Training Critical Thinking for Tactical Command

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Military missions are more and more focused upon peace enforcing operations in regional conflicts. There is often uncertainty about the intentions, capabilities and strategies of the parties involved. Successful operations under such unstable and complex conditions require competent commanders and staff personnel.

Recent studies have shown that experts in military tactical command treat decision making as a problem-solving process. Experts have large collections of schemas, enabling them to recognise a large number of situations as familiar. Another capacity of experts are their problem solving skills if an immediate match between the actual problem situation and available schemas in memory cannot be established. When faced with an unfamiliar tactical problem, experts collect and critically evaluate the available evidence, seek for consistency, and test assumptions underlying an assessment. They then integrate results in a comprehensive story. This expert's approach has been used to develop critical thinking training.

This paper presents empirical studies into the effects of critical thinking training. Individual commanders and commanding teams played scenario-based exercises in both simplified and high-fidelity task environments. Half of the participants received instruction, guidance, and feedback in critical thinking. The other half received the same scenarios, but without specific support. After training, test scenarios were administered to all groups. Results showed positive effects on the *process* of tactical command (i.e. better argumentation for situation assessment) as well as on the *outcomes* (i.e. more and better contingency plans). In addition, members of critical thinking training teams were more inclined to clarify their perspective of the situation to each other.

Critical thinking training supports commanders in situation assessment and decision making, and stimulates team members to engage in activities required to develop a shared mental model and to co-ordinate actions. For the Netherlands Navy and Army, the results of the studies are now being used to implement critical thinking into tactical decision games in order to develop new military training programs that will enhance the acquisition of sophisticated domain knowledge and decision making skills.

1. Introduction

In recent decades changes in the (inter-) national political situation has demanded a reflection on the way military personnel have to prepare for military missions. Peace keeping and peace enforcing missions have become more varied, complex and unpredictable. These missions have to be fulfilled with fewer personnel, in many different circumstances. At the same time, the professional development of our military officers has shifted towards more civil areas such as business administration, public administration, socio-economic studies, logistics and humanities. But with the number of deployments increasing, combat capabilities and skill in military tactics regain popularity. Training and education programs have to be adapted to provide military personnel and especially military commanders with training aimed at the successful preparation, execution and management of military operations in unstable and complex conditions (Lussier, 2003).

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Studies into expert strategies in tactical decision making have shown that experts have large collections of schemas, enabling them to recognise a large number of situations as familiar. Furthermore, when faced with novel situations, experts apply deliberate problem solving strategies that differ significantly from those of novices. When faced with a complex and unfamiliar tactical problem, experts collect and critically evaluate the available evidence, seek for consistency, and test assumptions underlying an assessment. They thus try to integrate the results in a comprehensive, plausible, and consistent story that can explain the actual problem situation, whereas novices very often consider aspects of the situation separately and independently. The experts' approach is used to develop a new training concept: *critical thinking* (CT) (Cohen, & Freeman, 1997; Cohen, Freeman, & Thompson, 1997; Cohen, Freeman, & Thompson, 1998).

The critical thinking strategy involves a problem solving approach to new and unfamiliar situations. It is a highly dynamic and iterative strategy, consisting of a moderately sized set of methods to build, test and critique situation assessments. These methods are to some extent generalizable but they can only be taught if grounded in a specific domain and trainees have already a certain level of knowledge of that domain. Effective critical thinking training combines instruction with realistic practice (Cohen, Freeman, & Thompson, 1998). Practice in the form of scenario-based training is considered an appropriate approach to training competencies required in complex task environments (e.g. Fowlkes, Dwyer, Oser & Salas, 1998; Oser, 1999). The design of exercise scenarios is very important since these have to provide opportunities to practise critical thinking strategies. Some guidelines for the design and execution of scenarios for critical thinking training are described in the next paragraph.

The effects of the critical thinking approach to tactical command and control training have been studied in several explorative studies (e.g. Cohen & Freeman, 1997; Klein, McCloskey, Pliske, & Schmitt, 1997). These studies showed promising results but they were conducted with individual decision makers, in simplified training environments and performance of critical thinking trainees were compared to trainees that did not receive any training. We conducted two training studies in which we compared performance of our critical thinking group with the performance of a control group that conducted the exercise scenarios with standard instruction and feedback. In the first study we focussed on the individual military decision maker and we conducted the training in a very simplified training environment. In the second training experiment we studied teams in more complex and dynamic training environments. These studies are described in paragraph 3.

In paragraph 4 we will briefly outline the approach to our implementation study of critical thinking training. This study is still being undertaken, so only some preliminary findings can be reported.

2. Scenario generation and instruction methodology for critical thinking training

In scenario based training, trainees prepare, execute and evaluate exercises that are simplified situations of the real world. A scenario has a starting point and depending on the type of scenario, events are specified in time and space. Scenarios can be very structured in the sense that all events are scripted, or have a free play character. Also, scenarios can differ in complexity: they may be simplified, leaving out many aspects of the real world, or they are complex, incorporating many aspects of the operational task environment.

Scenario based training provides trainees with the opportunity to build domain specific experience under controlled and safe conditions (Farmer, van Rooij, Riemersma, Jorna, & Moraal, 1999). By executing training scenarios, trainees may gain knowledge about typical problems and their solutions, thereby increasing their experience database of situation-response relationships. For critical thinking training, it is important that the training scenarios provide trainees with the opportunity to practise critical thinking skills. These involve (Helsdingen & van den Bosch, 1999):

Creating a story: A story is a comprehensive assessment of the situation, in which all the existing evidence is incorporated and explained and assumptions are made about uncertain aspects of the situation. Past, present and future are addressed in the story. The purpose of story building is to keep trainees from assessing

situations solely on isolated events. Instead, trainees are taught how they can integrate the available information into its context, which may include elements as the history of events leading to the current situation, the presumed goals and capacities of the enemy, the opportunities of the enemy, etc.

Testing a story: Testing a story is aimed at identifying incomplete and conflicting information. They have to correct these problems by collecting more data, retrieve knowledge from memory, or make assumptions about the missing piece of the story or to resolve conflicts in the argumentation.

Evaluating a story: After a story is constructed, it should be evaluated for its plausibility. The decision maker has to take a step back, identify critical or hidden assumptions and play the devils' advocate by falsifying these assumptions, i.e. explaining how this assumption can be false and building an alternative story.

Time management or the Quick test: Critical thinking is not always appropriate. Decision makers have to evaluate the time available and the consequences of their actions. In stressful situations such as those often encountered by military commanders, usually there is little time to spare. The decision maker should act immediately unless the risk of a delay is acceptable, the cost of an error is high, and the situation is non-routine or problematic (Cohen, Freeman, & Thompson, 1998). Critical thinking training focuses on the way trainees apply these criteria.

Our guidelines for scenario development follow directly from these critical thinking skills. An exercise scenario can be based on a real world course of events; however, some adjustments have to be made.

1. The real world course of events is probably too complex, with too many factors playing a role. It is important to simplify the scenario, especially for initial training exercises. Domain experts can identify critical factors and some distracting evidence.

2. The scenario should be built in the same way that trainees have to build their story. The developer and domain expert have to develop a coherent story, identify critical assumptions and come up with alternative explanations. This will help to decide what information has to be presented to the trainee and what uncertainties or conflicting evidence have to be introduced into the scenario.

3. The scenario developer or instructor has to consider the strategies by which the trainees can correct their stories. Do they have the knowledge to retrieve extra information from their memories; can they collect additional information, what kind of assumption could they come up with to resolve the gaps or conflicts in the information? This consideration will help the instructor or scenario players to anticipate on trainees' questions or behaviour during the actual exercise.

4. Exercise scenarios have to be varied and challenging. This means that the domain specific problems have to be challenging and varied, in order to prevent that critical thinking strategies become a trick.

5. What and when trainee performance has to be measured is something that has to be identified during the scenario development. Performance measures should be aimed at the outcome and processes of task performance. The outcome measures such as situation reports, orders, plans, and contingency plans are domain specific and linked to particular scenario events. They have to be designed and evaluated by domain experts. The process measures have a more generic character and they refer directly to the critical thinking skills. They can only be evaluated by domain experts, within the context of a specific scenario. Process measures include: information processing (selecting relevant information, story building, identification of incomplete or conflicting information), argumentation (the explanations for missing or conflicting evidence, criticising assumptions, coming up with alternative explanations), time management skills (make efficient use of the available time), and team skills (communication, supportive behaviour, co-ordination, leadership). 6. Test scenarios have to be developed for the measurement of transfer of training. Performance on the test scenarios has to be evaluated by independent experts, to prevent biased judgements by the familiar instructor. For the interest of evaluation of training effectiveness the independent expert should also be blind to the experimental manipulations.

3. Training studies

STUDY 1

The first study is conducted in the domain of "air defence" of the Royal Netherlands Air Force, in particular the Tactical Command Station (TCS) of a ground-to-air defence battalion. In an office room, trainee-officers played air-defence scenarios under supervision of a scenario leader. The trainee played the role of battle captain, the scenario leader played all other functions (lower and higher control), and introduced the scripted events in the scenario (e.g. battle damage reports, information about enemy movements, identified radar tracks). Prior to each training scenario, the trainee was provided with a short description of the political, military, and civil background situation.

Ambiguous, incomplete and inconsistent information was intentionally introduced into the scenarios to allow for alternative interpretations of events.

METHOD

Design: A training-posttest design was used (see Table 1). The supervising project officers arranged participants according to their tactical education and experience, and assigned matched pairs of trainees randomly to conditions.
Briefing and instruction: The critical thinking group received a critical thinking tutorial, followed by a demonstration in which two scenario leaders (one of them played the role of trainee) showed how critical thinking should be used in the scenarios. Trainees of the control group were instructed to run the scenarios as a normal command post exercise.
Training general: Two sets of three scenarios were used. Two scenario leaders were available. Order of scenario sets, and assignment of sets to scenario leaders was balanced. While performing the scenarios, trainees were asked to think aloud to give the scenario leader access to the assumptions and reasoning underlying the assessments and decisions. At pre-specified moments, the scenario leader "froze" the scenario for interventions (see below). After each scenario, the scenario leader filled in an evaluation form.
Critical Thinking group: critical-thinking supporting schemes were available during training. At scenario freezes and after completing the scenario, the scenario leader provided support and feedback on the critical thinking process (e.g. by asking "which alternative explanations are possible?" or "how can you verify that assumption?").
Control Group: trainees received outcome feedback only (e.g. "that was a good decision", or "you should have issued that request earlier").
Test: Two test scenarios and two scenario leaders were available. Order of scenario and assignment of scenario to scenario leader was balanced. All trainees were asked to think aloud. No support or feedback was given.

Condition	Instruction	Training	Test
Critical Thinking-group (N=8)	Instruction and demos in critical thinking	Scenarios 1-6, with support in critical thinking process- and outcome feedback	Scenarios 7-8; without support; no feedback
Control-group (N=8)	No specific instruction	Scenarios 1-6, no support outcome feedback only	Scenarios 7-8; without support; no feedback

Table 1: Research design

Performance measures: outcome measures were used to assess the quantity and quality of the end result (what is actually achieved?); process measures to describe the strategies, steps or procedures used to accomplish the task. Result and contingency plans were used as outcome measures; information processing and argumentation as process measures. Scenario leaders evaluated trainee performance on these variables on a 10-point scale. A verbal description was used for each scale point, ranging from "very poor" for score 1, to "excellent" for score 10. Prior to the experiment proper, scenario leaders had used the results of a pilot-study (using the same scenarios but with different trainees) to come to a common understanding of assigning scores.

Statistical analysis
Since the performance measures are ordinal data, we had to perform non-parametric statistical analysis. Data were analysed by means of the Kruskal-Wallis test.

RESULTS

Figure 1 shows the median scores on the test scenarios. The critical thinking group seemed to perform slightly better than the control group on all variables.

Significant differences between groups were only found for contingency plans ($H(1)=3.91$, $p<0.05$). The variables information processing, argumentation and result showed a similar pattern, but the differences between groups were not significant ($H(1)=1.62$, $p=0.21$; $H(1)=2.08$, $p=0.15$; and $H(1)=1.23$, $p=0.27$, respectively).
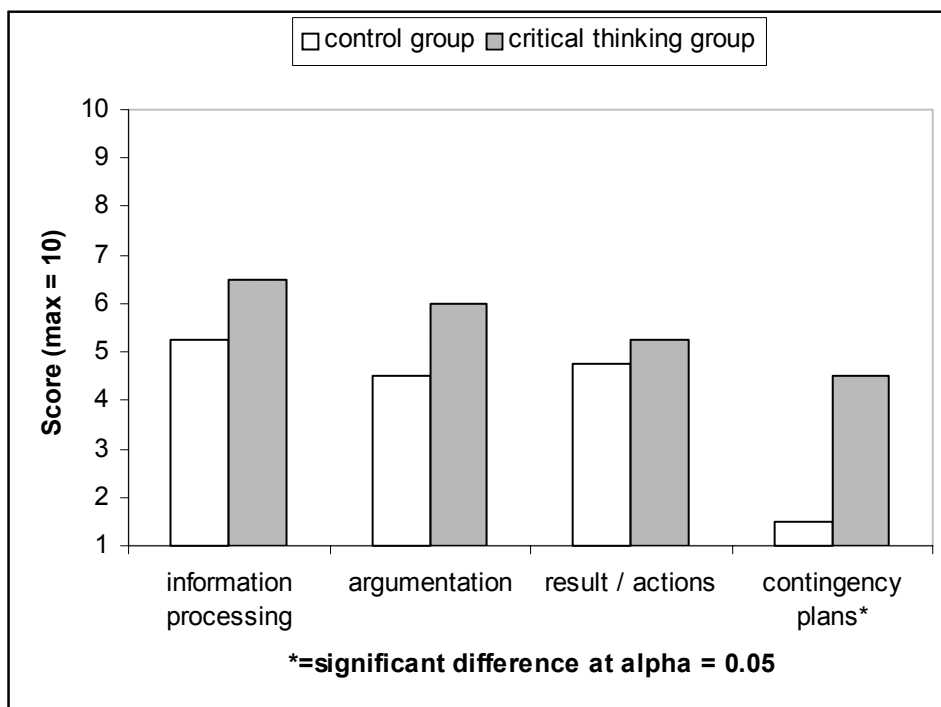

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Figure 1: median scores on the test scenarios

DISCUSSION

Trainees of the critical thinking group performed a little better than the control group. This indicates that the critical thinking approach might be a sufficient tool for improving the quality of tactical command. The results of the study had practical implications for the military training organisation as well. The scenario leaders discovered that this form of training disclosed gaps in tactical education of the participating officers that had remained concealed in the large-scale exercises constituting normal training.
The outcomes corroborate the positive outcomes of earlier explorative studies (e.g. Cohen & Freeman, 1997; Klein et al., 1997). However, further research is needed to investigate a number of questions. First, scenario

leaders' scoring may have been biased by their knowledge of the training intervention and the design of the study. More independent assessments are needed. Second, the effect of training has been studied in a simplified task environment. Eventually, critical thinking skills need to be applied in the real world. For reasons of transfer it is necessary to investigate whether critical thinking skills can be successfully trained in high-fidelity task environments. Finally, the training of the first study focused upon the individual commander, whereas tactical command is typically performed in a team. The effects of critical thinking training for teams need to be determined. These questions are addressed in study 2.

STUDY 2

This study investigates the effects of critical thinking applied to the training of command teams operating in their natural task environments. It is conducted in the domains of "anti air warfare" (AAW) and "anti surface warfare" (ASuW) at the Operational School of the Royal Netherlands Navy. Teams of trainees played single ship / single threat scenarios in a high-fidelity tactical simulator. The ASuW and AAW teams consisted of an officer and petty officer.

METHOD

Design: A training-posttest design was used. The supervising project officer arranged the eight participating teams according to their tactical education and operational experience, and assigned matched pairs of teams randomly to either the "critical thinking training" group or the "control" group. The supervising project officer selected two instructors for the study. They were randomly assigned to conditions.

Briefing and instruction: Prior to the experiment proper, instructors assigned to train "critical thinking training" teams were extensively briefed on the critical thinking training method, as well as how to support trainees in the application of critical thinking processes. Instructors assigned to the control team were not informed about the concept of critical thinking. They were told to support the teams as they would normally do in training. Instructors trained one team at a time. The briefing, training and testing required four days per team.

The first day of the actual study was used for briefing and instruction of the teams. The experimenter and the assigned instructor briefed the "critical thinking" team on the principles of critical thinking and showed them how to apply this principle in paper-based demonstration scenarios. The control group instructor briefed his team on the itinerary of the coming days, and discussed a paper-based demonstration scenario with them.

Training general: On the second day, teams received two interactive role-playing scenarios in a staff room under supervision of their instructor. On the third day, teams received two scenarios in the tactical simulator. A scenario run took approximately two hours. See study 1 for details on how the instructor made interventions to support learning.
Critical Thinking group: The instructor encouraged his team to explicitly execute all critical thinking components and he provided extensive guidance and feedback during and after the scenarios.
Control Group: The instructor supported the control group teams as in normal training.
Test: On the fourth and final day, teams were tested on two test scenarios in the simulator. Instructors were not present. Two independent subject matter experts evaluated the performance of trainees individually, as well as that of the team. They received the scenarios on paper. Markers in the scenario description prompted the evaluators to score trainee and team performance at that particular moment, on specified performance criteria.
Evaluators were not informed about the concept of training nor of the purpose and the design of the study. Assignment of evaluators to teams and to scenarios was balanced.

Performance measures: the same outcome and process measures as in study 1 were used. In addition, performance with respect to time management and team skills was also scored. Because the evaluators were used to using the official NATO 4-point scale, it was decided to use this 4-point scale in this study as well.

The verbal descriptions for the four scale points are, respectively: 1= UNsatisfactory, 2= MArginal, 3= SAtisfactory, and 4= EXcellent.

Prior to the experiment proper, the experimenter briefed the evaluators about the scoring procedure and how to use the scale. The results of a pilot-study were used to arrive at a common interpretation of performance measurement.

Statistical analysis

Since the performance measures are ordinal data, we had to perform non-parametric statistical analysis. Data were analysed by means of the Kruskal-Wallis test.

RESULTS

Data on individual as well as on team performance were collected during training and test. For reasons of brevity, performance data of the two test scenarios will be reported only. Figure 2 shows the results on the test scenarios.
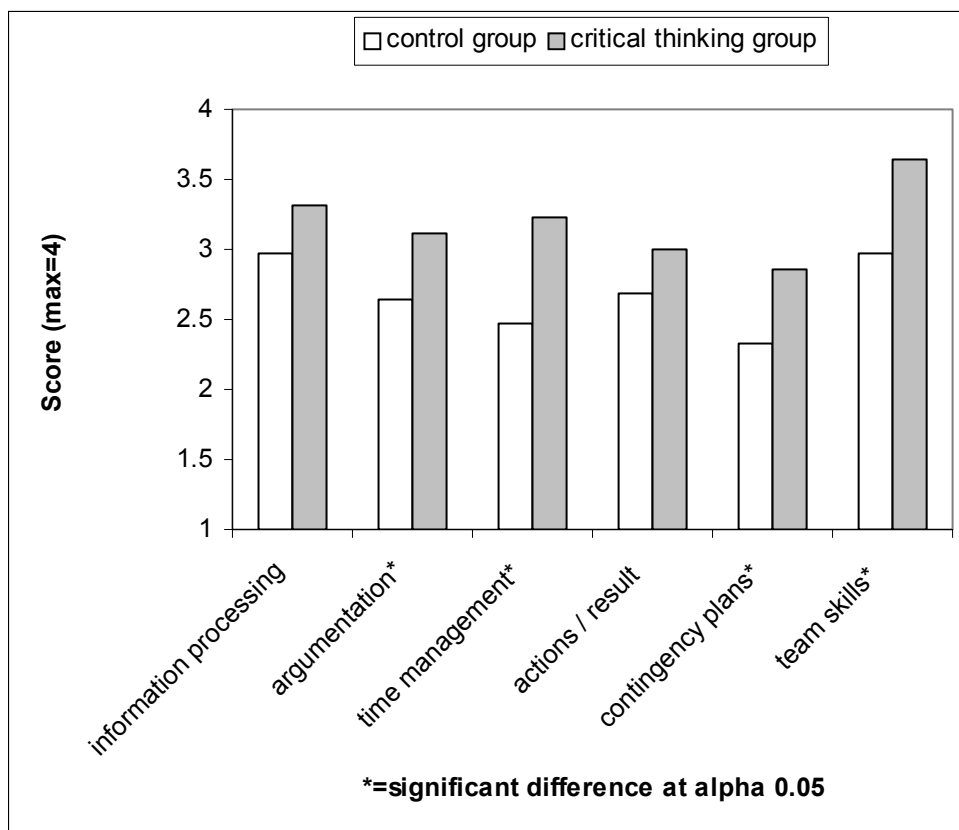

Figure 2: median results on the test scenarios

Univariate tests showed significant differences for argumentation ($H(1)=7.5$, $p<0.05$), time management ($H(1)=11.4$, $p<0.05$), contingency plans ($H1)=5.6$, $p<0.05$), and team work ($H(1)=8.7$, $p<0.05$). Performances on information processing and actions were not significantly different between groups.

GENERAL DISCUSSION

Critical thinking training produced positive effects on the process of tactical command (i.e. better argumentation for situation assessment) as well as on the outcomes (i.e. more and better contingency plans). The method supports not only individual commanders in situation assessment and decision making, it is also

particularly suitable for team members to clarify their assumptions and perspectives on the situation to the other team member(s). This is especially important for developing shared mental models and to co-ordinate team actions (Stout, Cannon-Bowers, & Salas, 1996). The dynamic and interactive nature of high-fidelity simulator training sometimes provides too little opportunity for the object of this type of training: reflective and critical task performance. This can be overcome by preparatory paper-and-pencil- and role-playing scenarios, and by introducing pauses in the simulator-scenarios.

The present and earlier studies (Cohen, & Freeman, 1997; Cohen et al., 1997; Cohen et al., 1998; Freeman & Cohen, 1996) now provide sufficient evidence warranting the implementation of this type of training in practical (military) training programs. Such implementation studies are needed to provide answers to important questions, like: "how can we integrate critical thinking training into an existing curriculum?", "what instruction and training do observer/trainers need for successful application (train the trainers)?", "what is the transfer of training?", and "what are the long-term effects?"

4. Implementation of critical thinking training

Our training studies have shown positive results for critical thinking training. However, these training studies were specifically designed to study the effects of our training manipulation. They were mini-training courses, conducted under controlled experimental conditions. This is very different from any normal training program. In a regular training program, instructors usually have the freedom to treat every student differently, according to the individual students' needs. In our training experiment, instructors had to treat all students similar and according to specific rules for reasons of standardisation. Another difference is the short duration of a training study as compared to a regular training program. A short training intervention may not provide the opportunity for trainees to have mastered critical thinking skills.

The Operational school of the Royal Netherlands Navy has recently revised the training program for CIC commanders. Two separate curricula, one for the air warfare commander and one for the surface and subsurface commanders, are merged into one. This demanded a review of the classes and teaching materials. One of the students' comments on the training program concerned the (perceived) lack of correspondence between classroom instruction on the theoretical basics of naval warfare and the practical exercises in the tactical trainers. As part of an effort to introduce an integrated teaching method for theoretical education and practice, we have started an implementation study for scenario-based critical thinking training.

APPROACH

The implementation study involved many work packages, such as:
- the investigation and evaluation of the current training program,
- selecting a suitable course,
- identification of the appropriate moments for a training intervention,
- design of instruction materials for instructors and trainees,
- conducting try-outs with domain experts,
- the actual implementation of the critical thinking module.
- evaluation of the training: qualitative (interviews) and quantitative (performance measurement on standard test scenarios)

The CIC commander training program consists of several separate courses. Our implementation study focused on one of these courses, i.e. Anti Surface Warfare (ASuW). Within this course, trainees have to attend classroom sessions on theoretical background and principles of ASuW and apply this knowledge in practical exercises in the tactical trainer. The scenario-based critical thinking training aimed to facilitate this step by introducing tactical decision games (i.e. paper-and-pencil scenarios). The scenarios for these exercises were developed by experts of the operational school, according to the guidelines set out in this paper.

Prior to the critical thinking training we have instructed the scenario leaders and instructors extensively on the background and principles of critical thinking. We developed readers for the trainees on critical thinking training within the context of surface warfare, and organised a classroom instruction on critical thinking for trainees. Observation protocols and performance measures were designed to support instructors in their tasks.

Critical thinking training consisted of 4 sessions of 4 hours. The first session was the classroom instruction, the other three sessions were scenario based exercises. In each session one scenario was discussed. Trainees were A scenario consisted of a description of a situation. Trainees were assigned a specific role in this scenario (e.g. ASuW commander or SAG commander) and had to develop one or more plans. Trainees were encouraged explicitly execute all critical thinking components. In the first two scenarios a trainer/scenario leader provided extensive guidance and feedback during and after the scenarios, in the last scenario it was expected that teams guided themselves through the critical thinking strategy.

During the exercises, scenario leaders evaluated the teams' critical thinking processes and their resulting plans. For a description of the performance measures see the training studies. After the last training session, we asked trainees to fill out an evaluation form and provide us with their opinion on critical thinking training. Until now, the final evaluation has not been undertaken.

PRELIMINARY FINDINGS

The students were enthusiastic and motivated to co-operate. They found that critical thinking helped them reasonably well to systematically assess a situation, integrate different observations into a coherent story, identify uncertainties and justify assumptions, and come up with (contingency) plans. They appreciated the simple scenario based exercises as a suitable method for applying their tactical knowledge and practising their skills in tactical decision making. Although some trainees did express that they were not completely convinced about the surplus value of the critical thinking approach when taken into account that it takes valuable time. Our impression was that some students did not have enough domain knowledge to incorporate the strategy and apply it as a context-dependent problem solving strategy, instead they treated it as an independent and obligatory thinking procedure. Very often, these students did not even recognise the uncertainties, ambiguousness or conflicts in the scenario. Even during after action reviews they labelled many alternative situation assessments as improbable.

Critical thinking in teams is a fruitful strategy to develop a shared understanding of the situation, to avoid misunderstandings, and to develop contingency plans since criticising one another's assumptions, playing the devils advocate, and coming up with alternative explanations is easy.

The instruction and training for the instructors and scenario leaders is a critical factor in the implementation of a training module in a training program. We found that the instructors of the Operational School could not conduct the critical thinking training exercises without our constant support. This may be due to insufficient time to train and prepare the instructors.

We can conclude that the critical thinking approach is a suitable strategy for scenario based training in tactical command. The critical thinking approach encompasses guidelines for the design of effective training scenarios and instruction and support for reflective decision making. It is especially helpful when introduced in a simple training environment, with sufficient time and support to practise all components of the strategy. There are a few important considerations when implementing this training strategy. Instructors and scenario designers should be extensively prepared and instructed into the principles and methods of critical thinking. Furthermore, the approach only works within the framework of a specific domain and trainees should have a sufficient level of knowledge of that domain in order to reflect critically on their decision making process.

The long-term effects of critical thinking training are not yet determined. We hope to be able to conduct our final evaluations in the near future, and maybe conduct a follow up study to monitor task behaviour of our trainees in their future work environment.

5. References

Cohen, M. S., & Freeman, J. T. (1997). Improving critical thinking. In: R. Flin, E. Salas, M. Strub, & L. Martin (Eds.), *Decision making under stress: emerging themes and applications* (pp. 161-169). Brookfield, Vermont: Ashgate.

Cohen, M. S., Freeman, J. T., & Thompson, B. B. (1998). Critical thinking skills in tactical decision making: a model and a training strategy. In: J. A. Cannon-Bowers, & E. Salas. *Making decision under stress: implications for individual and team training* (pp. 155-190). Washington, DC: APA.

Cohen, M. S., Freeman, J. T., & Thompson, B. B. (1997). Training the naturalistic decision maker. In: C. Zsambok, & G. Klein. *Naturalistic decision making*. Mahwah, NJ: Erlbaum.

Farmer, E.W., Rooij, J.C.G.M. van, Riemersma, J.B.J., Jorna, P.G.A.M., & Moraal, J. (1999). Handbook of simulator –based training. Aldershot, UK: Ashgate Publishing Ltd.

Freeman, J. T., & Cohen, M. S. (1996). Training for complex decision making: a test of instruction-based on the recognition/metacognition model. in: *Proceedings of the Symposium on Command and Control Research and Decision Aids*.

Fowlkes, J. , Dwyer, D.J., Oser, R.L., & Salas, E. (1998). Event-based approach to training (EBAT). *The International Journal of Aviation Psychology*, 8(3), 209-222.

Helsdingen, A.S. & van den Bosch, K. (1999). Concepts for training tactical command (Report TM-99-A043, in dutch). Soesterberg, The Netherlands.

Klein, G., McCloskey, M., Pliske, R., & Schmitt, J. (1997). Decision skills training. In: *Proceedings of the Human Factors Society 41th Annual Meeting*,(pp. 182-185). Held at: Albuquerque, AL. Santa Monica, CA: The Human Factors Society.

Lussier, J. (2003). Intelligent tutoring systems for command thinking skills. *ARI Newsletter*, volume 13, number 1, 7-9.

Stout, R. J., Cannon-Bowers, J. A., & Salas, E. (1996). The role of shared mental models in developing team situational awareness: implications for training. *Training Research Journal*, *2*, 85-116.