Scenario-based Training for Development of Leader-Subordinate Mental Models and Cohesion

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ABSTRACT

Mission Command doctrine emphasizes that command is a human endeavor in which leaders help develop their supporting teams through instilling cohesion and shared understanding (ADRP 6-0). One of the six principles of mission command is to provide a clear commander's intent. Whereas the communication and interpretation of tactical orders can be relatively straightforward, the same cannot be said of commander's intent. Misinterpretations of commander's intent can lead subordinate leaders to take inappropriate or ineffective actions that compromise mission success – outcomes that have been demonstrated in the laboratory, field training exercises, and the operational environment. Pigeau and McCann (2000) differentiate between two aspects of command intent: explicit and implicit. Explicit intent is the actual content of the order expressed by the words that are used to convey what the leader wants a subordinate to do (e.g. command intent statement). Implicit intent, on the other hand, constitutes the underlying meaning of the command as it is conceptualized by the leader. Implicit intent communicates the expectations and idealized solution that the leader envisions. The purpose of the research was to investigate *how shared interpretation of command intent* is developed within Army company leadership teams. Research findings led to the development and validation of a straightforward, scenario-based, leader led, hip pocket training tool to enhance shared understanding of implicit command intent between company commanders and their subordinate leadership team. This paper describes the development of the training tool, the benefits of scenario-based training for developing shared mental models of command intent, and findings from a field validation study conducted with 166 Soldiers (49 teams). Validation results showed an increase in team cohesion and shared interpretation of commander's intent after two hours of use. The implications of this research for military readiness and suggested future use will be discussed.

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INTRODUCTION

Performance demands of modern work have become more complex, ambiguous, and uncertain due to increased reliance on the use of technology, greater cultural and interpersonal diversity, and heightened specialization of the workforce. This is particularly true for the military. Over the past decade, Army leaders and their teams often find themselves facing ill-defined situations in which rules of engagement, standard operation procedures, and battle drills by themselves are not sufficient for adaptive performance. In many cases, Soldiers have not been able to reach back to their high level leaders in making decisions on how to proceed. In these situations, Army leaders rely on an accurate understanding of command intent to guide them. Mission command, as a philosophy, purports that commanders provide a clear intent to their forces that guides their actions but allows for freedom of action and initiative based on changing circumstances. Intent allows these subordinates to take the initiative and make good choices in the face of uncertainty and when the commander is not immediately present. Whereas the communication and interpretation of tactical orders can be relatively straightforward, the same cannot be said of commander's intent. Misinterpretations of commander's intent can lead subordinate leaders to take inappropriate or ineffective actions that compromise mission success – outcomes that have been disastrously demonstrated in both the laboratory and the field.

There is little doubt that a shared understanding of commander's intent is beneficial to the success of military organizations. Tools that assist in the development of a shared understanding of command intent should lead to enhanced operational effectiveness of U. S. military forces. To better prepare company and battalion leaders to function effectively in the modern battlespace, the Army has been exploring ways to provide leaders with deployable training, mission planning, and rehearsal tools. The purpose of this research was to develop and validate a training approach to enhance shared understanding of command intent between Army leaders and their subordinate leadership team. This paper describes the development of the training tool and a validation methodology of its effectiveness.

Commander's Intent: A Type of Shared Mental Model

Military Doctrine associated with mission command (ADRP 6-0) purports that adaptability can arise at a group level when subordinates' decision making and discretionary actions are constrained by the intentions of their leader. That is, the best decisions of subordinates are those which align with the preferences or intent of the leader. From this perspective, the individual subordinate behaves adaptively but within the constraints imposed by the leader. In a military setting, commander's intent is the leader's mental model of what success looks like and the boundaries around how that success is achieved. Arguably, if a subordinate fully understands their leader's conceptualization of the end state and the boundaries around achieving it, that subordinate would be more likely to make appropriate decisions without explicit guidance from the leader. Particularly in the face of novel situations for which there are no standard operating procedures. We refer to the subordinate's understanding of the leader's intent as shared interpretation of command intent (SICI).

At its core, SICI is a type of shared mental model between a leader and a subordinate. Generally speaking, a mental model is a cognitive representation of a system in the environment (Veldhuyzen & Stassen, 1977) that allows an

individual to form expectations and predictions through mental operations on that model for the purpose of interacting with the system (Rouse & Morris, 1986). Individuals use mental models to "generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states" (Rouse & Morris, 1986, p. 360). With an accurate mental model of the leader, a subordinate can predict the leader's reaction to situations and therefore more accurately mimic the leader in similar situations. Accurate subordinate mental models would be those with a high degree of similarity with the mental models of the leader. The degree of similarity between leaders and subordinates in their mental representations (of tasks, equipment, et cetera) should relate to the alignment of subordinates' decisions with leader's intent.

Commander's intent is comprised of two important aspects: explicit and implicit intent (Pigeau & McCann, 2000). Explicit intent is the direct concise statement of purpose, key tasks, and desired end state. A commander issues explicit intent in paragraph form that is disseminated to subordinate leaders up to two echelons down the chain of command. Explicit intent is meant to be vague enough so that it offers lower level leaders flexibility in decision making; it is meant to inform lower level commanders the purpose and end state but not how to complete the mission. Whereas an identical statement of explicit intent could be issued from different commanders, the implicit intent underlying those two statements might be very different.

In contrast, implicit intent is indirect and refers to all latent connotations not said within the explicit intent (e.g. what are the underlying goals, intentions, and constraints). Implicit intent includes social norms, expectations, trust, and/or intimate personal knowledge of subordinates. A shared understanding of commander's implicit intent develops slowly over time through training and experience – garrison and deployment. More often than not, shared understanding of commander's intent occurs on the job as Soldiers are making mistakes. Unfortunately in some cases those mistakes may cost Soldiers' lives. Even if those mistakes are not deadly, the inappropriate actions may have second or third order consequences such as hurting the reputation of the military or creating a negative unit climate. Although it is important to consider what is shared about the explicit message of command intent, it may in fact be more important to focus on the implicit piece of commander's intent. The main objective of this research was to build and validate a tool to accelerate the development of shared mental models of *implicit* commander's intent among a Company Commander and their subordinate leaders.

DEVELOPMENT OF THE SCENARIO-BASED TRAINING FOR AGILE TEAMS (STAT) TOOL

To develop the Scenario-based Training for Agile Teams (STAT) tool, the research team conducted semi-structured interviews with intact Company leadership team members (i.e., company commanders, platoon leaders, platoon sergeants, and executive officers [XOs]) stationed at three separate locations. When possible, platoon sergeants, platoon leaders, and XOs were interviewed with their company commanders. These interviews provided the team with a general yet flexible vision of the STAT tool characteristics: the tool should be scenario-based, low-tech, and extremely flexible, and informal. Each of these characteristics are discussed in the subsequent paragraphs.

Scenario-based training. Prior to the start of this research, our partners at the U.S. Army Research Institute (ARI) had conducted interviews with Army company commanders. They found that company commanders trained their subordinates in the field using a range of informal, ad hoc hip pocket training tools. Some of the company commanders had augmented versions of scenario-based tactical decision making games (DMGs). They were adapting versions of the scenarios and questions to train their Soldiers during downtime in the field. This information led to the decision to use scenario-based tactical decision making games as a jumping point for tool development.

Participants generally accepted the concept of better understanding commander's intent through decision making games based on scenarios/vignettes. As found in earlier interviews conducted by ARI, informal "decision making game-like sessions" are common in the Army's training and operational environment. Aside from more formal "war gaming" during the military decision making process (MDMP) process, small unit leaders (squad to company) frequently use scenarios or vignettes to conduct informal hip pocket training as part of pre-combat checks. Scenarios typically utilize the "what if?" process in order to explore alternative plans of action to effectively handle unknowns and unexpected variables. However, this process is instituted differently across leaders with no set format, and the procedures described were very diverse. Most participants felt that a standard tool would be useful.

Low-Tech solution. Over the last two decades, the movement for training development has been to computerize everything with the goal of developing computer-based training and tools to allow Soldiers to participate in high-

fidelity simulation anywhere and anytime. What happens, however, when a Soldier needs to use tools or techniques in situations where no computer is available, such as in the field? Military leaders regularly find themselves in this type of situation – working and training in the field with their team where no computers are available. During these situations, military leaders require "low-tech" solutions that they can bring into the field with them – solutions that are useful even when no computers are available. We developed the STAT tool to be technology free to allow leaders to utilize the tool in any situation – training or mission – regardless of resource limitations (e.g., internet connectivity).

Flexible and informal. The intent was to build a tool to promote an informal, scenario-based discussion between the platoon leader and his/her leadership team (XO, platoon sergeant, and/or platoon leader) in order to develop a shared understanding of commander's intent. The tool would be implemented during down time on the field such as sitting down to chow or while stretching during physical training (PT). Therefore, the tool needed to be developed to allow training across several short periods of time (5-15 minutes). Further, we did not want to dictate the scenarios or content. Rather we wanted to create a training tool that would essentially support the commander in creating his/her own training surrounding commander's intent. This was particularly important as the content related to implicit intent would likely change from commander to commander.

Soldiers reported unanimously that the tool should be similar in size and design as the "Write in the Rain" leader's notebook. This notebook is 4x6 inch in size with a spiral bound and made of weather resistant paper; it is currently in use and carried in most cargo pockets at the time of data collection. They expressed interest in tucking the tool into their leader notebook. If the tool needs to be bigger than their cargo pocket, they suggested making it foldable. The best way to fold would to be in half and half again. Further, they would like flexible folding to allow them to fold to the part of most importance to them. They noted flip booklets are good but they do not like spiral binding as it often falls apart. Participants also suggested that we incorporate blank space on which to take notes or write. Further, the tool should be laminated or waterproof in some way. The final STAT product was a double sided, two panel, 4x6 foldable card that could be printed on waterproof and erasable ink paper. Each side of the card is presented in Figures 1-5.

The purpose of the first page (Figure 1) is to orient the user to the overarching process. A simple scenario-based, group discussion process (referred to here as the "STAT process") emerged from interviews with Officers and noncommissioned officers (NCOs). First, the process required the commanders to develop a dynamic scenario on the fly. Second, commanders noted that creating "what if" statements helped them manipulate the scenario in a way to target developing a shared understanding of commander's intent. Third, there needed to be a discussion of the responses made to the "what if" statements. Further, there needed to be some structure around the discussion to ensure a focused and effective discussion. The first page of the STAT tool provides a brief overview of the purpose of the card and a figure outlining the STAT process. Some detail on how the discussion of "what ifs" should be organized is included. Specifically, commanders need to obtain and review not only the subordinate response to the "what if" but also their thinking behind that response.

The STAT process supports the processes of sense-making and sense-giving (Burke, 1999). During sense-making, leaders take information obtained from the larger environment and form a representation of the situation and devise strategies to accomplish individual, team, and organizational goals (Weick, 1999). Sense-making takes information and organizes it in a way that enables action. Sense-giving is when leaders convey information about the environment, goals, and resources to their team members. The process of sense-giving by the leader enables the development of shared mental models with team members. As the leader communicates his/her own understanding of the problem space and collects information about the subordinates understanding of the problem space, through communication, they work together to calibrate a shared understanding of that space. The STAT process is meant to facilitate that discussion within the context of notional scenario instead of relying solely on real life experiences.

Page 2 of the tool (Figure 2), reserves a space for the leader to jot down notes on the scenario they wish to discuss. It was suggested to use the Mission, Enemy, Terrain, Troops, Time available, Civil considerations (METT-TC) framework as a way to describe and bound the scenario. In addition to the traditional METT-TC considerations, additional space is allocated for commander's intent and a description of the tactical setting. The tactical setting is where commanders discuss the dynamic environment. Using METT-TC as a guideline for scenario development allows officers/NCOs to design scenarios using a familiar acronym. During the interviews, participants were asked to develop scenarios using the METT-TC guidelines. Participants were able to easily come up with quality scenarios in short periods of time using these guidelines. Not only were the guidelines useful, but most participants had previous

experience developing scenarios. Together, commanders should have little to no issues developing scenarios to be used in the discussion. Figure 3 provides a sample scenario.

Page 3 (Figure 4) of the STAT tool is meant to support the scenario discussion once it is presented. Space is provided for the commander to create several "what if" statements. In addition, general discussion guidelines are included at the bottom. These are meant to coach the commander into focusing on and appropriately explore one "what if" statement at a time. During the interviews, we noted many commanders had a tendency to shoot one "what if" statement after another at their unit members without a deep enough discussion on the "why" an answer was or was not in line with their intent. In addition, we added a section at the top of each "what if" panel (Figure 4) which outlined categories of "what if" targets that directly referred to commander's intent. The final panel (Figure 5) provides a space for the commander to draw a picture or map as needed.

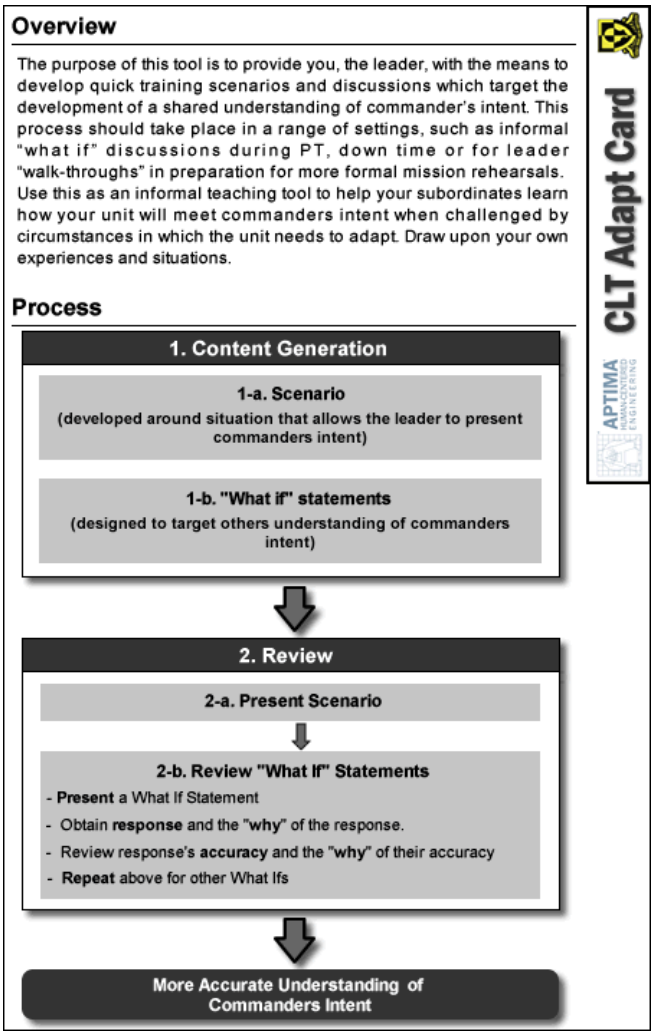

Figure 1: Panel 1 of the STAT tool – STAT process

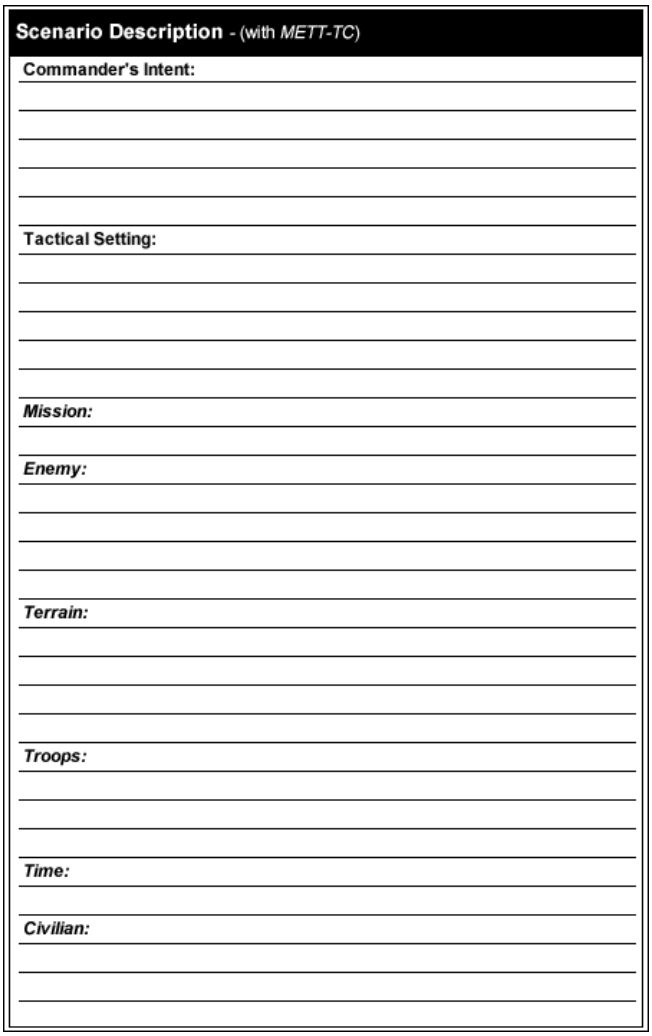

Figure 2: Panel 2 of the STAT tool -- scenario description

Sample Scenario

Intent: "Mission first. People always." Ensure and encourage that your troops are able to maintain contact with families.

Scenario/Description: Your unit is currently deployed in Afghanistan. During a counseling session you learn that one of your male troops in your unit is having marital problems and is considering leaving his wife. That concerns you but the Soldier seems to be performing all of his duties with no problems. Time goes on and another one of your Soldiers returns to you unit from block leave and comes to see you. He tells you that he was at a local bar, recognized the first Soldier's wife there and witnessed her flirting with several men. He initially considered telling the Soldier what he had seen but reconsidered and decided to ask your opinion. What do you think?

What-ifs:

- What if the Soldier that comes to you had been approached by the wife? What would you do differently?
- What if the first Soldier is scheduled to receive block leave soon?
- What if the Soldier on leave mentions that several others saw the wife while on block leave?

Figure 3: Sample Scenario

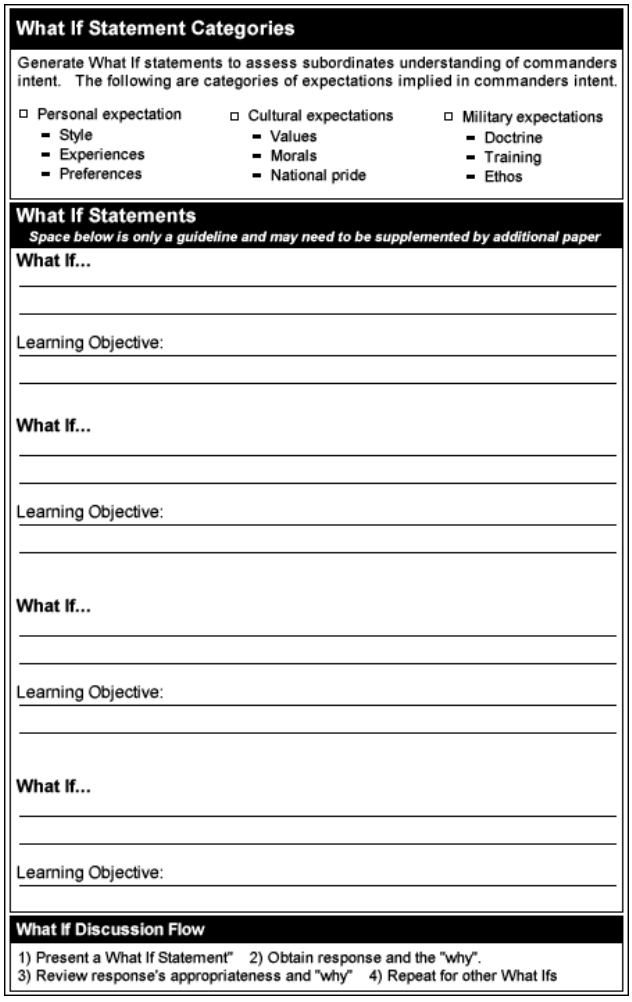

Figure 4: Panel 3 of STAT tool --Scenario Discussion

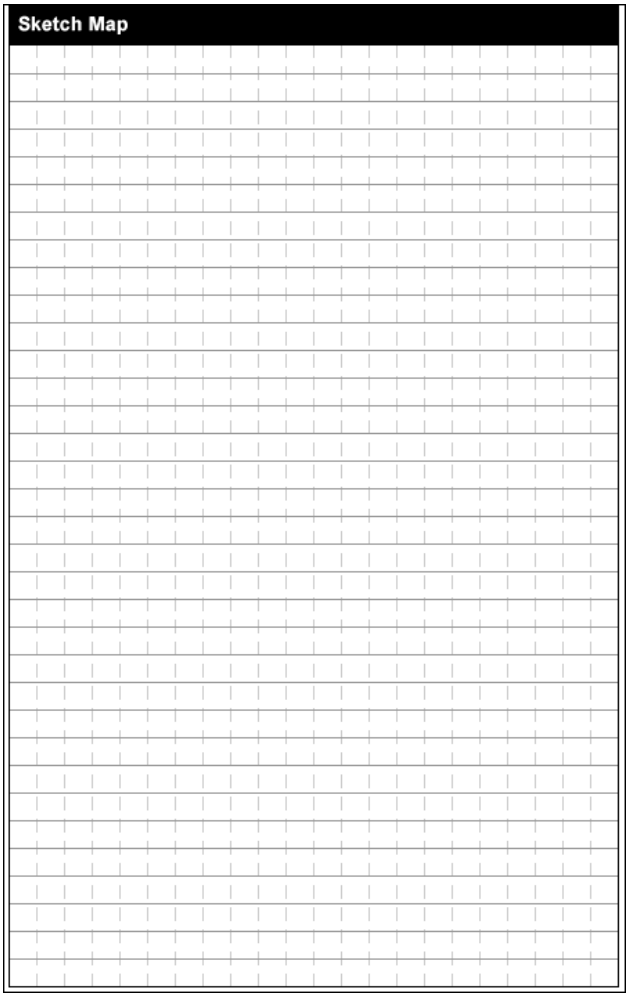

Figure 5: Panel 4 of STAT Tool –Sketch Map

EVALUATATION STUDY

It should be noted that the STAT tool itself was meant to support the overall STAT process. It was anticipated that a good commander could enact the STAT process without the tool. This research was a simple pre-post design meant to measure the extent to which the STAT process results in increased shared mental models of commander's intent, group affect, and group cohesion. Additionally, the design elicited feedback on the tool as a facilitator for the STAT process.

Participants

The participants in this field validation were 166 Army Soldiers (49 teams) from three locations. Some participants were made available through the Captains Career Course (CCC) while others were from FORSCOM installations. The CCC participants were all captains preparing for company command. FORSCOM participant teams were a mix of company commanders, platoon leaders, and platoon sergeants from the same unit.

Procedure

Participants were greeted by the experimenter and asked to sign in on a sheet provided. Participants were then told that the purpose of this session was to validate a training tool and the training for that tool. Once everyone had signed in, the lead researcher provided a briefing. As part of that briefing, they discussed the history surrounding the development of the tool. The participants were then asked to read and sign an informed consent form.

After the informed consent form was signed and collected, all participants were provided with a copy of the hip pocket training card and a print out of the training manual. Participants were asked to learn how to use the tool by reading through the training manual and referring to the card. They were also asked to improve the training by identifying awkward and/or unclear statements and instruction. The training session took approximately 25 minutes.

Once all participants were trained, they were placed into small groups of three to five participants. One member was designated as the leader and served as the company commander. During CCC sessions, participants were randomly assigned into groups and the leader of that group was randomly selected. During FORSCOM data collection sessions, participants were placed into their existing unit teams (e.g. company commander with his/her platoon sergeant and platoon leaders) when intact teams were available, and the leader maintained that role. If intact teams were not available, researchers randomly placed participants into teams and assigned one participant as company commander for the duration of the session. Once participants were put into their teams and the leader was assigned, they were asked to complete a battery of premeasures which included initial assessments for cohesion and shared mental models of commander's intent.

Upon completion of the premeasures, the lead researcher pulled the selected leaders aside and instructed them to engage their teams using the STAT exercises. To maintain consistency, the leaders were provided with two scenarios to discuss: one tactical scenario and one social scenario. The leaders were asked to use the scenarios to drive home points of command intent that were important to them. Following this instruction, the leaders went back to their groups and engaged in a discussion of the scenarios (as outlined by the training process) for a minimum of 45 and maximum of 75 minutes. If there was time left over, participant leaders were asked to come up with a third scenario based on their own personal experience.

Following the STAT training session, participants were provided with another set of measures, including a shared mental model measure and cohesion measure. Participants were also presented with a set of measures assessing their reactions to the STAT process, including overall satisfaction, utility of the tool and process, and general learning. All measures utilized a Likert scale of 1-5 and when appropriate, adapted existing validated measures of these constructs. The mental model measure was created for the purpose of this research and assessed the degree to which subordinate responses matched leader responses.

RESULTS

Reactions to the STAT Tool

The majority of participants (70%) reported learning something about the acting leader's intent during the STAT exercise (Figure 6).

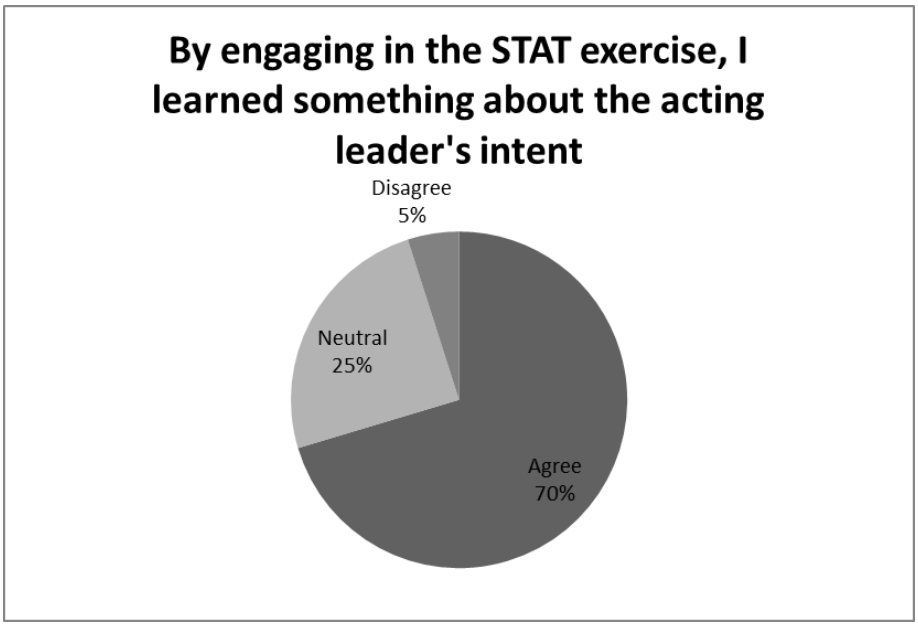

Figure 6: Percentage of people who reported learning something about their leader's intent.

Participants reported general satisfaction with the STAT tool and process (using a 5-point Likert scale), felt the tool and process were useful, and reported learning something (see Table 1 for means). Although the overall means were positive, they trended to neutral. During the exercise it was noted that there was quite a bit of variance in the ability of the "leader" to enact the STAT process. Therefore, a regression test was utilized to assess whether participants' feelings about learning something about their leader's intent explained variance in their satisfaction and utility scores. Indeed, the degree to which a participant felt he/she learned something about his/her leader's intent contributed to 36% of variance in their satisfaction reaction scores ($F = 65.36$, $p < .05$, $R^2 = .36$) and 31% of the variance in their utility reaction scores ($F = 51.05$, $p < .05$, $R^2 = .31$), such that participants were more likely to report positive reactions for the STAT tool if they had learned something about the leader's intent.

Table 1: Satisfaction, perceived learning, and usefulness reaction scores.

Reaction	M	SD
Satisfaction	3.67	.70
Perceived Learning	3.48	.72
Usefulness	3.73	.73

Development of Cohesion and Mental Models

Paired sample T-tests were run to test the whether there was an increase in social cohesion, task cohesion, and the development of more shared mental models. Results indicated a significant increase in all three dependent variables from pre to post-tests. Figures 7-9 present these results.

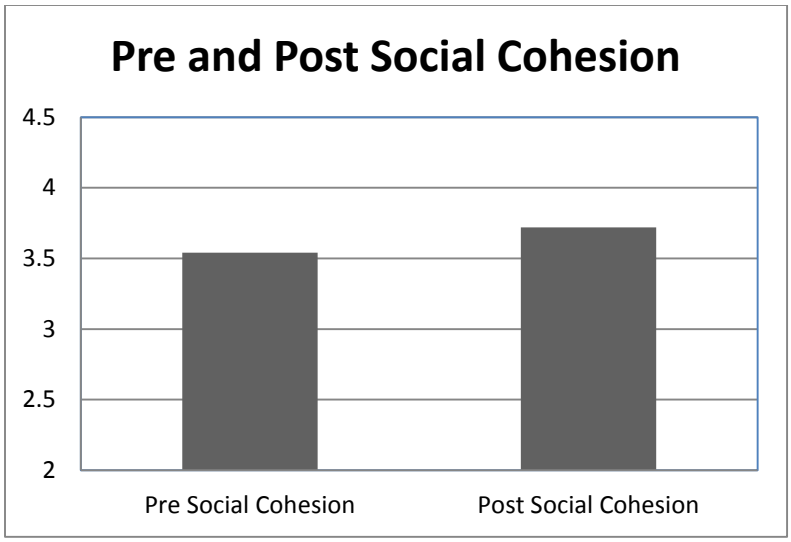

Figure 7: Significant difference between pre and post for social cohesion.

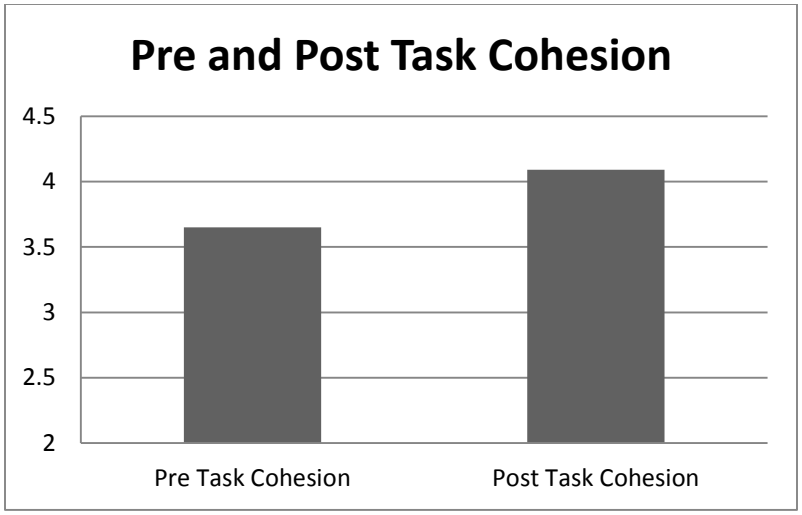

Figure 8: Significant difference between pre and post for task cohesion.

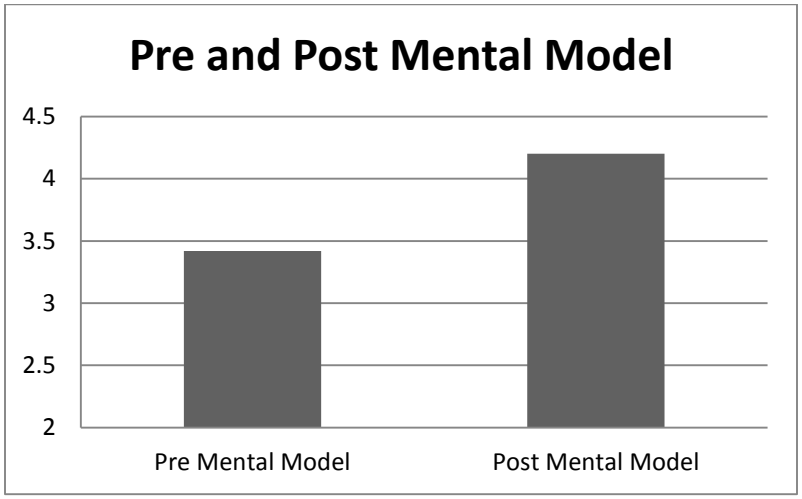

Figure 9: Significant difference between pre and post for shared mental models.

DISCUSSION

Due to the decentralized operations required for contemporary warfare, decision-making responsibility is often pushed down to junior officers who are often geographically removed from higher headquarters. These leaders – capable but frequently untested – often find themselves facing extremely ill-defined situations with little more than command intent to guide them. Commander's intent is often nebulous and misinterpretations can orient subordinate leaders to take inappropriate or ineffective actions that compromise mission success. In addition to the challenges faced in these types of operational environments, military leaders regularly find themselves needing "low-tech" training solutions that they can bring into the field when no computers are available. This research was successful in developing a flexible training process for company commanders geared towards accelerating the development of shared intent among the company leadership team members. Overall, the reaction to the STAT process and supporting set of tools was positive. Soldiers felt that the STAT process was a good way by which to build an understanding of implicit intent. Further, they found the STAT process to be familiar and the standardization of the card to be useful. They particularly liked the flexibility and informal nature of the process. Finally, results provided evidence that the STAT process leads to a greater shared understanding regarding commander's intent and develops affective team states such as cohesion.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the contributions of the many Army personnel who supported this research effort. In particular, we would like to thank Col. Gary Griffin (ret.). We would also like to recognize several U.S. Army Research Institute (ARI) personnel for their tireless efforts to ensure the project's success. Specifically, we extend our deepest thanks to Dr. Jay Goodwin for his assistance in recruiting and motivating research participants and for his dedicated and insightful leadership throughout all phases of this project. Finally, we express our deepest gratitude to all of the Officers and NCOs who participated in this research.

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