

## **Sensemaking: A Cognitive Approach to Training Situation Awareness Skills**

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### **ABSTRACT**

While no one will argue the importance of gaining and maintaining Situation Awareness (SA), there are a variety of perspectives on the best way to train it. Theoretical work on SA basically claims that we are either aware of the data, or we generate inferences and make these the basis of our awareness. In contrast, sensemaking is the attempt to understand how people arrive at an understanding of events. It covers the strategies people use and the reasons that they may struggle or become confused. In essence, we assert that sensemaking is the process through which SA is achieved. Building on decision making research, we hypothesized that a leader's SA skills can be improved by identifying and building his/her sensemaking skills. To test this hypothesis, a Web-based simulated decision environment in which participants performed an ambush mission while being mentored by a skilled tactician was used. This study measured the ability of students to improve their perception of the elements within a battlefield environment, to combine those elements to develop a coherent understanding of the situation, to use that understanding to mentally simulate possible changes in the situation, and to take appropriate actions to prevent and/or support those future events. With the objective to enhance SA, we structured the main components of the training intervention—the scenarios and the mentoring—to focus on sensemaking rather than tactical decision making. Likewise, the metrics designed to measure SA were also structured around student actions that were indicative of good or poor SA. The scenarios were found to be highly effective in building the students' skills in sensemaking and thereby, improving their SA. By the end of the training, the students demonstrated more complex mental models and a better ability to maintain SA in ambush situations.

### **ABOUT THE AUTHORS**

**Holly C. Baxter, Ph.D.** is a Research Associate II specializing in instructional design, evaluation metrics, and training. As a member of Klein Associates, she has worked in each of these areas on a variety of projects including the areas of knowledge management, training simulation technologies, enhancing situation awareness, and developing metrics for understanding the effectiveness of simulation technologies. Dr. Baxter holds a B.A. in Communication from the University of Dayton, an M.A. in Organizational Communication and Training from Indiana University, and a Ph.D. from Indiana University in Organizational Communication and Management with a focus on Training and Instructional Design.

**Danyelee Harris-Thompson** is a Research Analyst at Klein Associates. Her research interests include organizational development and training, theories of individual and team performance, the nature of expertise in teams and individuals, and training sensemaking and situation awareness. Ms. Harris-Thompson is currently involved in an effort to develop an electronic-based tool that will support content developers in authoring training scenarios for classroom and online delivery. She has worked on projects to develop tools for scenario-based decision skills training for geographically distributed teams, and web-based training focused on cultivating productive multinational teams within the SFOR environment. Ms. Harris-Thompson holds a B.A. in Psychology from Wheeling Jesuit University and an M.S. in Organization Development from Bowling Green State University.

**Jennifer Phillips** is formerly a Research Associate II at Klein Associates. Her research interests include the nature and acquisition of expertise, and decision-centered training. Ms. Phillips served as project lead on an Army-

sponsored effort to develop decision skills training for small unit leaders in military operations in urban terrain. Ms. Phillips worked on several USMC-sponsored efforts to re-engineer existing command posts and design experimental combat operations centers. She led an Army-sponsored program of research to identify the process by which individuals make sense of situations as they unfold, and to develop training which will bolster sensemaking skills. She is experienced in using Cognitive Task Analysis methodologies to capture components of expertise in a range of domains, and has used these methods to identify training requirements and for purposes of knowledge management. Ms. Phillips received a B.A. in Psychology from Kenyon College in 1995.

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### **INTRODUCTION**

While no one will argue the importance of gaining and maintaining Situation Awareness (SA), there are a variety of perspectives on the best way to train it. Theoretical work on SA basically claims that we are either aware of the data, or we generate inferences and make these the basis of our awareness. In contrast, sensemaking is the attempt to understand how people arrive at an understanding of events. It covers the strategies people use and the reasons that they may struggle or become confused. In essence, we assert that sensemaking is the process through which SA is achieved. Building on decision making research, we hypothesized that a leader's SA skills can be improved by identifying and building his/her sensemaking skills. The overall objective is to provide an effective training tool, in the form of a simulated decision environment, for leaders to improve their sensemaking and their skills at sizing up a situation. This paper will document the findings of an evaluation study that was conducted to judge the effectiveness of a training intervention for building sensemaking and, thereby, SA skills. It will discuss the quantitative and qualitative results, as well as the implications of these results on the overall effort.

This evaluation was designed to determine whether the training intervention produced improvements in sensemaking (the process by which SA is achieved) and SA skills within an infantry ambush situation. Students participated in a series of four scenarios, which allowed for the measurement of improved SA from one scenario to the next. This study measured the ability of the students to improve their perception of the elements within a battlefield environment, to combine those elements to develop a coherent understanding of the situation, to use that understanding to mentally simulate possible changes in the situation, and to take appropriate actions to prevent and/or support those future events. With the objective of this effort being to enhance sensemaking and SA skills, we structured the main components of the training intervention—the scenarios and the

mentoring—to focus on SA rather than tactical decision making. Likewise, the metrics designed to measure sensemaking and SA were also structured around student actions that were indicative of good or poor SA.

### **The Scenarios**

Good sensemaking and SA rely on a rich and complete mental model of a domain. Mental models consist of a sense of relevant versus irrelevant cues, knowledge of a wide range of patterns of cues and their meanings, and a sense of typicality and atypicality. The scenarios used for testing and analysis were designed in a way that supported the student in establishing patterns and mental models, recognizing anomalies within those patterns, and visualizing the battlefield in a way that supports pre-planning and informed decision making. The student received a great deal of information about the battlefield and terrain. By considering these different battlefield elements, the student began to visualize his (all subjects in this study were male) movements as well as the enemy's across the terrain. By learning the patterns of terrain utilization by the enemy across scenarios, the student should, through training, have been able to recognize when the enemy deviated from these movement patterns and, in turn, use that information to support his objectives. In addition to the physical battlefield, the scenarios were embedded with radio transmissions that mimicked the real-world battlefield. Some of the information received through these transmissions was critical; some was relevant but not high-priority. We were able to uncover the student's improvements in SA as he began to demonstrate the ability as a commander to discern the critical transmissions and interpret their meaning. As the student built better SA skills, he began to develop a greater awareness and enhanced attention management and was better able to discriminate between those transmissions that were most relevant to his mission and those that were less so.

## **The Mentoring**

Students received mentoring in two of the four scenarios they received. For this training intervention, mentoring is a key component. The mentors' goals were to assist the student in reading the cues in the scenario, sizing up the situation based on available cues, and understanding the implications for the near future. All of this was in service of the larger objective to broaden and deepen the students' mental models of the infantry ambush mission. Mentors utilized a Socratic approach, asking the students about their thought process and probing to elicit, and in many cases challenge, the reasoning behind their assessments of the situation. In this way they were able to guide the student to a better understanding of the critical transmissions and, more important, to a more accurate assessment and mental model of the current situation, including projections of what might happen next. Furthermore, the mentors led the students to mentally simulate how their own or the enemy's actions might affect the situation, thereby "evaluating" the value of a range of courses of action. As these lessons were taught and mental models were built throughout the scenarios, the teachings began to manifest themselves when the mentoring was not present in the form of stronger sensemaking and better SA in service of more appropriate tactical decisions.

## **The Measures**

For each of the scenarios, the developers articulated "desired actions" that allowed researchers to measure how the student perceived the situation and how that perception developed or improved across scenarios. The desired actions reflect decisions based on good SA and sensemaking, and are demonstrative of the completeness of the student's mental model of the current situation and his awareness of what is happening in the scenario. The desired actions address a range of proficiencies within the scenarios from reporting information to utilizing assets to maneuvering tactically in order to accomplish the mission. Achievement of these desired actions, and improvement from the control to the test scenario, indicates that the student is becoming better at sizing up a situation and is building his mental model of an ambush mission. The inclusion of these desired actions incorporates the mechanism for measurement into the scenario rather than relying on post hoc subjective judgments of the student's SA at different points in time.

Each of these areas within the intervention work together to provide a structure by which the student

can improve his SA skill and that improvement can be measured. Following is a more detailed discussion of the methodology for this evaluation and the results of the quantitative and qualitative analysis.

## **METHODOLOGY**

The subjects for this evaluation were students ( $n = 10$ ) graduating from The Basic School at Quantico, Virginia. All students were Second Lieutenants preparing for their first assignment. Some of the students had prior military experience in the enlisted ranks and some had no military experience. Additionally, the students were going into a range of different divisions in the military including military police, logistics, information operations, aviation, supply, and infantry. For this evaluation, the subjects were randomly split into two groups, hereafter referred to as Group I and Group II.

Two mentors were used in this evaluation. The first mentor was John Schmitt, a former Marine Major, experienced mentor, and originator of tactical decision games. The second mentor, Keith Holcomb, is a retired Marine Brigadier General with extensive mentoring experience. In addition, these mentors created the scenarios.

Two researchers were present during the evaluation to interview the students following their participation in the scenarios and to analyze the results of the interviews.

## **The Scenarios**

We utilized six scenarios: A, B, C, E, F, and G. Scenarios A, B, C, and E were conducted as normal tactical decision games with full scenarios and unrestricted mentoring. Each of these scenarios focused on an individual teaching point:

- Scenario A: Do not initiate an ambush until the entire enemy unit is within the kill zone.
- Scenario B: Place a security element on a key piece of terrain to guard your flank.
- Scenario C: Be aware of unconventional enemy reconnaissance and take action to confirm or deny any suspicions they might have.
- Scenario E: Look for indicators that the student's position has been compromised and if so, better conceal their platoon.

Scenarios F and G were used to test application of learning from the other four scenarios. Because they were designed to test the students' improvements in SA throughout the former scenarios, they did not include mentor intervention other than an introduction to the terrain and situation. Scenario F tested whether lessons were learned from scenarios A and C, and Scenario G tested whether lessons were learned from scenarios B and E.

### **The Scheme for Testing Learning from Scenarios A and C**

Scenario F was used to test whether a student was able to apply learning from Scenarios A and C. For this analysis, Group II served as a control group. Students in Group II participated in Scenario F before participating in any other scenarios. Each student received an overview and background from the mentor, participated in the scenario, and was then interviewed by a researcher at the end of the scenario.

Group I served as the test group. Students in Group I participated in fully mentored sessions with both Scenario A and Scenario C prior to participating in Scenario F. After participating in Scenario F, they were interviewed by a researcher in the same manner as Group II above.

### **The Scheme for Testing Learning from Scenarios B and E**

The scheme for testing Scenarios B and E proceeded in the same manner. Scenario G was used to test whether a student was able to apply learning from Scenarios B and E. For this analysis, Group I served as a control group. Group I participated in Scenario G before participating in any other scenarios. They received the overview and background from the mentor, participated in the scenario, and were interviewed by a researcher at the end of the scenario.

Group II, which served as the test group, participated in fully mentored sessions with both Scenarios B and E prior to participating in Scenario G. After participating in Scenario G, they were interviewed by a researcher in the same manner as Group I above.

### **The Testing Order**

Group I first served as the control group by participating in Scenario G, and then served as the test group by participating in Scenarios A, C, and F. They were each interviewed by a researcher after Scenario G and after Scenario F.

Group II first served as the control group by participating in Scenario F, and then served as the test group by participating in Scenarios B, E, and G. They were each interviewed by a researcher after Scenario F and after Scenario G.

### **Technology Control**

To help control for the factor of utilizing a new technology, each student was given an introduction to the tool and the opportunity to use it prior to participating in any scenarios. The mentor did not begin the scenario until it was clear that the student had an adequate grasp of the technology and how the scenario would play out. In addition, the student was advised of his responsibilities during the scenario.

### **Rationale**

This testing design allowed for the most powerful analysis given the constraints of time and few test subjects. Having a control group for each test allowed us to compare base knowledge to knowledge gained as a result of the scenarios. Without a control group, we would have no way of judging if the learning that occurred was a result of the scenarios or past experiences unrelated to the scenario-based training.

Splitting the subjects into two groups allowed us to maximize the significance of our results while not overtaxing our subjects. Each subject participated in a total of four scenarios and was interviewed twice. This design gave us five students as a control group and five students as a test group for each of our two evaluation scenarios (F and G). With numbers this small, every student made a significant impact on the evaluation results. With five people per cell, we had a better chance of getting a true picture of what had been learned instead of one person with an extensive experience base skewing the results of a two-person group.

**Table 1.** Desired Actions Targeting Primary Lessons, Per Scenario

Scenario	Lesson Learned	Time in Scenario	Desired Action
F	A	9:45	Directs all sections to hold fire until all enemy recon is in kill zone.
F	A	11:30	Directs sections to hold fire until enemy is well within kill.
F	A	12:45	Cautions sections to hold fire until enemy is clearly within kill zone.
F	C	2:00	Positions a platoon element to screen horsemen.
F	C	7:20	Issues orders for preparation to destroy enemy platoon and intercept horsemen.
F	C	10:10	Orders a section to cut off and screen horsemen ( <i>last chance to prevent ambush</i> ).
G	B	0:00	Could place a security element with initial set up.
G	B	11:30	Shifts a section to cover eastern flank near hunting lodge.
G	E	3:20	Orders 2 <sup>nd</sup> section to detain civilian visitors.
G	E	4:40	Instructs section leaders to detain civilian visitors until ambush is sprung.
G	E	5:20	Instructs section leaders to detain civilian visitors until ambush is sprung.

### DESIRED ACTIONS ANALYSIS

The desired actions generated by the scenario developers covered a wide range from the targeted learning lessons to radio reporting skills. In formulating the desired actions, the scenario developers provided observable indicators of the students' SA throughout the scenarios. We were primarily interested in the desired actions that addressed the main lessons from the learning scenarios (A, B, C, and E). Students had more than one opportunity to successfully complete the lesson in a given scenario. As each student participated in scenarios F and G, the mentors noted whether or not the student completed each desired action. In addition, the researchers wrote comments denoting whether the student needed to be prompted to complete a desired action (e.g., provide a report) or whether they completed the desired action but it was carried out incorrectly (e.g., reported to company level instead of platoon level). These comments from the mentors and researchers were the basis for the scoring used in the analysis.

### Quantitative Analysis

In this analysis, students received three points for every desired action they correctly completed without prompting. They received two points if they made a report at the correct time but to a higher level than was needed, and they received one point if they completed the action after prompting from the mentor such as, "Is there anything you need to report at this time?" If a student failed to exhibit his understanding of or the ability to incorporate one of the two teaching points within the scenario, five points were deducted to provide balance for the additional desired actions that were available for them to complete. It should be noted that students were only given points for intentionally performing a desired action. If they ended up performing an action out of luck or chance based on, for example, initial troop placement, they were not granted points. Each student was then assigned a cumulative score for the test.

After the scores were tabulated for control and test scenarios, a small sample t-test was run to determine whether there were significant differences between the two groups. In addition, the percentage of teaching points that were grasped was compared between the control and test groups for each scenario.

## **Qualitative Analysis**

To complete the qualitative analysis, we had each taped session transcribed, which provided a more complete representation of the students' thought processes and courses of action. By reviewing these transcripts along with the notes from the post-scenario interviews, we were better able to determine whether the students were carrying out desired actions as a result of their understanding of the situation or were making coincidental decisions. For example, in reference to the desired action, "positions a platoon element to screen horsemen" (Table 1), a student with a strong SA might have completed this desired action with the communicated rationale that the horsemen demonstrated a threat to his security as an unconventional force, and with placement of a platoon element he could monitor their movement and avoid being flanked. This is in contrast to a student who avoided being flanked because he coincidentally placed a platoon in an advantageous position at the beginning of the scenario, but throughout the scenario disregarded the threat presented by the horsemen.

## **RESULTS AND DISCUSSION**

### **Desired Actions Quantitative Analysis**

#### **Scenario G**

The scores for the control group ranged from 3-34 with a mean score of 13.8 and 0% of the teaching points. The test group scores ranged from 21-40 with a mean score of 32.5 and 92% of teaching points. After running a small sample t-test, a significant difference was found between the two groups ( $t = 2.69, p < .025$ ).

#### **Scenario F**

The scores for the control group ranged from 3-38 with a mean score of 22.5 and 25% of the teaching points. The test group scores ranged from 30-66 with a mean score of 47.8 and 75% of teaching points. After running a small sample t-test, a significant difference was found between the two groups ( $t = 2.85, p < .025$ ).

#### **Discussion**

The quantitative analysis illustrated the effectiveness of the scenarios in enhancing a student's SA through building sensemaking skills. We saw a significant increase in the number of desired actions performed between the first scenario and last scenario as a result of the students' increased SA. Students were paying

more attention to cues and factors in the environment around them. They were better aware of what information was highly relevant and what information they could discard as lower priority. In addition, they were better able to integrate the embedded lessons learned from comprehending and synthesizing the information received from different platoons. In both test scenarios, the students' ability to construct good SA improved significantly from the control scenarios. Not only did sensemaking, and thereby SA, improve, but these scenarios were also effective in teaching the four primary lessons embedded in the scenarios. We saw a significant improvement from the first to last scenario for each student in their ability to grasp lessons learned. This is another key indicator of an improved SA. Students would need a better understanding of the environment in order to grasp the lessons learned in these scenarios.

### **Desired Actions Qualitative Analysis**

#### **Scenarios F and G**

The results from this analysis provide qualitative support to the variances in SA found through the quantitative analysis. This evaluation study has shown us the effectiveness of utilizing electronic tactical decision games in conjunction with a mentor to enhance SA skills and mental models during an ambush. The qualitative data from the interviews have given us an excellent view of effective aspects of this training methodology.

Several students mentioned that they chose the correct actions in the final test scenario because they had learned them in earlier scenarios. In addition, the majority of the students mentioned that they learned a great deal from the mentor, and what they learned influenced their decisions in the final test scenario. Students also mentioned the effectiveness of the technology. They explained that the technology gave them a better picture of the battle situation than they had previously had from working on whiteboards in classrooms. They explained that it was helpful to get a visual picture of events as they occurred. The final factor students identified as influencing their actions in the test scenarios was past military and classroom experience. We saw a significant change in the students' SA from the first (control) scenario to the last (test) scenario. The following are examples of poor SA we saw from control group students in reference to civilians.

*CIVILIANS*

The following example demonstrates poor SA when a control group student encounters civilians within his sector during Scenario G. Note that the student dismisses the civilians as a distraction and shows no understanding that this interruption could be an indication that his platoon is not well concealed and that his security has been compromised. The lack of this mental model of the civilians is further evident in the post-scenario interview.

- *From scenario play*

**Student to Platoon:** [in response to first report of civilians] “Yeah, tell them to run back home to their house, would you? Thank you.”

**Student to Platoon:** [in response to second report of civilians offering gifts to the platoon] “Hey, that’s great. Don’t worry about the eggs or the chickens, just tell them that you’re going to keep watching here and you shouldn’t be any trouble.”

- *From post-scenario interview*

**Interviewer:** OK. Going back to the beginning of the scenario, a couple of your sections had some run-ins with civilians. Have you dealt with anything like that before? Is that similar to any TDGs [you’ve] played or anything?

**Student:** No, I can’t recall having run into civilians on any of the other TDGs. But it was just kind of like interference really. As far as what I heard over the net, it was just kind of like interference. It wasn’t like real information that had to get out...you know the kids and the dad and all that. It was just like extra information.

**Interviewer:** OK. So it was kind of distractive? [sic]

**Student:** Right. And we’d had something similar like that. Our SPC would pick up a book and then read random sentences out of a book and that was kind of like the same idea. So that’s maybe what I thought of when I heard that... now great, I’ve got a couple of civilians out there. It was just like, just running interference.

**Figure 1.** Example of poor SA

This example of poor SA is in contrast to the following, which is an example of good SA we saw from test group students after the teaching scenarios in reference to civilians:

*CIVILIANS*

The following is an example of exceptional SA from a test group subject. When this student encounters the civilians in his sector, he not only detains them (the desired action), but he takes extended security measures and conceals the civilian's vehicle. These actions demonstrate the student's understanding of the potential threat posed by the civilians—that his security may have been compromised or that he may not be concealed properly. In addition, these actions show that the student is projecting into the future and taking action to prevent detection by the enemy through concealing anything that may seem suspicious. He is considering his actions and the thoughts and potential actions of the enemy.

- *From the scenario play*

**Student to 2nd Section:** [in response to first report of civilians] Get his pickup truck camouflaged, get it out of the way so that it can't be spotted and hold on to him, 2nd section.

**Student:** [in response to second report of civilians offering gifts to the platoon] Uh, that's a negative on the gifts. Keep them detained. Hold on to them and make sure that, once again, that the truck is camouflaged. How copy? Over.

**Student:** 2nd section, this is platoon. What's the status of camouflaging that vehicle?

Mentor (role-play): Roger. We pulled that vehicle into a good hiding position in the trees there. Should not be visible from just about any direction. Over.

**Student:** Roger. Hold on to them. Keep 'em safe, and give them food. Over.

- *From post-scenario interview*

**Interviewer:** One interesting thing you did was when you decided to detain the farmer and his son and you decided to conceal the truck. Why were you concerned about the truck?

**Student:** I detained them for a reason. Because, and it ended up being the right reason, they were definitely sympathizers. One, they tried to trick us into letting them go or go back to their farm. Two, yeah, their story ended up checking [out] with the two little [kids], but that doesn't mean anything. That could be very well true; maybe their older brother is fighting for this armored brigade that's moving down. But they were enemy, if their comrades saw the truck – I mean, who knows how familiar they all are. And they may say, "Oh, that's Akmed's pickup...gee...what's going on there?" It's going to set off some kind of flag. I just wanted them to be thinking that everything's hunky-dory and that they wouldn't have the opportunity to do what they did in the last scenario. And completely catch us off guard.

**Figure 2.** Examples of good SA

These examples from the qualitative analysis demonstrate how students were paying more attention to cues within the environment, developing more robust mental models of the current situation, and making more informed decisions as a result of the training intervention. They had a better grasp of what was happening with their own sections as well as other platoons, and they comprehended the embedded learning lessons by watching the other platoons. They had an improved understanding of what could be inferred from enemy movements and were able to track the enemy better. They also showed advancements in recognizing when seemingly harmless individuals could pose a threat as unconventional reconnaissance or as a sign that their position had been compromised. In addition, they had a better grasp of when to attack, when to wait, and when to change troop positioning. They better realized the importance of looking at unconventional methods of approach and attack by paying attention to terrain features such as power lines, trails, and wooded areas. These factors from the

environment illustrate the improvement of sensemaking, and thereby SA, from the students in the control scenarios to the students in the test scenarios. In combination with the quantitative analysis, a strong case can be built that the training and analysis provided support in the development of sensemaking and SA skills.

## CONCLUSIONS

The evaluation study described in this paper was designed to measure whether SA skills in an infantry ambush setting improved as a result of the training intervention. The results indicate that, indeed, students enhanced their SA skills as a result of the training.

One possible explanation for the improvements from the first to the last scenario is that students were better versed in the task on the fourth scenario, given three prior trials. We do not believe this explanation accounts for the significant increase in desired actions

achieved or lessons learned grasped on the test scenario. The qualitative data captured through the researcher interview and the transmissions made by students show that the quality and accuracy of students' SA was vastly improved from the first scenario to the last scenario. This has nothing to do with the requirements of the task; it has to do with how students read the situation, projected into the future, and acted accordingly.

We believe the differences in the test scenarios were created by the students' enriched mental models as a result of the training. In general, we are increasingly convinced that the major components of mental models—the meanings attached to cues and patterns of cues, and the implications of those patterns for the future—enable a more accurate size-up of the situation and a more powerful base of knowledge from which to mentally simulate what the enemy might do next, and what impact one's own actions might have on the situation. The quality of one's SA, and one's ability to make sense of an unfolding situation, is highly dependent on the breadth and depth and accuracy of one's mental model of that domain. In this study, we saw mental models being enriched by the training intervention in two ways. First, the scenarios themselves provided experiences and feedback on actions (e.g., if the student did not guard or at least set up an observation post to his flank, he was devastatingly and unrecoverably flanked by the enemy). Second, and most powerful, was the impact of the mentors in the two learning scenarios. Their probing questions and queries about students' rationale led the students to better recognize critical cues and transmissions, better synthesize different pieces of information, and more accurately construct a plausible explanation for what they were seeing or a realistic simulation of what might happen next (i.e., story-building).

It is important to note that since mental models play such a substantial and mitigating role in the "goodness" of the SA that can be generated, sensemaking skill is largely domain-specific. We believe there is probably only a small set of generic sensemaking skills, if any. For example, one skill for sensemaking might be knowing to probe the

battlespace in order to generate additional information with which to construct SA. This concept was a recurring one in the mentoring, as the highly experienced mentors continually helped students determine how they could probe the battlespace for more information without compromising the mission. However, while "probe the battlespace" or "collect more information" might be seen as a generic skill for developing SA, it is not simply sufficient to know that more information would be beneficial. The tricky part is in knowing what information is needed, and how to get it. This is arguably domain-specific knowledge that relies on a strong mental model to accomplish effectively. Continued study is necessary to determine whether generic SA skills exist, and if so, how to address them through training.

Throughout this evaluation, it has been demonstrated that SA can be improved if the right methodology is utilized. Our methodology involved embedding lessons into scenarios that were realistic in terms of both content and time pressures. Through the combination of the desired actions being integrated within the simulated technology and the instruction provided by the mentors, we saw clear examples of the development of mental models and sensemaking. The expectation is that the training received through this effort will continue to support the students in further developing their SA as they participate in military exercises and missions outside of this effort. This training will support small unit leaders in more accurately sizing up situations, becoming more aware of the elements of that situation and how they combine to affect the mission, and making more informed decisions that will have a significant impact on their actions, enemy options, and the overall mission. Future research should focus on evaluating different training technologies and their effectiveness in training sensemaking and thereby, SA.

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