THE STUDY OF MILITARY HISTORY THROUGH COMMERCIAL WAR GAMES: A LOOK AT OPERATION CRUSADER WITH THE OPERATIONAL ART OF WAR

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

THE STUDY OF MILITARY HISTORY THROUGH COMMERCIAL WAR GAMES: A LOOK AT OPERATION CRUSADER WITH THE OPERATIONAL ART OF WAR**,** by MAJ Thomas J. Willmuth, 104 pages.

As the military scrutinizes and downsizes training budgets, the number of simulations for training, modeling, research, and education in the U.S. military continues to expand. The military endeavors to integrate these simulations into the military training life cycle, seeing them as essential for meeting military missions and goals in this era of reduced budgets, new military equipment, and strategies. There is little research on capitalizing on the commercial market's research and development for simulations. This study looks at one commercial simulation with a comparative analysis for the study of military history. Although this study just scratches the surface of the potential to tap into this great resource, it recognizes the limitations of current commercial simulations and the balance required in their use for historical analysis. This military history review focus is on the operational command level decisions of Operation Crusader. Operation Crusader was the desert clash between the German task force led by General Rommel and the Allied task force led by British General Auchinleck in November of 1941, using The Operational Art of War, a war game published by Talonsoft (1998). This study looks at the commercial game's use to educate military leaders to a critical analysis of examining possible command-level decisions. This study addresses this by using seven officers from different branches (infantry, armor, intelligence, engineer, aviation, quartermaster, and field artillery) who have never played The Operational Art of War, and an analysis of their experience playing the game.

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CHAPTER 1

INTRODUCTION

The great battles throughout history were often won and lost as the result of a few key decisions. Those who study history often question these key decisions through documentation and logical thought estimating the cause and effect of those decisions as well the multitude of rippling effects. Historians continue to revisit the command-level decisions to determine if there were better alternatives based on the information available. Were the Allies prepared for the German Army to release the reserve panzer divisions on 6 June 1944 for an attempted decisive counterstroke at Normandy? Would British General Montgomery make a stronger effort to take the vital port at Cherbourg if he anticipated the logistical frustration caused by the destruction of the Mulberries in the summer of 1944? What were the options available to the French when the Viet Minh introduced artillery at Dien Bien Phu? Did General Franks realize his cautious rate of advance would allow Iraqi Republican Guards units to escape? These are but a few of the infinite number of questions historians explore after the battle. Historians continue to address these questions and the decisions the commanders made through historical research, but technology today allows another avenue to scrutinize history, particularly in analyzing command-level decisions on the battlefield.

War gaming can give us insights into understanding command-level decisions. War gaming, a method of rehearsing a battle before and after it is fought, is hundreds of years old. Successful commanders used through history forms of war gaming before a battle to synchronize the many moving parts of a unit, anticipate enemy reactions, or just

assist in visualizing the upcoming battle. For example, when war with the United States approached, the Japanese military conducted extensive war games for a surprise attack on Pearl Harbor. Their military created an exact replica of the island of Oahu (about 1 to 32nd scale) and war-gamed every contingency they could think of.[1] Most war gaming in today's Army is used to train forces or staffs on hypothetical future conflict. The future of Army training increasingly focuses on simulations and their ability to train troops and staffs to battle tasks. These training simulations are invaluable to the Army in husbanding resources and training for contingencies without the risk of life. These training simulations often focus on anticipating events, evaluating cause and effect of actions, and raising questions for future consideration. Unfortunately, these training simulations have specific objectives that do not necessarily include educating the commander on how to think. This tutoring on how to think is balanced at the Army's Command and General Staff College by the extensive curriculum and through the study of military history. This paper will examine the method on how to think through the study of military history through war games.

Over 1,000 field grade officers a year train on command-level decision making by using computer simulations at the U.S. Army Command and General Staff College (CGSC) at Fort Leavenworth, Kansas. Computer war gaming is one of the many tools used to teach and train military officers on the technique of command-level decision making. Articles appear in military journals every month lauding the effectiveness of computer simulations in military command decision making. Some of these articles explore computer war gaming in areas of logistics,[2] armor,[3] infantry, combined arms,[4] and training[5] in order to analyze and promote the effective use of war gaming to assist in

decision making or predictive analysis. While training in tactical decision making, the officers studying at CGSC spend hundreds of hours studying, analyzing, and discussing military history with the intent to understand historical command-level decisions. This study of history is done by hours of reading selected works, then analyzing these works and the historical commanders through additional hours of classroom discussion. This method of studying history begs the question: Is there a better way? Contrary to the abundance of written material on war gaming for training, there is very little literature discussing the application or usefulness of war games in the study of military history. There is little written on the ability of computer war games to recreate the historical environment to the level of detail and realism needed for the military to understand the decisions made in battles by the leaders that fought them. This study will examine the usefulness of computer simulations in the study of history.

Several types of historical reconstruction are done in many government and civilian agencies that use computer simulations in training and researching "what if" scenarios. However, very few agencies use simulations to recreate events to gain insights into why the participants made the decisions they made. There are some simulations that attempt this, but they are few and very expensive. Probably best known in the civilian market is the Federal Aviation Administration's (FAA) use of computer recreations after a major aircraft incident. Through the use of the cockpit voice and instrument recorder, as well as other contributing factors, the FAA attempts to recreate an aircraft accident to determine the cause of the accident and the information presented to the crew. Through the simulation they research different possible courses of action that may prevent an accident in the future.

Unfortunately, in studying historical battles, most leaders and historians do not have access to the level of simulation used by the FAA in recreating aircraft accidents. In the use of computer war gaming to study history, many military commanders are constrained to use computer simulations obtained from computer software designers marketing war games for commercial purchase. However, as commercial designs become more sophisticated, they offer the potential for giving a new way to examine history.

Can we obtain historical insights on command-level decisions using commercial war games? This paper will take a famous battle, Operation Crusader in North Africa November 1941, from the perspective commercial war game The Operational Art of War (TOAW), Volume 1. This paper will address the question: How well do state-of-the-art commercial simulations replicate the key elements of command-level decision making in this game? This paper will address some key elements of TOAW and its fidelity for replicating the environment for command-level decision making. We also examined our critical analysis for credibility of the key decisions made.

This author's interest in using computer war games as decision making training tools started as an assistant professor of military science at Brigham Young University. Simulations were incorporated into the military science curriculum. Through a series of eight periods of instruction, cadets produced a platoon operations order, then execute their course of action on the computer simulation. Most students commented that during the exercise they could finally visualize the battlefield and understand the purpose of the operations order. Many students commented they could not really understand some subjects they studied for months until put in perspective by the simulation. This

produced a positive experience that commercial war games could be used for more than entertainment. This student realization of the battlefield was not unlike studying the Battle of Gettysburg. At first, the battle can be overwhelming to understand with confusing movements and formations, only to be understood when you see a map of the battle with the units arrayed. In this sense, historical computer war gaming can give a three-dimensional interactive map.[6]

This study will take one of the most detailed and highly praised computer war games on the commercial market, The Operational Art of War, Volume 1 (Talonsoft), and compare the Operation Crusader scenario to the historical campaign of November 1941. This study will begin by examining the campaign and describing the battlefield information and view of the battlefield that the commanders had. The study will include what the commanders historically understood as their strategic role, which drove their operational decisions. This paper will look at the units and equipment available and their technological differences and will briefly address operational differences (how they deployed and fought their units) and how they worked together with their historical allies. This paper will look at logistics, how each side viewed this important lifeline and how close they were willing to operate on the edge of their supply capability. A final look at terrain, weapon effects, rates of movement, weather, morale, leadership, fatigue, training, and time available will help to understand this battle in relation to the war game. From these key elements of tactical and operational command-level decision making variables, an evaluation of The Operational Art of War for purposes of studying history will be made.

Although the above elements are what many would call tactical, they can be useful in understanding tactical and operational decisions. At the home of Army command doctrine, Fort Leavenworth, Kansas, the Command and General Staff College teaches that "Operational art is the process that translates national strategy, via a theater commander-in-chief's (CINC's) theater strategy, into operational and tactical action."[7] This study will examine these key elements with subjects who have command experience from the viewpoint of armor, aviation, infantry, engineer, intelligence, field artillery, and logistics and compare the modeling of key elements of the war game to historical accounts. The subjects will accomplish this by first studying a thirty-minute reading of the historical operation that will focus on the critical roles and decisions of the historical commanders. They will then take a questionnaire to evaluate their perspective on the key decisions made by the historical commanders during the battle. The commanders will then participate in a controlled exercise, playing the game from the perspective of the Axis and then the Allies against a human player. After their gaming experience, they will take another questionnaire to analyze and measure their perspectives of the computer war game in relation to their understanding of the historical decisions made.

This methodology does not come without its challenges. The chief difficulty in comparing the key elements of the command-level decision making in the actual conduct of Operation Crusader to that modeled in simulation is that the computer artificial intelligence (AI) will react to events (movement, weather, etc.) in the game according to a programmed set of parameters. It is difficult to manipulate the computer AI algorithms to match the historical decisions once enemy contact is made. This is because the innumerable variables in combat that the AI will react to the opponent playing, which

will cause the battles to develop in a historical direction. For this reason the study will evaluate the game in the two-player, free play mode and computer versus computer. From the two-player mode, each of the seven commanders can compare battlefield effects and key elements from both sides against a consistent opponent. The seven commanders will answer a questionnaire before and after the simulation to identify insights they might receive. In the computer-versus-computer mode this study can compare these effects and elements against consistent opponents over many iterations. TOAW AI is not programmed to get smarter each time it plays, as humans tend to (one hopes). This author will command the Allied and then the Axis side of the war game with the same opponent during the two-player evaluation.

The answer to the question "why" will lead to the possibility of using the war game as a viable tool for current leaders to study history. If commanders can accurately visualize the battlefield in the simulation, then this is another tool to view history. Commanders can possibly get an additional perspective of historical events that they cannot get from reading or staff walks. Commanders can also save time. Current leaders can dissect and glean, in hours, concepts and decision criteria used, instead of days of research reading hundreds of pages of text. Studying history through war games will certainly not replace historical research or the benefits of a battlefield staff ride, but it may offer a timely view of the battle that will complement reading in a way no other medium can. If the simulation is reasonably accurate in modeling those key elements discussed earlier, the commanders could also compare, in part, their decision-making skills to those of the historical commanders in the historical time and conditions.

Commanders can experiment and, without consequences, make mistakes to better evaluate if the commanders made the appropriate decisions.

Beyond this, it is a tool to help fulfill Clausewitz's third intellectual activity in the critical analysis approach. "Critical analysis is not just an evaluation of the means actually employed, but of *all possible means*---which first have to be formulated, that is, invented. One can, after all, not condemn a method without being able to suggest a better alternative."[8] On the other hand, if commercial computer simulations cannot replicate the key elements of command-level decision making, then historical war gaming is left to its current purpose of entertainment.

Why chose commercial war games over military simulations? Currently, there are several very detailed combat simulations in use by the U.S. Army. Unfortunately these systems cost hundreds of thousands of dollars, take hundreds of man-hours to set up and execute, and are only available to a very small audience of commanders participating on a particular military exercise. None of the current military simulations address historical topics. The primary motive for choosing a commercial war game for the study of military history is because it is easily available to all commanders. Low cost, short setup and execution time, and accessibility to the widest audience make a game available. The simulation must also be affordable to the student of military history. Most commercial simulations cost between $20 and $60, compared to a corps battle simulation (CBS) that can cost over $100,000 for even a small set of operation cells and the contract to man and maintain them for one simulation. This small CBS system setup could train 200 leaders for five days and would require weeks of preparation for database upload, battle staff training, and full participation by all players in order to achieve the full benefit of the

simulation. Even with this extensive preparation, these large-scale systems do not address historical battles, but focus on command-level decision making in a hypothetical situation. On the other hand, a commander can install and operate a commercial war game in a few minutes. Even working through a long campaign the commander can stop, evaluate key decisions, and return to the simulation when time permits. Large simulated exercises do not allow this flexibility. Finally, CBS systems are not available to most commanders on a regular basis. These systems are limited to military schools, large training exercises, or research. Commercial simulations are widely available and only require a modest home computer. The simulation system must be available for the majority of commanders to regularly study the battles. No matter how good the system is, if it is not available there is little gain.

For these reasons, this study will use war games marketed for commercial use. As stated, this study will employ The Operation Art of War, Volume 1 (TOAW). Norm Koger, the designer of TOAW, designed the game for operational level decision making. He best explains his focus in the following note:

> The title "Operational Art of War" is based on a Soviet era military term meaning essentially, "the theory and practice of army level combat." There isn't really a hard definition of "operational level" scale. The term is generally used to describe anything in the gray area between strategy (overall conduct of a war, including non-combat factors such as industrial production) and tactics (the details of the actions of small units). If your primary focus is the battlefield, it isn't strategy. If you can't smell the smoke, you aren't really dealing with tactics. I think of the operational level as "a view of the battlefield on a scale just exceeding that at which differing ranges of various direct fire weapons are significant."[9]

TOAW is arguably the most comprehensive constructive commercial simulation available to the widest audience, as of the writing of this paper, in terms of the extensive equipment database and research of weapon effects. TOAW has the largest equipment

database and the most-detailed orders and statistics tables available commercially. TOAW is lauded as a superior war game with the most realistic historical maps and equipment available commercially and was awarded the best game produced in 1998 for historical realism according to six national computer game review magazines.[10]

Norm Koger used volumes of historical research and former military officers as advisors during game developing and production. Even with this, the game has limitations because it was made for entertainment. Making a game for "hard core realists" must also be balanced with playability. Norm Koger writes:

> You have to remember that the goals of commercial simulations are different from the goals of professional military simulations. A commercial wargame is essentially a form of role playing game. It succeeds by entertaining the player. For wargamers a substantial part of entertainment is tied up in the illusion that they are making the same kinds of decisions and facing the same kinds of problems as real world commanders.[11]

With this design limitation, commanders could easily dismiss commercial war gaming as a tool for studying historical command-level decisions. The answer is not that clear cut, but requires further research and analysis.

Choosing a good commercial simulation for historical study also includes selecting a battle that the simulation can accurately model. The battle must also meet historical teaching objectives for the commanders to analyze decision making. This study will examine Operation Crusader. Operation Crusader is a unique campaign in history. The commanders of Crusader faced a nonlinear desert battlefield that produced unique challenges to a new era of technology and way of fighting. How the commanders faced these challenges produce valuable historical lessons. Some of these challenges include defending and attacking forces in an extremely vast area of operations with too few soldiers for a linear battle. The campaign also demonstrates why coalition warfare was

important in making tactical and operational decisions. It also demonstrates some adroit as well as shortsighted logistical innovations on a porous battlefield. Finally, the commanders in Crusader had to make difficult operational and tactical decisions with intelligence information that was slow, misleading, incorrect, and sometimes nonexistent. The study of these challenges of a nonlinear battlefield faced in Operation Crusader can provide valuable experience for military commanders today.

Background

Operation Crusader was the British offensive to stop the German advance eastward toward Egypt. German General Erwin Rommel's North African offensive, beginning in March of 1941, completed the encirclement of Tobruk. Rommel put Tobruk under siege by May and was preparing a final offensive to take the Libyan city. Rommel intended to attack around the end of November. When the British attacked on 18 November, Rommel had roughly 414 tanks, 320 aircraft, and 9 divisions (3 German), four of which were tied down in the siege of Tobruk.[12]

What had frustrated Rommel's efforts in his successful campaign so far was the lack of strategic supply and replacements. In the summer of 1941, Germany launched Operation Barbarossa (German invasion of Russia), and Rommel's German forces (known as the Afrika Korps) became even less of a logistical priority than before, greatly curtailing Rommel's offensive posture. Rommel paused his offensive for weeks to build forces for the final assault on Tobruk. By mid-November 1941, Rommel was only days from launching his attack.

The British operations in the North African desert were a high strategic priority. Until this operation, the Empire suffered a series of morale-crushing defeats. They hoped

this battle, the one place in theater where British troops were engaging German troops, would turn the tide. Operation Crusader opened on 18 November with the British XXX Corps driving towards Tobruk, and the XIII Corps advancing by the coast. The Allied goals were to relieve the siege of Tobruk and destroy the Axis forces in Libya. The British started with over 700 tanks, 1,000 aircraft, and eight divisions. As the British entered Libya, Rommel thought the attack was only a diversion, but soon committed his two panzer divisions into a fast-moving desert fight centered around the key airfield of Sidi Rezegh, twenty miles south of Tobruk. The separated British armor brigades suffered a humiliating defeat with crippling losses. Rommel, lacking adequate visualization of the battlefield, made a critical error and attacked toward Egypt. This gave the British armor an opportunity to reconstitute and become an effective fighting force again. With his losses mounting, fuel reserves gone, and combat power culminated, Rommel faced some difficult decisions. He could stay and fight and possibly lose his entire combat force, or withdraw and save his mobile units. When allied forces threatened the relief of Tobruk, Rommel ordered a withdrawal to the west. The operation was a success for the British, but an expensive one in the loss of men and materiel. It was one of the first British victories over the Germans.

Conclusion

In the following chapters, this paper will study Operation Crusader and attempt to identify tactical and operational elements that were, in the eyes of the commanders fighting the campaign, most critical. Some of the items addressed are weaponry differences, unit organizational and operational differences, doctrine, allied relationships, environmental conditions, time, morale, and leadership training. The discussion will

address TOAW and Operation Crusader and why this combination for the study of command-level decisions in history. This paper will address design intentions of the game, use of the game in other military venues, and basic principles on how TOAW works. Besides combat, this study will look at supply, unit readiness, unit quality, deployment orders, unit loss tolerance, and unit special abilities. An additional analysis will then evaluate the game testing with the commanders from the point of view of historical decision making. This study will also conduct a comparative analysis with the results of the testing to historical outcomes of Operation Crusader.

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[7]Arthur T. Frame, "Introduction to Operational Art and Campaign Planning," *Fundamentals of Operational Warfighting*, vol. 2. (Fort Leavenworth, KS: Pub, August 2000), 34-36.

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[9]Norm Koger, *The Operational Art of War* (Players Guide, Talonsoft, M.D.: 1997), 6.

[10]PC Gamer (Editors' Choice), CG Rated (5 Stars), Computer & Net Player (Preferred), Computer Games.

[11]Norm Koger, designer of TOAW, electronic interview by author, personal notes, Ft. Leavenworth, KS, 12 October 2000.

[12]David Zabecki, “Battlefield North Africa: Rommel’s Rise and Fall,” *World War II* (Leesburg, VA: Empire Press, March 1997), 29.

CHAPTER 2

OPERATION CRUSADER

> Rommel! Rommel! Rommel! Rommel! What else matters but beating him?[1]
>
> Winston Churchill

The Focus

By November 1941, World War II was over two bloody years long with no quick or easy end in sight for the Allies. Poland and France quickly fell in German offensives and were out of the war. Operation Barborossa, launched by the Germans in the summer of 1941 to defeat Russia, surprised the world with its magnitude and success. Over one million Russian soldiers were dead or captive, and the German war machine was at the gates of Moscow. It appeared certain to all the world leaders that Russia would fall in weeks. America was still not a combatant, and even her subtle help was distracted by the Japanese threat across the Pacific Ocean.

The British not only suffered humiliating defeats on the European continent supporting the French, but also catastrophic losses in Singapore and elsewhere that drained her manpower resources. German U-boats were causing crippling losses for the island almost totally dependent on merchant shipping. Even though England had won the air war over its country, the battle severely depleted its reservoir of experienced pilots. Most discouragingly, with America still not in the war and Russia soon to fall, it appeared to the British and the world that soon England would be fighting Germany alone.

It is easy to understand why Churchill was passionate for victory in North Africa. This was the one place that British troops were engaging the German Army.[2] Before the Eighth Army moved into place, a message from the Prime Minister was read to all troops:

> For the first time British and Empire troops will meet the Germans with ample equipment in modern weapons of all kinds. The battle itself will affect the whole course of the war. Now is the time to strike the hardest blow yet struck for final victory, home and freedom. The Desert Army may add a page to history which will rank with Blenheim and with Waterloo. The eyes of all nations are upon you. . . . May God uphold the right![3]

The North African region was of extreme importance to both the British and Italians. The British needed the region to secure the oil reserves for their war machine. On the other hand, the German High Command did not share this passion and strategic tenacity for the North African theater. According to Macksey, Germany's strategic view of the North Africa campaign was that: "Despite the way Rommel regarded his achievements, how generously the British paid tribute to his prowess, or how extravagantly Hitler and the German propagandists praised him, the German High Command saw the Afrika Korps as a mere detachment which warranted only the barest essentials for its support in a secondary theatre of war."[4] These are the conditions that set the stage for Operation Crusader.

The Situation

By November 1941, the war in North Africa was at a critical stage for both the Allied forces led by the British and the Axis forces led by Germany. In the months preceding Operation Crusader, Axis forces led by General Erwin Rommel were on the offensive driving east to Alexandria. The audacious German offensive caught the British totally off guard, likely because they had too much information on what was supposed to

be German strategic and operational intentions. The German high command, readily intercepted by British intelligence, consistently ordered Rommel to maintain the defensive and husband his limited resources. According to British intelligence, "The British had long since found a way of deciphering the German Enigma code machine, and were therefore well supplied with many vital orders sent from Berlin to the Afrika Korps. How could Wavell [British commander-in-chief] guess that Rommel would disobey?"[5] Despite guidance from the German high command, Rommel attacked. Allied forces crumbled at the unexpected offensive. In late March 1941, Rommel once again demonstrated his mastery of mechanized warfare. He quickly swept aside the meager British forces in Libya, capturing four of their generals in the process. The Axis offensive left German and Italian forces in control of all of Libya, except Tobruk.

Tobruk was the thorn in Rommel's side that stalled his offense. In the months before Crusader, Rommel made several attempts to take Tobruk without success. German occupation of Tobruk was absolutely essential for Rommel to continue his offensive into Egypt. With the British in Tobruk, Rommel's supply lines stretched from Tripoli and his supply convoy used more fuel than it delivered. He needed Tobruk's ports to shorten his lines of communication if he were to have any chance of success in Egypt. A supplied British force in Tobruk could drive into the side of any eastward offensive into Egypt. Rommel believed that Tobruk must fall before he could focus his attack eastward to Alexandria and the Suez Canal. In November 1941 Rommel was fighting two unsavory fronts, one in the siege of Tobruk and his wide eastern front towards Egypt. Macksey sums up these fronts: "Within the perimeter [of Tobruk] were four Australian brigades, an assortment of tanks, some anti-aircraft guns, and a resolute commander. And on the

Egyptian frontier the British were evolving . . . an improvisation of small harassing columns, congenial to a nation which created the Commandos, the Long Range Desert Group and Wingate's Chindits in Burma."[6] Rommel was fixated on the fall of Tobruk and spent months of preparation and supply buildup to crack this shell in his side, so he could focus his attacks in the east. Rommel's operational goals (not exactly in line with the German high command, but tolerated because of Rommel's successes) were the expulsion of the British from Egypt, the capture of Alexandria, and Axis control of the Suez Canal.

The spring and summer of 1941 saw a series of setbacks and frustrating failures for the British. The Germans regained the territory from the British offensive in January 1941 that defeated an Italian army of over 250,000. In May 1941, the British launched Operation Brevity. Poor operational security and radio intercepts gave Rommel adequate warning, and he was able to repel the limited British attack.[7] Although the attack was very limited (only 53 British tanks), a determined German counterattack of 160 tanks forced the British out of the Halfaya Pass, a key coastal defile south of Sollum. Increasing pressure from Winston Churchill, Britain's Prime Minister, forced another premature offensive in June 1941.

Operation Battleaxe was to relieve Tobruk and give England a sorely needed morale boost. Instead, Battleaxe added to the string of devastating British losses in men and material. Having brought 238 new tanks into theater the British attacked with the 7th Armored Division (180 tanks) and the 4th Indian Division (19 tanks) against the Afrika Korps 150 tanks. The British were driven back losing 91 tanks to the Germans 25. More British tanks were lost to mechanical breakdown than to battle damage.

Two key elements in Operation Battleaxe developed events in Operation Crusader. First, Rommel "felt he learnt, by a study of panicky British radio traffic, that a raid aimed at their rear was an assured method of inducing fear and persuading them to bend to his will."[8] This experience during Battleaxe perhaps explains Rommel's dash to the wire in Crusader. The second key element is one that plagued the Afrika Korps throughout its tenuous existence. It was that victories in the African desert were won by the side that makes the best use of the resources at its disposal in campaigns that, in the final analysis, are governed by logistics.[9] Churchill knew that he could not keep Rommel at bay for long, he needed a tactical victory.

The British were not alone in their disastrous African campaigns. A key German offensive often missed by history books is Rommel's large raid near Bir el Khireigat in mid-September 1941. Rommel, anticipating a British buildup, planned a raid against a suspected large forward supply depot. Shortly prior to the raid, Rommel learned that the supply depot did not exist. Against his normal pattern of clear objectives and focusing on the destruction of enemy forces, Rommel launched the attack of 110 tanks (the 21st Panzer Division) and support equipment only to chase an unwilling enemy. The British decided to engage only by long-range artillery and to preserve their force by not engaging. When Rommel's precarious and fragile refuel system broke down, without fuel the 21st Panzer Division was caught in daylight by British bombers.[10] This is extremely significant because not only did this self-inflicted wound delay the assault on Tobruk, the attrition of his tanks less than two months before Crusader would prove disastrous.

The Commanders

This thesis will not attempt to go into a thorough biography of the leaders, but a cursory review should do. The reason for providing and understanding of the commanders for this battle is that it will give insights into their decisions they made at key points.

The German propaganda machine raised Erwin Rommel to near hero-status. The propaganda was effective to the point that Rommel was admired in the hearts of many Allies. The fact is that Rommel was a committed German patriot. His work ethic was strenuous to the point that it took him to exhaustion, and he expected the same from his officers and soldiers. He was always in his command vehicle by 0500 hours and commanded from the front. He usually took personal command of formations almost anywhere he went, often obscuring his operational view, but it did give him a feel for the battle. He was curt and bordered on abusive at times with his subordinates, particularly at perceived incompetence or cowardice. This brusqueness only magnified the terrible relations he had with the Italians, whom he distrusted and constantly blamed for combat shortfalls. He was not a diplomat. He was aggressive, sometimes over optimistic and arrogant, but frugal with his lifestyle. His opponents came to respect him and his tactical competence. Winston Churchill so feared that Rommel would turn the table during Crusader that he permitted the assassination attempt the night before Crusader. A commando group led by Colonel Keyes (son of Admiral Keyes of the Royal Navy) was put ashore by submarine near Apollinia to attack the house where they believed Rommel lived. Their information was incorrect and Colonel Keyes died in the raid.[11]

The heart of the Axis forces in North Africa were two German tank divisions known as the Afrika Korps, commanded by the most-capable officer, German General Ludwig Cruewell. He was an extremely aggressive warrior who understood armor tactics and his enemy. He could work well with his Italian allies, often repairing damage done by Rommel diplomatically. Rommel and the Italians alike trusted Cruewell, and he well deserved their confidence.

Taking command of the Eighth Army in September, British General Sir Alan Cunningham started with a good plan in Operation Crusader. Cunningham was a respected British officer, but was accustomed to a set-piece battle with secure lines and little battlefield friction. He often could not see the big picture and made decisions on unconfirmed information. He believed in pure units with traditional roles and rarely strayed from the school solution on tactics.

Certainly a "what if" to mention is the death of the British XXXth Corps Commander Vivian Pope, a brilliant tank expert. Former "Director of Armoured Fighting Vehicles at the War Office . . . on 5 October he and his two senior staff officers were killed in an air crash."[12] The British sorely missed his constructive leadership. General Wiloughby Norrie replaced him, although at this time he was still in convoy from Britain and had no experience in theater.

The Forces and Equipment

The Tanks. Vast open ground, fast-flanking movements, and relentless pursuits were common place in desert warfare, and the desert was the perfect terrain for these mechanized forces. Both Rommel and Auchinleck understood the importance of armored warfare and put appropriate resources to develop tactics that supported armored strength.

The main German tanks used in Operation Crusader were the Pzkpfw (Kleiner panzer befehlswagen) III and IV. The Panzer III used a 50-millimeter KwK L.42 main gun that could fire both antitank and high-explosive shells for antipersonnel, and at this time in the war the Panzer III was the backbone of German panzer divisions. The main gun fired a 4.5 pound projectile that could penetrate 56-millimeter of armor at 500 meters and was effective against the thin armor of the Allied tanks out to 2,000 yards. The tank weighted 19.5 tons, had frontal armor 30-millimeter thick plus an additional 30-millimeter of add-on armor making it nearly impossible for 1941 Allied tanks to knock it out at normal engagement ranges.[13]

The PzKpfw IV used was a close-support medium tank with a short-barreled 75-millimeter KwK37 main gun, had a maximum speed of 25 miles per hour, and weighed 17 tons. The main gun could penetrate 43-millimeter of armor out to 500 yards with high-explosive ammunition and was effective against a soft target out to 2,000 yards. The type of Panzer IV used in Crusader had 50-millimeter of frontal armor plus extra 20-millimeter plate bolted to the hull and sides.[14]

The Italian M13-40 weighed in at 14 tons, mounted a good 47-millimeter gun, and had a top speed of 20 miles per hour. Although subject to frequent mechanical failure in the dusty North African desert and possessing a tendency for its bolted armor to split with enemy fire, the M13-40 was the best the Italians had to offer. Although modification from earlier models made the M13-40 more formidable, it still could only penetrate 23-millimeter of armor at 1,500 meters, well below that of its contemporaries.[15]

One of the most famous of the early wartime cruisers was Crusader.[16] The 19-ton tank used the standard 2 pounder which could penetrate 44-millimeter of armor at 1,500

meters. It had frontal armor of 40-millimeter and a top speed of 27 miles per hour. Much more reliable than its predecessors, the Crusader still suffered horribly from mechanical breakdowns in the African desert. Additionally, the 2 pounder could only fire armor-piercing rounds, a relic of the prewar tank-versus-tank theories. This prevented it from providing fire support for general attacks (field artillery--which was towed--had to be deployed for this role, an awkward and inflexible arrangement).[17]

An almost shining star in Operation Crusader was the British Matilda Mark II, with thick armor (78-millimeter frontal), 26.5 tons, and a top speed of 15 miles per hour; it was virtually immune to all Italian guns except at point blank ranges.[18] In one engagement, a 7th Royal Tank Regimental commander counted forty-six direct hits from Italian antitank guns without a single penetration.[19] The Matilda was key to the success against the Italians the preceding year. But the Matilda used the 2-pounder main gun which was no match for the German tanks, and with the use of the German 88-millimeter FlaK (Flieger abwehr kanone) antitank gun, even the Matilda's thick armor lost its advantage.

The third British infantry tank used in Crusader was the Valentine. Well liked by its crews, the Valentine weighed 17 tons with armor up to 65-millimeter. Although more mechanically sound, it had a maximum speed of 15 miles per hour and carried the standard 2 pounder as the main gun.

The most common tank available to the British in Crusader was the M3 light tank. "The British called the American M3 light tank the 'honey' because it was so reliable, easy to drive and maintain."[20] This 12.23-ton light tank carried up to five machine guns and a 37-millimeter main gun that could penetrate 40-millimeter of armor at 1,500 yards.

The M3 had frontal armor of 25-millimeter and a maximum speed of 36 miles per hour.[21] The M3 was "the first American tank supplied to Britain under Lend-Lease in 1941."[22] Although designated a light tank, it was readily used to replace the British infantry tanks.

In summary, the German armor could outrange anything the British could throw at them and they were faster. This put the initiative in the hands of a capable German officer to pick the time and place of battle. The main advantage the Allied armor had was quantity. Their sheer numbers of tanks allowed them to close (at a cost) with the German armor to where their guns and superior numbers were effective.

Special Equipment

Of particular mention are two pieces of equipment that were decisive, the 50-millimeter and 88-millimeter antitank guns. The 50-millimeter antitank guns were light, maneuverable, and easily hid in the desert; could move with the advancing tanks and could penetrate the frontal armor of all British tanks at long range, except the Matilda's.[23] It could outrange the British tanks by 500 yards.

Most feared, at this stage of the war deservedly so, was the 88-millimeter FLAK gun. This dual-purpose antiaircraft gun was not as maneuverable as the 50-millimeter, but much more deadly. On the defense the 88 could outrange any British armor and penetrate anything it hit. The 88s were extremely accurate and properly dug in, gave a small signature. Even if not dug in, it could engage targets well outside the enemy's effective fire range then quickly move. The mere sight of the 88-millimeter often caused British armor to withdraw. The major frustration for the Germans is that there were never enough of them.

Command Relationships

German and Italian relationships were constantly strained. Much of this was because of the command relationship. Rommel had operational command of all Italian forces, except the divisions he wanted most, the Ariete and Trieste. Rommel's immediate superior was Italian General Bastico, who Rommel routinely ignored. Rommel thought little of the Italian fighting capability and announced it publicly and often. During World War I Rommel fought against the Italians and often commented on his lack of respect for their leadership and fighting capability. Cooperation between Rommel and his Italian comrades was strained in the best case, none existent in others. The bright light was Cruewell, who diplomatically worked well with the Italians, and whom the Italians trusted. Cruewell even got direct tactical support (a seldom act of cohesive effort) from two-thirds of the Ariete Division's armor without an order at a key point in the battle. Cruewell's cooperation with the Italians is definitely the exception, for Rommel's abusive tone and language tore down any bridges Cruewell could build. There was no trust. German and Italian units did not integrate.

Another difficulty was that the Italians had different equipment than the Germans. Except for fuel, there was no ability to cross-level the most basic repair and supply items. There was also little cooperation in areas of vehicle repair or combining and protecting supply convoys.

The Allied forces, on the other hand, could integrate repair parts and supply. Their equipment was mostly British or American made which alleviated many supply problems. Units could cross-level ammunition and repair parts and did so frequently. The British, Australians, New Zealanders, Indians (Punjabis, Sikhs, and Royal Sussex), and

South Africans generally had great respect for each other and often fought side by side. Many problems did occur which degraded performance (language barriers, command, and control) when units were mixed in with each other. These problems were usually brief because of the clear and respected chain of command and common esprit de corps between the different type of units.

The Tactics and Doctrine

Here is where the Germans excelled. The German's ability to see beyond the limits of linear battle enhanced their unit tactics from the corps level down to the individual fighting man. German units trained in nonlinear and combined arms combat. They readily abandoned conditions of continuous lines and secure areas and encouraged independent thinking at the lowest level. Before the operation, the Afrika Korps trained rigorously along the coast between Tobruk and the eastern flank in preparation of the upcoming assault of Tobruk. The training focused on close cooperation of tanks in the assault, supported by 88-millimeter and 50-millimeter antitank guns. This bold technique put a well- camouflaged antitank line well forward in order that the German armor might, in the confusion and smoke, lure enemy armor into the antitank guns.[24] This technique also provided an escape for German armor to easily disengage from the battle if needed. A second technique consisted of an assault with armor moving forward with the antitank guns. This took advantage of the superior range, rate of fire, and firepower of the antitank gun. Artillery and armor were also drilled together. These new tactics proved themselves over the next year with crushing tank losses to the Allies.

As important as the better-coordinated tactics were to the German's success, so was their understanding of the terrain and type of warfare they fought. Rommel

understood they could not defend large areas of ground. They simply did not have the men and material to cover the vast desert. Their tactics were force oriented. They concentrated on the enemy force and its destruction more than holding a piece of ground. When German armor met enemy armor, they would fire and maneuver using standoff range, terrain, or any other advantage possible.

The British armor tactics and doctrines revealed operational thought from battles fought on the European continent. They often practiced the use of mass and speed. Their focus was built on formations supporting each other with fires. They tried to use superior speed to charge or outmaneuver their enemy to put them at a disadvantage. They understood the advantage of envelopment, as the British proved a year earlier, pushing a vastly superior Italian Army out of Libya. What they clung to is the operational thought of a clean battlefield with no enemy in the rear or secure areas. The "I am on this side, your on that side" way of thinking is a reminder of the Western Front of 1917. Even more important, they did not practice or plan for the inevitable new, mobile type of warfare, which often led to premature withdrawals when the enemy was in their line of communications.

On the positive side, the British understood the enormous logistic nightmare the desert presented. Their offensives and counteroffensive were never conducted on the logistical gambles Rommel often had to take. The British did not depend on captured enemy supplies as the German often did, but rather on variables they could better control. The British often overcame their inadequacy in tactics, inferior equipment, lack of experience, overconfidence, and poor leadership at the inopportune times with superior

support. They had more and could lose more. Just as important to their success was that British tenacity and the ability to adapt did not run out before their reinforcements.

The Battle

General Sir Alan Cunningham, commander of the Eighth Army, opened Operation Crusader on 18 November 1941 with two clear objectives: Destroy the Axis armor around Tobruk and relieve the besieged Allied forces in Tobruk. In all 118,000 men, 600 tanks, and 5,000 support vehicles began the assault in fourteen brigades. This quartermaster's nightmare extended over 100 miles long and took six and one-half hours to pass a given point.[25] The match up of forces varies with almost every personal journal, but the official history, according to Lewin and supported by many relevant sources, put the forces as in figure 1.

Rommel had a total of 390 tanks, broken down as follows: 70 Panzer II, 130 Panzer III, 35 Panzer IV, and 146 Italian M13.40 in the Ariete Division. 8 Army disposed in 30 Corps of 94 of the earlier marks of cruiser, 210 Crusaders, and 173 Stuarts--a total of 477, which does not include those in 13 Corps' Army Tank Brigades: 135 in the 1st and 126 in the 2nd (of which most were Matildas of Valentines). But behind Rommel's front line lay little in the way of armoured reserves: behind Cunnigham, in the workshops and the depots, were over 250 tanks of various types, while convoy W.S.12, already on its way, was transporting to him 124 Crusaders, 60 Stuarts, and 52 "I" tanks. . . . In the air the British started with 550 planes in action out of a total out of a total of some 650, and Rommel with 342 out of a total 536.[26]

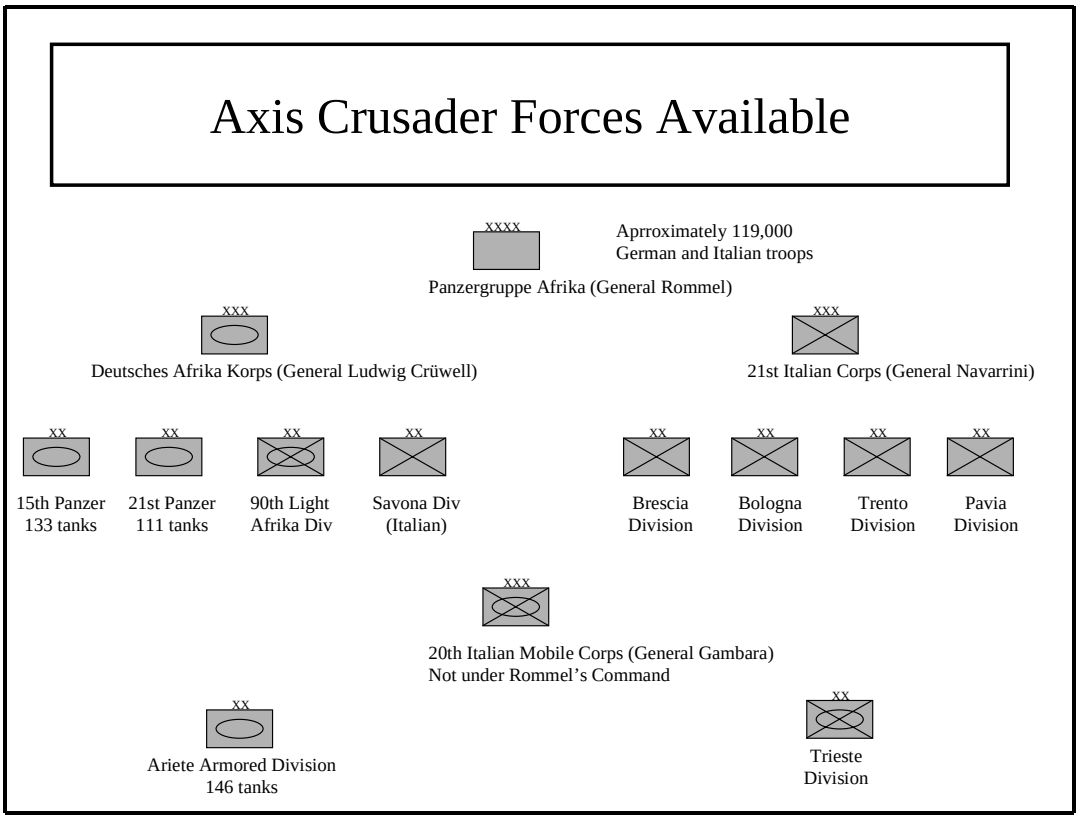


Figure 1

Cunningham believed the center of gravity for success was the destruction of the Afrika Korps by his armored force. For the Eighth Army that meant the XXX Corps, led by General Willoughby Norrie, which included the bulk of the army's mechanized punch. Cunningham's original plan was simple. He saw "the offensive not as one battle, but as two--the first a decisive tank action by 30th Corps, which by swinging round to the south of the frontier defenses and occupying first the area of Gabr Saleh, then the critically important escarpment at Sidi Rezegh, would draw Rommel's armour forward to its destruction; the second a primarily infantry operation against the Axis frontier defences and those round Tobruk."[27] A sound plan, but he did not stick to it. He anticipated his monumental tank battle to happen at Gabr Saleh, a critical road junction. After the

destruction of the Afrika Korps the Eighth Army would then relieve Tobruk. Had Cunningham stuck to his original plan, events might have turned out better for the British forces in the first few days.

Almost as an omen, the night before the battle, the normal mild November weather broke into a vehement unexpected storm. Lighting, rain, and squalls of sleet tore at the British Army in their assembly areas. The storm turned the area from Tobruk to Sidi Barrani into a spongy marsh, but most importantly, it washed out airfields and any chance for the R.A.F. to cover operations until they dried out. It even stopped a naval bombardment because spotting planes could not take off. The benefit for the Eighth

Army was that the Luftwaffe was similarly grounded.[28] Armored cars led in three columns with the 22nd Armored Brigade on the left, the 7th Armored Brigade in the center, and the 1st King's Dragoon Guards on the right. The 4th Armored Brigade and the New Zealand Division followed in the center with the 1st South African Division on the left and the 4th Indian Division on the right, all moving westward in enormous columns.[29] By the end of the eighteenth, the British achieved their first day's objectives (except for 22nd Armored Brigade which stopped ten miles short due to inexperience in the desert). The Eighth Army was is good position around Gabr Saleh expecting the Afrika Korps to present themselves for destruction. They suffered very little from enemy action but breakdowns had reduced the 7th Armored Brigade from 141 to 119 tanks, and the 22nd from 155 to 136.[30]

Perplexed by Rommel's failure to respond to their appearance at Gabr Saleh, Cunningham divided his forces on the morning of the nineteenth (figure 2). The impressive sight of the combined Eighth Army did not last long for this is where the

British sorely needed the expertise of General Pope, the great armor commander of the XXXth Corps just two months before. As this mammoth force moved forward, bypassing immobile frontier garrisons and watching opposing forces melt away at its very sight, the whole Army split up and went in different directions. For this monumental mistake the British would pay in blood. The armored column's objectives also changed. Instead of attacking towards the airfield at Sidi Rezegh to lure out the German armor, the left column was to attack to defeat the Italians by Bir el Gubi, thereby protecting the left flank. The center column's mission was to capture the airfield at Sidi Rezegh, to facilitate the center column's second echelon attack to relieve Tobruk. The right column was to hold the critical road junctions at Gabr Saleh, protecting the right flank.

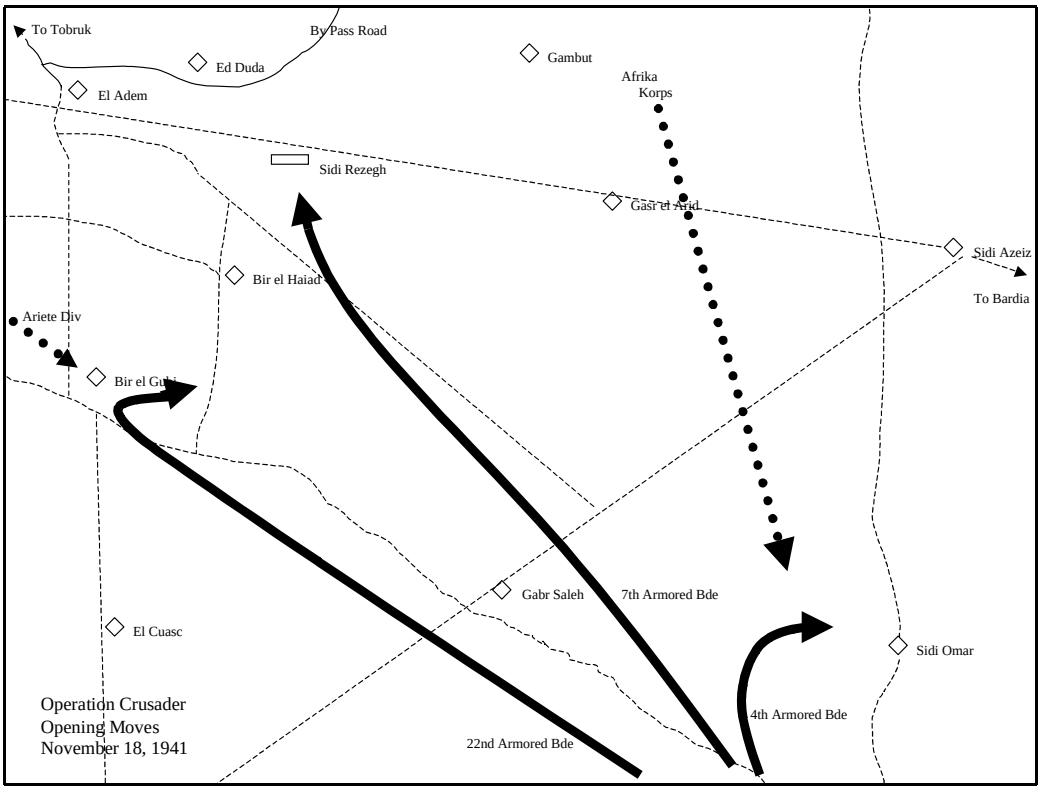


Figure 2

Rommel's failure to show up at Gabr Saleh was due to the fact that he remained unconvinced that the British offensive was more than a spoiling attack. The lack of air reconnaissance and only sketchy reports from ground reconnaissance of the 8th Army's position were not enough to convince Rommel to abandon his preplanned attack on Tobruk. This uncharacteristically sluggish movement by Rommel did not play into the British plans because Cunningham did not expect it, or recognize it. Mercifully for the Germans, Cunningham split his forces and sent the 22nd Armored Brigade west to attack Ariete Division, the 7th Armored Brigade forward to Sidi Rezegh (a key airfield southeast of Tobruk), and the 4th Armored Brigade to stay at Gabr Saleh.

There are several guesses why Cunningham disregarded his earlier objective of the destruction of the Axis armor. The most-supported rationale appears that this radical change to the original Crusader plan envisioned two brigades, one totally inexperienced and the other equipped largely with outdated tanks, brushing aside the Ariete formations at Bir el Gubi and advancing to Tobruk against whatever resistance Rommel could organize. Presumably the indifference with which Afrika Korps regarded Eighth Army moves to date would not continue once their vital communications between Sidi Rezegh and Ed Duda were threatened.[31] Whatever the reasons, this division of forces was almost an unrecoverable mistake for the Eighth Army.

The nineteenth of November saw the 22nd Armored Brigade (the left flank) impale itself against the Ariete Division. The inexperienced Brigade's main attack was "the nearest thing to a cavalry charge with tanks seen during this war."[32] The 22nd pressed the attack with élan knocking out 34 M13-40s and 12 guns and over 200 Bersaglieri were killed or taken prisoner.[33] However, by 1630 the Ariete Division

defeated the 22nd Armored Brigade attack. Minefields, artillery, and a counterattack by the 132nd Tank Regiment left blazing Crusaders across the battlefield. The evening of the nineteenth left 22nd Brigade at less than one-half strength, losing 82 tanks.

There was success in the middle column when tanks of the 7th Armored Brigade overran the airfield at Sidi Rezegh. This short-lived victory boosted the morale of the British when they charged the airfield with rewarding results. One of the British soldiers recalls that "many of the aircraft were shot down as they tried to take off, some were even shot down as they gallantly turned and tried to beat off their assailants, but many were caught on the ground and either crushed by the tanks or later hacked to pieces by exultant crew members."[34] One squadron of tanks tried to secure the northern escarpment, but were soundly repulsed by two battalions of the ex-Foreign Legionnaires of Africa Regiment 361. The British supporting infantry was still far south and could not support the attack. By the evening of the nineteenth, Sidi Rezegh was solidly in the 7th Armored Brigade's hands.

The 4th Armored Brigade anchored at Gabr Saleh did not sit the nineteenth of November out. Rommel finally took notice and allowed the formation of Battlegroup Stephan, consisting of 85 mixed Panzer III and IV, plus 35 Panzer II, with 12 105-millimeter howitzers and four 88-millimeter flak guns.[35]

What followed was the kind of desert tank battle never seen before, but was the prototype of the kind of battles fought in the next few days. The following excerpt best describes this utterly confusing battle of different types of tanks and different tactics and doctrines. Pitt, in recounting a British tank commander's experience, writes:

> What followed was the infinite confusion of the first purely panzer versus tank encounter on a large scale to take place in the desert, and it bore little relation to any previously held theories on armoured warfare. Instead of troops or squadrons manoeuvring *[sic]* together in mutually supporting teams, it became a frantic scurry of individual tanks fighting individual battles amid a cloud of sand and choking fog illuminated sporadically by the flare of exploding ammunition and often by the flash of cannon much too near for comfort.
>
> The Germans relied upon their drill and routine, the British upon the speed and manoeuvrability *[sic]* of their Honeys . . . and during the battle no one could tell which combination was proving the more effective. The first charge of the Hussars took them clean through the German formation.[36]

Both sides claimed victory, but an incident near the end of the battle underscored a serious shortfall in the British armor. Toward the evening a German supply convoy appeared on the horizon, the German armor swarmed around fuel and ammunition vehicles. Up to this point the British armor thought they had gone toe to toe with the Panzers because of the close proximity of the beehive type battle which minimized the advantages of the superior range and armor of the German tanks. When the German convoy showed up, the Honey's could only stand and watch as the German guns could pick them off long before their guns could register. Pitt explains: "As for the British artillery, it was too scattered, it took too long to get into action and out again--and it still lacked the spirit and training of close co-operation with armour."[37] The 4th Armored Brigade was erroneously delighted with the performance of the Honey against the Panzers and thought them equal. They were sure of the defeat of the German armor they faced the next morning. This was partly to exaggerated reporting through which they believed they destroyed between 19 to 26 Panzers. In reality, they knocked out two Panzer IIIs and one Panzer II. Four other Panzers taken by recovery returned to battle the next day. The British lost 24 tanks, but all except 11 returned to battle with 24 hours.[38]

November twentieth showed that neither Cunningham nor Rommel still had an appreciation of the battlefield or the forces stretched across it. Cruewell, given wide latitude from Rommel to deal with this "intrusion behind the frontier,"[39] also did not see that the entire 7th Armored Division was now west of the wire. He sent the 15th Panzer Division eastward and the 21st Panzer Division southeastward to encircle the British tanks from the north and south around Sidi Azeiz. Only small skirmishes slowed the German advance until they got to their objective only to find out there were no British tanks at Sidi Azeiz. Here the light came on for Cruewell who realized that the tanks at Sidi Rezegh were the spearhead of the Armored Division, and what he was unsuccessfully chasing was a flank guard. Now that Cruewell realized the British plan, he did not have the fuel to act upon it.

This unfortunate situation for the Afrika Korps should have played into the hands of the British. As for Cunningham, his view of the battlefield was based on misconception. Although concerned about reports that the 22nd Armored Brigade had lost one-half of its tanks, he assumed the same trouncing had been inflicted on the Ariete Division. Certainly, he falsely assumed, the British could not have lost so much in the attack without dealing the same. He also believed the Afrika Korps had taken a solid beating by the 4th Armored Brigade at Gabr Saleh. Even with the elated news of these bad assumptions, his greatest satisfaction was with the 7th Armored Brigades occupying an unprotected airfield at Sidi Rezegh.[40]

The events of the twentieth were inconclusive. Cruewell left the 21st Panzer behind to refuel and join the 15th the following day. The 15th Panzer Division, joined with the 8th Panzer Regiment with two mechanized infantry regiments and a powerful

artillery force, set out to “clean up” the assumed flanking force of the 4th Armored. A 30-minute battle cleared the British tanks from their hull down defensive positions and left the field to the Germans.

Intercepting radio transmits from Cruewell to Rommel, Cunningham ordered the 22nd on the west to join with the 4th Armored in the East, and by nightfall they were within supporting distance. That evening the 4th and the 22nd reported tank strengths at 97 Stuarts and 100 Crusaders combined. At the end of the day few were concerned that the rest of the 7th Armored Division, the 7th Armored Brigade, and the support group were 30 miles ahead of the division’s best-equipped armored force.[41]

This wide separation of forces put the 7th Armored Brigade at Sidi Rezegh in an unsupported position. The night before the twentieth the Germans holding the ridge reinforced their infantry with a battalion from the Italian Bologna Division and a battalion of Engineers, as well as some 100-millimeter guns. The German counterattacks the morning of the twentieth to retake the airfield were defeated by the British, but the 7th Armored Brigade commander felt he needed more infantry to take Point 175 as ordered by Cunningham. Although the 7th had the airfield, Point 175 was a key section of the escarpment that had not only a commanding view of the airfield, but was one of the few roads that led out of the desert towards Tobruk. Point 175 was as important as the airfield itself in the British drive towards the besieged city. The 7th awaited the arrival of the 5th South African Brigade to continue the attack and take Point 175, which did not arrive until late in the afternoon, too late for the attack. Thus, the twentieth ended unsurprisingly for the 7th Armored Brigade. They still had control of the airfield, Norrie had given the code word (Pop) to start the Tobruk garrison to attack the next day,[42]

infantry reinforcements arrived and preparations were made for the attacks toward Tobruk for the next day. To Cunningham, all was somehow going to plan. The fact that he kept changing the plan on erroneous assumptions seems to have escaped him.

A key event happened the evening of the twenty-first of November. Whether it was the prompting of Rommel's staff or the evening BBC broadcast that told of the 75,000-man Eighth Army invading Libya to relieve Tobruk that convinced Rommel that this battle was more than a British spoiling attack, no one knows for sure. Whatever it was that convinced Rommel, the evening of the twenty-first saw the Desert Fox finally spring into action.

The morning of the twenty-first began with the Allied forces in great spirits believing victory at hand. Little did they anticipate the desperate struggle they would endure to earn it. General Gott, leading the 70th Australian Infantry Division out of Tobruk with 32 cruisers and 69 Matildas, crossed the mile and one-half of no-man's-land to what he thought was the Italian infantry line of defense. Within 30 minutes the attack was in trouble. Not only were the Australian infantry regiments far behind schedule in taking their early objectives, minefields had knocked out many of their tanks. They did take the defenders by surprise, but the prisoners marching back to Tobruk were German soldiers of the Africa Korps. Gott was concerned. "By the time set for the final drive to Ed Duda (1430) 32nd Army Tank Brigade was, in fact, bitterly fighting to retain the ground won so far against. . . . German counter-attacks, organised *[sic]* by Rommel who by this time was personally directing the battle."[43] Rommel had put together a force of infantry and 88-millimeter antitank guns (four) earlier in the day to stop the British attempt to break through from Sidi Rezegh. This same force now stopped the 32nd Tank

Brigade well short of Ed Duda. Shortly before 1600, Gott received the message that the linkup must be put off a day. The battle at Sidi Rezegh had not gone exactly as planned.

Rommel's ad hoc reserve force of infantry and 88-millimeter antitank guns personally put together to stop the 32nd Tank Brigade, had earlier that day stopped the 7th Armored Brigade trying to break out of Sidi Rezegh. Before the British could press their attack, there were reports of German tanks coming from the south. Believing that the Afrika Korps armor was not in strength, the two regiments of the 7th Armored Brigade held in reserve (the 2nd and the 6th) turned to the south to dispense of this local threat so they could continue the attack toward Tobruk. The sight coming from the south was most confusing. The British tanks and armored cars first saw the horde about 0830, "but even then considerable doubt existed as to their identity for the head of the attack was wreathed in lorries of the Support Group's B Echelon, swept up in the course of 21st Panzer's advance and now--ignored by the panzer crews--endeavoring frantically to get out of the way. Among them, coolly and efficiently, the German anti-tank gunners had infiltrated their mobile 50-millimeter P.A.K. guns and with these they opened fire on the Hussars, who could not reply at that range anyway and were hindered by the swarm of British soft-skinned transport even when the range shortened."[44] By the days end the 2nd and the 6th Tank Regiments of the 7th Armored Brigade were severely mauled (the 2nd was down to six operational tanks), the 7th Hussars armored car regiment was annihilated, most of the British artillery overrun, and the support company of the rifle brigade wiped out. Of some good news, the 22nd and 4th Armored Brigades did show up around nightfall. The British Armored Brigade's lack of urgency, demonstrated by the fact that they took several hours in faster tanks to cover the same ground the Afrika

Korps did in one hour, is attributed to their belief in the destruction of the German armor. When night fell the 15th and 21st Panzer moved to opposite ends of the airfield to prepare for clearing the escarpments above Sidi Rezegh the next morning. The 22nd and the 4th Armored Brigades failed again to meet up with the German armor (figure 3).

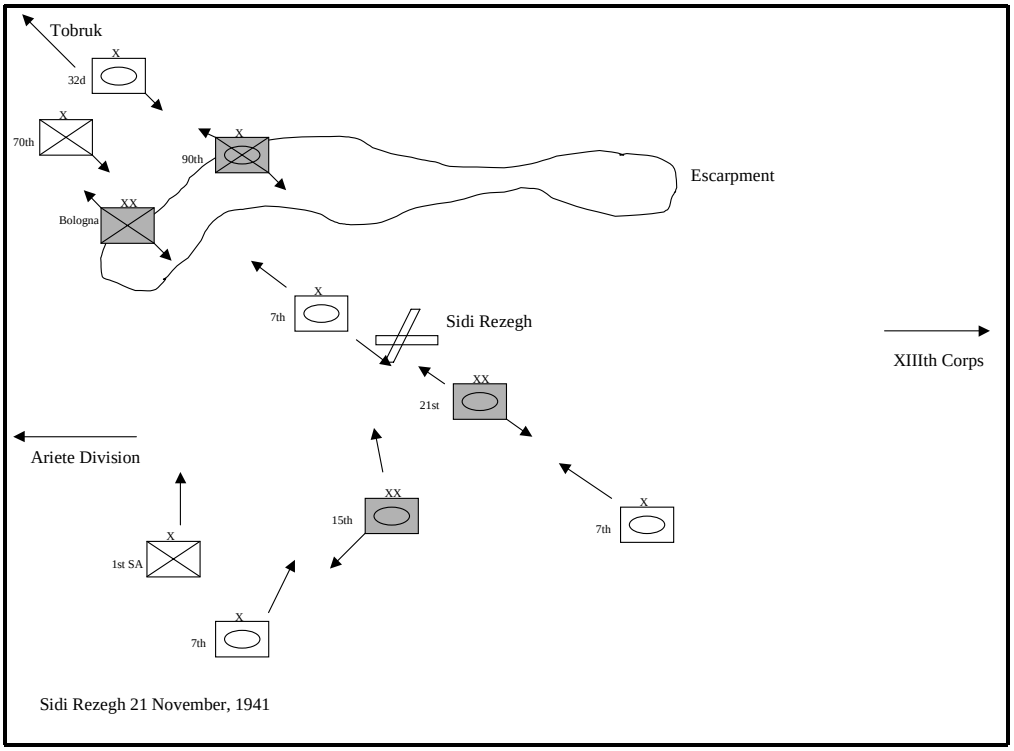


Figure 3

Looking at the battlefield the night of the 21 November, Cunningham did not fully understand what was happening. Breaking out of Tobruk were the Australians fighting south, but stopped short of Ed Duda with heavy casualties. Southeast of them was Rommel with German and Italian forces (Bologna Division) defending Australians from the north and what was left of the 7th Armored Brigade attacking from the south.

The 15th and 21st Panzer Divisions were attacking the 7th Armored Brigade in the north while preparing to defend against the 22nd and 4th Armored Brigades attacking from the south. The 1st South African Division was moving up from the south. Moving in from the east was the New Zealand Division, the Indian Division and the 1st Army Tank Brigade. Rommel was concerned about the proximity the attacking British forces to Tobruk. Cruewell was concerned that "his famous corps was almost completely encircled by forces 'immeasurably superior' . . . to his own, with an apparently inexhaustible supply of fresh reserves to throw against him whichever way he turned."[45]

The mood in the 8th Army headquarters was of supreme confidence and jubilation. Adding up their "hits" (a phrase they interpreted in that air of euphoria as damaged beyond repair)[46] they counted 170 German tanks out of action, over 50 percent of the Afrika Korps. Pitt explains that Cunningham believed that "this was further borne out by the figures of XXX Corps's casualties--for they could surely not have lost as many tanks as that without inflicting comparable losses on the enemy?"[47] Also adding to the euphoria was the assumption that Rommel was pulling back. This was due to the RAF reports of columns of vehicles moving west two days before.

It is important to note here that the Germans far surpassed the British in vehicle recovery and repair. This probably added to the British belief that so many German tanks were out of action, because British recovery methods were quite slow in comparison. The Germans, not having the luxury of huge reserves, moved recovery teams with leading elements. When the German armor lingered on the battlefield (as they usually won) the recovery teams, using innovative recovery vehicles, got the armor back in action quickly. The German teams not only worked miracles with their tanks, but also with captured

Allied tanks. Later in the desert campaign Rommel would attack El Alamein with German units consisting of as much as 50 percent of captured British equipment.

The extreme importance of roads must be mentioned. Although not as restricting to the armor that moved freely, the supply and support vehicles could not stray far from established routes. The inevitable result is that the armor could not stray far from the lifelines, which was the center of gravity for every tactical move. Air interdiction, which constantly plagued desert movement, was more effective when long columns of supply vehicles in open desert had to move predictably along a few routes.

The 22nd of November also did not go as planned for the British. It was a day for rest, maintenance, reconsolidation, and preparation for the next day's linkup with the Australians trying to break out of Tobruk. The storm the night before left sheets of water and turned the sand into marshes with the "consistency of cold cream."[48] The Indian attacks in the east against the coastal garrisons were partially successful, but at a higher than expected cost. Minefields stopped the Matilda's of the supporting infantry while 88-millimeter antitank guns punished them unmercifully. It did not seem that the Indian Division could keep the pressure on the coastal divisions for much longer.

The attack north of the Indian Division by the New Zealanders on the morning of the 22nd was doing much better. The 5th New Zealand Brigade stormed into Fort Capuzzo while the 4th Brigade reached the outskirts of Bardia and captured a German transport motor pool. The 6th Brigade of the New Zealand Division had similar success. Seeing the need for this division in the fight for Sidi Rezegh, Cunningham ordered them to the west to an obscure a point six miles southwest of Gambut, the site of the Afrika Korps headquarters.

The attack by the 21st Panzer on the escarpment overlooking Sidi Rezegh, personally led by Rommel, succeeded in driving the British from their hard-earned positions. The bulk of the British forces stayed on the airfield between the two escarpments preparing for the next day's battle and Cunningham's visit. By 1415 hours, everyone on the airfield could see the German attack.[49] Fifty panzers with support artillery, antitank guns, and infantry were coming up the slope towards them. A heated battle soon revealed the 7th Armored Brigade and 7th Support Group were in danger of annihilation. Suddenly the 22nd Armored Brigade appeared and pressed the attack. The relief was short lived. With the massed armor of the 21st Panzer, the 22nd Armored Brigade took a beating. Pressed into the attack repeatedly with crews withdrawing faster when losses started to mount, the 22nd was pushed back and soundly defeated. Overrun by the rear and without tank support, the King's Royal Rifle Corps was totally annihilated. By 1530, the 4th Armored Brigade showed up with 108 tanks. These were the Honeys and they were severely outgunned by the panzers. The medley of charging tanks caused a sand cloud that obscured the battlefield for miles. Amazing to the British, the cloud moved north as the panzers broke off the attack. The German armor running short of ammunition and fuel saved the 7th Armored Division, or what was left of it. "To all intents and purposes, 7th Armoured Brigade no longer existed, its survivors together with those of 22nd Armoured Brigade mustering only 49 tanks, between them; and if 4th Armoured Brigade still had 100 tanks, these were Honeys, outgunned and outranged."[50]

While the 7th and 22nd Armored Brigades were fighting for survival around Sidi Rezegh, the 5th South African Brigade, without artillery support, failed to clear the southern escarpment of the German infantry and fell back with staggering losses (25

killed in action, 9 missing, 83 wounded).[51] At sundown, they fell back into the desert to reorganize. The 1st South African Brigade did successfully disengage from the Ariete Division to take up a position that night a few miles from the 5th South African Brigade. This was to prove key for the next day's events. The setbacks were not finished for the British this day for the 15th Panzer, searching for the elusive 4th Armored Brigade throughout the day, found their headquarters in the dark at 1700. The surprise was complete. Seventeen officers, 150 other ranks, 35 tanks, armored cars, artillery and self-propelled guns, and other fighting vehicles fell into German hands.[52] Although it was just the brigade headquarters captured (Gatehouse, the Brigade commander was not there), it temporarily culminated the British attack. As Pitt explains, "from the British point of view it was a devastating blow, for it meant that for the next few vital hours, indeed perhaps days, the only substantial armoured formation left to XXX Corps would be without a head, incommunicado until an emergency signals framework could be set up, and with all its own internal and XXX Corps's codes hopelessly compromised."[53]

The night of the twenty-second, the New Zealand Brigade continued to move at maximum speed (eight miles per hour) to their objective south of Gambut. In the darkness their scouts got lost so at first light the columns had to stop and identify their position. As the sunlight came up on the twenty-third of November, the soldiers were washing and eating. Their columns spread out in every direction with little organization. At this point the general realization came to the New Zealand division had they had stopped with the Afrika Korps headquarters in their mist. A sharp battle ensured, but within minutes 200 German prisoners were rounded up. Pitt summarizes: "Gatehouse was not the only commander to face the coming day's trails without a headquarters and,

indeed, the loss of Afrika Korps Headquarters was obviously more serious to Rommel than the loss of 4th Armoured Headquarters to Cunningham."[54] Cruewell left with his chief of staff just 30 minutes before the New Zealanders arrived, and even though the loss of his headquarters was a great inconvenience, Cruewell saw opportunity in every action. Just receiving a lengthy coded message from Rommel with detailed instructions on that day's events (events that Cruewell obviously disagreed with), the loss of his "cipher staff provided him with a convenient blind eye, for he now issued orders to 15th and 21st Panzer Divisions which differed in marked degree from Rommel's intentions."[55]

The twenty-third of November began with Cruewell's modification of Rommel's intent, and the habit the Germans had of starting a workday before the British. For when the 15th Panzer (21st Panzer was late, but came in later) slammed in between the two South African Brigades during their morning rituals, pure chaos struck the Allies. Instead of pressing the attack to the vulnerable infantry brigades, the panzers destroyed the supply trains and drove through, meeting with Ariete Division near Bir el Gubi. The Ariete Division was not yet under German control (Rommel would get them the next day). This is where Cruewell's diplomatic efforts paid off. He convinced the Italians to join him and with over 160 panzers and 100 of the Ariete Divisions M13-40s, he lined them up shoulder to shoulder for an assault. The British used this lull very effectively to set up antitank screens and general defenses. The assault was devastating to both sides. The Italians were late, which left an exposed flank and created a piecemeal attack, of which the British antitank gunners took full advantage. The results saw the 5th South African Brigade totally destroyed.

The German victory on 23 November was wasted. Had the Germans consolidated their gains in captured equipment, repaired their vehicles and refueled and rearmed, then Eighth Army was doomed. Rommel, not knowing the status of his army and equipment, threw away these gains by pressing an attack to the Egyptian border in hopes of cutting off the Allies supply lines. The fast-paced sprint all but destroyed the Afrika Korps. The casualty rate for the day's advance was unrecoverable. Over 70 German and Italian tanks were lost in battle on 23 November in annihilating the 5th South African Brigade, and the recovery teams could do nothing to alleviate this because they were part of the advance. When he got to the wire, "Cruewell was faced with the fact that of the 170-odd panzers with which 21st Panzer Division had entered battle five days before, only four Pz IIs, fifteen Pz III's, one Pz IV and a command vehicle could still be considered battle worthy!"[56] The 15th Panzer Division had only 30 tanks in running order. The Italians, key to Rommel's plan, were stopped by British forces along the Trig el Abd and could not break through.

All these events, the heavy tank losses at Sidi Rezegh, the loss of the 5th South African Brigade, and the Afrika Korps seeming to race to the Nile unnerved Cunningham and he decided to pull back. Auchinleck, with nerves of steel, sacked Cunningham and replaced him with Richie. Auchinleck recognized that the XIII Corps was unmolested and making great gains. He believed that Rommel could not press the attack. He was right. The Afrika Korps finally returned to the Tobruk area where Rommel, down to his last fuel reserves, realized how close he was to losing his entire force. On 7 December, 1941 Rommel made plans to save what he could of his army. The constant gains by the Allied infantry supported by their remaining tanks put Rommel in an untenable position.

Official records account that "of the 412 tanks and armored vehicles with which he entered the 'Crusader' battles over two weeks before, only 26 remained in operation. That 814 enemy tanks and armored vehicles had been knocked out was of little consequence . . . because the British Eighth Army could afford the losses."[57] Leaving the immobile coastal garrisons and frontier divisions, Rommel turned west. The slow and unhurried pursuit cost the British heavily in tanks as Cruewell expertly punished them for their bungling pursuit. The last of the Axis frontier garrisons at Halfya surrendered on 17 January.[58]

Conclusion

What started out as a tank battle ended with the infantry seizing the day. There are a million "what ifs" that could change that outcome, but what is important is what can be learned from this historical conflict. The confusion of battle, the permeable battle lines, the heroism, the ability to turn disaster into opportunity, and the capability to turn victory into defeat. Operation Crusader was a confusing battle for the participants and exhibited often brilliant but sometimes lacking leadership for both sides. Even if Auchinleck and Rommel's generalship at times improved their situation, it was "only the courage and endurance of the fighting men . . . saved commanders on several occasions from the results of their own folly."[59]

As often seen in the North African campaigns, the side that could keep supplied was usually the victor, Crusader was no exception. The British extensive logistical preparations outlasted their string of defeats. Their preparation for the battle was their true victory. The transportation alone to dump supplies in forward areas used 180,000 gallons of fuel per day.[60] Sometimes overlooked, but just as important as fuel, was the

supply and storage of water. In preparation for Crusader, the British laid 160 miles of pipe, built seven pumping stations and nine reservoirs. On 11 October, a German air attack on Fuka caused the loss of all the water. Only through extreme effort was water restored by mid-November in time for the attack.[61]

Almost every move the Axis made was modified by the shortage of fuel. The German shortage of fuel and ammunition saved the 7th Armored Brigade from total annihilation at Sidi Rezegh. Rommel tried to capture and use Allied fuel depots and stores during his dash to the wire. When this failed, his offensive failed. The fact that the Royal Navy and Air Force sank 35 percent of Rommel's supplies in August and 63 percent in October[62] was as decisive to the outcome of Crusader as any decision made before or during the battle. Italian ships, filled with German divisions of tanks, on the Mediterranean floor created the victories the British needed. Operation Crusader was the inevitable outcome.

The British plans started clear enough: Destroy the Afrika Korps and relieve Tobruk. When Cunningham changed the plans he took his almost invincible armored fist and exposed all of its individual weaknesses in separate engagements. His plans changed daily as he made assumptions on information that he misread and unrealistic goals. When he started taking heavy casualties, particularly in his subordinate command and control systems, they suffered from lack of cohesion in the daily changes.

Rommel's plans are not as clear-cut. This is because subordinate commanders had the flexibility for independent actions. It is clear that once Cruewell convinced Rommel of the situation that their intent was to destroy the separated armored columns by envelopment by the Afrika Korps. This was almost done. There is much written about

Rommel's dash to the wire. His obvious intent was a complete victory, which almost worked by bluff, but he never had the forces for the decisive action. Historians will contest the reasons for failure but there is one inescapable fact; the farther you penetrate into the enemy's territory the longer your lines of communication. With the battles at Sidi Rezegh, the British and Germans were at the end of a very long supply system. At the Egyptian border, the British lines of communication were at their source of support while the German lines were unsupportable.

The problem with Rommel's dash to the wire is that the British attack never culminated. The XXXth Armored Corps culminated at Sidi Rezegh. The Allied western advance culminated with the annihilation of the 5th South African Brigade. The Australian breakout culminated short of Ed Duda, but the 13th Corps Indian and New Zealand Divisions never culminated. They were a force that Rommel would have to stop before the Eighth Army culminated. What Rommel did not see was that the Afrika Korps and the Ariete Division culminated at the losses taken at the destruction of the 5th South African Brigade. This is why a small British force held the Italians from joining Rommel's dash to the wire and why the Afrika Korps got there with 50 tanks.

There were several decision points in this battle. One that Cunningham underestimated was the importance of Sidi Rezegh. When the British took the airfield they felt they took the key terrain. Sidi Rezegh was much more important than a desert airfield, it was the only way to Tobruk. The coastal garrisons and the Afrika Korps blocked the coastal road. For the British to relieve Tobruk from the west, they would have to go through rough terrain with only one supply road and through the Italian Ariete and Trieste Divisions. Sidi Rezegh was the absolute key terrain. Not necessarily the airfield, but the escarpment

that went for miles in either direction and was impassable except for the few roads. Here is where the infantry and armor that held this choke point into the back door of Tobruk decided the battle for Sidi Rezegh and the relief of Tobruk.

The battle was costly to both sides. The soldiers in the missing column in table 1 are generally prisoners of war. Of the 29,900 Axis missing, 13,800 were taken at Bardia and Halfaya when the eastern divisions were abandoned.[63]

Table 1. Operation Crusader

	Killed	Wounded	Missing	Total
British	2,900	7,300	7,500	17,700
German	1,200	3,300	10,100	14,600
Italian	1,100	2,800	19,800	23,700
Axis Totals	2,300	6,100	29,900	38,300

Source: Mitcham, 130.

[1]Ronald Lewin, *Rommel: As Military Commander* (London: Van Nostrand Reinhold Co., 1968), preface

[2]Ibid., 214.

[3]Barrie Pitt, *The Crucible of War 2: Auchinleck's Command* (Finland: Werner Söderström Oy, 1986), 44.

[4]Kenneth Macksey, *Rommel: Battles and Campaigns* (New York: Mayflower Books, 1979), 68.

[5]Macksey, 56.

[6]Lewin, 39.

[7]Macksey, 61.

[8]Ibid., 66.

[9]Ibid., 61.

[10]Ibid., 71.

[11]Lewin, 61

[12]Ibid., 59.

[13]George Forty, *World War Two Tanks* (London: Osprey, 1995), 87.

[14]Ibid., 90.

[15]Ibid., 189.

[16]Ibid., 23.

[17]Chris Ellis and Peter Chamberlain, *Fighting Vehicles* (London: Hamlyn Publishing Group, 1972), 60.

[18]Ibid., 60.

[19]Forty, 40.

[20]Ibid., 129.

[21]Ibid., 111.

[22]Ellis and Chamberlain, 60.

[23]Macksey, 73.

[24]Lewin, 55

[25]Ibid., 43.

[26]Ibid., 62.

[27]Ibid., 54.

[28]Ibid., 62.

[29]Pitt, 45.

[30]Ibid., 47.

[31]Ibid., 50.

[32]Ibid., 51.

[33]Ibid.

[34]Ibid., 52.

[35]Ibid., 53.

[36]Ibid., 55.

[37]Ibid.

[38]Ibid.

[39]Ibid., 56.

[40]Ibid., 57.

[41]Ibid., 63.

[42]Ibid., 64.

[43]Ibid., 67.

[44]Ibid., 71.

[45]Ibid., 75.

[46]Ibid., 76.

[47]Ibid.

[48]Ibid., 79.

[49]Ibid., 82.

[50]Ibid., 87.

[51]Ibid., 88.

[52]Ibid., 90.

[53]Ibid.

[54]Ibid., 93.

[55]Ibid.

[56]Ibid., 111.

[57]Samuel W. Mitcham Jr., *Rommel's Desert War: The Life and Death of the Afrika Korps* (New York: Stein and Day, 1982), 3.

[58]Ibid., 153.

[59]Pitt, 153.

[60]Lewin, 61.

[61]Ibid., 61.

[62]John Strawson, *The Battle for North Africa* (New York: Charles Scribner's Sons, 1969), 72.

[63]Pitt, 152.

CHAPTER 3

THE OPERATIONAL ART OF WAR

Introduction

According to the game designer Norm Koger, "The Operational Art of War (TOAW) is a combined simulation and scenario editor covering military campaigns over the1939-1955 period."[1] It is a turn-based, constructive type war game using NATO symbology (or 3-dimensional) icons representing wartime units. Released in 1998 by Talonsoft computer software gaming company, the simulation won game of the year in 1998 from six popular computer gaming magazines.[2] Norm Koger designed the game engine and several of the scenarios. Doug Bevard conducted the research and designed the "Crusader 41" scenario that will be used for the analysis of Operation Crusader.

The game starts on 19 November with British forces already past the wire into Libya. The game starts approximately where the German forces realized historically the presence of enemy forces and began to react. There are some Italian units frozen (Trieste division and some brigades around Tobruk) that the German player gains operational control after three days. This is to replicate the historical command and control situation that did not allow Rommel control over some Italian units until released by his Italian commander. The scenario plays in approximately seventeen turns. The number of turns can vary based on victory conditions, unit losses, and supply. Each turn represents one day and each hex represents five kilometers. Although this is a game designed for commercial entertainment, much of the appropriated expenses were dedicated to historical research and accuracy to give the illusion of a historical simulation.

In a game designed to replicate operational art, it is impossible not to include the tactical application of force, for a sum of tactical decisions will have operational implications. TOAW strives to maintain the illusion that the player is an operational commander, but when units engage the computer processing unit goes into overdrive to arbitrate the extensive laundry lists of individual tanks, squads and thousands of variables and combinations of a tactical fight. This is the strength of a computer. Even though the user of the game may be making operational decisions, the computer will still resolve thousands of tactical engagements to give the user the operational result. The successful commander must realize that to get the operational results he desires he needs to understand the tactical, behind the scenes, actions that lead to the results. The following paragraphs describe the mechanics of TOAW, how and why the game was designed, and its strengths and weakness for war gamers.

Unit Capabilities

Capabilities are based on the equipment assigned, proficiency, readiness, and supply level.[3] Capability (unit strength) is basically the ability for the unit to attack and defend itself. It is broken into several categories based on the type of equipment the unit has and the type of equipment opposing the unit. The unit strengths broken down are:

Antiarmor: The ability to destroy enemy armor. A unit with tanks and antitank guns will have a higher antiarmor modifier.

Antipersonnel: The unit's ability to destroy nonarmored equipment and personnel. Ten percent (10 percent) is also used as antiarmor. This represents the possibility that even an infantry unit has the capability to destroy armor, which often happens if unsupported armor gets too close to infantry.

Antiair (high): This modifier is the ability of the unit to defend itself from medium to high level bombers, or interdicting aircraft in the area.

Antiair (low): This modifier is the ability of the unit to defend against combat support aircraft (low altitude aircraft) or interdicting aircraft against the moving unit.

Defense: The unit's overall ability to defend itself.

Reconnaissance: TOAW's approach to reconnaissance is unique among current war games. It is based on the type of reconnaissance equipment available (armored cars, recon squads) and represents the ability of the unit to identify the enemy type and strength, as well as move by units. It also influences the unit's strength at the beginning of the attack.[4] For example, a combined attack with a friendly reconnaissance unit will greatly enhance your ability to destroy enemy forces for the first turn. After the first turn, the advantages of reconnaissance begin to wear off as units close for battle. Few wargames take the synergistic effects of reconnaissance into account.

Unit Experience and Proficiency

Unit proficiency is represented by a percentage from one to one hundred. This is the unit's experience received in previous battles and continues to increase in subsequent battles. If a veteran unit receives too many replacements from battlefield losses, unit proficiency will go down. Unit proficiency is gained more quickly for less proficient units and more slowly for more proficient units.[5] This represents the ability of new units to quickly learn the basics (usually by getting their nose bloodied), but also the slow process of advanced tactics that only a veteran unit masters.

Unit Readiness

Unit readiness in TOAW is basically represents troop fatigue, how far they have marched or long they have fought, and equipment wear and tear.[6] A unit will lose some vehicles on a long march resulting in a degraded unit readiness, but if the unit does not move for a turn (representing one day), they will recover many of the vehicles plus replacements and normal supplies. The lowest unit readiness a completely fatigued unit can go is 30 percent.

Unit Morale

Unarguably unit morale is a critical element of warfare. Commanders for centuries have tried to tap into this encompassing combat multiplier with varying success, many looking for that magic formula that they hoped would guarantee the esprit de corps found in the most successful units. There are some key contributing factors that consistently improve or erode a unit's morale. TOAW looks at unit morale at an operational level, where units tend to have a higher morale when they are victorious and when they trust their leaders, are adequately supplied and do not have equipment inferior to their enemy's. TOAW addresses operational unit morale with a mechanical variable that takes a weighted average of a unit's proficiency, supply level, and readiness.[7]

Unit Quality

The last of these unit variables that TOAW tries to quantify is unit quality. Unit quality is an average of a unit's proficiency and readiness. Quality checks are made many times in a game turn to determine the unit ability to sustain an attack or hold their position against a determined attack.[8]

Deployment Status

The seventeen different unit deployment orders in TOAW attempt to give great flexibility to war gamers to tailor operational commands to units. As with actual orders to units, commands in TOAW are not absolute and the varying success the unit has in accomplishing the intent of the order depends on many variables. Some of these variables the commander can influence in the game. For example, if a tank unit gets an order to entrench to prepare for an enemy attack expected the next day, but spent much of the day just getting to the defensive site, as well as being low on entrenching supplies and fatigued, they will meet with limited success in gaining any defensive benefit from entrenching. The same unit well supplied and given adequate time will probably have much defensive benefit for the next day's battle. Another variable that will help the entrenching unit is the assistance of a nearby engineer unit. It is not as simple as board games that used to depict defense as 'unit doubled on rough terrain,' but an elaborate system of comparing hundreds of variables of movement, time, equipment, morale, terrain, supply and command.

The tactical and local reserve options give the commander flexibility in not giving specific tactical orders, but intent. For example, the commander can delegate reserves only to travel five kilometers to assist a friendly unit, or have the same unit programmed to respond up to a day's travel. There are some unit orders that the player does not have control over, or the unit executing them. When a unit is reorganizing from a high casualty battle, retreating, or routed the operational commander can do little in controlling the actions of the unit, but he can save it from possible annihilation by protecting it with other units.

On this subject it is important to note some of the game designer's intentions, and why he left out some factors that many would think were critical to this stage of the game. In responding to this Norm Koger writes:

> There are a lot of gamers who prefer the classic "5-5 attacks 2-2 in the woods (doubled) on the 1-1 column of the CRT . . . ." The current market does not encourage serious efforts at sophisticated modeling. It leads to unpredictability (unless you examine the units and environment in detail), can be difficult to debug, and is difficult and expensive to document. You can probably imagine how something that looks (with good reason) a great deal like 50+ pages of C code to be included in a player's guide would be received by corporate HQ--particularly when very few players would ever read such a thing, and every page costs $$$. In short, even if you get sophisticated modeling in a commercial wargame, you're not likely to see the kind of documentation required to fully evaluate it for your needs.[9]

Commercial wargames, like TOAW, have a "good idea" (market return) cutoff point. In development of TOAW, Koger acknowledges the magnitude of addressing simple combat analysis and its documentation:

> Even TOAW's relatively simplistic "calculate what's available, line it up, and shoot at the bad guys" logic does not lend itself to simple analysis and is hideously difficult to document. Effect of initial reconnaissance declines as "battles" continue, short range weapons become relatively more effective if something (terrain, weather, time of day) restricts visibility. Long ranged weapons are initially less effected by the presence of things like water obstacles. The list goes on. Every class of weapons tends to be affected differently by just about every environmental variable you can think of.[10]

The anticipation is that TOAW minimizes the great limitations in computer programming at a tactical level by focusing on the operational level. Even with a player's guide of 160 pages, TOAW cannot--does not attempt to--address every possible variable in combat.

Unit Movement

Although moving a unit seems simple, unit movement triggers many cascading events that can degrade a unit. A maneuver enthusiast will find in TOAW limitations that, if not addressed at the operational level, will doom him to defeat. For example, a mechanized unit marching the maximum distance it can travel for many consecutive days will leave many vehicles broken down by the side of the road, and the vehicles that make the journey in a state of needed repair. This adversely affects readiness and the unit combat capability. If this same unit were to stop its advance without other pressing orders, it would quickly regain most of its lost readiness. This pause will allow his vehicle recovery teams to police up the stranded vehicles, needed maintenance accomplished, and supplies replenished.

Unit Attack and Defend Orders

TOAW attempts to give the commander flexibility on the intensity of the attack or defense. In setting unit loss tolerances, how many casualties a unit will take before it will disengage, the commander can fight a determined battle or feint. There is no command to fight to the death, as most units will take only so much damage before they back off and reorganize.

TOAW attempts to reproduce the difficulty a unit has in disengaging in the middle of a fight. When a unit tries to disengage with a persistent enemy in TOAW several elements come into play. Besides the size of the units involved, their mobility and current orders, terrain and unit status, the ability to disengage depends on the type of combat equipment used to force the disengagement. Obviously armored cars and tanks

are harder to stop from leaving the battlefield, but any unit that does not have some screening forces will take severe losses, if they are able to disengage at all.

How Aviation Is Used

Aviation units in TOAW are only given interdiction, air superiority, combat support, and rest missions.[11] Game players focused on controlling every movement of their force will find his ability to tactically control their fighters and bombers extremely limited. Referring to this limitation in TOAW Norm Koger explains:

> Even the grognard crowd has a limited ability to master a complex game interface. This limits the amount of fine control a game designer can turn over to players. In TOAW, for example, I did not give players the ability to focus the efforts of a specific air unit on a given stretch of road. The player can elect to have an air unit interdict (more likely closer to base, more likely on roads, etc, but still a generic global order), support ground units in combat, fly superiority, or (in a very limited way) strike a particular location. Clearly, this implementation has problems as a training tool for professional military folks. But as complex as TOAW already was, I was terrified at the market response to any imaginable interface that allowed micro management of things like individual air unit missions.[12]

A result of this operational command of air units allows interdiction of enemy forces, but not how and when. The game parameters are set up to look for enemy convoys along roads and heavily traveled areas. The player cannot determine which roads to interdict directly, but he can move his air units to bases that give him a higher percentage by close proximity of interdiction where he wants.

Intelligence

Most operational intelligence gained in Operation Crusader was from reconnaissance (ground and air), human intelligence, and direction finding (DF). This is replicated in TOAW by a historical estimation of assets available portraying a strategic

reconnaissance percentage. The result is a seemingly random spotting of units behind the enemy lines depending on the enemy size, movement, and type. For example, the Eighth Army Headquarters unit, when not on radio blackout, is spotted within a hundred miles of the front.

Tactical intelligence is gained from the unit reconnaissance efforts. This success depends on the type of reconnaissance equipment available and the amount of time the unit has to determine the details of the targeted enemy.

Supply

Supply in TOAW is extremely complex. Almost every variable in the game modifies supply. Not only does movement affect supply as discussed earlier, but the proximity of roads is key to keeping the supply vehicles coming. Although tanks can go almost anywhere, the soft skinned wheeled vehicles that bring the fuel and ammunition ca not. Close proximity to the unit's higher headquarters will also assist in more rapid supply replenishment. Lines of communication (LOC) are also important in receiving supply, particularly if an enemy unit is sitting on the only road your trucks can use. Adverse weather and time of day (particularly night) can greatly reduce supply efforts. A unit receives replacements the same way it is supplied. If a unit receives too many green replacements this will reduce unit experience.

An important operational supply function in TOAW is transport asset sharing. Units that do not use all their supply vehicles in supplying assigned units or moving are temporarily used operationally by their higher headquarters to supply other units.[13] This is one way, operationally, the player can boost his inherent supply distribution shortage.

Weather

Weather significantly affects the battlefield in TOAW, usually negatively. Weather can slow movement by flooding roads frustrating coordinating attacks and resupply efforts. Bad weather can reduce reconnaissance efforts putting units dangerously close before detection. In TOAW, weather fronts and squalls can adversely affect some units while leaving others untouched.

Formations and Support Levels

An absolutely critical part of TOAW is formations and support levels. Unit cooperation determines how well two different units can coordinate an attack or share supplies. Two brigades from the same division and nationality can almost always cooperate well in an attack, quickly come to each other's aid in the defense, and consolidate common ammunition types and parts for like vehicles. In TOAW, putting a German tank regiment in an attack with an Italian tank brigade results in cooperation penalties. There are several levels of unit cooperation, but in the above example (being about the worst) the difficulty of the language barrier, different commanders with different intentions, different types of equipment, different tactics, prejudices, and miscommunication make a difficult task of an attack almost impossible. About the only logistical support they could give each other is fuel. In most war games, the player has complete control over all his units to freely use any way he wants. This is not the case in TOAW. The commander must play close attention to the unit formations he throws into the attack.

The Map and Terrain

The map and terrain in TOAW is typical, for wargames, in hexagon use and terrain movement limitations for certain type units. Fuel usage depends on the unit type and terrain. Terrain effects combat for line of sight, defensive advantages, and reconnaissance. Roads are key to operational movement as well as airfields, cities, and ports for obvious reasons. The Crusader scenario map is custom made for operational movement and combat and does not have the detail required for tactical decisions.

Time of Day

There are inherent difficulties in a turn-based wargame for fair and adequate sequencing of movement and combat. TOAW address these difficulties in an extremely detailed method of time and movement. For the player, this system can be overwhelming in its complexity. Within a turn a commander can move, attack, see the results, and attack again. He can only do this if he fully understands the time and consequences of the movement and the combat his units initiate. For example, if a player moves his units only a fraction of their maximum allowable distance and sets up a hasty attack, they can continue to move and attack until the day's allotment is used. But in this sequence, if the player moves a unit or the attack takes longer than anticipated, the movement for all units is used accordingly. The use of the time of day is critical in understanding the game and the sequencing of events.

Unit Generic Strengths

Unit strengths are the generic numbers shown on the icons. It is very important to understand that these numbers on the unit icons are for quick reference of unit strengths,

and to ignore what calculations make these numbers seriously degrade player performance. These generic strengths are the sums of the total strengths in each category (antiarmor, antipersonnel, reconnaissance, etc.) for all assigned equipment, multiplied by the unit's morale (scaled to fit the game displays). There can be a great difference between units at the low end (displayed strengths at less than 3) that show similar unit strengths.[14]

The Scenario Editor

The strongest part of TOAW is the scenario editor. A player can modify every aspect and variable of the game. There is not an event, movement or unit a player could not modify to exactly replicate his operational research. A determined player could not only modify scenarios, but also design a completely new wargame with the powerful scenario editor. Unfortunately, with no rules that required historical or even realistic allegiance, a player could design a game that looks and smells of operational value, but the extremely delicate behind the scenes algorithms can produce a historical and unrealistic battlefield pictures. For example, not giving a heavy tank unit adequate trucks will severely reduce the unit's ability to get supplies, or giving that same tank unit a high reconnaissance rating without the supporting scout cars and vehicles will give it a huge unfair advantage in combat.

Conclusion

The building of TOAW focused on several challenges. First is the professionalism of the game designers to produce a product of their passion. They tried to build a bridge from board wargamers to computer war gamers enveloping every conceivable detail in

combat realism, but there were limits. The first of these was resistance to change. Koger elaborates:

> But most of today's recreational wargamers grew up playing board wargames. For a lot of reasons, some things weren't modeled very well in board wargames. Most gamers…feel themselves blindsided when a developer attempts to model things like disengagement, effects of local reconnaissance, or command control. I suspect these are serious issues for tools that military professionals would wish to use, but they can be viewed as potential problems in the design of a commercial wargame. This has the effect of encouraging developers to avoid complex or controversial models.[15]

This resistance to change leads into the second challenge, money. Thousands of dollars a year went into just the research of equipment and battles of TOAW. Although the die-hard wargame enthusiasts developing TOAW strive for every historically correct detail, they are limited by time and money. The game must make money. As important as the attention to historical detail are the bells and whistles. Over 40 percent of the total development effort in TOAW went to sound and graphics.[16] The game must compete for sales with multimedia saturated games selling in the competitive market. The niche of buyers looking for a historically accurate war game can put game designers and researchers in the food line at the Salvation Army with just one game that does not make money. This results in compromises. Koger explains:

> A game has to cover a topic that interests a wide enough market. The focus of the wargame market has narrowed to the point where only tactical games have broad appeal . . . . Anything that attempts to focus on a level higher than individual vehicles and perhaps a few thousand "soldiers" is considered too abstract. No matter how you dress up an "operational" level game, the guys making the decision of which games to put on their store shelves immediately think pocket protectors and taped glasses if they don't see little dudes shooting at gnarly tanks on the back of the box. TOAW managed to sneak in under the wire.[17]

This is why TOAW is the best candidate for this research. In researching the game designers, understanding their intentions, and evaluating their product the

realization came that of all the commercial wargames developed, TOAW might have value to the military historian. Besides winning "wargame of 1998" by several leading computer war game magazines, TOAW received the highest ratings of realism and playability from over twenty online computer gaming companies.[18] One respected war gaming critic articulates well what most gaming critics said about TOAW:

> This is the Big Boy 1998. No game in '98 came close to achieving in the PC game world that Norm Koger's . . . did. TOAW is possibly the best of its kind to see the light of day.[19]

On the outset the game has design limitations and marketing compromises that may reduce or eliminate any historical value. But it also has a professional intent and historical detail that has the potential of great merit to the student of military history.

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[1]Norm Koger, *The Operational Art of War* (Players guide, Talonsoft, Inc., MD, 1997), 5.

[2]References available from The Operational Art of War home page at http://home.austin.rr.com/normkoger/toaw1.html; Internet.

[3]Koger, 12.

[4]Ibid.

[5]Ibid., 13.

[6]Ibid.

[7]Ibid.

[8]Ibid.

[9]Norm Koger, electronic interview by author, personal notes, Ft. Leavenworth, KS., 12 October 2000, 5.

[10]Ibid., 5.

[11]Koger, "Operational Art of War," 14.

[12]Koger, interview, 4.

[13]Koger, “Operational Art of War,” 27.

[14]Ibid., 12.

[15]Koger, interview, 12 October 2000, 4.

[16]Ibid., 3.

[17]Ibid.

[18]References available from The Operational Art of War [home page] available from http://home.austin.rr.com/normkoger/toaw1.html; Internet.

[19]References available from Wargamer Magazine [home page] available from http://wargamer.com/reviews/operational_art_of_war_review.asp; Internet.

CHAPTER 4

PLAYER IMPRESSIONS AND ANALYSIS

Introduction

This chapter will focus on player experiences and their initial perception of the game as it relates to their study of history. In the course of playing the game, players exercised their knowledge of the Crusader battle as well at their own tactical skills to try to gain historical insights. After hours of war gaming, discussions, and questionnaires, the players evaluated positive and negative aspects of the game in every area they thought possible. This chapter contains their initial impressions and analysis.

Although this chapter is about reviewing the initial impressions, it is important to note that the project started with some assumptions about the players, the subject, and the game. First, the players must have some interest, or requirement, to study history. Without motivation any vehicle to study history is usually doomed from its conception. Second, the players started with some degree of tactical competency. The train-up period and scenario familiarization focused on the mechanics of the game. The players were left to their own ideas of good tactics. Player expectations were not just the mastery of a paper, rock, scissors formula to use armor, infantry, and artillery. Players planned and executed the pursuit of operational goals and centers of gravity, and demonstrated logistical competency (or at least understanding). The final assumption is that the players were teachable. The players had to have an open mind and the initiative to seek historical insights instead of settling for obvious historical comparisons.

Few notions are more difficult to overcome than preconceived ideas. The player who is sure wargames are a waste of time will quickly point out perceived negative

shortcomings and discard insights as obvious without a critical analysis of anything but the most superficial conclusions. Just as dangerous is the player with the perceived idea that wargames are the best answer to the study of history. He will develop unrealistic views and contradictory historical assumptions as he assumes away any needed attribute for which the game does not compensate for.

Methodology

If there is a way to precisely measure the nature of historical insights one gains from computer wargames, it escapes this author. Even playing the simulation against one consistent opponent delivers innumerable different experiences and outcomes as the player exercises his unique course of action. The intent of this experiment was not to give every commander the same experiences or even to teach the chronological events of the battle. The intent was to evaluate potential insights to the options available to the historical commanders. Putting aside sixty years since Operation Crusader, and any personal bias, could the players gain a better understanding of the limitations of the forces available and an appreciation of why the commanders made some key decisions? Seven players (Command and General Staff College students) read chapter two of this document. Each of them took a survey of their view of the battle and the strengths and weaknesses of each side. After a game introduction (training) period, they each played the Operation Crusader campaign against the author. The subjects played both sides, the Axis first. After game play, the subjects took another survey to evaluate their perceived strengths and weaknesses of the game, insights into the situation of the historical battle, and failed expectations. The subjects were from different military backgrounds that TOAW has measurable criteria to evaluate (i.e., no finance officer). Their areas of

expertise, which the players were asked to focus on, were the effects and interrelationships of armor, infantry, aviation, quartermaster, field artillery, military intelligence, and engineer.

General Facts

The average length of one game if played at one sitting was about three hours. The shortest game was two hours and ten minutes, the longest was three hours and fifty-five minutes. Most of the games played were by electronic mail. The average days to completion were thirty. Since none of the subjects played TOAW previously, there was a train-up period. This ranged from twenty to fifty minutes, usually dependent on previous war-gaming experience.

The train-up and surveys stressed the relative unimportance of winning the scenario, compared to the lessons learned and insights gained. None of the subjects achieved a victory as the Axis player against the author, and only two players fought to an operational draw as the Allied player. This was largely due to the inexperience of the subjects in war gaming as they were experiencing many turns running out of fuel, bumping into unexpected units in the desert, and figuring out the best combination of unit types and strategies to attack and defend. As the game concluded, unanimously each subject desired to play again and felt they could do better. Although the object was not to win, the innate drive to best the enemy encouraged and facilitated the understanding of the game, which in turn facilitated the understanding of the battle from the view of TOAW. Thus, it was not in the interest of the author to discourage the competitive spirit.

The TOAW has the feature that allows the computer to fight against itself. The AI (Artificial Intelligence) is discussed later, but in twenty games of computer on computer,

the computer-Allied player won ten times, eight ended in stalemate and two were Axis victories. Tobruk fell to the Axis only once.

Positive Aspects

The players all felt that they gained a significant understanding of the logistics involved in the desert campaign, except for the quartermaster logistician. He felt he gained only a slightly better understanding, but commented in his exit survey that the game exercised his logistic decision-making process, particularly playing the Axis.[1] The results from the before and after game play surveys evaluating how well the players felt they understood the logistical constraints in Operation Crusader are in figure 4. The chart ranges from zero (not at all) to five (extremely well).

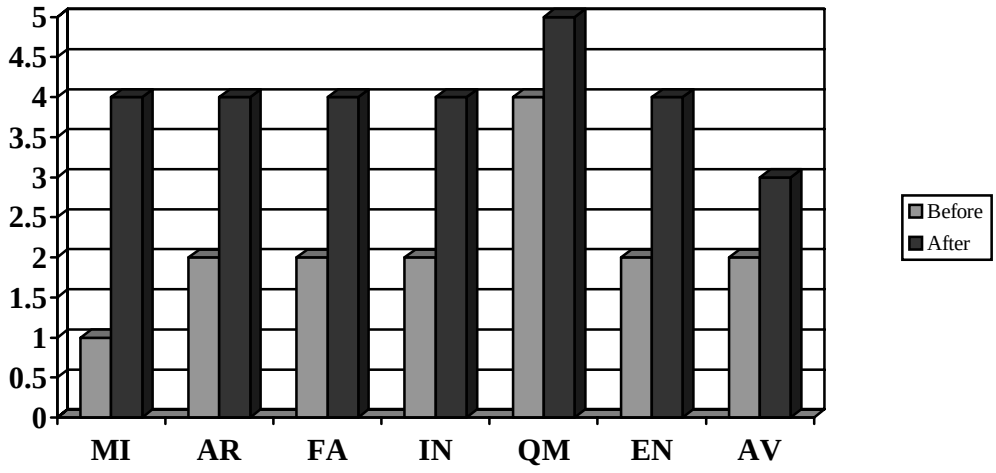


Figure 4. Understanding of the Logistical Constraints in Operation Crusader

Most players gained their understanding and respect for logistical constraints when they would race their units across the desert for three turns only to dive straight into three more days of battle. The resulting operational tempo (OPTEMPO) with 1940

machines greatly weakened combat strengths as key broken down vehicles lined the roads of the desert and troops were fatigued. By the end of the games, players learned the advantage of rotating units for rest and refit. Often players forgot that one turn represented one day and would push for one more victory with exhausted units only to find frustration with the results.

All players benefited some degree from the appreciation of nonlinear battle. It was not difficult to drive pincers into the enemy LOC, but demanded nerves of steel when the enemy returned the favor. In the porous battlefield of Crusader, players often tried vainly to set up linear defenses. The fact that both sides were to have units in the enemy rear areas was inevitable; how the player reacted was critical. After game play, all the players understood why Cunningham requested a general retreat when he did and received an appreciation for Auchinleck's nerves of steel not to withdraw when Rommel defeated 7th Armored Division and 1st South African Division, then raced to the wire. All scenarios developed conditions similar to Rommel's dash to the wire, which caused great concern for both players because of the uncertainty of the opponent's intentions or the outcome. These audacious moves caused player uncertainty and agitation because they produced too many branches and sequels to anticipate. Although these concepts are certainly not new to the battlefield commander, experiencing the vagueness of these huge gambles the players developed an admiration for the "nerves of steel" of General Auchinleck.

Probably the greatest advantage TOAW offered was the insight into battlefield friction. Deception plans did not always work, the enemy did not always cooperate by moving or dying where they were suppose to, and subordinate units did not always hold

ground and rarely fought to the last man. The most difficult variable to control was good morale. Entire brigades with fair supply would surrender with little fighting because they were surrounded, while other battalions with no hope of survival fought to the last bullet. The players spent hours discussing and researching reasons for such actions where every aspect of battle was discussed. Often some variable not anticipated (weather, fatigue, reconnaissance) was the culprit for the unexpected results.

One player believed the greatest insight the game gave to his view of Operation Crusader was the importance of the Italian forces. Having read much of the battle before the exercise he knew the center of gravity for the Axis was the DAK. What the gaming did was open his eyes to the critical role the Italians played. Where on their own they were of limited value on the offense, with German units they were a formidable addition and could not be discounted.

All players expressed much better understanding of the complexity of the battle. The player controls over 300 units in TOAW Operation Crusader scenario. This was overwhelming at first for all players, but by midway through the first game they were quite comfortable moving the masses. After major engagements it would take a day (one turn) to realign the forces that were mixed in the battle. The greatest complexity was not in the number of units, but their command and supply relationships. In the desert scenario, friendly forces often did not meet the enemy where anticipated which caused enormous friction in which units would participate. Often what unit was closest to the enemy did not work well (command relationship) with the reserves brought up to support him. Although the players understood this and worked to simplify matters, the friction and OPTEMPO of battle worked against their efforts. Figure 5 depicts the before and

after game play surveys of how the players felt they understood the complexity of Operation Crusader. The chart ranges from zero (do not understand the complexity at all) to five (understanding the complexity very well).

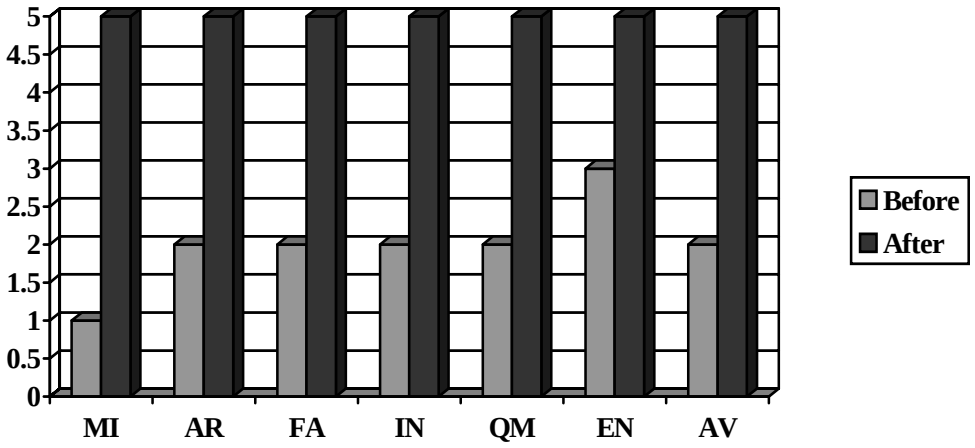


Figure 5. Understanding of the Complexity of Operation Crusader

Players also expressed a better understanding of weapon effects, not just the tank-on-tank-duel advantages, but the combined arms mix against a tank or infantry type pure unit. This was an aggregate of the hundreds of engagements with dozens of combinations of force mixtures. One of the strengths of the numerically inferior Germans in Operation Crusader was their tactical doctrine of combined arms. TOAW expresses this combined arms advantage in force mixture, where the Germans forces have historical force combinations of infantry, antitank guns, and tanks and the British tended to have more pure units. Historically, this British shortfall resulted in many tactical defeats. Similarly, players expressed that in TOAW, when the same historical conditions come about, they met with similar defeats.

One player curiosity TOAW addressed was the players' appetite for "what ifs." After reading the scenario all players believed that with minor alterations to the historical plan either side could achieve victory. We will not address all the different courses of action the players attempted, but one frequently disregarded fact became perfectly clear. It was that every action ripples to several actions that can give unpredicted results. For example, one player immediately combined Norrie's armored division for the thrust into Sidi Rezegh. He felt no matter what other mistakes were made in the battle, that action alone would change the outcome from the historical conclusion. What the player did not take into account was that his opponent's reactions, based on a different battlefield picture, also altered. Player's realized there were no simple changes that consistently produced expected results. All players felt reinforced in the conviction that the ultimate outcome lay in a good plan well executed that includes all aspects of warfare (reconnaissance, intelligence, logistics, combat power, etc.) and that can withstand battlefield friction.

One distinct advantage not anticipated was the esprit de corps developed amongst the players. Every player seemed to take on the character of the side they represented and vehemently asserted that side's strengths. The player's expressed excitement after every turn (by e-mail or phone) to discuss new elements (perspectives) they gained of the battle or a discussion of a reason a certain tactic failed. Electronic messages always contained simulated historical banter that added to spirit of gamesmanship. The players all enjoyed the games. All reported they would not only play the game in the future, but were already using the game to gain better understanding of other battles.

In summary, all players believed they had a much better understanding of Operation Crusader. The most common thought was that TOAW gave them a better perspective on the battle, terrain, options available, unit capabilities, and some the decisions made by the historical commanders. Figure 6 contains the results of the before and after game play surveys of how the players felt they understood the forces available in Operation Crusader. The chart ranges from zero (do not understand forces available at all) to five (understand the forces available very well).

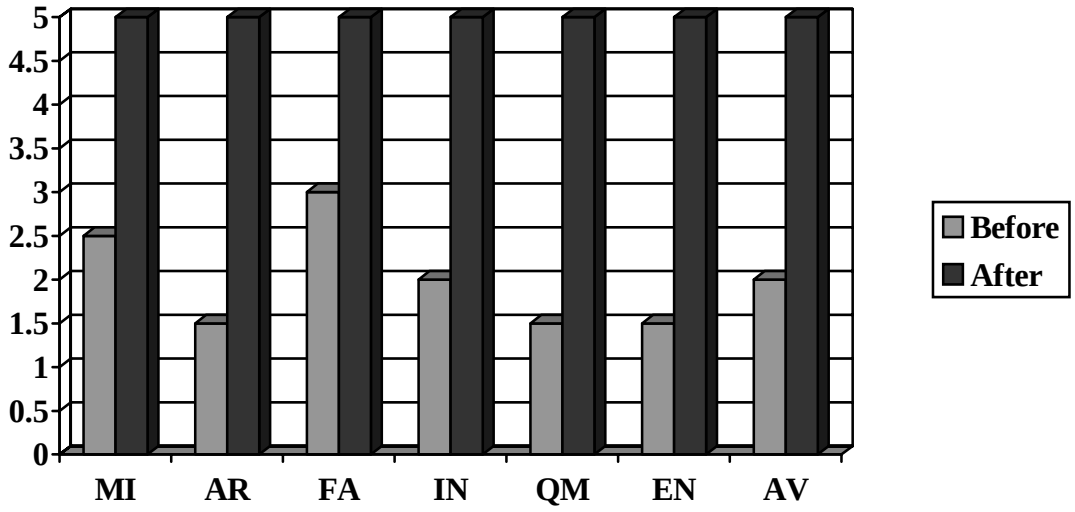


Figure 6. Understanding of the Forces Available in Operation Crusader

The next advantage has to do with TOAW scenario editor. The Crusader scenario had obvious errors. Some units could not move because they started on a terrain feature that did not allow movement of that type of unit. Other units started the scenario where movement was limited to a few hexes and could never be used in the game. A review of the historical terrain and a couple of mouse clicks fixed the scenario. The extremely

powerful scenario editor allows the adjustment (and complete build up from scratch if needed) of the scenario if further research found discrepancies.

Negative Aspects

Players generally did not agree on their impressions of where the game fell short of historical expectations. What one player considered a disadvantage, another would call realism. The Military Intelligence player had extreme difficulty in learning the game. Attributing this to his lack of gaming experience, we continued with the play testing. After an hour of what could be considered irresponsible operational and tactical maneuvering on his part, we stopped. At this point the player could not understand why he was doing so poorly and felt the game was flawed. He then mentioned that he was completely colorblind. He was guessing with complete inaccuracy the hundreds of colors displayed for quick reference that show the units statuses, types, and nationalities. He could not accurately differentiate between his German and Italian units (although he thought he could with ease) and often tried to maneuver enemy units and did not understand why they would disobey his orders. After a brief retrain up session the play testing continued with much success. His turns took much longer as now each unit required individual research (an available option by selecting each piece and reading the individual statistics) rather than using the quick reference colors to quickly surmise your division's status.

The most consistent perceived disadvantage was time. After reading a thirty-seven-page synopsis of the battle, taking a twenty-minute survey, participating in approximately six hours of wargaming, and then taking a forty-minute survey, it was more time than the players felt they could devote to the study of one battle. This length of

time was mitigated some by the play by electronic-mail system. Not that it was shorter, but the six hours of play spread over thirty days was more palatable.

Another disadvantage was the competitiveness of the players. In some ways, as stated earlier in this chapter, it was an advantage. Dr. White best articulates the disadvantage of competitiveness in his study of simulation games for historical instruction:

> Most commercial wargames are designed to end with the determination of a winner. This notion of "winning the game" must be downplayed as much as possible. If the mechanics of winning become the center of the simulation exercise, learning moves to the periphery. When players want to win they tend to argue about rules and valuable lessons may be lost as a result of this type of confrontation.[2]

The players often slipped into "the competitive mode" by contesting results without close examination of the rationale. Every time they were brought back to harmonize with the purpose of the exercise only by constant facilitation and a review of the objectives. Even with constant coaching and facilitation, most players commented in their exit questionnaire on the steep learning curve and the complexity of the game interfering with their ability to win. Although this is an obvious point, it echoes the underlying desire for the player to win. This focus to win left unchecked, would cascade and consume many possible historical insights in the wake of competitive gaming.

An important historical aspect of Operation Crusader was the inconsistency in friendly unit reports. Critical decisions were made on exaggerated reports and inaccurate unit strengths. For example, when Cruewell annihilated the South African Brigade, an event that triggered Rommel to launched his dash to the wire, Cruewell could not consolidate and articulate his losses to Rommel for several hours, long past Rommel's decision to attack. TOAW does not reflect this inaccuracy. At any time the player can

examine any of his friendly units and receive an accurate report down to the individual squad. Although much effort is put in TOAW to simulate enemy fog of war, the players felt there was no historical accuracy to simulate friendly fog of war. The author can only assume that this unit perfect knowledge is a compromise either for research time, software programming or marketability.

TOAW does not compensate for the personality of leaders. In the two-player mode this does not matter, but further study into the battle would benefit from a developed AI that could simulate the aggressiveness and audacity of the historical commander. For example, an audacious AI that could take on the offensive characteristics of Rommel would add additional historical flavor. Other wargames simulate this with varying degrees of success. TOAW in the single player mode, particularly in the Crusader campaign, would greatly benefit from a model of the leader personalities.

Most players saw the complexity of the game a disadvantage. The players were not accustomed to all the variables addressed in movement and engagement and made several errors early in the learning process that they felt were part of the game. Within a few turns as the players comprehended the strengths and weaknesses of their units these errors greatly decreased, except in one area. Mastering the time of day of movement and attacks required at least one game, and in most cases both games to master the finer techniques. This element is key to sequencing attacks for multiple orders in one day. This complex system is essential for a realistic orders process in a turn-based game. Compared to similar turn-based games on the commercial market this system is truly revolutionary.

The down side is that few have seen it, using it effectively takes more than one game, and understanding it is essential for giving effective operational orders.

Many players felt the intelligence simulated in the game at the tactical level was accurate, but at the operational and strategic level it was deficient. They felt it did not reflect the intelligence advantage the allies had during this part of the war. There are no ULTRA intercepts giving the Allies the German intentions or radio intercepts that detailed plans for the next days operations (as often happened between Rommel and Cruewell). The reading in chapter two does not address the intelligence capabilities or activities of the forces in Crusader. The introduction of the scenario gives a several page strategic and operational view and well as operational updates each turn. There are several articles and books written on the subject like Behrentdt's "Rommels Intelligence in the Desert"[3] or Ralph Bennett's "Ultra and the Mediterranean Strategy"[4] that details the exact intelligence and deception efforts of the forces involved. Without going into detail, the operational intelligence accuracy is debatable. If players still feel the operational intelligence is historically inaccurate it is easily manipulated in the scenario editor.

The final element discussed was not so much a disadvantage, as it is a future limitation. As powerful and flexible as the scenario editor is in building units, terrain and events, it will not allow the modifications of probability of kill (PK). For example, if further research changed the truth about the British 2-pounder gun being able to penetrate more armor at a specific range than the programmer allows, this could not be changed in TOAW without a programmer patch. Fortunately, historical research like this does not

change often, but does limit this particular game to current levels of historical accuracy. Subsequent versions of TOAW do allow more flexibility in the scenario editor.

Conclusion

All the players started with no interest to only a mild interest in wargames. Only two had what they considered an above average interest in the study of history with the remaining having interests of average or below. In all cases this exercise appeared to increase those interests. The next chapter will analyze and discuss the usefulness or futility of commercial wargaming in the study of history. All the players agreed that regardless all the advantages and disadvantages, this was fun.

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[1]Leigh Bandy, exit survey by author, personal notes, Ft. Leavenworth, KS, 26 January 2001, 3.

[2]David White, *Use and Selection of Simulation Games for Instruction: An Analysis of Programs in Military History* (Michigan: University Microfilms International, 1985), 70.

[3]Hans-Otto Behrendt, *Rommels Kenntnis vom Feind im Afrikafeldzug* (Germany: Romback + Co., 1980).

[4]Ralph Bennett, *Ultra and the Mediterranean Strategy* (New York: William Morrow and Co., 1989).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter will put into perspective the player's impressions of this method of the study of history and look at why this method of the study of military history may or may not be useful.

The simulation and modeling community is expanding quickly to dominate not only military training, but military acquisition and future concepts. Department of Defense guidance requires decision makers to "encourage and facilitate" lessons learned from past experience. Specifically, "models and simulations shall be used to reduce the time, resources, and risks of the acquisition process and to increase the quality of the systems being acquired."[1] It is reasonable to believe if the military is using simulations to study and train current and future concepts that these simulations can assist in the study of historical ones. As stated earlier, the methodology of using simulations is not to give every commander the same experiences or even to teach the chronological events of the battle. The intent is to evaluate potential insights into the options available to the historical commanders.

The dynamics of the Crusader battle certainly was constructive for this kind of in-depth study. It is reasonable to accurately model the Crusader battle because of the large amount of documentation available on the battle and the equipment used. The battle was large enough to gain insights into operational decisions, but small enough to digest small details that were critical to the outcome. Crusader also presented a complex nonlinear battle that produced historical challenges that are applicable to the current battlefield. In

short, current military commanders could improve their professional skills by studying this battle.

The data collected can offer a window into the possibilities and limitations of employing historical wargames in the study of history. Many of these limitations are similar to the boundaries simulations have in general, whether in the study of history or current and future training. Although the study sample was small, it is in no way intended to represent a percentage of any population. It was rather intended to gather fresh perspectives from military professionals not accustomed to studying history through wargames. The challenge of this exercise is to extrapolate valid lessons and principles from this data.

The players, after testing, could easily put into words many positive and negative details of the game and how they thought the exercise could further their personal research and understanding of history. This is not uncommon with any simulation exercise. When Talonsoft released TOAW in 1998, they were swarmed with hundreds of questions concerning every detail about the game and found themselves defending almost every aspect of the programming to players and historians. When asked in a written interview with the author about the volume of opinions about TOAW, Mr. Koger responded:

> There are folks out there with way too much time on their hands. Difficult as it is to dig up information needed for this kind of work there's always someone who (after a game is released) manages to come up with tons of data proving that the 1937 French 37mm AT gun could actually penetrate 7.3mm further into rolled homogeneous armor at 250 meters that the 1939 model--unless of course it's inclined at greater than 23 degrees, where the '39 is better . . . and why the hell wasn't this taken into account in the database![2]

Similar to the reaction the game designer experienced after the release of TOAW, it was astonishing how quickly even this small selection of professional players would quickly dissect the smallest details for historical understanding. It is important to note that this process of dismembering the game for "how it works" has its positive and negative aspects. As this examination of minutiae proved invaluable in understanding historical position and relation, it is but one resource to begin to understand history through wargaming.

The more difficult task the players struggled with was the expression of how the exercise helped their historical knowledge of Crusader. Obviously, the games did not play out in historical accuracy as nonhistorical decisions produced a ripple of non-historical events. How could war games help us learn history without playing back the historical battle? The following paragraphs will address this question as well as the player's perceived positive and negative facets of this method of studying history.

Analysis

Of the dozens of positive and negative comments on the use of the game, the single most encountered discussion point was the increased attentiveness the exercise brought to the use of logistics. On the one hand, every single player felt they received a fantastic lesson on operational logistics. They believed that they experienced the logistical challenges of moving 1940's era divisions and corps in a sustained campaign of about three weeks. Every movement, battle, situation, unit type and position had logistical consequences often unanticipated, but always adequately explained by the rules. The quandary is that none of the players have this time frame or operational level of logistical experience to compare against. TOAW portrays logistics with the look and

feel the players expect division and corps logistics to look like. The danger obviously is that if the simulation is flawed, the lessons learned will instill incorrect assumptions about this level of logistics. The closer the simulation is to reality, or what the player expects reality is, the more rooted and easily accepted the inaccuracies. This psychological trick on the mind is very similar to aircraft simulators that can create physiological effects to the body. In military full motion aircraft training simulators, pilots can experience simulator sickness. This sickness is directly related to the fidelity of the simulator. The better the simulator, the more realistic to the pilot the environment, the more frequent and intense the potential simulator sickness. This is because in a low fidelity simulator, the body is not fooled by the inaccuracies and does not react to them. In a high-fidelity simulator, the body is fooled by the inaccuracies and believes it is looking or doing one thing (like a 60-degree turn), but the model is only partially replicating that thing (visually doing a 60-degree turn, but the hydraulic "box" is only tilting 30 degrees). The conflicting data can cause simulator sickness.[3] The effect of this aircraft simulator is not unlike TOAW. Unfortunately (or fortunately), we do not have the physiological warnings of something replicated almost right. TOAW replicates logistics with such detail and perceived accuracy that it convinces the players that this is the way logistics were. Players can minimize incorrect assumptions by understanding the principles on which simulations operate. Although TOAW is designed to be accurate, it was not designed to be all encompassing. As with all simulations, TOAW had to make compromises to balance reality with playability, marketability, and financial solvency.

TOAW proved a historical game of friction. The ultimate winner of the games (although winning was not the object) was usually more tactically adept and regularly the

one who anticipated logistical constraints, had a more in-depth operational plan, developed flexible courses of action for unanticipated events, used effective deception, employed good reconnaissance and generally fought his enemy and not his own plan. These results suggest that, in the desert especially, tactics and logistics are inextricably intertwined. This was not surprising as constructive simulations like these are used regularly for training. The true advantage was the new found perceptions players gained on historical units, capabilities, options, and decisions.

The greatest strength of the exercise was the ability of the system to allow players to explore. In playing the game, players explored many different possible courses of action. This immeasurably contributed to the players' understanding of possible actions the leaders could have taken. This is important to help determine if the historical leader made the best decision, and what would have been the consequences if he made a different choice. TOAW provides one unique avenue to explore more in depth the third level of critical analysis described by Carl von Clausewitz when he wrote: "We therefore have to consider the full extent of everything that has happened, or might have happened. . . . Critical analysis is not just an evaluation of the means actually employed, but of all possible means--which first have to be formulated, that is invented."[4] TOAW gives us a viable opportunity to analyze with some accuracy viable options available to the commanders. As Clausewitz also wrote: "One can, after all, not condemn a method without being able to suggest a better alternative."[5]

To more fully develop Clausewitz's third level of understanding history with TOAW, it would require the use of the powerful yet complicated scenario editor. Playing the ready-made scenario limited players to analyzing and exploring conditions starting

from the nineteenth of November, the beginning of the game. With the use of the scenario editor players could explore changing doctrine, force structure, unit positions, weather, terrain and a host of other variables. The scenario editor allows the player to control every almost detail of TOAW. Although this allows the player much latitude in exploring all available options, it does not come without a price. To modify a scenario is relatively easy and with a few mouse clicks it can be done. To understand the principles and the effects of those changes is not so simple. For example, a typical Allied infantry battalion in the Crusader scenario would have the actual historical balance of forty-four trucks for their forty-two infantry squads and other equipment. Changing the trucks to fifty would greatly skew the dynamics of the unit and game. The unit could now supply much faster as well as any unused trucks in the turn would be available to increase other unit's supply through transport sharing. The bottom line is that, unless a player researched accurately the exact historical makeup of the units and understood the intimate dynamics of TOAW, their use of the scenario editor would likely produce results not at all related to the historical options available.

The most significant drawback to TOAW is the time required learning and playing. In the average time it took to complete the train up and two games, the average history student could have read between 300 and 650 additional pages on the subject. Undoubtedly the details and analysis of these one to two books would greatly surpass many historical gains of playing the scenario. The advantage to TOAW is that it offers perspectives and insights that cannot be gleaned from any number of books. This method is certainly complimentary, but not an alternative, to historical research. The hard

question is whether these insights gained through experiencing the battle through TOAW are worth the time it takes to gain them. For some the answer is yes, for others no.

Could Rommel have learned from this exercise? For Rommel and the serious student of military history the answer is an astounding yes. Rommel's blind spot is often described as his lack of logistical foresight. TOAW Crusader scenario would have shown him the logistical consequences of the far sweeping maneuver and constant battle. The unique perspectives, insights, and certainly the exploration of other courses of action provided by this commercial simulation probably cannot be fully grasped by the history student without this inimitable experience. Much like the unique experience that can only be gained by a participating on a staff ride. As a student for months of General Custer's Last Stand at Little Big Horn, all the reading and research of the battle complemented, but could not replace the perspective gained by standing on that piece of ground. TOAW, and simulations like it, offer insights, perspectives and opportunities for serious student unmatched anywhere else.

For the casual student of history who needs to maximize his time to study a more diverse and balanced history, TOAW is certainly not a waste of his time, but probably not his most effective method. To maximize TOAW in the study of history, the student must read beforehand historical accounts and some analysis on which to base his game decisions. Without the research, the game is just that, a game. At best the player will test his tactical and operational skills against another wholly missing the hours of historical preparation painstaking designed into the simulation. If the casual student of military history does not have the time to read and play, then he would get the most history from reading. Do not dismiss TOAW as merely fun. The players tried several different battles

that they were unfamiliar with and after playing the game, they went back and researched what was represented in the battle. The fun and perspectives often seemed so enticing as to demand more study. There just never seemed to be enough time to do everything.

One aspect of the game not analyzed but that deserves mention is the artificial intelligence (AI). Players exercised against human opponents to avoid the analysis of the game's AI, as an effective review of TOAW's AI could not fit in this paper. AI adds a totally different dimension to the game as the AI is reviewed for human, subhuman, and superhuman qualities. The player must keep this in mind when reviewing a battle, particularly when exploring other possible courses of action. Here the player must research the limits of the AI to determine the effectiveness of the game for his historical study. In TOAW, when the AI played against itself, there was a lack of audacity and deception seen with human players.

With over thirty years of board and computer war-gaming experience this exercise exposed this author to new ways to look at warfare, particularly historical warfare. Modern day programs like TOAW make that bridge between complexity, fidelity, realism, and playability. To put it best, Michael Schrage in his book about using simulations in the corporate market said, "The most potent models are complex enough to yield counterintuitive results yet simple enough to let people grasp how those results were obtained."[6] TOAW seemed to find this delicate balance. The greatest impressions were learning the intent and drive of the game author, Norm Koger. Working within timelines and budgets and trying to make a product that appeals to a wide audience, Mr. Koger made a product unparalleled in commercial war gaming for its use as a study in military history. This is because the design team was not just making another game for

entertainment and profit, but put their heart and soul into a game that has historical connotation.

It is easy to point out what TOAW cannot do. The constructive type simulation that TOAW is often compared to in the military is the Brigade/Battalion Simulation (BBS) system the U.S. Army uses to train battle staffs. Many of the battlefield services TOAW tracks are automated. For example, the player cannot control the level of maintenance performed on a unit like that in BBS. But often those same systems in BBS are automated because of the unit training objective does not require training in that area or the unit does not have the over 80 personnel required to run the full up exercise (not including the 24 technicians). Usually in BBS the player controls only one or two actions at a terminal (i.e., evacuation of wounded and graves registration). It is impossible for one terminal to control even a portion of the maneuver, combat service, and combat service support effectively in BBS. So the critiques that say TOAW does not give the flexibility that BBS does are missing the point. The simulations were designed with completely different objectives. The reason many compare these systems is because they look similar. Certainly it would be worth the effort to explore TOAW for uses of training up for BBS for those who are new to constructive wargaming. Currently the U.S. Army is researching a method to put a downscaled version of BBS on one CD for personal use and training.[7] It may end up looking a lot like TOAW.

An unexpected perspective gained by the players and the author was the use of a facilitator. All the players found that the use of a facilitator enhanced learning important details about the game and the battle. Often a query was answered in a few sentences by a knowledgeable facilitator rather than hours of research to find out why something in the

game happened. Without a facilitator, the exercise has the potential to drag on longer than needed to gain the historical benefits. Players could lose interest because of the inability to understand the historical events or gaming rules. When the facilitator did not know the answer, further research was required that was usually followed by hours of discussions about the newfound peculiarity of the battle or game.

The Future

Commercial war gaming can be an extremely helpful tool in the study of history. However, much research and thought must go into how to implement this type of historical study. TOAW is probably not the end product for this addition to historical research, but it is close and is the best the commercial market currently has for a constructive type war game. Study is required to view how best this could be used to help the military historian. What is the right mixture of research and game play? What is the role of the facilitator? How do we integrate war games into a professional study program and standardize their historical significance?

Further study is also needed in the development and use of the AI. There are great additional historical insights we might gain if we could fight Rommel or Cunningham. Technology is available for a thinking AI to learn against an opponent. An AI that would react in a probable fashion of a historical commander would add further realism into researching possibilities available to the player side.

Future study in this area would benefit from a more-refined methodology. The use of leaders from different branches of the service, though interesting, was not conclusive in any way towards the research. The most beneficial insights gained were from those who had almost no wargaming experience. Longer and more precise surveys are also

needed to pinpoint research questions and measurable criteria. Although having all the players play the same battle against the same opponent gave a foundation for measurable results, the results from different battles and opponents may provide even more insightful strategies for the study of military history.

The application of commercial wargames is a great possible future for the study of history. Not to harness the power, speed, and three-dimensional insights of a computer simulation for the study of history seems a terrible waste of assets. However, to pick the right simulation the user must first determine his learning objective, then select the simulation that best supports that objective. The military historian should not look at wargames as replacing historical research, but as a product of historical research. The possibilities are truly endless.

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[1]Lieutenant Colonel Michael Johnson, Mark Mckeon, and Terence Szanto, *Simulation Based Acquisition: A New Approach* (Fort Belvoir: Defense Systems Management College, December 1998), 3-1.

[2]Norm Koger, electronic interview by author, personal notes, Ft. Leavenworth, KS, 5 January 2001, 1.

[3]Thomas J. Willmuth, "Simulators Make Me Sick," *Aviation Digest*, July-August 1992, 33.

[4]Carl von Clausewitz, "Critical Analysis" in *On War* (Princeton, NJ: Princeton University Press, 1976), 156-169; excerpt reprinted in US Army Command and General Staff College, *A686: Military History Through Simulations* (Fort Leavenworth, KS: USACGSC, July 1998), 22-23.

[5]Ibid., 23.

[6]Micheal Schrage, *Serious Play: How the World's Best Companies Simulate to Innovate* (Boston: Harvard Business School Press, 2000), 119.

[7]Per research and conversation with the Brigade and Battalion Simulation program team at the National Simulation Center located at Fort Leavenworth, Kansas, on

27 March 2001. Estimated completion date is fall of 2001 with additional research in the implementation and integration of the one compact disk BBS system on going.

APPENDIX A

THE OPERATIONAL ART OF WAR/OPERATION CRUSADER SURVEY

1. Have you ever played TOAW? □ Yes □ No
2. Have you ever played this scenario before? □ Yes □ No
3. How often do you play constructive type wargames?

□ Almost never
□ Once per month
□ Once per week
□ More than once per week

4. After reading the scenario, generally how well do you think you know the battle?

□ Extremely well – I could probably teach this battle to my peers.
□ Pretty well – I could discuss this battle with my peers.
□ Average – I could understand what others are talking about without further reading.
□ Not very well – I would need additional reading to keep up on discussions.
□ Not at all – What happened anyway?

5. How long did it take you to do the reading?

□ Less than one hour
□ One to one and a half hours
□ One and one half to Two hours
□ Two to three hours
□ More than three hours

6. What do you think were the key operational decisions (decision points) made by the Axis?

7. What do you think were the key operational decisions (decision points) made by the Allies?

8. What do you think the key objectives for the Axis were and were they achievable?

9. What do you think the key objectives for the Allies were and were they achievable?

10. Why did the Axis lose?

11. What do you think were the flaws in the British plan?

APPENDIX B

THE OPERATIONAL ART OF WAR/OPERATION CRUSADER EXIT SURVEY

1. After Playing TOAW “Operation Crusader” game, do you think you have a better understanding of the strength and weaknesses of the Axis and Allied forces in the area of:

a. Logistics?

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected logistics very well at all

b. Battlefield cooperation with friendly units?

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected battlefield cooperation very well at all

c. The complexity of battle?

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected the complexity of battle very well at all

d. The forces available?

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected the forces available very well at all

e. In what the capabilities were of the opposing forces?

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected the capabilities of the opposing forces very well

f. Do you have a better understanding of the terrain available?

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected terrain very well

g. Do you have a better understanding of the differences between the military systems? (German, British, Italian)

- □ I have a much better understanding
- □ I have a slightly better understanding
- □ I gained no more understanding
- □ I became more confused and understand less
- □ I do not feel the game reflected differences between military systems very well

2. What do you understand in this scenario as the relationship between tactical capabilities to operational effects?

3. Do you think the game reflected enemy intelligence well? How or how not.

4. Do you think that you better understand why the commanders made the decisions that they did? (i.e. Cunningham's splitting of forces, Rommel's dash to the wire)

5. What, if any, historical insights did you gain form playing the scenario?

3. What insights were not there that you thought should have been?

4. Did the game give you a better perspective of the battle?

5. What do you think are the strengths of this exercise?

6. What do you think are the weaknesses of this exercise?

7. Did the exercise challenge you to think critically about your profession?

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