.S. Army (http://www.americasarmy.com). This game was chosen because it has been quite popular; over 2 million players registered in a little over a year. This popularity made it a good platform to identify features that motivate continued play. Also, since the game was intended to inform the players about the U.S. Army, the characteristics of the game that promoted learning could be assessed.

Instructional Characteristics

America's Army game involves players going through a virtual "basic training" and then completing on-line military missions as part of a team. The virtual basic training sections of the game included Army background information, marksmanship training, an obstacle course, weapons familiarization, and a military-operations-in-urban-terrain (MOUT) training mission. After going through basic training, participants answered questions regarding information presented during the game and about motivational aspects of the game. The research looked at three different instructional characteristics: the type of information presented, how the information was integrated into player progression through the game, and how the information was presented.

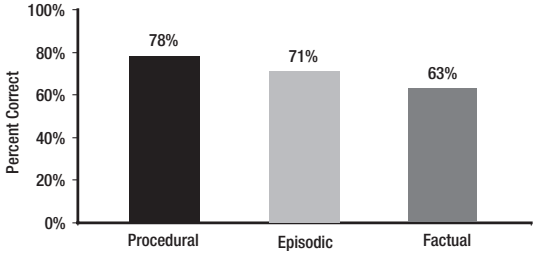

Figure 1: The mean percent correct for questions involving the three different information types.

The type of information presented during the game was classified as belonging to three different subsets: (a) procedural – knowledge about motor skills or activities; (b) episodic – experiential memories of sensation, perception, and past events; and (c) factual - facts and concepts represented by text and symbols. Procedural information was most likely to be recalled (78%), followed by episodic information (71%); factual information was the least likely to be recalled (63%) - Figure 1. These findings support previous research in training methodology, which states that what is done (procedural) is learned best, followed by what is observed (episodic), and that symbolic information (factual) is least likely to be learned.

To assess the likelihood of recall based on how content was integrated into player progression through the game, two categories were used: (a) relevant – information that is required or helpful for the player to progress in the game; and (b) irrelevant – information that does not impact on game progression. Information that was relevant to the progression of the game was recalled more accurately (72%) than information irrelevant to player progression (59%) - Figure 2. This suggests that training game developers should incorporate learning objectives into the storyline of the game. If the training objectives are not part of the game play, the player may remember how to play the game instead of learning the training objectives. Also, it has been demonstrated in multimedia instruction research that the inclusion of irrelevant details can be distracting and have detrimental effects on

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Critical Thinking as Dialogue (continued)

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ticular type of dialogue is for achieving the real-world goals of the participants in the current context and how effectively participants have conducted themselves so as to achieve the goals of that type of dialogue.

Dialogue may be the way we both learn and apply critical thinking. For an individual, critical thinking is a mini-debate you carry on with yourself. In the military, however, decision making often takes place in a team context, offering an opportunity for true critical thinking dialogue. Dialogues are the interactions by which team members pool information and insights to solve problems, resolve competing goals, build up shared understanding of the situation and tasks, and construct relationships that improve team cohesiveness and trust. The fastest road to improved critical thinking in both an individual and a team may well be training for critical thinking dialogue.

For additional information, please contact Dr. Sharon Riedel, ARI - Leader Development Research Unit, ARI_LDRU@ari.army.mil

Training Lessons from America's Army Game

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retention and learning transfer.

The modality used to present information was categorized into three different subsets: (a) graphic images, (b) spoken text – narrated information, and (c) printed text. Our findings indicate that graphic images (79%) and spoken text (74%) were recalled more accurately than printed text (57%) - Figure 3. The finding that spoken text was superior to printed text in the PC-based game environment extends the findings of prior research in instructional design that found that students retained text from multimedia presentations better through audio channels than through visual channels. A casual observation during the experiment indicated that some participants skimmed or skipped full pages of text by merely clicking on "next" to proceed to the next page without ample reading time (i.e., some players may have ignored large blocks of text).

Motivational Features

Four features were identified as influencing motivation to continue playing the game: (a) *challenge* – trying to complete a task or reach a goal (i.e., "it was fun trying to complete the obstacle course in only 90 seconds"); (b) *control* – the player interacting with the game environment (i.e., "I enjoyed seeing the targets fall when I shot at them"); (c) *realism* - elements that made the game experience more representative of a real-life experience (audio/visual fidelity, realistic weapon effects, and correct procedures); and (d) *exploration* - the process of discovery and novel sensory stimulation (i.e., using night-vision goggles for the first time). It should be noted that while these elements influence motivation, their presence will not guarantee motivation nor will their absence preclude motivation. Therefore, these four motivating features should be treated as areas of concern when creating a training game and not as strict requirements.

Different players may have different preferred levels of the above motivational features. Having a system that allows for the variation of these levels may be beneficial to learner motivation, and the control of these systems may take many forms.

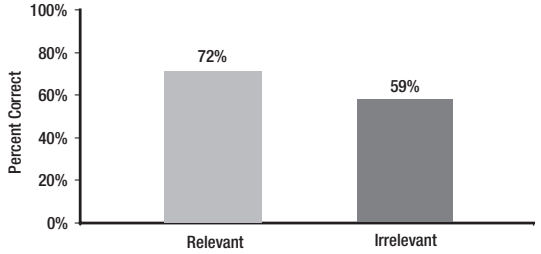

Figure 2: The mean percent correct for questions involving relevant and irrelevant information.

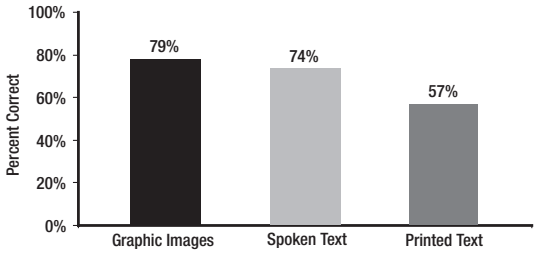

Figure 3: The mean percent correct for questions involving three different types of information presentation formats.

One is to allow the player to set the level in the game. A second would be to allow an instructor to select the level. A third would be an automated system that identifies an appropriate level based on player performance. A combination of these variable features may be appropriate. For example, the instructor might select the level of realism based on the training objectives, the player might select the level of exploration and control, while the game automatically regulates the level of challenge based on the player's performance.

Conclusion

In the current research, instructional and motivational features were assessed in an attempt to identify features that might influence the effectiveness of PC-based training games. The findings regarding instructional characteristics, while novel to the realm of PC-based games, mirrored previous findings from research using interactive multimedia instruction. Likewise, the findings regarding motivation confirmed previous research in motivation using different types of games.

Based on the research with *America's Army* game, the following lessons are offered to training game developers:

1. Instructional objectives should be integrated into the game storyline, so that the training material is relevant to the progression of the game.
2. Spoken text and graphic images were found to be more effective presentation modalities than printed text; therefore, printed text should be kept to a minimum.
3. Games should be used for teaching procedures and experiences rather than factual information.
4. Training games should be designed with attention to challenge, realism, control and opportunities for exploration, which influence player motivation.

For additional information, please contact ARI-Advanced Training Methods Research Unit, Dr. Jim Belanich ARI_ATMRU@ari.army.mil

A benefit to the squad and platoon leaders

Measuring Situational Awareness (SA) in Radio Communications

A leader's SA can be heard over his radio . . .

Situation Awareness (SA) is a fundamental requirement for warfighter success on the battlefield. Good battlefield SA not only forms the basis for effective military decision making, but it is the framework around which a leader's plans and actions are conceived. In essence, SA means knowing what is happening around you, understanding why those events are happening, and projecting what is likely to happen in the near future. Although the concept of SA has been historically difficult to measure, we sought to develop an effective way to measure the SA of small unit leaders from the content of their battlefield communication, specifically their radio transmissions to superiors and subordinates.

Developing a New Measure of SA

Our approach to developing a communication-based SA measure involved the use of the critical incident technique. Specifically, three retired Army officers and one retired Army Non-Commissioned Officer were given a two-hour training workshop on how to write suitable incidents of radio communication behavior. Over a subsequent period of several weeks, they authored a pool of 318 behavioral incidents, each intended to represent either outstanding, typical, or poor SA on the part of platoon or squad leaders.

The 318 behavioral incidents were then given to a group of 24 independent evaluators who were either active duty military personnel, retired military personnel, or civilian scientists familiar with military field research. Each evaluator was asked to judge whether or not each item reflected the SA of small unit leaders. If they thought an item reflected SA, they were also asked to indicate whether the item suggested outstanding, typical, or poor SA. For each SA level, the 20 items having the greatest independent evaluator agreement were selected for inclusion in a behavioral checklist titled the Radio Communications Checklist of Leader Awareness (RCCOLA).

The RCCOLA checklist was designed to enable observers to record the occurrence of SA-related communication behaviors in real time while listening to the squad and platoon radio networks of a squad leader. Similarly, RCCOLA items were designed to be suitable for the assessment of platoon leader SA, by listening to company and platoon radio networks. For each trial or mission, the RCCOLA measure was scored as follows:

$$\frac{\text{number of outstanding checkmarks} - \text{number of poor checkmarks}}{\text{total number of outstanding, typical, and poor checkmarks}}$$

Possible RCCOLA scores ranged from -1 to +1, with a score of 0 indicating a typical level of SA for squad leaders.

Field Testing the New Measure

Field trials using the RCCOLA checklist were conducted as part of a larger field experiment investigating the degree to which squad radios enhanced Soldier SA. Sponsored by the Military Operations in Urban Terrain (MOUT) Advanced Concept Technology Demonstration (ACTD) program, this field experiment involved the conduct of squad reconnaissance and link-up missions in a largely wooded environment, where fire teams were geographically separated from each other most of the time. Each team approached a fenced compound from different directions, where they were instructed to surreptitiously report any activities of observed enemy and civilian personnel. Later, the teams linked up at a designated checkpoint, which served as another site for the observation and reporting of enemy and civilian activities.

Who was Tested

Research participants were seven squad leaders, each having two teams of either three or four men each. Most of these squad leaders were relatively inexperienced, either having been recently assigned to the squad or having been assigned to a temporary squad leadership position. In some cases, squad leaders had no prior field training experience with their squads. Our research focused only on the SA of the squad leaders, as reflected in their radio communications with squad members and with a simulated platoon leader. The platoon leader's role was played by an experimenter

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Measuring Situational Awareness (SA) in Radio Communications (continued)

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whose outgoing radio transmissions were largely dictated by a rehearsed mission script for each trial.

How the Testing was Done

Each of the seven squad leaders performed six reconnaissance and link-up missions with their respective squads. Thus, we were able to observe a total of 42 squad missions. Half of the missions were conducted during the daytime and half were conducted at night. Missions lasted an average of 41 minutes, during which time we listened to radio transmissions over both the platoon and squad radio networks. Working independently, two members of our research team rated each squad leader's SA with the RCCOLA checklist based on what they heard over the radios. A third member of the research team recorded the actual number of radio transmissions heard during each mission.

Squad leader SA was compared using three different procedures for squad radio employment. One procedure called for no squad radio, requiring squad leaders to communicate with squad members by other means (e.g., hand signals, voice communication, or messenger). A second procedure called for each squad member to carry a radio, but only the squad leader was allowed to talk. However, squad members were allowed to listen and acknowledge receipt of squad leader transmissions. A third procedure further allowed the squad members to initiate radio transmissions, either to their squad leader or to other squad members, whenever they desired. Of the six missions performed by each squad leader, two missions were conducted using each of the three procedures for squad radio employment.

What we Found

Based on their RCCOLA scores, we found the SA of squad leaders to be highest when everyone was able to freely communicate over the squad radio. Squad leader SA was lower when radio transmissions were restricted to the squad leader or when no squad radio was used. Further, we heard an average of 125 audible radio transmissions on trials when the squad radio could be freely used, compared to an average of only 37 transmissions when radio use was limited to the squad leader. This latter finding suggests a greater number of radio transmissions may be associated with a higher level of squad leader SA.

Recommendations

Although the size of our squad leader sample limits the conclusions one can draw from the field trials, the findings obtained were largely positive. Our RCCOLA checklist appears capable of reliably measuring the SA of squad leaders in field settings. The measure also appears sensitive to differences in the way squad radios were used (e.g., whether or not squad members were allowed to transmit). For these reasons, we recommend the use of the RCCOLA checklist in future research, field exercises, and virtual training environments where radio transmissions of small unit personnel can be monitored. Further research is needed to increase and broaden the sample of small unit leaders, to determine the relationship of our communication-based measure to more objective measures of SA, and to gauge its utility for a wider variety of Soldier missions.

As squad and platoon radios become more common items of equipment within small units, the ability of our Soldiers to communicate effectively with each other will become a critical factor influencing their ultimate level of combat effectiveness. In the past, when most small unit personnel did not communicate with radios, this was an issue rarely addressed in after-action reviews (AARs) of unit performance. This situation needs to change in a hurry. How squad members contribute, or fail to contribute, to the SA of their squad and platoon leaders is an AAR topic that needs more emphasis. Similarly, we also need to understand and emphasize how the communication behaviors of small unit leaders contribute or detract from the situational understanding of their subordinates. Before the promise of better small unit communication can be realized, however, we must get trainers and observer/controllers to routinely monitor squad and platoon radios during field exercises and training center rotations. Once optimal squad and platoon radio communication procedures have been identified, they need to be formally introduced into appropriate institutional courses for the benefit of junior leaders. We believe that a communication-based measure of SA can serve an important role in improving the communication practices and resulting levels of situational understanding among all Soldiers at the small unit level.

For additional information, please contact Dr. Ken Evans, ARI-Infantry Forces Research Unit, ARI_IFRU@benning.army.mil

Radio Communications Checklist of Leader Awareness

Date: _____ Time: _____ Squad: _____ Rater: _____

PLANNING / PREPARING

OUTSTANDING

- ❑ requests additional time or assets when an unrealistic task is assigned.
- ❑ anticipates noncombatant actions within his area and directs elements to be prepared to respond.

TYPICAL

- ❑ directs subordinates to conduct communication checks before mission begins.
- ❑ conveys an accurate picture of the situation after answering some questions from subordinates.
- ❑ provides warning to subordinate leaders of a change in mission upon notification from higher headquarters.
- ❑ directs a "be prepared" order to subordinates, after receiving planning directions from higher.

POOR

- ❑ fails to disseminate or inadequately disseminates critical change-of-mission information or factors impacting current mission to subordinates.
- ❑ fails to anticipate the need for night observation devices and begins night operations without them.
- ❑ does not notify appropriate personnel of the meaning of signals that are being used during an operation.
- ❑ does not issue "be prepared" orders after receiving guidance from higher to do so.
- ❑ does not convey an accurate picture of the situation even after answering questions.
- ❑ does not convey a complete picture of the situation even after answering questions.
- ❑ does not convey the commander's intent to subordinates during a change of mission order.
- ❑ presents a plan that will not accomplish the task in the time required.

MOVEMENT

OUTSTANDING

- ❑ anticipates activity and locates himself at the best position to control unit.
- ❑ reports encountering mines or obstacles along unit route of movement and presents the operational impact or possible COAs to overcome the impediment.

TYPICAL

- ❑ occasionally must ask subordinates to report their current positions.
- ❑ directs a change in unit movement formation because terrain just encountered has changed.
- ❑ recognizes that his unit has moved into a danger area, he reports this, and then takes action to move through or out of the danger area.
- ❑ reports encountering mines or obstacles along his unit route of movement.
- ❑ modifies plan or activity to accommodate a situation evolving in an adjacent friendly unit, after receiving directions to do so from a higher.

POOR

- ❑ does not report that his unit is at a danger area or takes no action to avoid it.
- ❑ displays little knowledge of the enemy capabilities or terrain, failing to inform subordinate of enemy activities in an area capable of observing or bringing direct fire on unit positions or activities.

ACTIONS ON ENEMY CONTACT

OUTSTANDING

- ❑ when asked for a SITREP while actively engaged with the enemy, can immediately respond with accurate information.
- ❑ correctly identifies weakest enemy point.
- ❑ directs the relocation of a subordinate element to be prepared to assist/reinforce an expected weakness by another friendly element.
- ❑ requests assets to augment unit to assist with mission accomplishment before unit strength becomes inadequate to accomplish mission.
- ❑ displays evidence of fire control measures and a change in threat or danger to the unit by recommending the lifting or shifting of supporting fires in an adjacent sector.
- ❑ plans personnel rotation to have best people at appropriate locations to complete critical tasks.
- ❑ directs subordinates to break enemy contact because cost of fighting the enemy is higher than the benefit.
- ❑ displays evidence of his knowledge of the enemy or friendly situation by relieving or replacing a unit or element before it has become ineffective.
- ❑ directs subordinate to take an action that distracts the enemy from the friendly unit main effort or action.
- ❑ requests ammunition resupply, projecting that current supplies will be exhausted in 30 minutes given the present rate of expenditure.
- ❑ informs higher that the unit is nearing a status of non-combat effective early enough so higher can react.
- ❑ presents the future likelihood of threat COAs in providing SITREPs to the higher element while actively engaged with the enemy.

TYPICAL

- ❑ reports enemy activity in his area to the higher element.
- ❑ moves forces to respond to an enemy attack or counterattack.
- ❑ directs a soldier to take charge of an element when he is informed that the element leader is a casualty.

Continued on page 10

Radio Communications Checklist of Leader Awareness (continued)

Continued from page 9

- ❑ directs subordinates to continue actions because the mission is not yet fully accomplished or complete.
- ❑ displays evidence of his knowledge about enemy capabilities and terrain by informing subordinate units of nearby enemy activities.

POOR

- ❑ fails to designate a new element leader when one of them becomes a casualty.
- ❑ fails to direct the replacement of a critical individual who has become a casualty.
- ❑ directs that no subordinates relocate even when a subordinate element notifies him that assistance or reinforcement is needed to accomplish the mission.
- ❑ directs subordinates to halt actions before the mission is accomplished/complete even though sufficient resources are available to continue the mission.
- ❑ continues the operation "to the last man" and does not inform higher.

MISCELLANEOUS

OUTSTANDING

- ❑ whenever asked, the leader can immediately provide a detailed and accurate platoon ACE report.
- ❑ modifies his current plan/activity to accommodate a situation evolving in an adjacent friendly unit.
- ❑ conveys a complete picture of the current situation to his subordinates.
- ❑ takes action that is beneficial to civilian population without hindering operations.

TYPICAL

- ❑ requests medical evacuation for an injured soldier.
- ❑ reacts to noncombatant actions in the area.
- ❑ uses an alternate frequency when primary frequency fails to make contact with intended station.
- ❑ reports a change of command post location.
- ❑ notifies appropriate personnel of the meaning of signals being used during an operation.
- ❑ directs a change in MOPP based on commander's guidance, orders, or the SOP.

POOR

- ❑ does not notify subordinates of a friendly ground unit moving through the area, which could lead to fratricide.
- ❑ does not warn subordinates of civilian movement in the area.
- ❑ treats a sound recommendation or advice from subordinates as an interruption and takes no action.
- ❑ does not notify subordinates of a friendly aircraft moving through the area, which could lead to fratricide.
- ❑ fails to direct any reallocation of critical resources

For additional information, please contact Dr. Ken Evans, ARI-Infantry Forces Research Unit. ARI_IFRU@ari.army.mil

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U.S. Army Research Institute for the Behavioral and Social Sciences
John S. Kay, Communications • Ellen Kinzer, Associate Editor
E-mail: news@ari.army.mil • Web site: www.ari.army.mil

More Efficiently Target Individual Needs

Battle Command Experts and Novices

Our future tactical leaders will be entrusted with responsibility for a wider array of systems sooner in their careers. The demands placed on tactical leaders will be of unprecedented complexity, diversity, and scope. They must be able to think quickly and accurately and act decisively against an unpredictable enemy across the full spectrum of conflict. To emphasize the point, U.S. Army planning documents for the Future Combat System of Systems specifically call out the need to "develop, through training and experience, the thinking, confident, versatile, adaptive, and seasoned leaders" required at the tactical level (U.S. Army Training and Doctrine Command, 2001). To meet the demand, Army tactical training systems must work efficiently and systematically to shorten the time required to acquire tactical proficiency.

Research involving experts and novices in a variety of domains indicates the expert knowledge is organized in such a way to enable more proficient and qualitatively different performance when compared to novice performance. A key to providing training solutions is the development of a good description of the differences in how tacticians think as they progress from novice to expert, differences in how they understand the battlefield, and how they visualize, plan, communicate, decide, and act. A second key is to develop methods that reliably measure these cognitive – and mostly unobservable – features of an individual's level of tactical expertise. In short, understanding, describing, quantifying, and measuring the differences between experts and novices will be vital to providing efficient and effective training.

The Future Combat Systems - Command and Control Program

Recently the Defense Advanced Research Projects Agency, along with the U.S. Army Communications-Electronics Command, led an effort called the Future Combat Systems Command and Control (FCS C2) program. The project developed and tested a prototype command group interface in a series of commander-in-the-loop experiments at Fort Monmouth, NJ. The interface allowed a small group of warfighters to command and control a mixed array of live and robotic sensors and weapons during simulated battle runs. As a key member of the Human Performance Team for FCS C2, ARI observed and collected human performance data across the experiments.

For the most part, warfighter input to the iterative development of the prototype command and control system came from a team of tactical experts comprising four active-duty U. S. Army lieutenant colonels who were all graduates of the select School for Advanced Military Studies at Fort Leavenworth. The high level of expertise represented by that group was instrumental in rapidly developing and testing a

Continued on next page

Figure 1. Command and control vehicle with expert command group, driver, and gunner.

Battle Command Experts and Novices (continued)

Continued from page 11

quality prototype. Nonetheless, it was evident that the actual systems which the prototype was intended to represent would ultimately be operated by leaders with considerably less tactical experience. An experiment – three days of battle runs - was conducted in which a novice command group replaced the usual military experts. The novice group was composed of two West Point cadets and two ROTC students from the Ohio State University. The experiment afforded ARI a good opportunity to compare the performance of the two groups and to gather information about the nature of battle command expertise development and its measurement.

Overview of findings

Objective data were collected by recording the conversations of the command groups during battle runs and by recording the interactions of each command group member with their automated command and control system. Analysis of the data provided measures of human-human verbal communication behavior and human-computer interaction behavior. In addition a variety of subjective measures were employed, using questionnaires to provide assessments of workload and performance success, system support of various C2 functions, adequacy of training, and other human-systems integration issues. Overall, many significant and interesting differences between the novice group and the expert group were found. Although findings are preliminary, the differences reported provide useful indicators for distinguishing novice and expert performance, with implications for training design. The results, however, must be interpreted with caution. It is important to realize that the differences reported are based on data from a single expert group and a single novice group. A significant result might simply reflect a difference between the two participant groups rather than between the populations of experts and novices they represent.

Some of the key differences found were:

- Novices talked more about firing, less about seeing.
- Novices talked more about own troops, less about enemy.
- Novices talked more about enemy location, less about enemy identification and disposition.
- Novices performed fewer computer interactions to recognize and identify targets.
- Novices performed more computer interactions to assess battle damage.

See the Battlefield versus Strike Targets.

Figure 2 displays the percent of verbalizations by C2 function and expertise level. Verbal communications supporting the See function were performed significantly less by the novice group compared to the expert group. However, Strike-related communications were performed significantly more by the novices. The novices' lack of experience and training may have limited their abilities to "see" the battlefield and assess the multitude of threat images presented by the C2 prototype. In contrast, the Strike-related communications by the novices indicated their concern with destroying all elements of the enemy force rather than conducting effects-based operations by developing a good picture of the enemy and then destroying key elements. It should be noted that many of the novices' Strike engagements were performed without proper identification of enemy targets as indicated by frequent warnings by higher headquarters to ensure target identification before firing on targets. The trend is borne

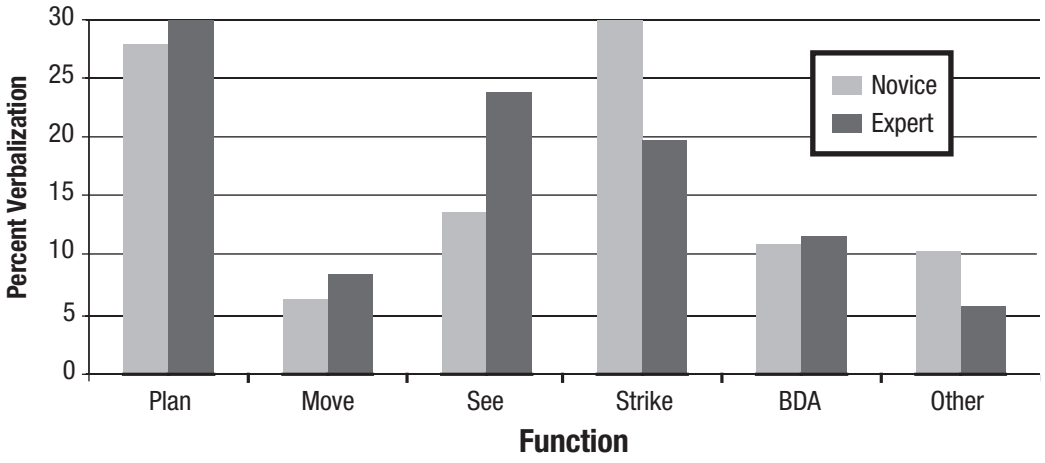

Figure 2. Percent of verbalization by Function and Expertise group.

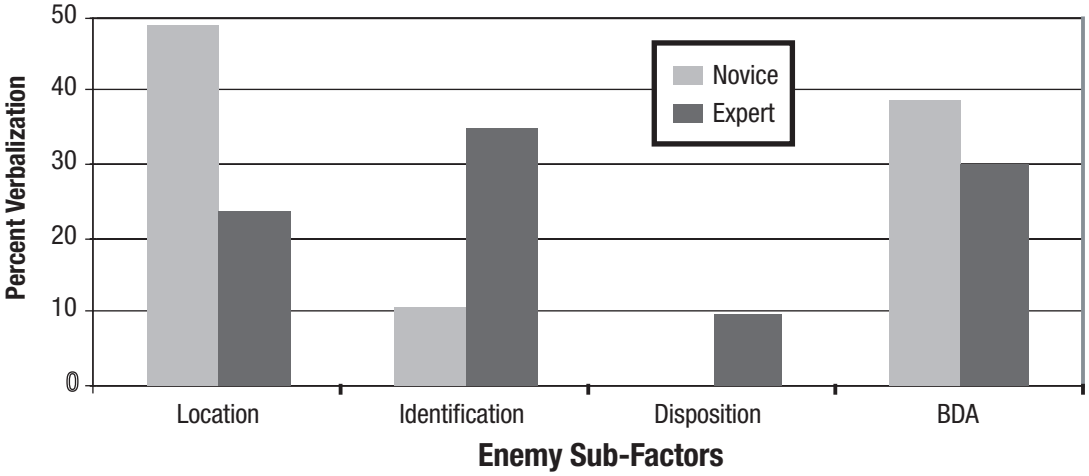

Figure 3. Percent of verbalization by Enemy Sub-factors and Expertise group.

out by an analysis of human-computer interactions. Novices performed significantly fewer See related interactions and devoted a significantly higher percentage of their total interactions to the Strike function.

It was also found that the novice command group was focused primarily on a single dimension of enemy (location) compared to the experts who concerned themselves with a greater number of enemy characteristics, as shown in Figure 3. This is consistent with the notion that the experts try to develop a fuller picture of the enemy to develop situational understanding, while the novices were focused on enemy location in order to support targeting.

Own Troops versus Enemy

An analysis was made of the frequency of verbal communications by METT-TC factors (Mission, Enemy, Troops, Terrain, Time, Civilians). Troops-related and Enemy-related communications encompassed most of the verbalizations, accounting for approximately 90% of all verbalizations by novices and experts. These two factors, however, were found to be significantly different by expertise. The novices made fewer Enemy-related verbalizations and more Troops-related verbalizations compared to the expert group. The finding that novices tend to focus much greater attention on friendly forces than on the enemy has been noted in other battle command research efforts as well as in other fields, e.g., chess, where it is a frequent observation that novices focus on their own plans and moves and seem to ignore what the opponent is doing. In other ARI research, officers judged as poor tacticians were described as all but ignoring the enemy. Better tactical performers showed a more balanced level of attention to friendly and enemy forces. With superior tacticians the finding may reverse; there is greater consideration of unpredictable enemy actions compared to more predictable friendly actions. One explanation of the difference between novices and experts is that one must consider 'own forces' in order to act, and such consideration virtually exhausts the capacity of the novices to build, maintain, and operate their mental models. Only with increasing expertise are models of sufficient complexity to encompass both 'own forces' and 'enemy forces' possible. Thus novices in all domains of expertise have a tendency to jump to solutions before gaining a sufficiently deep understanding of the situation.

Conclusions

If the development of tactical thinking skills follows a consistent and discernable pattern, then individual performance levels can be diagnosed, and training can be more efficiently targeted to individual needs. The ARI work described in this article is a start, but it addresses only the two ends in the continuum of tactical expertise. Tactical performance must be investigated further across a complete range of expertise to develop a fuller model of the acquisition of expertise.

Additional findings from the FCS C2 effort address a range of performance issues of much greater scope than the cognitive issues mentioned in this article. A complete discussion can be found in the ARI report RR1821 titled Novice Versus Expert Command Groups: Preliminary Findings and Training Implications for Future Combat Systems by Carnahan, Lickteig, Sanders, Durlach, and Lussier.

For additional information, please contact Dr. James Lussier, ARI – Armored Forces Research Unit, ARI_AFRU@ari.army.mil.

Ensure Training Readiness for Future Army Forces

Multi-Echelon Distributed Army Leaders Information Support Training (MEDALIST)

Training in the Future

After a two-week exercise with the entire squadron in the field, Lieutenant Colonel (LTC) Williams was concerned that he and his troop commanders were still not performing as a team. With elements of the squadron widely dispersed across the training area, the team was unable to communicate requirements quickly enough to complete two full missions a day. As the Cavalry Squadron Commander, he had to find a way to work collectively with his commanders on team communication.

The next day, LTC Williams searched the Army's training repository. Keying his search on "communication training," he discovered a program that provided Internet-supported, PC-based drills designed to train leader teams in the communication component of battle command. The program simulated Force XXI Battle Command for Brigade and Below (FBCB2) type capabilities and offered various tactical scenarios for different types and levels of combat units. He had his executive officer (XO) review the drills available, contact the program's point of contact to arrange the assistance of an expert coach who would support the training from the coach's home station, download the supporting training materials and software, and schedule the training.

Four months later, deployed in theater and awaiting their movement to take over a security sector, LTC Williams contemplated his new A Troop commander. There was a marked difference in the communication between his experienced and trained commanders and the "new guy." The drills would help, but would they be able to perform the drills out here in the desert? Yes. The same training he had executed at his home station, with the same coach, was available. A few drills and not only was the new commander up to speed, but the entire team had refined its skills further to make communication even more responsive and accurate.

It all paid off a few weeks later. During routine security activities, a heavily armed paramilitary force lunged across the border. Expecting to get in, strike quickly, and get out before the scattered U.S. forces could react, they miscalculated badly. Williams' squadron was on the move, updating their situational awareness and planning and coordinating their actions from the far corners of the sector. Faster than anyone could have expected, the troop commanders understood the situation and what their commander expected of them. They were able to translate rapid planning directly into action and the enemy force was captured and destroyed. Only a tightly integrated team of commanders skilled in communicating with each other could have pulled this off, Williams later reflected.

Introduction

The above vignette is imaginary, but demonstrates an exciting capability to those dedicated to ensuring the training readiness for future U.S. Army forces. No longer just a vision, the potential for highly synchronized distributed operations is currently being fulfilled through the Army's commitment to assimilating emerging technology and innovative ideas into all areas of training and leader development. The assimilation is underway with the construction of Future Force organizations and the identification of critical performance requirements and effective training methods for both the Current and Future Force timeframes.

Training of Future Force Soldiers will occur before, during, and after deployment into the operational area. Training products and embedded simulations will be readily available to support distributed training. There is a need to execute effective training when and where training needs arise even though the training participants and trainer personnel may be separated by great distances. Specifically, there is a need to identify coaching skills and to develop effective methods for providing consistent and timely feedback to participants during distributed training exercises.

The goal of the MEDALIST project was to develop a training method to support the training and coaching of command group teams in a distributed environment with a focus on two key tasks: communication required in the command and control of distributed operations and dynamic replanning (planning under rapidly changing conditions while executing a mission).

The Training Approach

The MEDALIST approach to distributed training requires only those participants necessary for the tasks and competencies being trained without requiring the participation of others. Both structured training and deliberate practice methods were incorporated into the training approach because they incorporate features such as frequent repetition, active coaching, systematically varied conditions, and the provision of opportunities to address task performance independently of mission outcome.

Figure 1. Characteristics of MEDALIST Training

- Immediate Repetition
- Active & Effective Coaching
- A Focus on Process
- Well-Defined Process Keys
- Systematically Varied Conditions
- Objective Behavior Measurement
- Consistent & Timely Feedback
- Correct Performance
- Overlearning
- A Focus on Difficult Areas
- A Focus on Weakness
- Work, not Play

MEDALIST Performance Coaching

While practice alone can sometimes generate improvements in performance, especially at the novice level, it does not guarantee improvement. Similarly, it does not control for the occurrence of negative training, where participants become efficient at performing tasks the wrong way. Coaching increases the rate at which participants can improve their performance, as well as the probability that they will learn to perform tasks correctly and by the most effective means. Traditional Army after-action-reviews identify what the audience needs to improve in future training events. Quality coaching must go beyond that. The coach must assist the training audience in bringing their performance to standard during the exercise.

MEDALIST Prototype System

The MEDALIST Prototype System (MPS) was developed to support the execution of the training exercises. The MPS is a constructive simulation that runs on personal computers networked via Internet or intranet and establishes the conditions and events of the tactical scenario, provides communication capabilities, and enables the training to be conducted in a distributed manner. The MPS creates the training environment by presenting tactical reports, messages, displays, and overlays to the training audience. The MPS represents, but does not necessarily replicate, the functions of the Army's operational communication systems. Functions represented include: an FM voice communication function, a written reporting function, an instant messaging function, a tactical display function, and a tactical overlay function. The MPS also provides the trainer additional capabilities of starting, pausing, and rewinding exercises, as well as manipulating the prepared tactical reports and displays contained in the simulation database files. In some cases, the OneSAF Testbed Baseline (OTB) simulation is integrated with the MPS allowing for the replication of SBCT and Future Force environments.

To present all these functions, the MPS requires a dual set of computer monitors at each station. One monitor presents a reports and communication interface, and the other presents a tactical display and overlay interface.

Training Execution

Based on the MEDALIST training approach exercises were built for Current, SBCT, and Future Force environments at various command group levels.

Figure 3: Developed Exercises.

Type of Training	Exercise	Audience Positions
Current Force Compliance Inspection	Battalion-Company	Battalion Commander Company Commanders (3)
	Company-Platoon	Company Commander Platoon Leaders (3)
STRYKER Replanning	Squadron-Troop	Cavalry Squadron Commander Reconnaissance Troop Commanders (3) Senior Troop Commander
	Troop-Platoon	Reconnaisance Troop commander Reconnaissance Platoon Leaders (3) Fire Support Team
Future Force Replanning	Battalion-Company	Combined Arms Battalion Commander Reconnaissance Troop Commander Mounted Combat System Co. Commanders (2) Infantry Company Commanders (2) Non-Line of Site (NLOS) Weapons Officer
	Company-Platoon	Mounted Combat System Co. Commander Mounted Combat System Platoon Leaders (3)

The execution of each MEDALIST exercise lasts approximately 2 hours. This allows for an approximately even mix of training run-time and coaching. As the exercise proceeds, written tactical reports and tactical displays are sent to the training audience, portraying scenario events. During an exercise, events cause the commander to (a) interact with his subordinates and intelligence sources, (b) revise his situational understanding, and (c) consider changing his intent and/or scheme of maneuver. The routine of presenting events is repeated several times during an exercise to prompt repeated performance of the training objective. At appropriate times throughout the exercise the coach can pause the exercise to provide feedback to participants. The coach can also rewind the exercise to allow the participants the opportunity to perform a task correctly before continuing the exercise.

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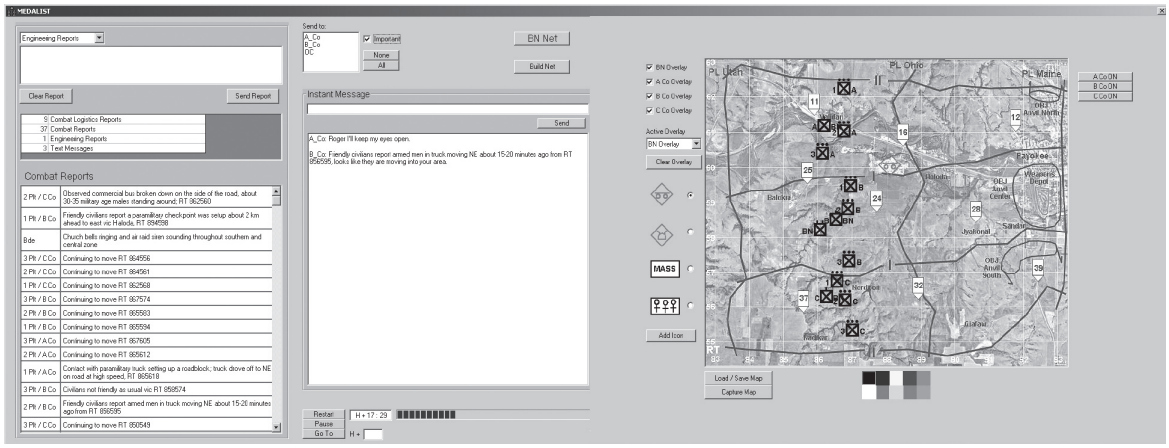

Figure 2. MEDALIST Prototype System.

Realistic film, ***Power Hungry*** case study, captures students' attention to reflect on leader elements

Using Interactive Case Studies as a Tool for Leadership Development

With increasing United States Army activity in a variety of stability and support operations and military operations other than war, non-commissioned officers (NCOs) and junior Officers are sometimes compelled to make decisions that can have far-reaching consequences for US activities abroad. Small-scale operations have the potential to become international incidents, and lower-level leaders must be prepared to think through the long-term implications of their actions. Additionally, prior to deployment leaders need to develop the interpersonal skills that will enable them to foster trust, communicate intent, share their vision, shape team climate, and instill confidence in their Soldiers because each of these elements is inextricably intertwined with mission success.

In a previous edition of the *ARI Newsletter* (Aug 2003, Vol 13, Issue 2), ARI described a research prototype called Think Like a Commander—Excellence in Leadership (TLAC-XL) that was being evaluated as a tool for developing the interpersonal skills of Officers. While research on the prototype is ongoing and conclusions about the overall instructional effectiveness of this tool would be premature, the widespread interest in this product warrants disclosure of some of the preliminary research findings regarding this prototype tool, as well as a greater discussion of how TLAC-XL can be used as an instructional aid.

What is TLAC-XL?

TLAC-XL is a software prototype of an interactive case study that explores six leadership themes: mission clarity, shared vision of intent, unity of command, setting a model of command, cultural awareness, and respect for experience. The software consists of two major parts: a 13-minute filmed case study and a 90-minute interactive module in which students interview characters from the film. TLAC-XL was developed in conjunction with the Institute for Creative Technologies (ICT) based at the University of Southern California. LTC (ret) Clark Delavan from the Center for Army Leadership (CAL) served as an expert advisor to the project.

During the case study phase of TLAC-XL, students watch a short film called *Power Hungry*. In the film, a battalion is tasked with securing a site for a non-government organization (NGO) to distribute food in Afghanistan. At the last minute, the commander develops acute appendicitis and a new Captain named CPT Young must be flown in to take his place. The story begins when CPT Young arrives on the site, which is in disarray. With only a few hours to secure the site before the NGO convoy arrives, CPT Young has several obstacles in securing the site: (1) he has never met his Soldiers before, (2) he lacks interpersonal skills, (3) the site has terrain and tactical disadvantages, and (4) rival warlords arrive at the site. Over the course of the case, CPT Young is confronted with these leadership problems (and more) that snowball as the story progresses.

Teaching Themes of TLAC-XL

TLAC-XL: Leadership Issues

- Clarity of Mission
- Shared Vision of Intent
- Unity of Command
- Setting a Model of Command
- Cultural Awareness
- Respect for Experience

The *Power Hungry* film is unique from typical case studies in that the story was filmed, edited, and acted by Hollywood professionals. The result is a film that achieves the quality of many major motion pictures. Even though the film is highly engaging and interesting, it should be noted that the script was based on stories and leadership issues raised in interviews with Captains on the faculty at the United States Military Academy. Consequently, the film not only captures student attention, but also serves as a useful springboard for educational discussion.

The second part of the TLAC-XL software consists of an interactive module to help students reflect on and discuss specific elements of the *Power Hungry* case study. In the interactive module, a computer-generated mentor leads students through a series of questions designed to get students to think and talk about each of the six leadership themes. During the course of the interactive module, students have the opportunity to interrogate different characters from the film, including CPT Young and an Afghan warlord. At the end of the training, students should have formulated a better understanding of how each of the leadership themes contributed to failure of the mission.

In its current form, TLAC-XL is a research prototype used for investigating the usefulness of interactive technologies for leadership development. Research regarding the effectiveness of the software is ongoing. However, many instructors have expressed a desire to use TLAC-XL in its prototype form as an instructional tool. Furthermore, many instructors

want to use only the film portion of the computer package because the film serves as a valuable starting point for discussion on any number of leadership-relevant topics. Such interest has allowed ARI to collect data regarding the reactions of students who have used either the film as a case study for discussion or the TLAC-XL product as a whole.

Preliminary Research Findings and Implementations of TLAC-XL

Combining *Power Hungry* with Instructor-led Discussion

Approximately 23 Soldiers (primarily Sergeants) watched the film as a group. After watching the film, the Soldiers broke into 4 discussion groups in which instructors facilitated discussion about the movie for approximately 20-30 minutes. Overall, survey results indicated that Soldiers reacted positively to the film and lesson.

TLAC-XL was incorporated a second time into the Stryker Leader Training at Fort Lewis in August 2003. Approximately 33 Soldiers participated in the training and 29 trainees provided survey data. Rather than breaking into small groups, however, a single instructor led discussion with the large group.

With respect to the *Power Hungry* film, many Soldiers commented that they found the film to be interesting. In general, trainees found the film to be realistic, although a subset of trainees found the film to be highly unrealistic. In general, the trainees reported that group discussion facilitated learning.

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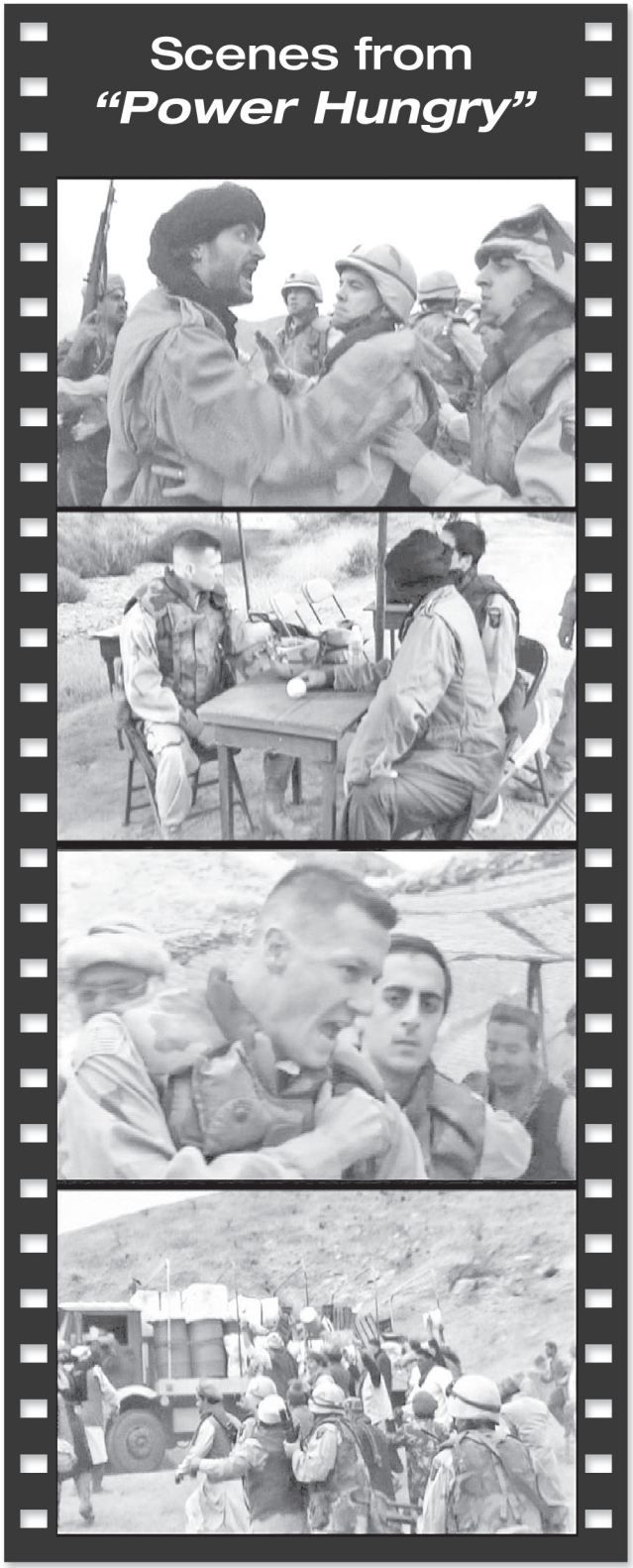
A snapshot of the computer interaction interface.



Soldiers increased capabilities lessen the unit's burden

Applying the Multi-Skilled Soldier Concept to the SBCT and Beyond

"In 2015…the Army consists of multi-skilled Soldiers and leaders who lead and coordinate mixed units on the battlefield."

— Objective Force White Paper 2015

Until recently, materiel and organizational aspects have dominated discussion surrounding the human dimension of the Future Force Soldier. The reality is that advanced technology and multi-functional units are essential to the Future Force, but both are dependent on the skills and abilities of adaptive Soldiers. In an effort to advance the discussion of these concepts across a broader audience, the Vice Chief of Staff, Army, tasked the U.S. Army Training and Doctrine Command (TRADOC) with the Army Development System XXI Enlisted Development Action Plan #1, Multi-Skilled Soldier (MSS). The Personnel Proponency Directorate, Office of the Deputy Chief of Staff, Operations and Training, TRADOC, sponsored the study being conducted by the U.S. Army Research Institute (ARI), Occupational Analysis Office, to investigate the MSS concept and its applicability to the Stryker Brigade Combat Team (SBCT).

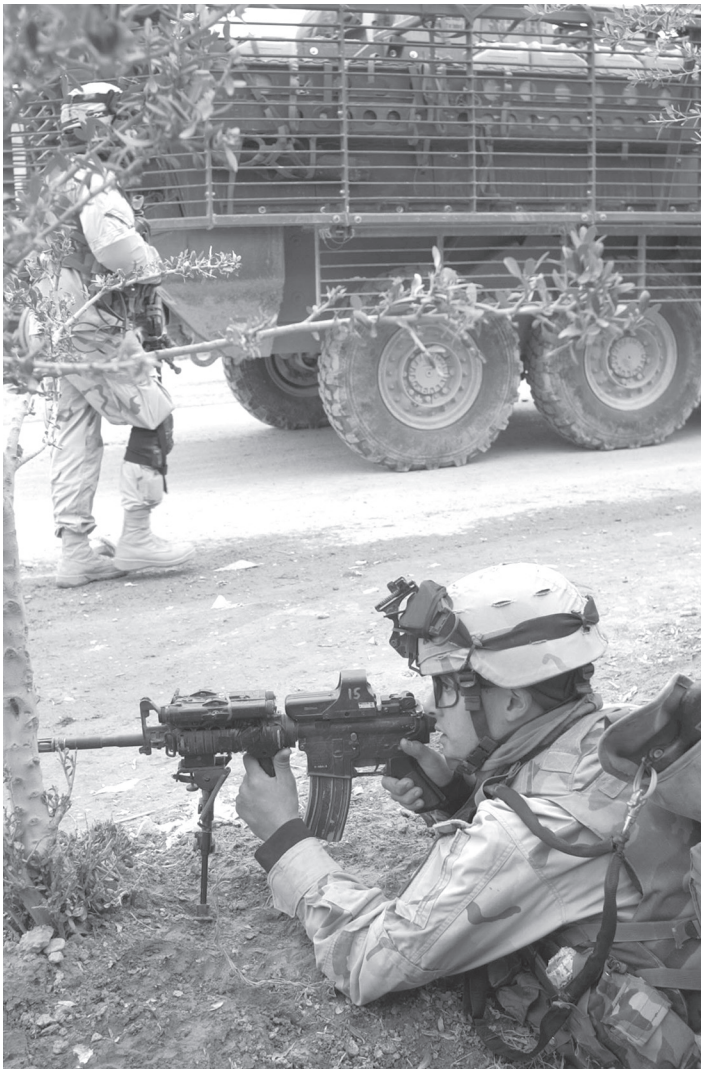
Under the direction of ARI, a study team was responsible for focusing on two aspects of the MSS. The first of which was to make a determination of MSS applicability to the SBCT, as it might be implemented in Initial Entry Training (IET). Second, the study team developed an SBCT-specific prototype for possible MSS implementation in IET, with an eye toward application across the Future Force. The methodology used in studying these aspects of the MSS consisted of seminar-like group interviews involving senior noncommissioned officers (NCOs) and company grade officers from representative units across the Army's first fielded Stryker brigade (3rd Brigade, 2nd Infantry Division) at Ft. Lewis, Washington. These sessions centered on exploring options regarding approaches to future Soldier multi-skilling. Responses were assessed for the potential value-added to the SBCT from such multi-skilling, and to identify additional skill task sets across the brigade for each mainstream Military Occupational Specialty (MOS) that would most contribute to mission effectiveness and increased skill depth and redundancy. While at Fort Lewis, interviews were conducted with key members of TRADOC's on-site Brigade Coordination Cell (BCC) staff regarding the difficulties and challenges faced by the SBCT over the past year and candidate MSS constructs.

The study team concluded in their report, "Applying the Multi-Skilled Soldier Concept to the Stryker Brigade Combat Team," that the MSS concept is fully applicable to the SBCT. Adoption of the recommended prototype could significantly enhance unit training and readiness postures.

"Multi-Skilled Soldier" Defined

There are various interpretations of the MSS. Some have tended to associate the notion of multi-skilling with Assignment Oriented Training (AOT) or ongoing MOS restructuring efforts, especially MOS consolidation. However the study team felt that multi-skilling was distinctly different.

The study team has defined the MSS as a Soldier who is trained, developed, and educated with skill sets beyond



Stryker Brigade Combat Team conduct reconnaissance.

those common to his or her MOS that are needed to operate proficiently in increasingly complex environments. The MSS concept applies to enlisted service members, warrant officers and officers and is the basis for building increasing capabilities throughout one's career. The study team has documented in general terms how MSS might exist for all the ranks. However, the primary focus of this study is on how it might pertain to enlisted Soldiers in IET. In this context, the MSS concept is applied to enhance mission accomplishment in Soldiers' first units of assignment following IET.

A Formalized Approach to Multi-Skilling

The notion of multi-skilling is not new to the Army. Units in the field have extensive programs to cross-train their Soldiers with additional skills that lie outside of their primary MOS. Most prominent among such programs are the Combat Life Saver (CLS) training program and the Driver Training Program. It is this type of multi-skilling to which the MSS concept could be likened. The proposed concept recommends approaches and practices to implement MSS in an institutionalized, formal fashion and in a manner that transfers a considerable amount of the burden for initially conducting such training from the field to the schoolhouse.

The study team developed a proposal for a 2 – 2.5 week MSS training program that would occur during the last weeks of IET. The IET class would be divided into 4-5 different groups and would receive additional skill training in different areas, such as CLS, drivers training, communications, land navigation, nuclear biological chemical (NBC) group survival, advanced weapons, unit armorer, call for fire, and generator operator skills. The additional skilling areas would be chosen in a way that would enhance skill depth and redundancy in the Soldiers' first units following IET. The training would be hands-on and performance-oriented, with the intent to develop an apprentice-level of knowledge that the Soldiers would bring to their first units of assignment. The study report presents theoretical and practical underpinnings for this design and also discusses the methodologies that could be used for prudent selection of Soldiers for the most appropriate additional skilling.

MSS Applicability to the Stryker Brigade Combat Teams

The study team interviewed SBCT leadership to determine training challenges, applicability of the MSS concept and additional skills needed most. Overall, NCOs welcomed the notion of the MSS and viewed it as a means of providing Soldiers with increased capabilities right from IET. They also valued the way in which the MSS concept could potentially lessen the unit's burden to conduct individual training that is not part of a Soldier's MOS. It became clear from the interviews that the unit's burden to conduct such individual training has increased significantly in recent years, especially in units fielding new equipment or experimenting with new operational approaches, such as the SBCT. Lightening the burden in such units to conduct additional skill training allows the unit more time to conduct collective training, as well as more time to conduct in-depth individual training on primary MOS-related skills. This is particularly important for the SBCT because of the specialized additional individual training requirements associated with fielding new equipment.

Challenges and Benefits

One of the more significant challenges in implementing the MSS program revolves around the cost of additional resources and time spent in IET. In this regard, the report recommends approaches that could mitigate the magnitude of this challenge.

The study team viewed the MSS concept as equally applicable both to SBCTs and to the rest of the Current Force. It also became clear that the MSS concept could be used as a valuable tool to assist in evolving new MOS structures as the Army moves toward the Future Force.

Conclusion

The main conclusion of the study is that the benefits of the MSS program far outweigh the associated challenges. Implementation of the MSS concept, in a manner documented by the study team in their report, is recommended.

For additional information, please contact Dr. Elizabeth Brady, ARI Occupational Analysis Office, ARI_OAO@ari.army.mil

MEDALIST Training (continued)

(Continued from page 15)

Conclusions

Feedback and results from over ten implementations with Soldiers from the U.S. Army Armor School suggest that the method represents an effective prototype for future distributed training. The prototype design provides a "laboratory" for identifying recommendations on the design of future and interim training systems. The MEDALIST effort is providing answers on how training might be conducted in a distributed fashion. Further recommendations are being compiled that will identify requirements for providing the architectural portability, troubleshooting capabilities, and other features needed to support system application in the context of future training. The Future Combat System - Training Support Package (TSP) developers are using the products from this research to guide Future Force TSP development.

For additional information, please contact Mr. Scott B. Shadrick, ARI – Armored Forces Research Unit, ARI_AFRU@ari.army.mil.

Preliminary Research Findings and Implementations of TLAC-XL (continued)

(Continued from page 17)

In the March training session, approximately 20-30 minutes were allotted for discussion in small groups, and approximately 17% of trainees indicated that they wanted more time allotted for discussion. In the August class, approximately 90 minutes were allotted for discussion, and approximately 7% of trainees indicated that they wanted more time for discussion.

Combining *Power Hungry* with Computer-led Discussion

In June 2003, two CAS3 instructors used the TLAC-XL software in their classes, resulting in 26 Captains watching the film and engaging in computer interaction. Computer interaction occurred in groups of two to five Captains per computer. With respect to the film, Captains indicated that the film was interesting, involving, and realistic.

ROTC: Comparing TLAC-XL with Other Technology

In September 2003, 20 Reserve Officer Training Corps (ROTC) students who were juniors or seniors at Kansas State University participated in a study that compared TLAC-XL with a PowerPoint version of the software (TLAC-PP). The PowerPoint version differs from the TLAC-XL software in several ways.

1. The *Power Hungry* scenario is presented using the soundtrack and snapshots from the film over the course of several slides.

2. This differs from TLAC-XL because in TLAC-XL, students must interrogate characters in a pre-determined order and generate their own questions to ask characters.

3. After selecting a question in PowerPoint, students can hear the responses of the characters, but students do not see the characters speaking.

4. In the PowerPoint version a computer-generated mentor does not guide students through the lesson. Instead, students can proceed to a series of discussion questions (i.e., questions normally posed by the computer-generated mentor in TLAC-XL) at any point during the PowerPoint presentation of the "computer interactive" phase.

In TLAC-PP, Students click on a character to view questions to which the character has answers.

After selecting Omar the Warlord, students would be taken to the next slide. Students click on the button next to the question to hear Omar's response.

Ultimately, both TLAC-XL and TLAC-PP provide students the opportunity to access the same information about the Power Hungry scenario. However, the PowerPoint "computer interactive" version allows students greater flexibility in how students can access the information and structure the lesson. ROTC students were randomly assigned to either the TLAC-XL or PowerPoint formats.

Summary

In sum, student reactions to the Power Hungry film and TLAC-XL software have been positive, and instructor interest in the product remains constant. TLAC-XL is a research prototype and evaluation of its impact on learning is expected to continue through FY04.

For additional information, please contact Dr. Michelle Zbylut, ARI-Fort Leavenworth Research Unit, ARI_LDRU@ari.army.mil