

Determining Tempo & Momentum of the Marine Expeditionary Force in the Spacetime Dimension

**A Monograph
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ABSTRACT

DETERMINING TEMPO & MOMENTUM OF THE MARINE EXPEDITIONARY FORCE (MEF) IN THE SPACETIME DIMENSION by Major Mike Brown, USMC, 50 pages.

The noted Prussian theorist, Carl von Clausewitz wrote about the concentration of forces in space, and the unification of forces in time, as though they were two separate entities. Albert Einstein, however, with the advent of his theories on special and general relativity, linked space and time into one entity – spacetime. Given the complexities of the modern battlespace it is necessary for military commanders and planners to conceive operations using Einstein’s concept of spacetime instead of Clausewitz’s discreet approach. This is important because the perception of an adaptive enemy’s movement is relative to the movement of Marine forces (e.g., Marine Expeditionary Force (MEF)). Therefore, neither combatant will agree on their observations of either space or time. This fact, coupled with the Marine Expeditionary Force’s desire to place him in a position of disadvantage, requires the MEF to act faster (in decision-making and execution) so that it might generate more tempo and momentum than its adversary is capable of reacting to.

The Marine Corps defines tempo and momentum as controlling the rate of actions and interactions within a campaign to maintain the initiative. “Tempo is relative and not absolute. The focus must be on ensuring that our [the MEF’s] tempo is superior to an enemy’s.” This author asserts that to determine tempo and momentum, in relation to one’s adversary, the MEF commander must take advantage of information management (IM).

This advantage must take place in Einstein’s spacetime dimension. This dimension is the theoretical understanding that “space and time...can no longer be thought of as an inert backdrop on which the events of the universe play themselves out; rather, through special and then general relativity, they are intimate players in the events themselves.” The ability to think in this dimension should allow the MEF commander to continually assess his position, in motion, relative to a reactive enemy who likewise is in motion. According to Einstein’s theory of relativity, whoever is moving faster is experiencing time in a slower dimension since time elapses more slowly for an individual in motion than it does for a stationary individual. Given this scientific analogy, the MEF must think and react more quickly, in its decision-making and execution, than its adversary if it wishes to achieve the effect of having time slow down, thus giving it the ability to leverage additional time into its military operations.

The monograph concludes that the MEF must develop a future predictive if it intends to try to determine if it has achieved the generation of tempo and momentum relative to its adversary. In a spacetime dimension, this information would provide the MEF the knowledge necessary for them to dictate the pace of operations and the events that would occur leading toward their enemy’s culmination.

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CHAPTER 1

INTRODUCTION

Admiral, the Navy is on its way out. There's no reason for having a Navy and a Marine Corps. General Bradley tells me amphibious operations are a thing of the past. We'll never have any more amphibious operations. That does away with the Marine Corps. And the Air Force can do anything the Navy can do, so that does away with the Navy.

Honorable Mr. Louis A. Johnson, Secretary of Defense, to Admiral Richard L. Connally, Chief of Naval Operations, 1949¹

In 1775, the Continental Congress formed the United States Marine Corps (USMC) as sea-going infantry to support the Continental Navy. Throughout its history, the Marine Corps evolved into what we presently know today – America's premier expeditionary force. This warfighting capability is outlined in Department of Defense Directive 5100.1, *Functions of the Department of Defense and its Major Components*, specifically stating that the Marine Corps is tasked to,

Organize, train equip and provide...forces to conduct prompt and sustained combat operations at sea, including sea-based and land based aviation. These forces will seek out and destroy enemy naval forces, suppress enemy sea commerce, gain and maintain general naval supremacy, control vital sea areas, protect vital sea lines of communication, establish and maintain local superiority in an area of naval operations, seize and defend advanced naval bases, and conduct land, air, and space operations essential to a naval campaign.²

This demonstrates the inextricable link between the Marine Corps and the Navy in the defense of this nation. Interestingly, the exchange between Mr. Johnson, and Admiral Connally, in 1949, illustrated General Omar Bradley's lack of understanding about the

¹ LtGen Victor H. Krulak, USMC (Ret), *First to Fight*, (Annapolis: United States Naval Institute Press, 1984), 120. Note: General Bradley, with the backing of President Truman and General Eisenhower (Supreme Allied Commander Europe), were in the process of trying to disband the Marine Corps.

² Headquarters, United States Marine Corps, *Marine Corps Warfighting Publication 0-1, Marine Corps Operations*, (Washington D.C.: United States Marine Corps, 1999), 1-3.

capabilities that these two services provide, clearly manifested following the successful landing at Inchon in 1950 by the 1st Marine Division, and elements of X Corps.

However, there may be some truth today in General Bradley's assertion because the type of amphibious landings demonstrated in World War II and Korea may be obsolete. In 1996, the Marine Corps unveiled its new concept, Operational Maneuver from the Sea (OMFTS). This concept evolved from amphibious operations, designed for ship-to-shore movement, to OMFTS, designed as ship-to-objective maneuver.

BACKGROUND

The purpose of this monograph is to illustrate the doctrine of OMFTS from the point of view of the Marine Expeditionary Force (MEF). Specifically, this monograph answers the question of whether the Marine Expeditionary Force can determine the tempo and momentum required to take advantage of information management in a spacetime dimension. The author analyzed each of the sub-components of this question into the chapters of this monograph. Each of these chapters concludes with an analysis of that particular topic, then expand to address each subsequent chapter's material.

The noted Prussian theorist, Carl von Clausewitz wrote about the concentration of forces in space, and the unification of forces in time, as though they were two separate entities.³ Albert Einstein, however, with the advent of his theories on special and general relativity, linked space and time into one entity – spacetime.⁴ Given the complexities of

³ Carl von Clausewitz, *On War*, Translated and Edited by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 204-205.

⁴ Brian Greene, *The Elegant Universe*, (New York: Random House, 2000), 49-50.

the modern battlespace it is necessary for military commanders and planners to conceive operations using Einstein's concept of spacetime instead of Clausewitz's discreet approach. The importance of this is because our perception of an adaptive enemy's movement is relative to our own movement. Therefore, neither combatant will agree on their observations of either space or time. The ability to place an adversary in a position of disadvantage, require Marine forces to act faster so that we might generate more tempo and momentum, in our planning and execution, than he is capable of reacting to.

The Marine Corps defines tempo and momentum as controlling the rate of actions and interactions within a campaign to maintain the initiative. "Tempo is relative and not absolute. The focus must be on ensuring that our tempo is superior to an enemy's."⁵ This author asserts that to determine tempo and momentum, in relation to one's adversary, the MEF commander must take advantage of information management (IM).

An advantage must take place in Einstein's spacetime dimension. This dimension is the theoretical understanding that "space and time...can no longer be thought of as an inert backdrop on which the events of the universe play themselves out; rather, through special and then general relativity, they are intimate players in the events themselves."⁶ The ability to think in this dimension should allow the MEF commander to continually assess his position, in motion, relative to a reactive enemy who likewise is in motion. According to Einstein's theory of relativity, whoever is moving faster is experiencing time in a slower dimension: "time elapses more slowly for an individual in motion than it does for a stationary individual."⁷ Given this scientific analogy, the MEF must think and

⁵ General Charles C. Krulak, USMC, "Operational Maneuver from the Sea," *Joint Force Quarterly*, (Spring 1999): 83.

⁶ *Ibid.*, 6.

⁷ *Ibid.*, 39-41. Note: The Spacetime dimension will be explained in greater detail in Chapter 3.

react more quickly, in its decision-making and execution, than its adversary if it wishes to achieve the effect of having time slow down, thus giving it the ability to leverage additional time into its military operations.

APPLICABILITY TO THE MARINE CORPS

The understanding of spacetime provides the MEF commander with a better appreciation for the use of available time, his ability to disrupt the amount of time available to his adversary, and his ability to create more time through the generation of tempo and momentum in relation to that adversary. This generation of tempo and momentum, if properly achieved, should allow the MEF the ability to optimize its decision-making in a spacetime dimension.

In the end, this research should provide the reader greater insight into how the MEF intends to determine if it has achieved an advantage of tempo and momentum, using its doctrine of OMFTS, against a reactive enemy in a spacetime dimension.

ASSUMPTIONS

An underlying premise to this research is the Marine Corps continued development of the MV-22 Osprey and the Advanced Amphibious Assault Vehicle (AAAV) to support OMFTS.⁸ The research involving IM will not address systems, but will focus on the cognitive process involved in making rapid decisions.

⁸ Headquarters, United States Marine Corps, *Concepts and Issues 2000*, (Washington D.C.: United States Marine Corps, 2000), 138-139, 162-163. "The Advanced Amphibious Assault Vehicle (AAAV) will join the MV-22 and LCAC, as an integral component of the amphibious triad required for executing Operational Maneuver from the Sea." Current funding projects the delivery of 1,013 AAAVs between FY06 to FY12. The Marine Corps intends to buy 360 MV-22s. The estimated delivery of these MV-22s cannot be made, at this time, due to the temporary suspension by the Marine Corps/Navy on the decision to

CHAPTER 2

OPERATIONAL MANEUVER FROM THE SEA

By using the sea as maneuver space, enemy vulnerabilities can be exploited and opportunities can be seized before they vanish. In short, [the] MAGTF will act so quickly the enemy will be unable to react effectively. This is dominant maneuver.

*General Charles C. Krulak,
31st Commandant of the Marine Corps, 1999⁹*

INTRODUCTION

The development of OMFTS extended from what General Charles C. Krulak, 31st Commandant of the Marine Corps (CMC), termed “chaos in the littorals.”¹⁰ The underlying premise of OMFTS is that future conflict will likely occur in the littorals, “those areas characterized by great cities, well-populated coasts, and the intersection of trade routes where land and sea meet.”¹¹ The Marine Corps based this belief on the growing migration of the world’s population toward those regions supplying water, employment, and communication. While OMFTS is not a radical departure from existing amphibious warfare doctrine, it is a new approach, far more efficient in its use of combat power than previous doctrine. By definition, operational maneuver from the sea involves the entry phase of an expeditionary operation. OMFTS may include enabling actions, or decisive actions, depending on the nature of the mission and environment. In order to understand OMFTS, a brief explanation of how it was developed is required.

transition to Milestone III, Full Rate Production. Procurement of the MV-22 remains the Marine Corps number one aviation acquisition priority.

⁹ General Charles C. Krulak, “Operational Maneuver from the Sea,” *Joint Force Quarterly*, (Spring 1999): 82.

¹⁰ Headquarters, United States Marine Corps, *Operational Maneuver from the Sea*, (Washington, D.C.: United States Marine Corps, 1996), 3.

¹¹ *Ibid.*

EVOLUTION OF MARINE CORPS AMPHIBIOUS WARFARE DOCTRINE

The doctrine of amphibious warfare that exists today in Joint Publication 3-02, *Joint Doctrine for Amphibious Operations*, evolved from the Fleet Marine Force landing exercises (FLEX) of the 1930s.¹² The basic element of this doctrine, over the past seventy years, has been ship-to-shore movement. Once ashore, the assaulting force has traditionally seized the beachhead, and then expanded that beachhead to create a lodgment for follow-on forces.¹³

The Marine Corps did not originate the amphibious assault concept, however, the Corps deserves credit for developing the doctrine used by both the Army and the Marine Corps throughout World War II. In 1931, the Chief of Staff of the Army, General Douglas MacArthur, argued against the existence of the Marine Corps. He preferred to send Marine ground units to the Army, and Marine aviation to the Army Air Corps. The Navy, not wanting to lose any asset to the Army, challenged Marine Commandant B. H. Fuller, to justify the Corps' many missions and assign them some priority. Fuller's response was that the Marine Corps was ideally suited to "seize and defend naval bases."¹⁴ Further, he postulated that the objectives of amphibious assault would not only

¹² *Marine Corps Warfighting Publication 0-1, Marine Corps Operations*, 1-3. DoD Directive 5100.1 directs the Marine Corps to, "Develop the doctrine, procedures, and equipment of naval forces for amphibious operations and the doctrine and procedures for joint amphibious operations." The service responsibility for this doctrine resides with the Marine Corps per DoD Directive 5100.1, *Functions of the Department of Defense and its Major Components*.

¹³ The Joint Staff, *Joint Publication 3-02, Joint Doctrine for Amphibious Operations*, (Washington D.C.: The Joint Staff, 1992), I-3 – I-4. "A beachhead is a designated area on a hostile or potentially hostile shore which, when seized and held, ensures the continuous landing of troops and materiel and provides maneuver space requisite for subsequent projected operations ashore."

¹⁴ Colonel Allan R. Millett, USMCR, *Semper Fidelis: The History of the United States Marine Corps*, (New York: The Free Press, 1991), 329.

be enemy naval bases but also air bases that menaced fleet operations. This new mission introduced the Marine Corps into a new realm of warfighting.

The students of the Field Officer's School (Class of 1931), Quantico, Virginia, were assigned the role of developing this doctrine. Colonel Ellis Bell Miller led these fifteen students (lieutenant colonels and majors), to develop a single volume on amphibious assault. In seven months, they wrote the manual called, *Tentative Manual for Landing Operations, 1934*. "It was not too well written, it was not handsomely printed, and it was bound with shoestring but it was there, some 127,000 words of it – more hard, doctrinal pronouncement on the seizure of an objective by amphibious assault than had ever been assembled in one place in all of history."¹⁵

The Navy adopted the Tentative Manual in 1938 with minor alterations and redesignated it as Fleet Training Publication Number 167, *Landing Operations Doctrine*. This doctrine specified that amphibious assaults occur from ship-to-shore. Once ashore, the Marine Corps transitioned to a conventional ground force with heavy reliance on the Navy for naval gunfire and close air support (CAS). In 1941, the Army, "whose interest in amphibious operations had theretofore been minimal, copied the *Manual*, lock, stock, and barrel, and published it as Field Manual 31-5...More important [*sic*], it governed every amphibious operation during that war [World War II]."¹⁶

As early as 1948 the Marine Corps began experimenting with the helicopter as a means for launching amphibious assaults from the sea. In 1973, the Commander of Amphibious Forces Atlantic Fleet published *Amphibious Operations 1985-2000: A*

¹⁵ LtGen Victor H. Krulak, USMC (Ret), *First to Fight*, (Annapolis, United States Naval Institute, 1984), 81.

¹⁶ *Ibid.*, 82.

Conceptual Study. This visionary document foresaw the issues of over-the-horizon operations with transport aircraft capable of vertical, or short take off, and landings operating at ranges of 250-500 nautical miles.¹⁷ However, very little happened to expand this concept until the latter half of the 1980s.

The doctrine of amphibious assault changed very little during the next forty years until 1987, when General Alfred M. Gray became the 29th Commandant of the Marine Corps. He revolutionized Marine thinking from an attrition-based doctrine to a maneuver warfare based doctrine. His challenge to change Marine doctrine culminated with the publication of Fleet Marine Force Manual 1 (FMFM-1), *Warfighting*. In 1989, he challenged Marine general officers to consider the Corps, “as an expeditionary intervention force with the ability to move rapidly, on short notice, to wherever needed, we are truly the Nation’s premier fighting force.”¹⁸

Gray tasked Marine officers to read William S. Lind’s *Maneuver Warfare Handbook*. This book, albeit a tactical level primer, served as the blueprint of a new operational approach for amphibious maneuver.¹⁹ The Marine Corps views maneuver warfare as a warfighting philosophy that “seeks to shatter the enemy’s cohesion through a variety of rapid, focused, and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope.”²⁰ Maneuver warfare seeks simultaneous action in space and time. Spatially, maneuver seeks to generate and exploit some kind of advantage over the enemy in order to accomplish an objective as effectively

¹⁷ MajGen Patrick G. Howard, USMC, & LtCol Len Blasiol, USMC, “OMFTS: Forging a Path to the Future of Amphibious Warfare,” *Marine Corps Gazette*, (June 1999), 18.

¹⁸ Millett, 651. Note: MCDP 1 replaced FMFM1 in 1997.

¹⁹ William S. Lind, *Maneuver Warfare Handbook*, (Bolder, Westview Press, 1985), 36-40. Mr. Bill Lind was an advisor on military affairs to U.S. Senator Gary Hart, and president of the Military Reform Institute.

²⁰ Headquarters, United States Marine Corps, *Marine Corps Doctrinal Publication 1 (MCDP-1), Warfighting*, (Washington D.C.: United States Marine Corps, 1997), 72-73.

as possible. Temporally, maneuver seeks to generate faster operational tempo than the enemy does in order to gain an advantage of time.²¹ OMFTS evolved as the logical extension of taking maneuver warfare to its next level in terms of utilizing the sea as maneuver space and rapidly maneuvering against the enemy's decisive point.

PRINCIPLES OF OMFTS

The heart of Operational Maneuver from the Sea is the maneuver of naval forces at the operational level, a bold bid for victory that aims at exploiting a significant enemy weakness in order to deal a decisive blow. Mere movement, which may lead to indecisive results or even be counterproductive, does not qualify as operational maneuver. That is to say, operational maneuver should be directed against an enemy center of gravity – something that is essential to the enemy's ability to effectively continue the struggle.

Operational Maneuver from the Sea, 1996²²

Six principles form the basis of OMFTS. These principles are: *OMFTS focuses on the operational objective; OMFTS uses the sea as maneuver space; OMFTS generates overwhelming tempo and momentum; OMFTS attacks asymmetrically to pit friendly strength against enemy weakness; OMFTS emphasizes intelligence, deception, and flexibility; and OMFTS integrates all organic, joint and combined assets.*²³ This paper will address one of these principles, generating tempo and momentum. In its definition of generating tempo and momentum, MCWP 0-1 states, "The objective of maneuver warfare is to create a tempo greater than that of the enemy. This provides the commander freedom of action while limiting the enemy's freedom of action."²⁴

²¹ Ibid.

²² *Operational Maneuver from the Sea*, 10-11.

²³ *MCWP 0-1, Marine Corps Operations*, 2-3 – 2-4.

²⁴ Ibid., 2-3.

The Marine Corps believes that generating overwhelming tempo and momentum is achieved with advancements in technology combined with a command and control (C²) system oriented towards rapid decision-making at all levels of command.²⁵ The additional speed and flexibility offered by advancements in C² and logistics will translate into higher tempo operations, thus allowing the MAGTF commander faster decision-making results than his adversary. While this sounds conceptually feasible, there exists the requirement to define speed (the movement through space over time) in relation to tempo and momentum in order to fully understand how the decision making process will be improved, or made more efficient to respond to any increase in speed.

The author believes, based on the concept of OMFTS, that the Marine Corps intends to enhance its combined arms approach to maneuver warfare, through the specific use of new Navy and Marine Corps technologies to overwhelm the enemy's capability to interdict their simultaneous attack in the enemy's battlespace. These technologies (MV-22, AAV, LCAC), coupled with the MAGTF commanders C⁴I, would give him an advantage in dictating the tempo of an operation. Their proper application in the battlespace would conceptually provide the commander with a greater pace of operations (decision-making and execution) than the adversary could react.

Tempo, however, defined as being, "relative and not absolute... Overwhelming tempo will bring about operational shock (or psychological dislocation) through a rapid breakdown of an enemy, causing it to become disoriented, diverted from its objective, and unable to make decisions."²⁶ This research, while not focusing on specific

²⁵ *Operational Maneuver from the Sea*, 14.

²⁶ General Charles C. Krulak, USMC, "Operational Maneuver from the Sea," *Joint Force Quarterly*, (Spring 1999): 83.

technologies, must allow some discussion of them to provide the reader with an understanding of what these systems provide in the conceptual framework of OMFTS.

General Krulak asserted that the MV-22 Osprey, AAV, and the LCAC, form the cornerstone of OMFTS by saying that, “made possible by technological advances for transporting landing forces ashore, OMFTS seeks to generate high operating tempo by combining ship-to-shore movement and what has traditionally been called subsequent operations ashore into a single decisive maneuver directly from amphibious shipping.”²⁷ This new maneuver is designated ship-to-objective maneuver (STOM). STOM advances the concept of OMFTS, using the aforementioned systems, by engaging the enemy at a decisive point.

STOM takes advantage of emerging mobility (MV-22, AAV) and C² systems to maneuver landing forces in their tactical array from the moment they debark their ships. This new concept replaces the tedious ship-to-shore *movement* of current amphibious warfare with amphibious *maneuver*. Advanced mobility technologies permit landing forces to execute combined arms maneuver from over-the-horizon attack positions “through and across the water, air, and land of the littoral battlespace directly to inland objectives.”²⁸

The capability this provides to Marine forces allows power projection deeper inland than in the past (increased distance up to 200 miles inland, compared to 75 miles under current systems), progressing with far greater speed and flexibility that deny the enemy warning and reaction time. If the enemy chooses to defend a vast area along the

²⁷ Ibid., 82.

²⁸ Headquarters, United States Marine Corps, *Warfighting Concepts for the 21st Century*, (Washington D.C.: United States Marine Corps, 1997), II-6. Authors note: Over-the-horizon is considered 15 nautical miles or greater from amphibious shipping to the high-water mark of the beach.

beach then seaborne maneuver and deep power projection would render these forces irrelevant.²⁹ This new capability could allow Marine forces to directly attack an enemy's center of gravity (CG) or critical vulnerability (CV).³⁰ The impact of this maneuver would have a direct impact at the operational level in support of the Joint Force Commander and the CINC.

SPEED & TEMPO

In an effort to define the necessary speed a MEF must operate to generate overwhelming tempo and momentum, the Marine Corps must articulate, utilizing METT-T,³¹ the environment it intends to fight in and the type enemy it intends to engage. While this may prove very difficult to define, a simpler solution may be to set its own standard for how fast the MEF can reach a decision, based on how fast the MEF can move through the battlespace. Speed would be determined if the decision making process is well-defined and scripted along a formal process, much in the same way that the Marine Expeditionary Unit (MEU) conducts its Rapid Response Planning Process (R2P2), that allows it to execute a mission six hours after formal notification by higher headquarters.

MCWP 0-1, *Operations*, defines speed in three distinct ways. First, it defines *speed in combat*. Secondly, it defines *speed and time*. Lastly, it defines *timing*. Speed in combat is being consistently faster than the enemy, thereby allowing the MAGTF to gain the initiative and an advantage over the enemy. Speed is central to every aspect of tactics. "Physical speed, moving more miles per hour, is a powerful weapon in itself. On

²⁹ Ibid., II-7.

³⁰ Dr. Joe Strange, *Centers of Gravity & Critical Vulnerabilities*, (Quantico, VA: Marine Corps University, 1996), 2-3.

³¹ The United States Marine Corps uses Mission, Enemy, Troops, Terrain – Time.

an approach to the enemy, speed in movement reduces his reaction time.”³² The definition addresses the use of speed as it relates to travel over ground and in relation to the speed used by an enemy. The definition does not account for the use of speed in how quickly the MEF can make a decision then use their speed over ground to gain an advantage over their enemy.

Secondly, speed and time, in a military sense, are more than simply going fast (distance over ground), and there is a critical difference between acting quickly (tempo) and acting recklessly. In tactics, time is always of the utmost importance. “Time that cannot be spent in action must be spent thinking about how to act effectively. If speed is a weapon, so is time.”³³ The understanding of time, when coupled with the previous definition of speed in combat, raises the question of trying to determine exactly how fast, in planning and execution, a MEF must actually operate. How fast is fast enough? Can the MEF be too fast for its own good if an enemy could never come close to attaining the same speed as the MEF? These questions directly relate to the author’s research question because the challenge for the MEF is to try to determine at what tempo and momentum it must operate in order to achieve an advantage with regard to its use of information management (IM). These questions will be addressed further in the following two chapters.

Lastly, speed and time create tempo. Tempo is not merely a matter of acting faster, or at the earliest opportunity; it is also a matter of acting at the right time. Sir Julian Corbett believed that, in war the “choice of time and place will always be influenced by the enemy’s dispositions and movements, or by our desire to deal him an

³² *MCWP 0-1, Marine Corps Operations*, 5-11.

³³ *Ibid.*

unexpected blow.”³⁴ While the MEF commander can extend operating cycles through the economical use of resources, his forces cannot operate at top speed indefinitely. “Marines must rest, supplies must be replenished. The test of skill is to be able to generate and maintain a fast pace when the situation calls for it and to recover when it will not hurt.”³⁵ In Corbett’s analysis, the enemy retains the initiative. This author believes that the tempo and momentum generated by OMFTS allows the MAGTF commander to dictate the terms of battle, thus providing him with the initiative.

Based on these definitions, we must have the means of knowing when our adversary is moving and when he is stationary (in physical terms) so that we can dictate when, and how fast, we must move. For example, if our enemy and we are maneuvering against one another at the same time, then we may be required to move faster in our decision-making and execution so that we gain a temporal advantage. If he is stationary, then our movement will not have to be as fast for us to gain that advantage. An analysis of the spacetime dimension will make this concept clear, for if time is a weapon, then we must know how to leverage it against our enemy.

ANALYSIS

The concept of OMFTS asserts that Marine forces must be capable of generating tempo and momentum. The Marine Corps has clearly defined the word tempo in its doctrine and warfighting publications, but the word momentum has not been defined. This monograph will use the definition of the word momentum as prescribed in Webster’s Collegiate dictionary, “a property of a moving body that the body has by virtue

³⁴ Sir Julian S. Corbett, *Some Principles of Maritime Strategy*, (London: Longmans, Green and Co., 1911), 130.

³⁵ *MCWP 0-1, Marine Corps Operations*, 5-11.

of its mass and motion and that is equal to the product of the body's mass and velocity: strength or force gained by motion or through the development of events."³⁶

Secondly, the MEF will need to possess a future predictive if it is to achieve an advantage in tempo and momentum. The future predictive is the concept that we have the ability to move beyond the current realm of near-real time and real-time information. The future predictive conceptually reasons that a commander and his staff would have the ability to know enemy actions before they occurred. This concept, called 'preemptive tactics' was developed by Robert R. Leonhard and will be further examined in Chapter 3, Spacetime Dimension. While this future predictive may sound like some form of odd scientific fiction, it is actually being pursued as a means of solving complexity and information theories. In short, studies are underway to build a computer that behaves like the human brain.³⁷ If this research comes to fruition, then it is conceivable that the computer would be capable of rationalizing the available courses of action considered by an enemy commander.

CHAPTER 3

THE SPACETIME DIMENSION

We have seen that the constancy of the speed of light implies that a moving light clock ticks more slowly than a stationary light clock. And by the principle of relativity, this must be true not only for light clocks but also for any clock – it must be true of time itself. Time elapses more slowly for an individual in motion than it does for a stationary individual.

Brian Greene, Physicist, 1999³⁸

³⁶ Merriam-Webster, *Merriam-Webster's Collegiate Dictionary*, (Massachusetts: Merriam-Webster, Inc., 1993), 750.

³⁷ Tom Siegfried, *The Bit and the Pendulum*, (New York: John Wiley & Sons, Inc., 2000), 145-164.

³⁸ Greene, 41.

INTRODUCTION

Clausewitz referred to space and time in Book Three of *On War*. In Chapters Eleven and Twelve he discussed the “Concentration of Forces in Space” and the “Unification of Forces in Time.”³⁹ Clausewitz asserted that the best strategy is “always to be strong; first in general, and then at the decisive point.”⁴⁰ OMFTS asserts that it could achieve operational effects directly at an enemy’s decisive point. With regard to time, Clausewitz believed that, “it [time] must be significant for one opponent or the other.”⁴¹ If Clausewitz’s assertion is correct, the relevance for us today is our attempt to alter the significance in our favor. In order to create this environment, we must fully understand the physics of time in order for us to exploit its capabilities.

BACKGROUND

The purpose of this chapter is to provide an understanding of Albert Einstein’s concept called spacetime, and how this relates to OMFTS. This understanding is important if we believe that a distinct temporal advantage can be achieved relative to our adversary. The introductory quote, taken in context with the previous chapter, begs the question of how we intend to generate and maintain tempo and momentum over our enemy when we are moving. This author believes we can optimize our forces in the battlespace to achieve our desired effects more efficiently through a more detailed understanding of the spacetime dimension. A definition of this efficiency is our ability to generate tempo and momentum against our enemy and deny him the

³⁹ Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1976), 204-205.

⁴⁰ Ibid.

⁴¹ Ibid., 209.

ability to gain initiative against our forces. This efficiency is evaluated in greater detail in Chapter 4, as the criteria of how the Marine Corps intends to employ information management (IM) against the enemy, thus serving to evaluate the validity of these concepts.

SPACETIME

In the science of physics, there is a movement to synthesize the theories of quantum mechanics (developed from Max Planck's Quantum Theory in 1900) and the theory of general relativity (developed by Albert Einstein). This new theory, called String Theory (or 'Superstring'), developed in the 1980s proposes that general relativity and quantum mechanics are interdependent, not mutually exclusive as previously believed. String theory requires us to change our understanding of space, time, and matter:

Not only are space and time influenced by one's state of motion, but they can warp and curve in response to the presence of matter or energy. Such distortions to the fabric of space and time...transmit the force of gravity from one place to another. Space and time, therefore, can no longer be thought of as an inert backdrop on which the events of the universe play themselves out; rather, through special and general relativity, they are intimate players in the events themselves.⁴²

In 1905, Albert Einstein unveiled his theory of special relativity. This bold concept was a radical departure from the existing theory of quantum mechanics, "the theoretical framework for understanding the universe on the smallest of scales:

⁴² Ibid., 6.

molecules, atoms, and all the way down to subatomic particles like electrons and quarks”.⁴³ Special relativity began with the presumption that the speed of light (670 million miles per hour) and the laws of physics are the same for all observers regardless of their relative (unaccelerated) motion. He concluded, therefore, that two observers in relative motion to each other would have differing perceptions of the “positions of events and the time intervals between them.”⁴⁴

Einstein published his theory of general relativity in 1916, extending the theory of special relativity to include accelerated motion. This theory postulated that if someone were to be placed in a sealed compartment they would not be capable of discerning if they were at rest in a gravitational field, or if they were accelerating upward in a gravity-free-zone. Einstein asserted that gravity is a property of space-time rather than a force exerted by large bodies. Spacetime is distorted, or curved, near massive bodies (e.g., the sun and the earth). Einstein believed that spacetime represented the fourth dimension: “occurrences in the universe cannot be described in terms of space or time alone but only in terms of both at once.”⁴⁵ If we support this theory as valid, then what is its relevance to the Marine Corps in the employment of OMFTS?

ANALYSIS OF SPACETIME & OMFTS

The answer to this question appears in Marine Corps Doctrinal Publication

⁴³ Greene, 3. Note: *Quanta* are the smallest physical units into which something can be partitioned, according to the laws of quantum mechanics. For instance, photons are the *quanta* of the electromagnetic field.

⁴⁴ Chris Rohmann, *A World of Ideas: A Dictionary of Important Theories, Concepts, Beliefs, and Thinkers*, (New York: Ballantine Publishing Group, 1999), 340.

⁴⁵ *Ibid.*

(MCDP) 6, *The Nature of Command and Control*. This doctrine asserts that command and control (C²) is the realm that must understand and address the use of time in the employment of OMFTS. In Chapter 1, the environment of C² deals with two problems; uncertainty and time. In the realm of time, the basic dilemma for a commander and his staff is the ability to gain and process information.

This creates three related problems. First, the knowledge gained in war is perishable: as the time it takes to gain new information, information already gained becomes obsolete. Second, time is a commodity used by both sides. While we strive to gain information about a particular situation, the enemy may already be acting, thus changing the situation and the events in the process. Third, the rapid tempo of modern operations limits the amount of information gathered, processed, and assimilated in time to be of any significant relevance.⁴⁶ The key point is that both adversaries are in a race for time and a better situational understanding, with the object being to achieve a relative advantage over another.

However, if the Marine Corps, utilizing OMFTS, understands the rate of tempo and momentum their adversary is capable of moving, they can then deduce how fast the Marine Expeditionary Force must move, in terms of decision-making and execution, to achieve this relative advantage. Thus, time is relative to the observers of the events. This notion returns us to the earlier definition of *timing*. The Marine Corps stated in MCWP 0-1, *Operations*, that, “speed and time create tempo.”⁴⁷ New technologies (MV-22, AAV, LCAC) allow Marine forces to move faster and deeper in the battlespace, thus

⁴⁶ Headquarters, United States Marine Corps, *Marine Corps Doctrinal Publication 6, The Nature of Command and Control*, (Washington D.C.: United States Marine Corps, 1996), 56-57.

⁴⁷ *MCWP 0-1, Marine Corps Operations*, 5-11.

giving it an advantage of speed in space. A C^2 process that is oriented on rapid decision making at all levels may provide an advantage in time. Given this understanding of the creation of tempo, within the concept of spacetime, Marine forces must make faster decisions that yield faster mission execution than the enemy so that the enemy's observations of the MAGTF's movement, relative to his own, will be distorted.

However, the real advantage of spacetime will be when we can predict future enemy actions. Near real-time technologies exist today and real-time technologies are currently being developed. Predictive technologies of the future will enable the MEF commander and his staff to make faster decisions that result in faster execution. In his book, *Fighting by Minutes: Time and the Art of War*, Robert Leonhard proposed the following concept,

To construct a theory of time in war, the student of military history must take the physicists' approach. Time must be measurable, or else it eludes the scrutiny of the scientific method. The future must be changeable, or else our study of time in war is merely academic rather than practical. The purpose of this book is to change the approach that the student of war takes in his study, interpretation, and even practice of war. We will proceed from the viewpoint that time can be first, observed; second, measured; and third, manipulated. For the student of war, the time component must be as familiar as the spatial dimensions.⁴⁸

Leonhard makes the interesting observation that the American military spends the vast majority of its time moving, training, resting, planning, resupplying, or conducting combinations of these activities that slow down our combat readiness. He argues that we must adopt "temporal tactics." Temporal tactics seek to hit the enemy at those times that he is not ready, either before he is prepared or after his strength has culminated. In short, "they aim at turning the enemy's time flank."⁴⁹

⁴⁸ Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War*, (Connecticut: Praeger Publishers, 1994), 3.

⁴⁹ *Ibid.*, 154.

The author believes that this concept fits into the Marine Corps belief that operational maneuver from the sea affords Marine forces the ability to strike from distances that make enemy counter-movement very difficult. This means that Marine forces can plan, deploy, and execute missions with near impunity because of the distances separating them from their adversaries. When coupled with planning in a spacetime dimension, the advantage for the MAGTF commander to utilize a rapid decision-making process would allow him to out-ODA loop his opponent. Then, utilizing the technologies advanced under OMFTS, would allow him to execute faster missions capable of striking at operational-level objectives necessary to cause the enemy's culmination.

Finally, it is this author's belief that, based on the Marine Corps' definition of tempo and momentum, coupled with our understanding of the spacetime dimension, the MEF cannot currently determine if it has achieved enough tempo and momentum to gain an advantage. This belief will be expanded in the following chapter's analysis of IM and how it is used within the MEF.

CHAPTER 4

INFORMATION MANAGEMENT

Effective information management (IM) can deliver critically important information in a timely manner to those whom need it in a form they quickly understand.

MCWP 6-23, Information Management, 2000⁵⁰

⁵⁰ Headquarters, United States Marine Corps, *Marine Corps Warfighting Publication 6-23, Information Management*, (Washington D.C.: United States Marine Corps, 2000), 1-1.

INTRODUCTION

The purpose of this chapter is to address how Information Management (IM), in relation to OMFTS and spacetime, aids in generating the tempo and momentum necessary for the MAGTF commander to achieve his desired results. Therefore, it will be necessary to evaluate the command and control doctrine (MCDP 6, *Command and Control*), and warfighting publication (MCWP 6-23, *Information Management*), to gain a comprehensive understanding of how they intend to support the commander's decision-making process that will enable him to generate the tempo and momentum necessary to defeat his adversary faster and more efficiently. Lastly, this chapter will build upon the theories and concepts outlined in the previous chapters as a means of analyzing how OMFTS, spacetime, and IM relate to one another.

BACKGROUND

Everything in war is simple, but the simplest thing is difficult. The difficulties accumulate and end by producing a kind of friction that is inconceivable unless one has experienced war.

*Carl von Clausewitz*⁵¹

Clausewitz captured the chaotic nature of combat with his description of fog and friction in Chapter 7, Book 1. The effective commander, in Clausewitz's estimation, is capable of operating in this chaotic environment. Fog and friction lead to uncertainty in the battlespace, therefore the commander and his staff seeks innovative ways of mitigating the chance of making an egregious error using quality and timely information.

The MAGTF commander requires information to understand the situations and events providing challenges to him. Quality information can determine success or failure

⁵¹ Clausewitz, 119.

due to the value it adds to his decision-making process. Recent advancements in technology provide the ability to share useful information with personnel at distant locations and support the C² process that integrates into the decision cycle.⁵² “Commands now possess the ability to simultaneously disseminate quality information used to support all aspects of the planning, decision, execution, and assessment cycle for multiple dispersed units.”⁵³ Commanders and their staffs rely on this information to attain a qualitatively better understanding of their battlespace than their adversary does. The Marine Corps’ primary doctrinal publication, *Warfighting*, stipulates that,

Whoever can make and implement decisions consistently faster gains a tremendous, often-decisive advantage. Decision-making in execution thus becomes a time-competitive process, and timeliness of decisions becomes essential to generating tempo. Timely decisions demand rapid thinking with consideration limited to essential factors. In such situations, we should spare no effort to accelerate our decision-making ability.⁵⁴

Technological advancements provide many useful benefits, but also provide a pivotal downfall – information overload, created by too much unfiltered information flowing in to the commander and his staff. More information is available than one Marine can possibly collate, assimilate, and evaluate. Information collected in this environment, moreover, can often be inaccurate or misleading. “Most of the information may not be important, relevant, or available within the time constraints of the commanders’ decision-making process.”⁵⁵

Collecting and disseminating more information will not reduce information

⁵² *MCWP 6-23, Information Management*, (Washington D.C.: United States Marine Corps, 2000), 1-1.

⁵³ *Ibid.*

⁵⁴ *MCDP 1, Warfighting*, 85.

⁵⁵ *MCWP 6-23, Information Management*, 1-2.

overload. The commander and his staff must avoid information overload, which can increase uncertainty due to the enormous amount of information one must try to process; the eventual outcome it produces is chaos. This chaos is not just a result of the fog and friction that Clausewitz described on the battlefield, but it is created within the staff itself, thus denying the staff and the commander any chance of generating the tempo and momentum they are trying to achieve.

The philosophy contained in MCDP 6, *Command and Control*, emphasizes that Marines must learn to operate in this environment of chaos but this chaos need not be self-inflicted. Because war is a complex struggle between independent human wills, there will never be certainty about events yet to unfold. In other words, war generates uncertainty. We attempt to reduce uncertainty to a manageable level by gathering and using information.⁵⁶ The challenge for Marine forces today is to try and develop the means for working in this environment yet still be capable of processing the information available to them in a way that does not degrade the time required for the commander to reach a decision.

Compounding the issue of trying to harness the amount of information available to a commander, technological improvements in mobility, range, lethality and intelligence, surveillance, and reconnaissance (ISR), continue to compress time and space, forcing higher operating tempos and creating a greater demand for information. Given the advancements in technology that the Marine Corps is pursuing for its OMFTS doctrine (described in Chapter 2), Marine forces will be capable of moving greater distances and engaging the enemy at greater ranges than at any time in its history. The

⁵⁶ MCDP 6, *The Nature of Command and Control*, 55.

consequences of this fluid, dynamic environment increase the need for continuously updated information and place a strain on the commander's ability to C^2 due to the expanded battlespace that he must cover.⁵⁷ Therefore, the commander must have the means of synthesizing this information so that it is timely enough to support his decision-making process. This capability, conceptually, would provide him the ability to make faster decisions, thus enabling him to generate sufficiently different (e.g., faster) tempo and momentum than his adversary would.

These technological improvements, however, are not the only means of achieving faster decisions and generating tempo and momentum. Clausewitz's chapter, On Genius, provides insight into the qualities of an effective commander; principally the commander's intellect and temperament, the qualities Clausewitz called the "appropriate gifts."⁵⁸ The MEF commander currently commanding the II MEF has served for over thirty-two years in billets ranging from platoon commander through battalion and Marine Expeditionary Unit (MEU) level commands until his present assignment.⁵⁹ These commands have certainly shaped his abilities to develop that inner eye, or coup d'oeil, that Clausewitz said was the quality that would lead a commander to the truth. The truth

⁵⁷ Ibid., 58.

⁵⁸ Clausewitz, 100-101.

⁵⁹ United States Marine Corps [database on-line] (Washington D.C.: Headquarters Marine Corps Homepage, 2001, accessed 10 April 2001); available from: <http://www.usmc.mil/genbios2nsf/biographies.com>; Internet.

that the commander seeks is the vision that he possesses of what the MAGTF can do in a given situation. This truth leads the staff to develop the necessary steps to achieve the commander's perceived endstate. This cognitive process, when coupled with the technology available to the staff and their commander, enables the MEF to optimize their decision-making and execution process.

INFORMATION MANAGEMENT

The Marine Corps predicates its understanding of IM on, what it terms, 'Command and Control Theory.' This theory is the belief that speed is an essential element of effective C². Speed, in C² theory, is defined as shortening the time needed to make decisions, plan, coordinate, and communicate.⁶⁰ The aim of Marine forces is to be faster than the enemy, which implies that we interfere with his C² as we attempt to streamline our own. *MCDP 6* stipulates that the speed differential does not have to be a large one: "a small advantage exploited repeatedly can quickly lead to decisive results."⁶¹ The process that the Marine Corps advocates is the 'OODA loop.'

This process, developed by Air Force Colonel John Boyd, reflects that the C² process is continuous and cyclical. OODA represents the *observation-orientation-decision-action* model that Colonel Boyd developed during the Korean War when he flew fighter aircraft against the North Koreans. This realization was a result of his being able to orient faster because his canopy provided him three hundred and sixty degree observation. His opponent's poorly designed canopy did not afford the pilot a similar amount of observation. Ultimately, as Boyd predicted, the OODA-loop process would

⁶⁰ Ibid., 65.

⁶¹ Ibid.

allow the commander to generate faster tempo based on the creation of a highly fluid environment that minimizes friction using initiative (e.g., decentralized execution) and thereby tightening the OODA-loop process. The enemy commander, if not capable of operating at the same level of tempo, is rendered powerless because of his inability to efficiently utilize time to cope mentally with the rapidly changing situation.⁶²

Two basic principles frame IM theory: *supply-push* and *demand-pull*. A supply-push system pushes information from the source to the user as it becomes available or according to a schedule. A demand-pull system does not rely on the ability to anticipate information needs; instead, it is inactive until a demand is made on it.⁶³ Each of these systems possesses strengths and weaknesses, yet both share the same common goal, providing the commander with the information he needs to make timely decisions. From this theory stem the practical applications of IM.

IM is defined as “the sum of all activities involved in the identification, collection, filtering, fusing, processing, dissemination and usage of information.”⁶⁴ IM focuses on providing the commander with quality information that enables him to make better decisions. The goal of IM is to, “facilitate the development of quality information throughout the information hierarchy, thus increasing its value and relevance, and ensure the development of understanding by the commander.”⁶⁵ The commander and his staff use the planning, decision, execution, and assessment cycle to make accurate and timely decisions.

⁶² Colonel Phillip S. Meilinger, USAF, *The Paths of Heaven: The Evolution of Airpower Theory*, (Alabama: Air University Press, 1997), 363-368.

⁶³ *MCDP 6, Command and Control*, 96-97.

⁶⁴ *MCWP 6-23, Information Management*, 1-2.

⁶⁵ *Ibid.*, 1-4. Note: The information hierarchy is defined as; Raw Data, Processed Data, Knowledge, and Understanding (Situational Awareness).

This cycle provides the framework that the commander needs to assimilate information and increase tempo through timely and decisive actions.⁶⁶ Commanders are able to evaluate their decisions based on the commander's critical information requirements (CCIR) and the decision points that are articulated to their staff, and their subordinate commanders. For example, CCIR enable the MAGTF commander to remain proactive because he can, "maintain tempo by controlling the flow of quality information [he] require[s] to attain the level of understanding... within the battlespace." Meanwhile, decision points identify in "time or space" where the commander expects to make key decisions.⁶⁷ These tools, if used properly, focus the commander and his staff toward identifying enemy objectives that they can efficiently apply military force against, in an overall effort toward gaining the speed they are trying to achieve in their decision-making process.

MCWP 6-23, *Information Management*, is a recent addition to the Marine Corps warfighting library. Published as a coordinating draft in June 2000, this document is currently being applied to Marine Expeditionary Force (MEF) level exercises.⁶⁸ In order to conduct analysis of IM within the Marine Corps, an examination of a MEF IM plan is required. For the purposes of this monograph, the author has chosen the II MEF (Camp Lejeune, NC) as the headquarters for evaluation. This headquarters recently published a Joint Task Force Standard Operating Procedures (JTF SOP), dated 20 November 2000, in preparation of Exercise Unified Endeavor 2001, in which the MEF serves as the JTF headquarters.

⁶⁶ Ibid., 1-6.

⁶⁷ Ibid., 1-6 - 1-10.

⁶⁸ Major Phil Boggs, USMC, interview by author, personal interview, II MEF, Camp Lejeune, North Carolina, 02 February 2001.

The MEF's annex on IM defines it in accordance with the definitions previously outlined from MCDP 6 and MCWP 6-23. The commander manages information using the Common Operational Picture (COP). This system provides him with "near real time" force disposition tracking.⁶⁹ The benefit of this system is that it graphically depicts the locations of component organizations on the ground, air, and sea. This system does lack, however, the ability to provide real time information. This does not enable the MEF commander to operate in the full capacity of the spacetime environment because of the time lag induced by manual updates from the system's human operators. Instead, the true benefit of COP will be fully realized when information can be accessed as "future time" information.

Future time is the ability to gain a fourth-dimensional advantage over the enemy, by estimating enemy activity over time. That is, "we must view the enemy's intent – primarily in terms of formation or disposition changes – over a period of time."⁷⁰ Once technology allows this to occur, the MEF commander can utilize the spacetime dimension to its truest intention. This JTF SOP fails to articulate how the MEF commander could utilize IM to generate the tempo and momentum necessary to gain a positional advantage over his adversary. This deduction is the result of an analysis of this annex and the realization that it fails to address how the MEF would optimize time in the commander's decision-making process. Instead, this annex of the SOP focuses on procedures (e.g., e-mail, web pages, OPSEC, defensive IO, VTC, and internal JTF policies & procedures) for conducting IM. This document fails to articulate how the

⁶⁹ II Marine Expeditionary Force's Joint Task Force Standard Operating Procedure, United States Marine Corps [database on-line] (Camp Lejeune, North Carolina, 2000, accessed 02 February 2001); available from <http://www.iimef.usmc.mil.html> ; Internet.

⁷⁰ Leonhard, 170.

MEF, acting as a JTF headquarters, would optimize IM to achieve the tempo and momentum it requires in an OMFTS environment.

ANALYSIS OF INFORMATION MANAGEMENT IN SPACETIME

Based on this author's research, there are two vulnerabilities to IM. First, the commander and his staff must avoid information overload. Secondly, the staff must avoid an IM plan that focuses on procedures and processes and does not address how these two factors enable the commander to gain a decision-making advantage through his use of time relative to his adversary. The ultimate goal of IM in an OMFTS environment must be toward generating tempo and momentum. The realization of this goal will be fully optimized when technology, coupled with the MEF commander's coup d'oeil, allows us to have a "future time" capability in terms of the information that is available to the staff and commander. This realization, coupled with our understanding of C^2 Theory (the Boyd Cycle), will enable Marine forces to out-OODA loop our enemy. This means that we would plan and execute our operations at a much faster rate than he could react to and we would possess the ability to predict his military intentions utilizing a future predictive. If this concept is valid, and we apply it to the spacetime dimension, then this could conceivably afford Marines the ability to conduct simultaneous and sequential action occurring so fast that the enemy's reaction is ineffective.

The MEF cannot currently determine if they have generated the tempo and momentum to take advantage of IM because this would require an absolute knowledge of the enemy's tempo and momentum. As was previously stated in the chapter on spacetime, we will never agree on our observations of one another. Therefore, if we

cannot determine tempo and momentum, relative to our adversary, then can the MEF generate faster decision-making and execution, thus rendering the enemy's reactions irrelevant?

Instead, perhaps the answer is that we need to think in terms of *events* and not in terms of *distance* (i.e., the location between points). Events mark a location in spacetime. Since every event has its own reality, and the interval between every pair of events also has its own reality, which we can experience directly, then instead of passing through physical locations, "we must pass through the actual events; we must be at each event precisely when it occurs."⁷¹ This ability would optimize the technologies pursuant to the Corps' doctrine of OMFTS, principally through the mobility systems of the MV-22, AAV, and the LCAC.

Perhaps the MEF can determine its tempo and momentum by comparing the number of events relative to our adversary. If our ability to generate faster decisions by optimizing our ability to use IM, and our mobility systems allow us greater speed over ground and less response time from the moment Marine forces are activated to conduct a mission, then we could, conceptually, conduct more events than our adversary. Based on this logic it is conceivable to think that if we conduct events closer to one another (e.g., assaulting two enemy critical vulnerabilities near simultaneous), we gain an absolute advantage in time over our adversary. Based on the difference in time or space between the attacks on these critical vulnerabilities, we would measure the events as either timelike intervals or spacelike intervals. Likewise, measuring the adversary's intervals will allow us the ability, utilizing a future predictive, to determine what action he is most

⁷¹ Edwin F. Taylor and John Archibald Wheeler, *Spacetime Physics: Introduction to Special Relativity*, (New York: W.H. Freeman & Co., 1992), 9-10.

likely to consider, thereby affording us a distinct advantage to counter his movement or maneuver before he has executed it. This reasoning is pursuant to the ideas articulated at the end of Chapter 2 in the author's explanation of the future predictive.

It is necessary to explain how the MEF would conduct an operation against an adaptive enemy utilizing its IM to achieve an advantage in tempo and momentum. The following chapter will illustrate the capabilities of the MEF and how it would benefit from operating in the spacetime dimension.

CHAPTER 5

THE MARINE EXPEDITIONARY FORCE

Having been resurrected from the ashes during the late 1980s and tested during the Gulf War, the MEF is the Marine Corps' primary tactical warfighting organization. The MEF will deploy in its entirety, or if required, task-organize smaller forces through adaptive force packaging, bringing structure to the Marine Corps in today's national security environment.

Major Robert Brennan, USMC, 1994⁷²

INTRODUCTION TO THE MAGTF

The Marine Air Ground Task Force (MAGTF) is the Marine Corps' principle organization for the conduct of all missions across the range of military operations.

MAGTFs are "balanced, combined-arms forces with organic ground, aviation, and sustainment elements."⁷³ Although organized and equipped to participate as part of a Naval Expeditionary Force (NEF), MAGTFs also possess the unique capability to

⁷² Major Robert Brennan, USMC, "The MEF as a Warfighter," *Proceedings*, (November 1994), A-3 – A-5.

⁷³ Headquarters, United States Marine Corps, *Marine Corps Reference Publication 5-12D, Organization of Marine Corps Forces*, (Washington D.C.: 1998), 2-1.

conduct sustained operations ashore. The MAGTF provides a combatant commander with a versatile expeditionary force capable of a broad range of missions and capabilities. MAGTFs are organized, trained, and equipped to perform missions ranging from humanitarian assistance to peacekeeping to high intensity combat in permissive, uncertain, and hostile environments. Each MAGTF is task organized into four elements; command element (CE), aviation combat element (ACE), ground combat element (GCE), and combat service support element (CSS). There are four types of MAGTFs: the Marine Expeditionary Force (MEF), the Marine Expeditionary Brigade (MEB), the Marine Expeditionary Unit (MEU), and the Special Purpose Marine Air Ground Task Force (SPMAGTF). The examination of this monograph will focus on the MEF and the MEB due to their forcible entry and sustainment capabilities.⁷⁴

ORGANIZATION OF THE MEF

The MEF is the largest of all MAGTFs within the Marine Corps. There are three standing MEF headquarters located in Camp Pendleton, California (I MEF), Camp Lejeune, North Carolina (II MEF), and Okinawa, Japan (III MEF). Each standing MEF consists of a permanent CE and one Marine division, Marine Air Wing (MAW), and Force Service Support Group (FSSG).⁷⁵ The size and composition of a deployed MEF can vary based on mission requirements. For example, during Operation Desert Shield/Desert Storm, I MEF consisted of two infantry divisions, two MAWs, and two FSSGs, as well as support from Marine Forces Reserve (MARFORRES).

⁷⁴ Author's Note: The MEU and the SPMAGTF do not possess a forcible entry capability due to their size.

⁷⁵ MCRP 5-12D, *Organization of Marine Corps Forces*, 2-3.

A MEF typically deploys by echelon with sixty days of sustainment. The lead echelon of the MEF is normally the MEB. The MEB is constituted with elements from within the MEF's structure (division, MAW, FSSG). This monograph will focus its examination on II MEF located at Camp Lejeune, NC. II MEF consists of its own command element, the 2nd Marine Division, the 2nd Marine Air Wing, and the 2nd Force Service Support Group. There are approximately 43,000 Marines and 3,000 Sailors in this MEF.⁷⁶

FIGHTING THE MEF

II MEF's information management (IM) plan does not articulate how it will generate tempo and momentum in an OMFTS environment. However, if we were to project the MEF into an environment where it used future time (or future predictive) against an adaptive enemy, we could predict if it was capable of determining its tempo and momentum generation. For the sake of this research, the author believes that, given the MEF's speed in decision-making and execution, it is capable of conducting four decisive actions simultaneously thus providing a temporal advantage over their enemy.⁷⁷

In order to achieve this temporal advantage, the MEF must be capable of defeating an adaptive enemy. This monograph will analyze the American experience in

⁷⁶ The MEF is the principle Marine Corps warfighting organization. It is capable of missions across the range of military operations, through amphibious assault and sustained operations ashore in any environment. With appropriate augmentation, the MEF CE is capable of performing as a JTF headquarters. Headquarters, United States Marine Corps, *MSTP Pamphlet 5-0.3, MAGTF Planner's Reference Manual*, (Quantico, VA: 2001), 7.

⁷⁷ Based on their organic combat capabilities, the division should be capable of performing two decisive actions simultaneously. This presumption is made based on the combat power within the division and the close fires provided by the MAW in direct support of the division, coupled with their role to fight only the close battle. The MAW performs two decisive actions, typically in the MEF's deep operations area. The MEF's organic air support is robust enough for the MAW to conduct shaping operations in the MEF's deep battlespace.

Somalia, in 1993, in order to demonstrate how an adaptive enemy defeated U.S. special operations forces. This example will serve to illustrate how the MEF could notionally utilize a future predictive against this same enemy to avoid the results of October 3, 1993.

In his monograph titled, “Into the Beehive – The Somali Habr Gidr Clan as an Adaptive Enemy,” U.S. Air Force Major Mark Duffield outlined how a non-linear, adaptive enemy was capable of inflicting significant damage on U.S. forces.⁷⁸ Duffield’s analysis shows that U.S. forces failed to adapt in four areas. First, U.S. planners predicted that General Mohammed Aidid’s clan, the Habr Gidr, reaction time was at least one hour; therefore, mission times were planned by the Army’s Rangers to be completed in under an hour. Secondly, Task Force Ranger believed that their helicopters were invulnerable to the Somalis, despite the loss of a Blackhawk on September 25, 1993 to a rocket-propelled grenade (RPG). Third, despite their lack of a working telephone system, the Somalis used the simple tactic of smoke from fires and two-way radios to signal one another of the location of a military engagement. Lastly, Somali response times improved dramatically once men were joined by women and children in a fight.⁷⁹

These acts, taken over time, did not cause U.S. planners to alter their tactics significantly enough maintain an asymmetric advantage over their adversary. In fact, Task Force Ranger became predictable enough for the Habr Gidr leadership to develop a strategy for inflicting harm on them. The challenge that this historical vignette demonstrates for Marine forces today is that it can help to develop the means of determining how the MEF could react in similar circumstances. Determining future events will be possible with an analysis of past events.

⁷⁸ Major Mark Duffield, USAF, “Into the Beehive – The Somali Habr Gidr Clan as an Adaptive Enemy,” (Ft. Leavenworth: SAMS Monograph, 1998), 11.

In review, Task Force Ranger tried to use time to its distinct advantage when conducting their missions. The problem that they created for themselves was that their use of airpower, specifically the Blackhawk helicopter for insertion/extraction methods became too familiar for the Somalis. Even more, the belief that this aviation platform was invulnerable to surface fires was wrong. Specifically, the most significant event that occurred before October 3rd was the loss of a Blackhawk to an RPG in late September. This event should have been a clear signal that the Somalis were adapting their tactics to meet the threat. Next, the use of smoke as a signal was significant in that it meant that the enemy was adaptive and resolute enough to use whatever means necessary to coordinate their attacks. Lastly, the improved response time and participation of women and children should have been a clear indicator that the Somalis were as determined as ever to defeat U.S. & United Nations forces.

The MEF, utilizing future time against the Somalis, could use predictive simulations to track these events as a means of forecasting the future. The technology of predictive simulations exists today and was used extensively by Central Command (CENTCOM) before the Gulf War in 1990-1991, thereby reducing the planning time necessary to develop courses of action available to the CINC, but not by Task Force Ranger in 1993.⁸⁰ The difference for the MEF's use would be to make predictions based upon past events utilizing both the art and the science available within the MEF's headquarters. This capability would be demonstrated when applied to Bayes' Law.

⁷⁹ Ibid., 35-40.

⁸⁰ Kevin Kelly, *Out of Control: The Rise of Neo-Biological Civilization*, (New York: Addison-Wesley Publishing Company, 1994), 433-435. It is not known by this author why Task Force Ranger did not use predictive simulations to forecast actions by the Habr Gidr clan.

Bayes' law predicts future probabilities based on past events. As was articulated in Chapter 4, tempo and momentum could possibly be determined if the MEF could predict the events that would occur in the future. For example, the events that occurred leading up to October 3rd, should have given U.S. planners enough warning that a more coordinated Somali attack was imminent. Given the spacetime argument, and when applied to the MEF's capability to conduct four simultaneous decisive actions, the answer to the challenge of how to recreate October 3rd would have been for the MEF to have conducted numerous raids throughout the city to have seized more than just the Habr Gidr leaders at the one location. Instead, using "swarm" tactics, the MEF would have overwhelmed the Somali's to the point that they could not have reacted to any one location, but would have had to disperse themselves to multiple sites against MEF forces, thus rendering their reaction time and effect far less than it was against the Rangers. The author, Kevin Kelly, has written about "swarm tactics" in his predictive analysis of what the "neo-biological" world holds for our future. This tactic was discussed in detail in his book, *Out of Control*, an examination of the future.⁸¹

The Reverend Thomas Bayes was an eighteenth century mathematician who developed measurement changes in probability, and the expectations created by the addition of new information to past experience.⁸² His law states that the probability of the outcome of a test, given the hypothesis, then multiplied by the probability of the hypothesis, in an absolute sense, and divided by the probability of the outcome of the test will generate the requisite answer.⁸³ "The grandeur of Bayes' law lies precisely in its

⁸¹ Ibid., 22-27.

⁸² Rohmann, 91.

⁸³ Massimo Piattelli-Palmarini, *Inevitable Illusions: How Mistakes of Reason Rule Our Minds*, (New York: John Wiley & Sons, Inc., 1994), 105-109.

great formal simplicity – but a simplicity that requires a highly intelligent mix of science and art when applied to concrete variables.”⁸⁴ Bayesian statistics are useful because they are an effective way to minimize risk and maximize advantages.⁸⁵ Bayes’ law could have provided the MEF with the variables it needed to predict the actions of the Habr Gidr clan on October 3, 1993, based on the assumption that the MEF accurately monitored all of the events leading up to that day.

Specifically, the MEF would look like what Kelly called the “network swarm.”⁸⁶ The network swarm is all edges and “therefore open ended any way you come at it. Indeed, the network is the least structured organization that can be said to have any structure at all. It is capable of infinite rearrangements, and of growing in any direction without altering the basic shape of the thing, which is really no outward shape at all.”⁸⁷ The MEF, based on its task-organized structure, closely resembles Kelly’s network swarm because of its decentralized C², thus giving it the appearance of a loosely led and structured organization, thereby making it difficult for an adversary to determine the MEF’s predictive behavior.

⁸⁴ Ibid., 109.

⁸⁵ Ibid., 107-109. “Today we have mathematical theorems that show how Bayes’ law (in the abstract and under ideal conditions) is the only way to make certain decisions wholly rational. Calculating future probabilities from past probabilities, as well as assessing the likelihood that a certain hypothesis or conjecture may be right on the basis of data we have reliably gathered, is called “induction.” It must be stressed that both Bayesian and non-Bayesian theoreticians of induction agree on the formula discovered by Bayes... What theoreticians disagree about is the amount of insight one gains from applying this formula to all actual cases of induction... Even the non-Bayesians bow to the formula’s elegance and admit it is very important, though not vitally (and not “imperialistically”) so. An intuitive way of understanding what Bayes’ strategy is all about is expressed in the following spoken (approximately, but intuitively telling) reasoning... Thereafter, applying Bayes’ formula is purely mechanical. A pocket calculator can give you the result, which consists of no more than a multiplication and a division.”

⁸⁶ Kevin Kelly, *Out Of Control*, (New York: Addison-Wesley Publishing Company, 1994), 26.

⁸⁷ Ibid.

ANALYSIS

The MEF must, in order to determine its tempo and momentum use information management to track its own events as well as the enemies. If it can do this effectively, it could determine if it had gained an advantage in the relation between events, timelike or spacelike intervals. These intervals display an advantage in either time or space. This information would be useful to the MEF commander and his staff because it would show them if their adversary held an advantage over them, then they could try to reverse this advantage in favor of the MEF.

CHAPTER 6

CONCLUSIONS

ANALYSIS OF FINDINGS

Marine Corps doctrine does address time and space issues quite extensively, in both their doctrinal publications as well as their warfighting publications. The author believes that, in lieu of their maneuver warfighting doctrine, the Corps would be better served to adopt the understanding of spacetime – the symbiotic relationship that space and time are interconnected in the fourth dimension. This understanding would enable the Marine Corps to fully examine the relevance of spacetime and its related benefits to their doctrine (e.g., event intervals; spacelike and timelike).

The Marine Corps must adopt a common definition of momentum. This word is used as a principle in the concept of OMFTS, but it is never defined the way that tempo is described in both doctrinal and warfighting publications. The inability to define momentum may confuse readers who interpret it on their own, as opposed to the way the

Marine Corps wants it understood. The author's recommendation is that the Marine Corps define momentum before it adopts OMFTS as full-fledged doctrine.

The Marine Corps' expansion of technological advancements in pursuance of OMFTS must not negate the issue of achieving faster command and control. The MV-22 Osprey and the Advanced Amphibious Assault Vehicle will double the amount of battlespace they can pass through over the current systems in the Marine Corps inventory, but this speed will be negated if the staff and their commander cannot make faster decisions that lead toward faster execution.

It is the author's belief that the II MEF information management (IM) plan does not define how it intends to generate tempo and momentum. The IM annex to their existing JTF SOP is merely a guide to how systems work (e.g., e-mail, VTC, COP), and it does not address how these systems work in unison with one another to help the commander reach a necessary decision. Therefore, the IM annex needs to be re-written in a way that it aligns itself with each of the principles of OMFTS, specifically the principle related to generating tempo and momentum. This will allow both the staff and their commander to have a common understanding of how they will achieve their goals in decision-making and execution.

RECOMMENDATIONS FOR FURTHER RESEARCH

Bayes' law has utility for simulations with regard to determining predictive variables that can lead a staff and their commander to achieving a short-term future predictive. Until the MEF can achieve an advantage in future time, through technological and cognitive means, this simulation may be their best alternative. The understanding of

Bayes' law requires further detailed analysis to determine if it has significance in determining the probability of the MEF gaining a spacelike or timelike advantage over an adversary.

Secondly, the Marine Corps must analyze the impact that OMFTS in a spacetime dimension has on their ability to logistically sustain it afloat and ashore. As mobility systems increase range and distance through space, and faster C^2 increases the speed in decision-making, the ability to keep Marine forces sustained will be ever increasing for logisticians.

Third, the MEF must learn to define and describe their enemy in such a way that can articulate to the entire staff and their commander how fast, in planning and execution, their adversary is capable of working within. This information, coupled with predictive simulations and their vulnerabilities (e.g., logistical sustainment in an OMFTS environment) should provide the MEF with a prediction for how fast they must operate in order to generate the tempo and momentum necessary to gain an advantage over their adversary. In a spacetime dimension, this information would provide the MEF the knowledge necessary for them to dictate the pace of operations and the events that would occur leading toward their enemy's culmination.

GLOSSARY¹

AAAV	Advanced Amphibious Assault Vehicle
ACE	Aviation Combat Element
BSSG	Brigade Service Support Group
CAS	Close Air Support
CAT	Crisis Action Team
CCIR	Commanders Critical Information Requirements
CE	Command Element
CENTCOM	U.S. Central Command
CG	Center of Gravity
CINC	Commander-in-Chief
CMC	Commandant of the Marine Corps
C ²	Command & Control
C ³	Command, Control, & Communications
C ⁴ I	Command, Control, Communications, Computers & Intelligence
C ² S	Command & Control Support
C ² W	Command & Control Warfare

¹ MCRP 5-12D, *Organization of Marine Corps Forces*, Appendix A.

COP	Common Operating Picture
CSS	Combat Service Support
CSSE	Combat Service Support Element
CV	Critical Vulnerability
DoD	Department of Defense
DP	Decision Point
FLEX	Fleet Landing Exercise
FMFM	Fleet Marine Force Manual
FSPG	Force Structure Planning Group
FSSG	Force Service Support Group
GCE	Ground Combat Element
HA	Humanitarian Assistance
IO	Information Operations
ISR	Intelligence, Surveillance & Reconnaissance
JFC	Joint Force Commander
JTF	Joint Task Force
LCAC	Landing Craft Air Cushioned
MAGTF	Marine Air-Ground Task Force
MARFORRES	Marine Forces Reserve

MAG	Marine Air Group
MAW	Marine Air Wing
MCDP	Marine Corps Doctrinal Publication
MCRP	Marine Corps Reference Publication
MCWP	Marine Corps Warfighting Publication
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
METT-T	Mission, Enemy, Troops, Terrain, & Time
MEU	Marine Expeditionary Unit
MPF	Maritime Preposition Force
MSTP	Marine Air Ground Task Force Staff Training Program
NEF	Naval Expeditionary Force
NEO	Non-Combatant Evacuation Operation
OMFTS	Operational Maneuver from the Sea
OPSEC	Operations Security
RLT	Regimental Landing Team
SPMAGTF	Special Purpose Marine Air Ground Task Force
STOM	Ship-to-Objective Maneuver

USMC

United States Marine Corps

VTC

Video Teleconference

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