USAWC STRATEGY RESEARCH PROJECT

OBJECTIVE FORCE REPRESENTATION

by

DR. KARSTEN ENGELMANN
U.S. ARMY'S CENTER FOR ARMY ANALYSIS

COL Jerry D. Johnson
Project Advisor

The views expressed in this academic research paper are those of the author and do not necessarily reflect the official policy or position of the U.S. Government, the Department of Defense, or any of its agencies.

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

Public reporting burder for this collection of information is estibated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burder to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 07-04-2003	2. REPORT TYPE	3. DATES COVERED (FROM - TO) xx-xx-2002 to xx-xx-2003

4. TITLE AND SUBTITLE Objective Force Representation Unclassified	5a. CONTRACT NUMBER 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) Engelmann, Karsten ; Author	5d. PROJECT NUMBER 5e. TASK NUMBER 5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army War College Carlisle Barracks Carlisle, PA17013-5050	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME AND ADDRESS ,	10. SPONSOR/MONITOR'S ACRONYM(S) 11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
APUBLIC RELEASE
,

13. SUPPLEMENTARY NOTES

14. ABSTRACT
See attached file.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19. NAME OF RESPONSIBLE PERSON
			Same as Report (SAR)	38	Rife, Dave RifeD@awc.carlisle.army.mil
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER International Area Code Area Code Telephone Number DSN

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39.18

ABSTRACT

AUTHOR: Karsten G. Engelmann, Ph.D.

TITLE Objective Force Representation

FORMAT: Strategy Research Project

DATE: 7 April 2003 PAGES: 38 CLASSIFICATION: Unclassified

Wargaming—or gaming—is an integral part of the development of ideas. Kings of Prussia, major combatants during the World Wars, and the U.S. Army during the current transformation of the military have used gaming to help elucidate, illuminate, and educate. Homes, schools, businesses, and governmental offices conduct gaming because it is a shorthand form of communication. Like a map, a game enables a significant transfer of information for little cost and enables a user to gain a good understanding of the place or event represented. This Strategy Research Project (SRP) provides the designer notes supporting a new board game system called *Objective Force Commander* (*OFC*), which represents the Army's Objective Force in the strategic and operational environment.

Gaming is one of the most effective ways to teach groups of people about new concepts or ideas, because it allows participants to discover for themselves, at their own pace, the advantages and disadvantages of ideas. Gaming also places individuals in a position or role that they might never face in life, such as a wartime combatant commander. The importance of the Objective Force to the Army leadership and future security of the United States makes training U.S. military and civilians and ally forces about its implementation and effectiveness critical. As the ideas are developed, and a new generation of leaders grown, now is the time to create a board game on the Objective Force and incorporate it into training.

The SRP discusses the benefits and limitations to the representation of the Objective Force as part of modern (future) warfare using a board. While all models are representations of the real thing, the design philosophy presented here is simplicity. Additionally, the system presented represents a revolutionary way to examine conflict. Initial development of the first scenario is already underway. The recommendation is that the U.S. Army continues development of the *OFC* system with the eventual goal of producing a version to be distributed to officers and units within all the services.

TABLE OF CONTENTS

ABSTRACT iii

ACKNOWLEDGEMENTS vii

LIST OF ILLUSTRATIONS ix

OBJECTIVE FORCE REPRESENTATION 1

- **THE OBJECTIVE FORCE COMMANDER SYSTEM** 2
- **REALISM VERSUS PLAYABILITY** 4
- **LEVEL OF RESOLUTION** 5
- **REPRESENTATION OF OPERATIONAL CONCEPTS** 6
  - PRECISION ENGAGEMENT 7
  - FULL DIMENSION PROTECTION 7
  - DOMINANT MANEUVER 8
  - FOCUSED LOGISTICS 9
  - INFORMATION DOMINANCE 10
- **REPRESENTATION OF THE OPERATIONAL ENVIRONMENT** 12
  - THREAT 12
  - POLITICAL 12
  - UNIFIED ACTION 13
  - LAND COMBAT OPERATIONS 13
  - INFORMATION 14
  - TECHNOLOGY 15
- **REPRESENTATION OF NUMEROUS SCENARIOS** 15
- **REPRESENTATION OF MULTIPLE TYPES OF WARFARE** 16
- **CENTER(S) OF GRAVITY AND VALUES—ACHIEVING VICTORY** 17
- **CONCLUSION AND RECOMMENDATION** 18

ENDNOTES 21

GLOSSARY 25

BIBLIOGRAPHY 27

ACKNOWLEDGMENTS

This paper is dedicated to the 34th Chief of Staff of the U.S. Army,
General Eric K. Shinsheki for his tireless efforts to transform the U.S. Army.

The author would like to acknowledge the boundless support
of his wife Kaarin Engelmann

LIST OF ILLUSTRATIONS

FIGURE 1. STRATEGY CARD EXAMPLES 4
FIGURE 2. TERRAIN EXAMPLES 6

OBJECTIVE FORCE REPRESENTATION

There is little doubt about popularity of wargaming. During a single week, more than 400,000 people downloaded the special Recon version of the computer simulation America's Army.[1] Homes, schools, businesses, and governmental offices conduct gaming because, besides being popular, wargaming—or gaming—is an integral part of the development of ideas. Kings of Prussia, major combatants during the World Wars, and the U.S. Army during the current transformation of the military, have used gaming to elucidate, illuminate, and educate. Games—or simulations—take various forms, including human (e.g., Maneuvers); computer (e.g., the Joint Integrated Contingency Model, JICM); internet (e.g., the EverQuest game); and table-top (e.g., The Napoleonic Wars).

Gaming is useful because it is a shorthand form of communication.[2] Like a map, a game enables a significant transfer of information for little cost and enables a user to gain a good understanding of the place or event represented. This Strategy Research Project (SRP) provides the designer notes supporting a new board game system to be called *Objective Force Commander* (*OFC*) that represents the Army's Objective Force in the strategic and operational environment.

The SRP describes the *OFC* system at a macro-level, the way the operational concepts of the Objective Force are represented, and the way the Operational Environment facing the Objective Force is represented. It also discusses the way the *OFC* system meets the following goals:

1. Emphasizes playability over realism to ensure that players use the game and understand the concepts;
2. Represents the four major operational concepts described in *Joint Vision 2020:* dominant maneuver, precision engagement, full dimension protection, and focused logistics;
3. Enables players to understand the application of—and gain an appreciation for—each of these operational concepts;[3]
4. Represents the six dimensions of the operational environment where the Objective Force will function: threat, political, unified action, land combat operations, information, and technology;[4]
5. Simulates an appropriate level of resolution;
6. Represents numerous scenarios in any campaign in any theater;

7. Represents not only attrition-type warfare (precision strike, indirect fire, and direct fire), but also warfare aimed simply at destroying unit cohesion and effectiveness (multiple types of warfare) and asymmetrical warfare (including weapons of mass destruction); and
8. Represents the effects of American, allied, and enemy values (centers of gravity) on a campaign.

The SRP concludes with recommendations for using board gaming to assist with implementation of the Objective Force.

THE OBJECTIVE FORCE COMMANDER SYSTEM

OFC will represent warfare in a manner it has rarely (if ever) been done before. Military analyst Mark Herman argues that "virtually all current models, simulations, and wargames (board-games) are fundamentally attrition based. Analytically, they often provide quantitative results that support one recommendation over another."[5] As a result, most wargames use command, control, communications, computers intelligence surveillance and reconnaissance (C4ISR) as a factor that increases or decreases attrition.[6] The problem with the traditional approach to modeling is that a sole focus on attrition is incompatible with the vision the U.S. Army has regarding the Objective Force.

The U.S. Army is planning to employ the Unit of Action (the Objective Force's brigade equivalent), which means that more than traditional attrition and destruction, models and gaming representing the Objective Force will need to represent dislocating and disintegrating enemy forces.[7] Herman's (1998) arguments support such a plan. He claims that a state can direct warfare against the cohesion of units or states rather than their components and asserts that preventing an armored unit from maintaining its situational awareness can destroy its effectiveness just as certainly as the elimination of its systems using firepower.[8]

Based on the evidence that solely representing attrition-based combat is inadequate for modeling the Objective Force, *OFC* examines aspects of cohesion and effectiveness of units. The game design rewards superior information by, among other things, allowing a friendly force to detect enemy forces, thus denying the enemy force the defensive benefits of terrain. Furthermore, disruption of command and control renders a unit unable to effectively engage in combat operations.

In recent years, boardgame designers have begun using cards to represent diplomatic, economic, and informational power and events. Cards are particularly useful for representing the strategic aspects of a scenario.[9] The strategy card system allows designer to represent the limitations of forces and the various constraints a commander must face. For example, in a hypothetical Caspian Sea scenario, cards could be used to represent the influence of nations not directly involved in the fight. An objective of the scenario might entail the swaying of neutral powers through diplomatic means. The application of extraordinary diplomatic effort would come as a cost, perhaps a limitation on the operational effectiveness of a force. Cards easily represent this situation by imposing constraints on a player.

In order to provide the flexibility desired, *OFC* will present players with a wide range of possible game choices while illustrating the key factors of the Objective Force in a conflict. *OFC* will represent the importance of aspects of future conflict, such as Information Operations and Focused Logistics, while minimizing the complexity of the system. As represented by Figure 1, the central aspect of the game lies in the Strategy Cards. Players will use the cards to conduct operations, refit and re-organize forces, or conduct critical events, such as determine the enemy's center of gravity (COG). The system is, in many ways, similar to proven game designs, but it expands on previous concepts with a revolutionary representation of modern warfare.

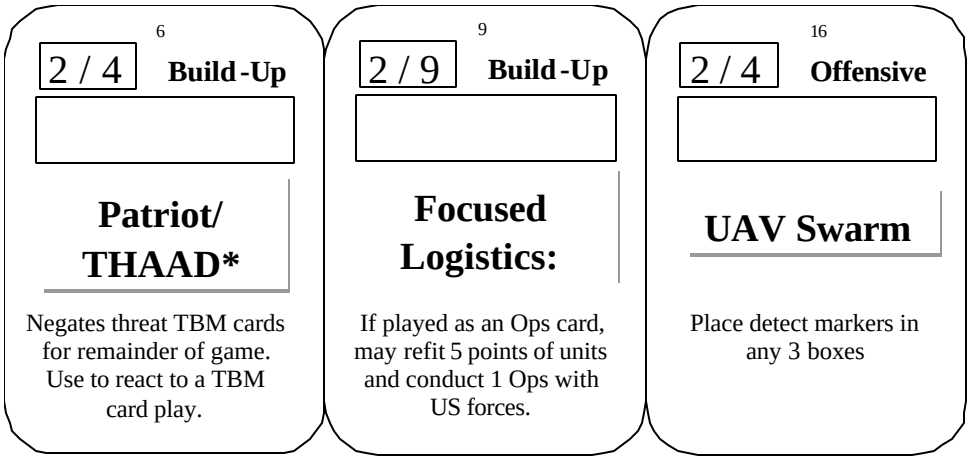

FIGURE 1. STRATEGY CARD EXAMPLES. Players refer to the numbers in the box to know the number of formations that they may activate or the number of refit/re-supply points that they may expend. Additionally, players may choose to either play the event or execute the operation listed on a strategy card.

Another advantage of strategy cards is the ability to represent the distinctions between various phases of a campaign. Selection by the player of initial strategy cards mirrors the flexible deterrence options that commanders decide between. Different phases of the campaign are represented by several sets of strategy cards. For example, the U.S. player will make the decision when to transition from the build-up phase to the offensive phase. The strategy cards associated with each phase are different, and represent the types of activities generally conducted.

REALISM VERSUS PLAYABILITY

"Everything should be made as simple as possible—but not simpler."[10] This quote, often attributed to Albert Einstein, is particularly apt when applied to game design. Games are simplified representations of the entity they imitate or simulate.[11] Games with a high degree of realism are, by definition, more complex. Although they may more accurately represent reality, their complexity often distracts from effective implementation, because players cannot easily understand the elements represented and have difficulty learning rules and interpreting results. In addition, such games require an inordinate amount of time for resolution. Games with a high degree of playability are simpler than realistic games, quicker to play, and rules and results are typically more intuitive. Soldiers and civilians are more likely to understand, use, and benefit from playable games.[12]

For the reasons described, the *OFC* system will emphasize playability over realism. The key, as stated in *Military Modeling for the Decision Maker,* will be allowing the *OFC* system to capture only "essential processes" and use only "essential parameters".[13] To accomplish this goal, the design relies on some simplifying assumptions, as described below.

First, the *OFC* system will represent units using three classes: future combat system (FCS)-equipped, legacy-equipped, and irregular. In addition, all FCS-equipped units in the initial game will be identical. Although no two FCS-equipped units are likely to be identical for some protracted period of time,[14] within the *OFC* system, the benefit of portraying each unique unit does not outweigh the complications to logistics, command and control, and operational employment that would result.

Second, instead of showing every contour on the battlefield, *OFC* will represent terrain using a network-based system that defines the predominant terrain in critical

locations and the terrain between these locations. Results from network-based models, such as the Joint Integrated Contingency Model, and from historical games, such as Berlin to Barbarossa or the Napoleonic Wars, demonstrate that this type of system will be adequate. The *OFC* system uses boxes to represents critical locations, such as major urban areas and ports of debarkation.

Third, rather than track the numerous types of ammunition and various fuels units consume, *OFC* will determine whether or not a unit has enough supply to engage in operations. Those units that have inadequate supply will have reduced capabilities on the defense and will be unable to assume offensive operations. *OFC* will also calculate whether or not units' precision munitions have become depleted. The system will use the term "refit points" for re-supplying both fuel and precision munitions. The system will evaluate each unit to determine the number of refit points (RP) necessary to return it to fighting condition.

Fourth, only a few critical aspects of a unit's status will be tracked. Players place information markers on units to keep track of unit status. Markers indicate when units are "pinned" (unable to move, unless they successfully pass a test, such as rolling a die), "depleted" (unable to conduct precision fire), or "detected" (outmaneuvered, observed, and deprived concealment or terrain protection).

LEVEL OF RESOLUTION

Objective Force Commander represents forces at the Unit of Action (UA) level, which is roughly equivalent to a brigade or an armored cavalry regiment of industrial age (20th century) armies. Multiple Units of Action will make up a Unit of Employment (UE), which will control the UAs. UEs are the equivalent of division-level and corps-level entities.[15] As explained in FM 100-15, Corps Operations, corps are the instrument by which higher echelons of command conduct operations at the operational level, the level that *OFC* represents.[16]

OFC represents terrain and geography at the appropriate resolution level for a campaign using the strategic canalization attributed to a box-based terrain system. As shown in Figure 2, each box contains three values, representing the terrain's ability to provide concealment and protection; which affect information superiority and precision strike; and its limitations on the capabilities of units to maneuver, which affects dominant maneuver.

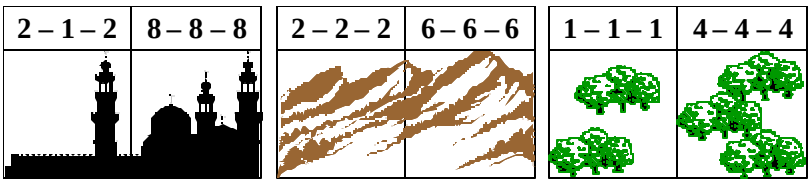

FIGURE 2. TERRAIN EXAMPLES. Terrain boxes on the *OFC* map contain a graphic to represent the type of terrain. The boxes are split in half, with the portion on the right designating conditions for the defender and the portion on the left designating conditions for the attacker. The three numbers in each part of a box are values that represent the terrain's concealment, protection, and maneuverability.

The concealment value represents the likelihood that the terrain will mask a force from visual and electronic detection. For example, a lightly wooded area would provide minimal concealment, mountains would provide medium concealment, and an urban area would provide maximum concealment. The protection value represents the increase in survivability that a terrain type provides for a force. For example, a lightly wooded area would provide no protection, mountains would provide moderate protection, and an urban area would provide maximum protection. Maneuverability represents the impediment to a formation's ability to conduct battlefield maneuvers against an opponent in the terrain. For example, a lightly wooded area would have high maneuverability and mountains would have low maneuverability.

Because concealment, protection, and maneuver may affect defenders and attackers differently, *OFC* splits terrain boxes in half—the portion on the right, with higher values, shows terrain values for the defender and the one of the left shows the values for the attacker.

REPRESENTATION OF OPERATIONAL CONCEPTS

As mentioned earlier, one of the major design objectives of *OFC* is to represent the four major operational concepts described in Joint Vision 2020: dominant maneuver, precision engagement, full dimension protection, and focused logistics. Proper representation is important because these four new concepts will enable the "creation of a force that is dominant across the full spectrum of military operations – persuasive in peace, decisive in war, preeminent in any form of conflict.[17] Initially, *OFC* focuses on offensive and defensive operations.

PRECISION ENGAGEMENT

According to *Joint Vision 2020*, precision engagement is the linking of sensors, delivery systems, and effects.[18] Precision engagement, thus, goes beyond the concept of precision strike, or the exact use of munitions. Rather, precision engagement is a philosophy of isolating and neutralizing critical elements of the enemy force on the battlefield. Within *OFC,* precision engagement will use a variety of means, including very accurate aerial deliveries or air drops and discriminate weapon strikes, and will consist of an all-weather stand-off capability.[19] *OFC* incorporates this capability because the Joint Chiefs of Staff argue that long-range precision capability, combined with a wide range of delivery systems, will be a key factor in future warfare.[20]

OFC will represent precision strike differently than indirect fire using target selection on the battlefield. In traditional boardgaming, a defending force defended as a single entity. Thus, multiple units in an area provide mutual defense. In *OFC*, a force that is capable of precision strike can attempt to single out and target an individual unit using command, control, communications, and intelligence capabilities. Thus, heavy armor forces could not protect a headquarters unit from a targeted precision engagement.

OFC will also represent the limited availability of precision munitions because the need to rearm is a particularly important issue for the Army, as its systems cannot return to friendly controlled and well-stocked bases after every engagement. Another reason ammunition supply is an important issue for the Army is that the cancellation of the Crusader program reduced the Army's beyond-line-of-sight (BLOS) capability. To compensate, the Army will likely employ a container/launcher unit called Netfires. Netfires is a container/launcher unit carrying either loitering attack missiles (LAM) or a precision attack missile (PAM). Netfires boxes could be deployed across the battlefield in order to provide on-call fire support for the Objective Force units. The LAM will be equipped with advanced sensors that will enable it to operate in both the attack and ISR modes.[21] One potential drawback to this system is limited munitions. Thus, *OFC* will represent potential shortages by designating "depleted" units that run out of ammunition.

FULL-DIMENSION PROTECTION

The Joint Chiefs of Staff have expressed an interest in developing the philosophy of full dimension protection. According to their office, full-dimension protection requires that U.S. forces control the battle-space to ensure they maintain freedom of action

during deployment, maneuver and engagement, while providing multi-layered defenses at all levels.[22] The importance of full-dimension protection means that forces equipped with the Future Combat System (FCS) will need to maintain freedom of action when they become involved in a close fight or they will be put at a distinct disadvantage. It also means that survivability is a critical objective for each individual on the battlefield and each FCS-equipped unit.

The Army maintains that "survivability combines technology and methods that afford the maximum protection to Army forces. Lethality enhances survivability: lethal forces destroy enemies before they strike and can retaliate if necessary."[23] Thus, the FCS-equipped forces must engage and destroy the enemy before they, themselves, are destroyed. One of the ways to enhance survivability is with information superiority. *Objective Force Commander* will enable units with information superiority to strike first or avoid a combat altogether. Thus, information superiority will be the basis of full dimension protection and will provide multidimensional awareness and assessment, and identify all forces in the battle-space.[24]

Besides information superiority, full dimension protection will need to include elements of active and passive defense. The Joint Chiefs describe active defense as "battle-space control operations to guarantee the air, sea, space and information superiority that is needed to gain the degree of control to accomplish the assigned tasks."[25] *OFC* will represent many of these active defense measures via strategy cards. For example, the U.S. player can play a strategy card that represents Patriot/THAAD anti-missile systems. *OFC* will also represent passive defense measures via strategy cards, because passive measure, such as enhanced deception, increased individual and collective protection, and a joint restoration capability against the effects of WMD, are key elements for achieving full dimension protection.[26]

DOMINANT MANEUVER

To achieve dominant maneuver, forces must deploy from debarkation ports directly into combat.[27] *OFC* uses strategy cards to model this capability. Since the main advantages of the FCS and Objective Force are speed and ease of deployment, *OFC* will allow Objective Force units to enter the game faster than legacy systems. Although faster arrival and flexibility of arrival do not ensure victory, they enable a force to execute dominant maneuver via synchronized operations from dispersed locations,[28] meeting one of the primary objectives of *Joint Vision 2020*.

The Joint Chiefs claim that "the organizational concept of dominant maneuver is a prescription for more agile, faster-moving joint operations, which will combine air, land, and maritime forces more effectively to deliver decisive combat power."[29] To game this concept properly, *OFC* players will have to learn to manage strategy cards. Cards will enable players either to bring in new forces or to conduct intensive operations. Also, players will need to decide when to end the build-up phase of the campaign and transition to offensive operations. Since *OFC* divides the strategy card deck into two parts, the U.S. player determines when the build-up phase is over and when the offensive phase begins.

For the land component, dominant maneuver requires an army to rapidly deploy the force directly to combat.[30] Thus, to achieve victory, an army must execute the transition from build-up to offensive at the proper time. Untrained and inexperienced players often fail to properly execute dominant maneuver; however, this gaming system enables players to gain an appreciation of and learn insights about true dominant maneuver and what it can do for a commander.

An example of lessons covering dominant maneuver came from the Army Transformation Wargame (April 2002). This game revealed the importance of acquiring special lift assets, such as an advanced quad tilt-rotor transport, and similar systems to take the place of the C-130.[31] *OFC* enables players to gain their own insights into the advantages of different lift systems and the relative dominant maneuver capability of the FCS-equipped units versus the legacy force units.

The Joint Chiefs of Staff emphasize that "dominant maneuver allows us to apply decisive force to attack enemy centers of gravity at all levels and compels and adversary to either react from a position of disadvantage or quit."[32] Achieving the Joint Vision of dominant maneuver requires the U.S. force to "outmaneuver" the enemy and remove the advantage defensive terrain might have provided to the opponent in direct fire combat. Thus, when *OFC* players pin a unit, the adversary will be compelled to either react from a position of disadvantage or quit.

FOCUSED LOGISTICS

Joint Vision 2020 describes focused logistics as "the ability to provide the joint force the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity, across the full range of military operations."[33] *OFC* represents the impact of focused logistics using two different systems. First, *OFC* will portray

focused logistics using the availability and delivery of munitions, especially precision munitions on the battlefield. Second, *OFC* represents the ability to deliver tailored logistics packages to units in the field, with some units—such as FCS-equipped units—requiring far less logistical support than legacy systems.

Precision attacks are critical on the modern battlefield, because they reduce the need for logistics. Durham (2002) claims that each smart bomb delivered on U.S. enemies is more effective than 400 dumb bombs dropped in the past.[34] Still, precision munitions (smart bombs) are likely to be in short supply on the battlefield. Thus, *OFC* units become depleted if a player relies too heavily on precision munitions. A depleted unit can only recover when it breaks operations and the player uses a strategy card as a refit card.

The strategy card system also affects focused logistics. By judicious play of strategy cards to refit organizations, the *OFC* player's forces will be able to recover faster after an engagement than the opponent's forces. *OFC* uses this system because, in warfare, commanders must tailor force packages to provide sufficient CSS while exercising every solution to reduce the CSS footprint.[35]

INFORMATION DOMINANCE

Information technology improves military commanders' ability to see, prioritize, assign, and assess information.[36] Additionally, it gives commanders enhanced awareness of their areas of responsibility, whether their objective is to close with and engage an adversary or to render assistance in a humanitarian operation.[37] U.S. forces can successfully execute the four operational concepts described in *Joint Vision 2020* when they also achieve information superiority to the point of complete information dominance.

Since information dominance is so vital, commanders must focus on non-attrition factors, such as a force's ability to attack the technical aspects of an enemy force, including logistics, command and control, and information surveillance and reconnaissance.[38] They must also control the enemy's knowledge of friendly forces. To do this—and provide increased accuracy and a wider range of delivery options, commanders can use global positioning systems, high-energy research, electromagnetic technology, and enhanced stand-off capabilities.[39]

The Objective Force will rely upon information superiority to compensate for its lack of heavy armor protection. The U.S. Army is betting that information superiority and

the ability to move comfortably within an enemy's reaction capability will allow light forces to substitute maneuver agility for the protective qualities of armor.[40] However, if information superiority fails, the Objective Force will become vulnerable and unable to stand-up to traditional industrial age forces. To represent this need for information superiority, *OFC* will make it easy for FCS-equipped units to fire on the move, but make these units vulnerable when engaged in a battle for a protracted period of time. In the game, as in real life, the Objective Force must win decisively first contact battles or be left at a disadvantage. The mantra is maneuver and fire; combat in place puts the Objective Force at a severe disadvantage.

OFC integrates information warfare into the concealment, detection, and operational aspects of the game. Information warfare includes both traditional attrition attack methods, such as a precision attack to destroy an adversary's command and control capability, and nontraditional attack methods, such as electronic intrusion into an information and control network to convince, confuse, or deceive enemy military decision makers.[41] Within *OFC*, when a player makes a successful information warfare attack, he or she will reduce the number of actions the opponent can execute.

Strategy card play represents both operational and strategic aspects. *OFC* uses strategy card hand size to represent the number of all-source intelligence assets a player can make and a player's ability to fuse this intelligence. This concept is supported by *Joint Vision 2010,* which argues that "the fusion of all-source intelligence with the fluid integration of sensors, platforms, command organizations, and logistic support centers will allow a greater number of operational tasks to be accomplished faster."[42]

Objective Force Commander represents modern warfare's continuous operations using impulses. On each impulse, players draw a card, play a card, and execute operations. Players subject to information warfare attacks either skip the card draw (i.e., default to standard operations) or hold one less card (i.e., have fewer options for actions). These limitations represent true information superiority: "The capability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same."[43]

Dominant battlespace awareness is an interactive picture which will yield much more accurate assessments of friend and enemy operations within the area of interest.[44] Battlespace awareness, an important aspect of information dominance, is difficult to represent properly in a boardgame because it occurs naturally as both sides have significantly more knowledge of the battlespace than their real world counterparts would

have. Such artificial awareness can be limited by conducting games in a double blind manner, with a referee to adjudicate decisions and outcomes of combat. However, such methodology severely limits the utility of a game. Thus, the underlying assumption for *OFC* is that both sides will be able to "see" large formations on the battlefield.

REPRESENTATION OF THE OPERATIONAL ENVIRONMENT

A second major objective of *OFC* is to represent the six dimensions of the operational environment where the Objective Force will function: threat, political, unified action, land combat operations, information, and technology.

THREAT

For any game to accurately portray the Objective Force and its capabilities, it must properly represent the enemy forces. *OFC* assumes that adversaries seek to shape conditions to their advantage.[45] Thus, the Threat (non-U.S.) player has a set of strategy cards that represents the events he or she is attempting to achieve. Depending on the scenario represented, *OFC* allows threat forces to have elements representing information technology forces, industrial age, and pre-industrial age forces. For example, the threat may employ UAVs (technology age), ballistic missiles (industrial age), and guerilla bands (pre-industrial age). Such a varied threat is necessary, because as Czege (2002) points out, "even relatively primitive military forces have added new technological arrows to their quivers, as Russia's experience in Afghanistan and Chechnya and our own experiences in Somalia and Kosovo attest."[46]

Adversaries operate against U.S. forces using various means, including advanced technology systems that create surprise and limited duration overmatch in specific areas.[47] Thus, *OFC* allows the Threat player and his forces to overmatch the Objective Force in specific areas that, if leveraged correctly (and the Objective Force makes mistakes), will result in a Threat victory.

POLITICAL

OFC's card-play system is ideal for representing the political aspect of the operational environment. Strategy cards enable players to conduct diplomatic initiatives, such as obtaining basing rights, political support, or over-flight privileges; or convincing allies to contribute forces. Finally, the system gives both sides the ability to influence the

will of the enemy population/government concerning termination and ultimate victory in the game.

UNIFIED ACTION

FM 3-0 describes unified action as the wide scope of actions taking place within unified commands, subordinate commands, or joint task forces under the overall direction of the commanders of those commands.[48] *Objective Force Commander* represents assets from all of the services and multiple command levels using both strategy cards and counters on the map. When players use strategy cards as operations, they will be able to combine Air Force assets and Army assets into a joint operation.

OFC also represents elements and functional capabilities, including providing situational awareness and an understanding of the entire battlefield Objective Force's survivability and lethality.[49] Rather than reacting to obstacles they encounter, units are able to ignore obstacles and have increased maneuver ability. *OFC* players will have a common operational picture (COP) and access to other aspects of unified action because they can see the entire board at once. *OFC*'s victory conditions require unified action to encourage players to synchronize activities between the services and with other governmental organizations.

LAND COMBAT OPERATIONS

Traditional attrition is not the only way to achieve an opponent's destruction, disorganization, and disintegration.[50] Regardless, a force must almost always resort to attrition in the end. As Greer (2002) points out, even with high technology and the promise of information operations, war remains a nasty, brutal business that kills people and destroys things.[51]

Land combat operations are a major component of the *OFC* boardgame. To cover the spectrum of available possibilities, *OFC* represents three classes of engagement: direct fire, indirect fire, and precision strike—weapon systems used to damage/destroy critical assets. By separating out precision strike from other types of combat, *OFC* demonstrates the emphasis the Objective Force and modern combat place on precision strike. This separation also allows *OFC* is to properly represent all

military organizations, from armored divisions to guerilla bands, and enables the game to model their actions in ways that are not possible using Newtonian logic.[52]

As a standard, all units have a direct fire capability. This capability represents all direct fire weapons from small-arms to the main gun on an armored fighting vehicle. Additionally, *OFC* integrates the ability of direct fire units to conduct fires on the move and negate (or use) defensive terrain.

Indirect fire, such as gravity bombs and artillery, traditionally provides lethal and non-lethal close support fires to maneuver forces, counter fire, and interdiction fires.[53] It also represents the Objective Force beyond the line of sight (BLOS) capability. While the Chief of Field Artillery, Major General Michael D. Maples (2002) has discussed the importance of three classes of fires—destructive, protective/suppressive, special purpose—*OFC* primarily considers the effect of destructive fires.[54] In *OFC*, indirect fire focuses on an area, as opposed to an individual unit. Although artillery units (and the BLOS capability of the Objective Force) are typically destructive in nature, *OFC* also allows them to act as protective/suppressive fire.

Application of precision fires is one of the great advancements for the Objective Force. It allows a force to achieve desired objectives faster and with far fewer friendly, civilian, or enemy casualties.[55] Another advantage of precision fires is that successful strikes against vital functions or personnel, such as senior non-commissioned officers and elements of command, prevent enemy forces from reorganizing.[56]. In *OFC,* players perform precision fires during the precision strike combat phase. The game identifies each unit's precision-strike capabilities. Units with precision strike capability will be able to single out enemy formations—frequently the headquarters units responsible for command and control of a force—and disrupt/destroy them, which will degrade the force as a whole.

INFORMATION

Information has always been critical to commanders. According to FM 3-0 (2001), the U.S. Army believes that information will be the dominant factor on the battlefield in the future. Further, commanders need effective command and control, as well as adequate equipment and intelligence, to visualize operations, which is critical to success.[57] *OFC* represents information in several ways, including the aforementioned strategy cards. To represent operational and tactical level information, *OFC* uses values on the units. These values affect the ability to detect enemy forces or avoid detection.

In *OFC*, the number of strategy cards a player currently possesses represents the amount of information and C4ISR he or she has. Players with degraded networks, have less information, which affects their performance, causing perhaps a loss of cohesion and a corollary rise in entropy that renders their forces incapacitated.[58] *OFC* represents reduced performance by depriving affected players of opportunities to gain information (i.e., draw cards) and use information (i.e., play cards) during a given impulse. The methodology is equivalent to allowing one side to conduct multiple actions before the other can react.

Within *OFC*, information dominance and C4ISR affect the indirect fire and precision strike capability of a unit. A unit that attempts to engage in precision strike or indirect fire can use its C4ISR to deny the target unit the concealment value of its defending terrain. Superior headquarters, as well as strategy cards, can detect enemy units. Units lose knowledge of enemy forces (i.e., the opposition will re-conceal) after a given number of impulses. This loss of information represents the entropy effect of information.[59]

TECHNOLOGY

Perhaps no aspect of the operational environment is more dynamic than technology. The combination of smart, long-range ballistic and cruise missiles dramatically increases the reach and tempo of military operations, and eventually will demonstrate the capability of a force to attack mobile targets with an effectiveness approaching that of manned aircraft.[60] Additionally, UAVs, as well as other technological advances, will figure prominently in future warfare. Technology—more than influencing the concept of warfare—will change warfare. Within *OFC*, strategy cards represent the changes in the operational environment caused by advancements in information and technology.

REPRESENTATION OF NUMEROUS SCENARIOS

Players can use *OFC* for various scenarios in different campaigns located in any part of the world. A campaign, as defined here, is a “series of related and integrated major operations with complimentary actions at all levels of war (strategic, operational, and tactical) simultaneously and/or sequentially arranged to accomplish one or more national strategic, theater strategic, and operational objectives within a given time and

space."[61] Players may execute the objectives simultaneously, sequentially, or both.[62] Recent Army wargames/operations have represented several scenarios, including a coalition engaged against the New Islamic Republic (NIR) over access to Tigris-Euphrates water rights and motivated by the desire for regional hegemony[63] and an exercise set in Indonesia intended to deliver humanitarian and counter-insurgency support in Sumatra. [64]

Whether a campaign has military objectives or humanitarian objectives, the Army is always engaged in one or more offensive, defensive, stability, or support operations.[65] The *OFC* system focuses on offensive and defensive operations that are part of campaigns and major operations conducted and sustained to accomplish strategic objectives within theaters or areas of operations (AOs).[66] *OFC* will leverage the Army Transformation Wargame of 2001 for its first scenario (campaign), which will consist of both offensive and defensive operations.

REPRESENTATION OF MULTIPLE TYPES OF WARFARE

Herman (1998) argues that entropy can be used to describe disorder imposed on a military system at any given moment, and that this metric is the steady degradation of a system. Thus, entropy is an effective unit to measure enemy disorganization and ineffectiveness.[67] Based on this concept, units in *Objective Force Commander* exist in one of four states that describe, in a general way, a unit's level of disorder: Units will begin as "fresh"; as battles occur, units will degrade to "spent"; continued degradation sends a unit into one of two levels of disruption.

These four states allow *OFC* to represent what Herman calls loss of cohesion. "As a unit loses cohesion, its entropy level increases until, at maximum entropy, it becomes a mob of individuals incapable of coordinating combat potential."[68] Within *OFC*, players remove from that game any units that reach a second level of disruption or have degraded systems or damaged equipment. This methodology allows *OFC* to appropriately represent an entropy-based warfare paradigm: As enemy elements lose their cohesion, they are struck with overwhelming force to effect final dispersal and surrender. [69]

The U.S. player will need to balance the rapid arrival of forces with operations. Additionally, the U.S. player may be faced with the requirement to conduct opposed-entry operations such as an amphibious operation, or an air assault operation. American

doctrine calls for, whenever possible, U.S. forces to seek unopposed entry, which may be either assisted or unassisted (assisted entry requires the cooperation of the host nation).[70] An important type of warfare that *OFC* represents is the early introduction of credible, lethal forces into the theater.[71]

Another type of warfare that *OFC* represents is asymmetrical warfare. According to the Army, "asymmetry concerns dissimilarities in organization, equipment, doctrine, capabilities, and values between other armed forces (formally organized or not) and U.S. forces."[72] Because of U.S. deployable military strength, future opponents will likely rely upon asymmetrical attacks and anti-access operations "including information technology, ballistic and cruise missile capabilities, WMD, and genetic engineering."[73] *OFC* models many of these advances, especially in the arena of ballistic missiles and UAVs.

Although the Army does not define ballistic missiles, cruise missiles, and armed UAVs as precision munitions, in *OFC*, they will attack during the precision strike phase. *OFC* represents ballistic missiles and long-range Army ATACMS using strategy cards that engage enemy forces at long range. The weapons will have different levels of accuracy. *OFC* considers ballistic missiles to be indirect area fire weapons and ATACMS to be precision strike weapons. The effects of UAVs will be represented using both strategy cards and as capabilities within units. Units containing organic UAVs, such as Objective Force brigades, will have a superior C4I capability and the ability to detect enemy formations. Thus, UAVs allow players to more easily detect enemy formations that are positioned in terrain that would otherwise provide adequate concealment.

OFC models attacks by weapons of mass destruction—including nuclear, biological, chemical, and radiological weapons—as a single type of attack. WMD attacks will affect all units in a single area, or box, on a particular turn. *OFC* allows players to coordinate WMD and other asymmetrical attacks, thus increasing risk to U.S. forces.[74]

CENTER(S) OF GRAVITY AND VALUES—ACHIEVING VICTORY

To achieve victory, a military force must identify and evaluate the centers of gravity (COG) affecting the conflict.[75] This is not an easy process. According to Greer (2002), "centers of gravity, lines of operation, and decisive points are difficult to discern in a complex mix of political, economic, and military peacekeeping efforts in the Balkans, or when attacking a worldwide terrorist organization such as al-Qaeda."[76]

Centers of gravity at the strategic level are based on a nation's values. For example, the Japanese abandonment of militarism and the American acceptance of the Emperor of Japan as sacred ended the Second World War in the Pacific. In any conflict, if an opponent refuses to either accept the values of the victor or adjust its own values, it can be annihilated. For example, in the conflict between the Romans and the Carthaginians, Rome destroyed Carthage because the Carthaginians would not cease being a seafaring people and move 10 miles inland.[77] With such concepts in mind, a nation can only develop an effective strategy by assessing of the values of all participants in a conflict and the way these values change over time.[78]

The Joint Chiefs of Staff have identified several U.S. centers of gravity, including protecting the lives and safety of Americans both at home and abroad; maintaining the political freedom and national independence of the United States with its values, institutions, and territory intact; and providing for the well-being and prosperity of the nation and its people.[79] Clearly, these statements are ambiguous, and this ambiguity is an important part of any conflict.

OFC reproduces this ambiguity by establishing a set of victory conditions that are not known to either side in the beginning. As Army field Manual 3-0, Operations (2001) explains, "strategic and operational commanders decide strategic aims, force requirements, force allocation, which organizations to mobilize and deploy, and when to do so. Seldom are these decisions clear out the outset."[80] Over the course of the conflict, players use information warfare (i.e., draw cards) to learn more about their own and their opponent's values.

CONCLUSION AND RECOMMENDATION

Gaming is one of the most effective ways to teach groups of people about new concepts or ideas, because it allows participants to discover for themselves, at their own pace, the advantages and disadvantages of different ideas. Gaming also allows individuals to be placed in positions and roles that they might not otherwise face, such as the role of a wartime combatant commander. Thus, gaming can be applied to teaching U.S. military and civilians and ally forces about the importance and implementation of the Objective Force. As U.S. military leadership is currently developing new ideas about the Objective Force, and developing a new generation of

leaders, now is the time to incorporate a board game on the Objective Force into training.

OFC's design philosophy is simplicity, but it also uses revolutionary methods to examine conflict. *OFC* represents information at the strategic, operational, and tactical levels and uses strategy cards to allow players to develop their game play. The system offers additional benefits, such as emphasizing elements of information warfare, including requiring players to progressively gain knowledge about centers of gravity.

Of course, the proposed *Objective Force Commander* system has some limitations in its ability to represent modern (future) warfare, because all models are simply representations of the real thing. *OFC's* greatest limitation may be it inability to prevent players from having more battlespace awareness than would be expected on the battlefield. It could give players a false impression about the amount of information available to a commander on the battlefield.

This paper has presented the possible utility of the *OFC* system. While initial development of the first scenario is complete, the *Objective Force Commander* system will undergo many changes as the development process matures.[81] This evolutionary development process will teach the U.S. army much about both the *OFC* system and the Objective Force, itself. Thus, the author's recommendation is that the U.S. Army continues developing the *OFC* system, with the eventual goal of creating a version to be distributed to officers and units within all the services.

WORD COUNT: 6,541

ENDNOTES

[1] Trey Walker, *America's Army Tops 400,000* [Internet] (PC Games, 2002, accessed July 10, 2002 2002); available from http://gamespot.com/gamespot/stories/news/0,10870,2873986,00.html.

[2] Wayne P. Jr Hughes, ed., *Military Modeling for Decision Making* (Alexandria, VA: Military Operations Research Society, 1997), 1.

[3] Joint Chiefs of Staff, "Joint Vision 2020," (Washington D.C.: US Government Printing Office, 2000), 2.

[4] U.S. Army, *Fm 3-0 Operations* (Washington D.C.: Department of the Army, 2001), 1-8.

[5] Mark Herman, "Entropy-Based Warfare: Modeling the Revolution in Military Affairs," *Joint Force Quarterly*, no. Autumn/winter 1998-99 (1998): 85.

[6] Ibid.

[7] Bill Rittenhouse, "Phone Discussion Regarding Wargaming the Objective Force," ed. Karsten Engelmann (Carlisle, PA: 2002).

[8] Herman: 86.

[9] Karsten Engelmann, "Shattered States," (Vienna, Virginia: EMS, 1990), Mark McLaughlin, "The Napoleonic Wars," (Hanford, California: GMT Games, 2002), Ted Racier, "Barbarossa to Berlin," (Hanford, California: GMT Games, 2002).

[10] Hughes, ed., 25.

[11] Ibid., 1.

[12] Ibid., 3.

[13] Ibid., 25.

[14] Daniel Goure, "Army Must Set Priorities for Objective Force," *National Defense* LXXXVII, no. 586 (2002): 30.

[15] Rittenhouse.

[16] U.S. Army, *Fm 100-15 Corps Operations* (Washington D.C.: Department of the Army, 1989), 1-1.

[17] Joint Chiefs of Staff, 1.

[18] Ibid., 28.

[19] Joint Chiefs of Staff, "Joint Vision 2010," (Washington, D.C.: US Government Printing Office), 21.

[20] Ibid., 11.

[21] Goure: 30.

[22] Joint Chiefs of Staff, "Joint Vision 2010," 22.

[23] Army, *Fm 3-0 Operations*, 3-4.

[24] Joint Chiefs of Staff, "Joint Vision 2010," 23.

[25] Ibid.

[26] Ibid., 23-24.

[27] Robert Townsend, “Dominant Maneuver: Strategic Mobility in the 21st Century” (U.S. Army War College, 1998), 8.

[28] Joint Chiefs of Staff, "Joint Vision 2020," 26.

[29] Joint Chiefs of Staff, "Joint Vision 2010," 21.

[30] Townsend, 1.

[31] Goure: 30.

[32] Joint Chiefs of Staff, "Joint Vision 2010," 20.

[33] Joint Chiefs of Staff, "Joint Vision 2020," 30.

[34] George A. Durham and James E. Cunningham, "Netfires: Precision Effects for the Objective Force," *Field Artillery*, no. March-April 2002 (2002): 5.

[35] Army, *Fm 3-0 Operations*, 3-4.

[36] Joint Chiefs of Staff, "Joint Vision 2010," 13.

[37] Ibid.

[38] Rittenhouse.

[39] Joint Chiefs of Staff, "Joint Vision 2010," 11.

[40] Herman: 89.

[41] Joint Chiefs of Staff, "Joint Vision 2010," 16.

[42] Ibid., 13.

[43] Ibid., 16.

[44] Ibid., 13.

[45] Army, *Fm 3-0 Operations*, 1-9.

[46] Huba Wass de Czege and Zbigniew M. Majchrzak, "Enabling Operational Maneuver from Strategic Distances," *Military Review*, no. May-June 2002 (2002): 16.

[47] Army, *Fm 3-0 Operations*, 1-9.

[48] [Army, 2001 #45@2-1]

[49] Anders B. Aadland and James L. Allen, "Engineer White Paper - into the Objective Force," *Engineer*, no. April 2002 (2002): 5.

[50] James K. Greer, "Operational Art for the Objective Force," *Military Review*, no. September-October 2002 (2002).

[51] Ibid.: 24.

[52] Ibid.: 25.

[53] Robert Beckinger, “The Future of Ground Fire Support Systems” (U.S. Army War College, 2002), 13.

[54] Michael D. Maples, "The Fa and the Objective Force," *Field Artillery*, no. September-October 2002 (2002): 2.

[55] Price T. Bingham, "Air Power Targeting Theory: A Key Element in Transformation," *Military Review* LXXXII, no. 3 (2002): 34.

[56] Herman: 89.

[57] Army, *Fm 3-0 Operations*, 3-5.

[58] Herman: 90.

[59] Glenn A. Tolle, "Shaping the Information Environment," *Military Review*, no. May-June 2002 (2002): 47.

[60] Beckinger, 14.

[61] U.S. Army, *Fm 3-93 (100-7) the Army in Theater Operations - Third Draft October 2001* (Washington D.C.: Department of the Army, 2001), 1-6.

[62] Army, *Fm 3-0 Operations*, 1-16.

[63] U.S. Army, *Army Transformation Wargame 2001* (Fort Monroe, Virginia: Office of the Deputy Chief of Staff for Doctrine, Headquarters US Army Training and Doctrine Command, 2001), 5.

[64] Rittenhouse.

[65] Army, *Fm 3-0 Operations*, 1-15.

[66] Ibid., 2-2.

[67] Herman: 86.

[68] Ibid.: 87.

[69] Ibid.: 89.

[70] Army, *Fm 3-0 Operations*, 3-16.

[71] Ibid., 3-6.

[72] Ibid., 4-13.

[73] Townsend, 2.

[74] Ibid., 4-32.

[75] Michael and Peter Paret Howard, ed., *Carl Von Clausewitz: On War* (Princeton, New Jersey: Princeton University Press, 1984), 595.

[76] Greer: 26.

[77] Donald Armstrong, *The Reluctant Warriors* (New York: Thomas Y. Crowell Company, 1966).

[78] Don DeYoung, "Strategic Vision Can Be Powerful," *Proceedings* (2000).

[79] Joint Chiefs of Staff, "Joint Vision 2010," 3.

[80] Army, *Fm 3-0 Operations*, 3-5.

[81] Hughes, ed., 25.

GLOSSARY

BLOS	Beyond Line of Sight
C2	Command and Control
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
COG	Center of Gravity
CSS	Combat Service Support
FCS	Future Combat System
FM	Field Manuel
ISR	Intelligence, Surveillance, Reconnaissance
LAM	Loitering Attack Munition
OF	Objective Force
OFC	Objective Force Commander
PAM	Precision Attack Munition
RP	Refit Points
SRP	Strategy Research Project
UA	Unit of Action
UAV	Unmanned Aerial Vehicle
UE	Unit of Employment

BIBLIOGRAPHY

Aadland, Anders B., and James L. Allen. "Engineer White Paper - into the Objective Force." *Engineer*, no. April 2002 (2002): 4-10.

Armstrong, Donald. *The Reluctant Warriors*. New York: Thomas Y. Crowell Company, 1966.

Army, U.S. *Fm 100-15 Corps Operations*. Washington D.C.: Department of the Army, 1989.

_____. *Army Transformation Wargame 2001*. Fort Monroe, Virginia: Office of the Deputy Chief of Staff for Doctrine, Headquarters US Army Training and Doctrine Command, 2001.

_____. *Fm 3-0 Operations*. Washington D.C.: Department of the Army, 2001.

_____. *Fm 3-93 (100-7) the Army in Theater Operations - Third Draft October 2001*. Washington D.C.: Department of the Army, 2001.

Beckinger, Robert. "The Future of Ground Fire Support Systems." U.S. Army War College, 2002.

Bingham, Price T. "Air Power Targeting Theory: A Key Element in Transformation." *Military Review* LXXXII, no. 3 (2002): 34-39.

Czege, Huba Wass de, and Zbigniew M. Majchrzak. "Enabling Operational Maneuver from Strategic Distances." *Military Review*, no. May-June 2002 (2002): 16-20.

DeYoung, Don. "Strategic Vision Can Be Powerful." *Proceedings* (2000).

Durham, George A., and James E. Cunningham. "Netfires: Precision Effects for the Objective Force." *Field Artillery*, no. March-April 2002 (2002): 5-9.

Engelmann, Karsten. "Shattered States." Vienna, Virginia: EMS, 1990.

Goure, Daniel. "Army Must Set Priorities for Objective Force." *National Defense* LXXXVII, no. 586 (2002): 29-30.

Greer, James K. "Operational Art for the Objective Force." *Military Review*, no. September-October 2002 (2002): 22-29.

Herman, Mark. "Entropy-Based Warfare: Modeling the Revolution in Military Affairs." *Joint Force Quarterly*, no. Autumn/winter 1998-99 (1998): 85-90.

Howard, Michael and Peter Paret, ed. *Carl Von Clausewitz: On War.* Princeton, New Jersey: Princeton University Press, 1984.

Hughes, Wayne P. Jr, ed. *Military Modeling for Decision Making.* Alexandria, VA: Military Operations Research Society, 1997.

Joint Chiefs of Staff. "Joint Vision 2010." Washington, D.C.: US Government Printing Office.

_____. "Joint Vision 2020." Washington D.C.: US Government Printing Office, 2000.

Maples, Michael D. "The Fa and the Objective Force." *Field Artillery*, no. September-October 2002 (2002).

McLaughlin, Mark. "The Napoleonic Wars." Hanford, California: GMT Games, 2002.

Racier, Ted. "Barbarossa to Berlin." Hanford, California: GMT Games, 2002.

Rittenhouse, Bill. "Phone Discussion Regarding Wargaming the Objective Force." ed. Karsten Engelmann. Carlisle, PA, 2002.

Tolle, Glenn A. "Shaping the Information Environment." *Military Review*, no. May-June 2002 (2002): 47-49.

Townsend, Robert. "Dominant Maneuver: Strategic Mobility in the 21st Century." U.S. Army War College, 1998.

Walker, Trey. *America's Army Tops 400,000.* PC Games, 2002. Accessed July 10, 2002. Internet. Available from http://gamespot.com/gamespot/stories/news/0,10870,2873986,00.html