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NETWORK-CENTRIC WARFARE: MANEUVER, ATTRITION AND THE AMERICAN WAY OF WAR

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CONTENTS

ABSTRACT

Advances in communications, weaponry and computers combined with the end of the Cold War has fuelled a Revolution in Military Affairs and an explosion of divergent ideas on the future of war. This merger of technology and ideas is transforming the way the United States military equips and fights. At the forefront of this transformation is the theory of Network-Centric Warfare (NCW), a concept that is likely to determine the force structure and doctrine of Western Militaries for the foreseeable future.

This paper contends that Network-Centric Warfare, as currently envisioned by the US military, is not an emerging theory of war but a form of attrition warfare. To prove this thesis, the NCW concepts espoused by the Office of Force Transformation were examined in detail. So to were the warfare theories of John Boyd, a prominent military theorist and synthesizer of ideas. These were then used as the basis to conduct a careful assessment of NCW in light of Boyd's models of attrition, maneuver and moral conflict. This demonstrated that NCW is most properly classified as a form of attrition warfare, in keeping with 150 years of US military tradition that has placed a premium on the use of technology to achieve victory through the destruction of the enemy.

It is not the purpose of this paper to assess the utility of attrition as a way of war nor to claim the technology of NCW is necessarily attritionist. Rather it is to challenge military professionals to recognize the direction that current NCW theory is taking the US military. It will be up to the military to develop the technology and doctrine in a way the best meets the needs of the American people, whether the approach is attritionist, maneuverist or something altogether different.

CHAPTER 1

INTRODUCTION

Warfare is not 'network centric.' It is either 'people centric' or it has no centre at all.

- Lt Gen William Wallace, USA

Network-Centric Warfare (NCW) is ostensibly a theory about how one can or should employ new and emergent technology to conduct war at the strategic, operational and tactical levels. The intent of this paper is to examine the NCW with respect to an established theoretical construct of war to determine if it is indeed an "… emerging theory of war."[1] It is not to critique the wisdom or efficacy of the technology or even the employment of that technology in conflict. Rather it will seek to explore the underlying nature of the war that NCW, as advocated by the US military, will bring to the battlefield.

INTRODUCTION

In Millennium Challenge 2002, the US Department of Defense (DOD) held a $250 million war game in the Eastern Mediterranean designed to test the new technologies and concepts of transformation and network-centric warfare.[2] The opposition forces were commanded by Lt. Gen. Paul Van Riper, a former president of the Marine Corps University, simulating a regional power.[3] During the first days of the "Free Play" (i.e. unscripted engagements where the opposition forces were free to set there own tactics) the Red forces were able to launch a pre-emptive strike and cause

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[1] Office of Force Transformation, ed., *The Implementation of Network Centric Warfare* (Washington, D.C.: Force Transformation, Office of the Secretary of Defense, 2005), www.dodccrp.org, 15

[2] Joint Doctrine Division of the Joint Warfighting Center, United States Joint Forces Command., *Pamphlet for Future Joint Operations : Bridging the Gap between Concepts and Doctrine* (Suffolk, VA: Joint Warfighting Center, United States Joint Forces Command,[2006]), 7-12

[3] This has been variously claimed to be Iran, Iraq or Israel.

significant damage. By striking first and using unconventional tactics, General Van Riper's forces reportedly were able to sink 16 ships including an aircraft carrier.[4] After the attacks the "lost" ships of the American force were reactivated and the Red force freedom of action was restrained. Van Riper subsequently quit his position complaining that the exercise had been scripted for American victory.[5]

Revolution in Military Affairs

Millennium Challenge 2002 and the technologies and doctrine that it was intended to test and validate were the outgrowth of the ongoing Revolution in Military Affairs (RMA). The RMA, as envisioned by the US, seeks to use new technology to transform the ways in which military units conduct war. This is to be done primarily by adopting the same technologies and concepts that are transforming the business world. In short, the Department of Defense is attempting to move from the Industrial to the Information age in the same way that the commercial sector is doing.[6] The underlying technologies are those that have fuelled the information age, the computer and communications technologies combined with quantum improvements in sensor and precision weapon technologies. The result will be, proponents claim, the ability to see a "battlefield" as large as forty thousand square miles with unprecedented precision, understanding, and timeliness, regardless of time or environmental conditions.

> The commander will know the precise location and activity of enemy units-even those attempting to cloak their movements by operating at night or in poor weather, or by hiding behind mountains or under trees. He will have instant access to information about the U.S. military force and its movements, enabling him to direct nearly instantaneous air strikes,

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[4] Mark F. Cancian, "Seeing through the Fog of War," *Proceedings of the U.S. Naval Institute* 130, no. 2 (February 2004, 2004), http://proquest.umi.com (accessed 23 March 2007), 53

[5] *Battle Plan Under Fire/A New York Television Production to NOVA*, DVD, directed by C. Scott Willis (Boston, MA: WGBH, 2004), http://www.pbs.org/wgbh/nova/wartech/nature.html (accessed 4 April 2007)

[6] William A. Owens, *Lifting the Fog of War* (New York, NY: Farrar, Straus and Giroux, 2000), 10

> artillery fire, and infantry assaults, thwarting any attempt by the enemy to launch his own attack.[7]

The concept that will enable this is the "system of systems" or Network-Centric Warfare.

Network-Centric Warfare (NCW)

There are many who see NCW as revolutionizing the way the US military will fight, among the most ardent supporter being the late Vice Admiral (retired) Arthur Cebrowski, Director of the Office of Force Transformation (OFT). He stated that "our military is embracing NCW. All of the Service and Joint Transformation roadmaps are based on a central principle. This is helping to create and maintain a decisive warfighting advantage for U.S. forces."[8]

The advantage the US anticipates is that Network-Centric Warfare will generate increased combat power by networking sensors, decision makers, and shooters. The networking creates a shared awareness, which will result in faster decision making and a high degree of self-synchronization. This, combined with information superiority and enhanced lethality, in turn allows for a higher tempo of operations.[9] The Department of Defense believes that this dominance of the information domain, along with other attributes, qualifies NCW as a new theory of war.

The Nature of Warfare

To determine if NCW truly is a new theory of war it will be necessary to examine it with respect to current theories. If it truly is a new theory, current theories should be inadequate to fully comprehend NCW. While there are countless theories of war those of

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[7] Ibid., 14-15
[8] Office of Force Transformation, *The Implementation of Network Centric Warfare*, i
[9] David S. Alberts, John Garstka and Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority* (Washington, DC: National Defense University Press, 2000), 284, www.dodccrp.org, .2

the late Colonel John Boyd (retired) are best suited to examine NCW. Colonel Boyd was an Air Force officer who would eventually become a driving force in the military reform movement of the 1970's and 80's and warrants, according to Colin Gray, "honorable mention as an outstanding general theorist of strategy."[10]

Boyd's theories of conflict are ideal for analyzing NCW not merely for their comprehensive nature but because advocates of NCW often speak in terms coined and promoted by Boyd. Boyd hypothesized three categorized types of conflict: attrition, maneuver or moral. To provide historical context, the American way of war in the 20th century will also be reviewed.

Analyzing NCW

By c the characteristics of NCW against Boyd's theories of conflict it will be possible to determine the deeper nature of NCW beyond the claims and rhetoric. A comparison of the attributes of warfare, according to Boyd's models, will provide insight into the nature of NCW. By examining NCW's relationship with respect to Boyd's concepts of focus, emphasis, nature, means, end, requirements and characteristics the nature of NCW will become evident. A deeper examination of the concepts of combat power, compression of the levels of war, and self-synchronization and how they relate to NCW will further illuminate the nature of Network-Centric Warfare.

Thesis

This paper will prove that Network-Centric Warfare is not an emerging theory of war but should be considered a form of attrition warfare when assessed using the theories of conflict of John Boyd.

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[10] Colin S. Gray, *Modern Strategy* (New York, NY: Oxford University Press, 1999), 91

CHAPTER 2

NETWORK-CENTRIC WARFARE

INTRODUCTION

Since the end of the Cold War there has been an explosion of thought and writing on the future of war, the nature of conflict and on military theory. These writings have run the gamut from predicting the end of the Western way of making war as espoused by Martin Van Creveld to Alvin and Heidi Toffler's theory of "third wave" high-technology, information warfare.[11] Then there are others, such as Ralph Peters or Robert Kaplan, who offer a vision of a world of failed and failing states and non-state actors engaged in asymmetric conflicts.[12] The challenge for military professionals in this complex environment is to avoid the urge to "… consign Carl von Clausewitz to the dustbin of history" and instead "… to learn how to fight effectively across the spectrum of conflict."[13] The U.S. Department of Defense (DOD) has turned to a NCW theory of war to addresses this formidable undertaking.[14]

The Office of Transformation defines Network-Centric Warfare as:

> … an information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality,

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[11] Van Creveld is noted for his book *The Transformation of War* (1991) where he proposes a "non-Trinitarian model of war. The Toffler's books *The Third Wave* and *War and Anti-war* propose that society is entering a post-industrial age that will determine the way war is conducted with information being the dominant factor.

[12] Ralph Peters, a retired army officer, has written extensively for military journals. Robert Kaplan is a journalist and writer. *The Coming Anarchy: Shattering the Dreams of the Post Cold War (2000)* and *Imperial Grunts: The American Military on the Ground (2005)* promote the idea of failing states dominating American security concerns.

[13] Michael Evans, "From Kadesh to Kandahar: Military Theory and the Future of War," *Naval War College Review* 56, no. 3 (Summer 2003), 132-150, http://proquest.umi.com, 138, 140

[14] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 17

> increased survivability, and a degree of self-synchronization. In essence, NCW translates information superiority into combat power by effectively linking knowledgeable entities in the battlespace.[15]

In essence, Network Centric Warfare is seen by the Department of Defense and other advocates as "an emerging theory of war", one that will transition the US military from the Industrial Age to the Information Age.[16] The term refers not only to the technology and equipment but also the tactics, techniques, procedures, command and control, organizations and strategies that a networked force would employ to achieve a decisive warfighting advantage. Although human behaviour is at the centre of Network-Centric Warfare, this warfighting advantage would stem from a level of shared situational awareness only possible through networking.[17]

By linking sensors, decision makers, and shooters into a "system of systems" one is able to achieve this networking advantage.[18] This networking results in a shared situational awareness, increased speed of command, a higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization that translates information advantage into increased combat power.[19]

ORIGINS OF NETWORK-CENTRIC WARFARE

Networks designed to create shared situational awareness, such as tactical data links, have been around for many years but the origins of Network-Centric Warfare are quite recent. The concept of "network-centric warfare" was first described fully in print

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[15] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2
[16] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 3
[17] Ibid., 4
[18] Owens, *Lifting the Fog of War*, 98-103
[19] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 4

in a 1998 *U.S. Naval Institute Proceedings* article titled *Network-Centric Warfare, Its Origins and Future*.[20] Since that article there have been a number of developments, both conceptual and practical, in the American theories comprising Network-Centric Warfare, however the "canon" for the US DOD are the Information Age Transformation Series of books published by the Department of Defense Command and Control Research Program (CCRP). *Network Centric Warfare: Developing and Leveraging Information Superiority* forms the intellectual basis for the DOD NCW theory within the transformation framework.[21] Most of the concepts that will be discussed in this chapter are derived from the work of the CCRP.[22]

The *Proceedings* article helped to focus the thinking on the Revolution in Military Affairs. The authors advanced the idea that today's RMA is the confluence of economics, information technology and business practices and compared the potential impact of NCW to the transformational impact of the French concept of the *levee en masse* during the Napoleonic period.[23] This thinking built upon the latest trends in the business world and the writings of Alvin and Heidi Toffler.[24] These ideas had enormous impact in the halls of power particularly within the George W. Bush administration. Echoing the thinking of the Tofflers, Deputy Secretary of Defense Paul Wolfowitz, summed up what was by then accepted wisdom in an October 2002 speech:

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[20] Arthur K Cebrowski and John J. Garstka, "Network-Centric Warfare: Its Origin and Future," *United States Naval Institute. Proceedings* 124, no. 1 (Jan 1998, 1998), http://proquest.umi.com, 28-35

[21] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 5

[22] CCRP Publications of note *include Network Centric Warfare: Developing and Leveraging Information Superiority* by Alberts, Garstka, and Stein (1999), *Understanding Information Age Warfare* by Alberts, Garstka, Hayes, and Signori (2001), *Power to the Edge: Command ... Control ... in the Information Age* by Alberts and Hayes (2003), and *Effects-Based Operations: Applying Network-Centric Warfare in Peace, Crisis and War* by Smith (2003). These publications are available at http://www.dodccrp.org

[23] Cebrowski and Garstka, *Network-Centric Warfare: Its Origin and Future*, 28

[24] Alvin Toffler and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston, MA: Little, Brown, 1993), 4-5, 57

> Throughout history, warfare has assumed the characteristics of its age and the technology of its age. Today we see this trend continuing as we move from the Industrial Age warfare with its emphasis on mass to Information Age warfare, which highlights the power of networked distributed forces and shared situational awareness.[25]

Central to this belief is the theory that power flows from the ways societies create economic power and wealth. When there are shifts in these ways, as from an agricultural to an industrial society, there will be a corresponding shift in military power that mirrors that of society. This, proponents state, is what is happening today as the Western World changes from economies powered by industry to ones powered by information.[26]

It is unquestioned that the major advances in information technology are now being driven primarily by the demands of the commercial sector and not the military. The ongoing technological explosion has both unleashed and subsequently been fuelled by the information age where the ability of the human being to operate in the information domain has increased exponentially, enormously impacting the way people attain wealth and power.[27] This is changing society and the way we do business and, to paraphrase Wolfowitz and the Tofflers, the way we do business is the way we generate military power and wage war. For the US, as the world's economic superpower and foremost innovator, with its innate advantage in this arena, it is unsurprising that its leaders would gravitate to a theory that expounds economic power and business processes as key to military power.[28]

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[25] Paul Wolfowitz, *Government Electronics and Information Technology Association Remarks by Deputy Secretary of Defense Paul Wolfowitz, Vienna, VA , Wednesday, October 30, 2002*Office of the Assistant Secretary of Defense (Public Affairs), 2002), http://www.defenselink.mil

[26] John Arquillan and David Ronfeldt, *In Athena's Camp: Preparing for Conflict in the Information Age* (Santa monica, CA: Rand, 1997), 114-5

[27] Ibid., 296-8

[28] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 18

This vision of military power was certainly one held by George W. Bush even before his election to the Presidency.[29] It is therefore unsurprising that Bush selected Donald Rumsfeld, an advocate of military reform since his days in the Nixon White House, to be his Secretary of Defense. Rumsfeld proved enthusiastic with the concepts of a Network enabled military and set about revamping the military with zeal.[30] He established the Office of Force Transformation in October 2001 and gave it the mission of synchronizing all of the transformation efforts of the services putting the late Vice Admiral Arthur K. Cebrowski (retired) in charge.[31] An early promoter of NCW and coauthor of the original *Proceedings* article, Cebrowski enshrined NCW as the goal of transformation and repeatedly declared that transformation programs in the services would be judged by the extent to which they approached the NCW ideal.[32]

Proponents have asserted that while NCW will not alter the nature of war as a human endeavor subject to violence, danger and risk, it will fundamentally change the character of war.[33] They contend that it will usher in a new era of warfare by enabling a methodology so basic yet powerful that all information age societies will adopt it and that all previous methods of waging war will be vulnerable to it. As Cebrowski puts it:

> What we are seeing, in moving from the Industrial Age to the Information Age, is what amounts to a new theory of war: power comes from a different place, it is used in different ways, it achieves different effects than it did before. During the Industrial Age, power came from mass. Now power tends to come from information, access, and speed. We have come to call that new theory of war network-centric warfare. It is not only about

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[29] George W. Bush, *George W. Bush: A Period of Consequences* (Charleston, SC: Citadel News Service, 1999), http://pao.citadel.edu/pres_bush (accessed 19 April 2007)
[30] Donald Rumsfeld, *Secretary Rumsfeld Delivers a Major Speech on Transformation*, 2002), http://www.au.af.mil (accessed 11 March 2007).
[31] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 31
[32] Frederick W. Kagan, "War and Aftermath," *Policy Review Online* August/September 2003, no. 120 (2003), http://proquest.umi.com (accessed 21 March 2007), 5
[33] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 15

> networks, but also about how wars are fought—how power is developed.[34]

Cebrowski believes that forces that are networked and whose organizational relationships and processes are optimized for information sharing at all levels will outperform those forces that are not.[35] This, however, does not mean that NCW theory throws out the theories of earlier strategists. Michael Handel of the Naval War College concluded that:

> … while the classic strategic theories of war may require adaptation to a changing environment such as we are experiencing in the Information Age and in the conduct of the global war on terror, they remain fundamentally intact. The logic of waging war and of strategic thinking is as universal and timeless as human nature itself.[36]

Sun Tzu, Clausewitz, Jomini and others remain as relevant today as ever. What has changed is the metrics by which we measure and apply power. Instead of measuring power in terms of numbers and mass, DOD NCW theory proposes to rely on speed, rates of change, operational and tactical innovation thus creating what they claim is a marked shift from other forms of warfare. These ideas lie at the heart of the DOD view of NCW theory.[37]

THE US MILITARY THEORY OF NETWORK-CENTRIC WARFARE

In order to assess NCW it is essential to define NCW as the United States military understands it for it is their ideas on NCW that will determine the ultimate nature of this theory. Accordingly, it is not the intention to prove or disprove these claims but rather to understand the American viewpoint.

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[34] Ibid., 14
[35] Ibid., i
[36] Ibid., 16
[37] Ibid., 16

The Office of Transformation sees Network-Centric Warfare as not merely the latest round of weapons systems acquisitions but playing the predominant role in US Military Transformation. Of the four major defense policy goals: assuring allies and friends; dissuading future military competition; deterring threats and coercion against US interests; NCW, is at the center of the final policy goal, i.e. if deterrence fails, decisively defeating any adversary.[38] Defeating the enemy will not rely exclusively on technological solutions but rather on the ability of the US military to address human and organizational behavior issues in adopting a network-centric way of thinking and applying it to military operations. These operations will be focused on networking that, through synchronization and speed of command, will increase lethality, survivability, and responsiveness and thus generate unprecedented combat power.[39] The US Army defines combat power as:

> …the ability to fight. It is the total means of destructive or disruptive force, or both, that a military unit or formation can apply against the adversary at a given time.…Commanders do this by synchronizing the elements of friendly force combat power to create overwhelming effects at the decisive time and place. Focused combat power ensures success and denies an enemy any chance to maintain coherent resistance. Massed effects created by synchronizing the elements of combat power are the surest means of limiting friendly casualties and swiftly ending a campaign or operation.[40]

Drawing much of the thinking from analogies within the business sector, it is not surprising that DOD NCW theory views the basic elements necessary to generate this

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[38] Ibid., 5
[39] Ibid., 88
[40] United States, Department of the Army, *Operations*, Vol. FM 3-0 (Washington, DC: Headquaters, Department of the Army, 2001), 4-3

combat power as similar to a business.[41] The infostructure can be considered the foundation of NCW. It facilitates shared awareness and knowledge which in turn leads to self-synchronization and offers the potential for more flexible and responsive command and control structures and processes.[42] Ultimately, it is believed that NCW will decrease risks and costs (in men and material) while increasing tempo, responsiveness, and, most importantly, combat effectiveness.[43]

An important concept inherent in the DOD view of NCW is the concept of the massing of fires. This allows the military, particularly the army, to move away from the traditional approach of massing of forces to one based upon the massing of effects. Mass, once necessary to create a sufficient weight of fires, can be abandoned or reduced thus shrinking the size and number of high-value targets available to the enemy.[44] Additionally, NCW theory expands the concept of maneuver by reducing the need to physically move units to concentrate fires. The result is that an actor can "be" in more than one place at a time, or more accurately, the effects he creates can be in more than one place. In other words, the shooter or sensor can engage different targets without having to move.[45] Maneuver, once associated only with units, can now be constituted of both units and fires.[46]

For the military professional the concept of combat power is easily understood, however, the concept of Network-Centric Warfare is more difficult. The Office of Force

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[41] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 25-52, 54
[42] Ibid., 88
[43] Ibid., 90
[44] Office of Force Transformation, *The Implementation of Network Centric Warfare*, ii
[45] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 91

Transformation views NCW theory as being based on four domains of conflict—the physical, information, cognitive, and social domains. The Physical Domain is where combat power has traditionally been measured in terms of numbers and mass. The Information Domain is where information is created, manipulated, and shared and where sensors and their processes are found. Also, this is where "finished" intelligence resides and the commander's intent is conveyed. The Cognitive Domain resides in the mind of the war fighter and includes the commander's intent, doctrine, tactics, techniques and procedures. Finally, the Social Domain is where humans act, share information and understanding and make collaborative decisions.[47] It is the intersection of these four domains that information superiority and thus Network-Centric Warfare exist (figure 1).[48]

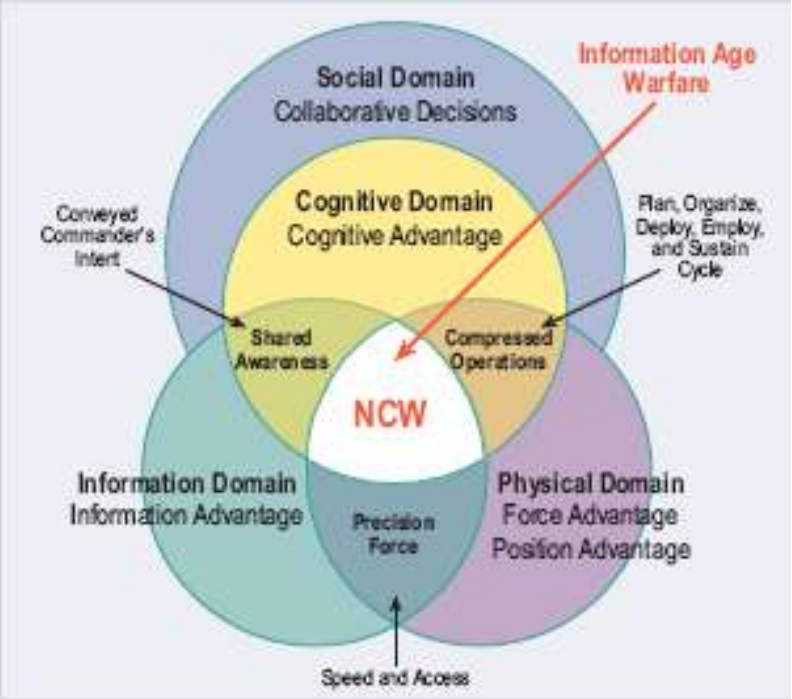

Figure 1 Domains of Conflict

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[46] Robert R. Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle* (Novato, CA: Presidio Press, 1991), 179 This is the concept of interchangeability. Leonard discusses the flaws in this concept at some length.

[47] Edward R. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War* (Washington, DC: Dept. of Defense-CCRP, 2002), 113

[48] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 20-21

Source: Office of Force Transformation, *The Implementation of Network-Centric Warfare*, 21.

Information Superiority

The concept of information superiority lies at the heart of NCW and can be described as the ability to collect, process, and disseminate information while exploiting and denying an adversary's ability to do the same.[49] In NCW theory, the important dimensions of information are relevance, accuracy and timeliness as the control of these aspects determines the degree of information superiority.[50] The U.S. seeks to both generate and exploit information superiority by adopting Network-Centric concepts.[51]

It is important to understand that information superiority is not sought for its own sake but for what it can enable. In that way it is analogous to air superiority, a capability not valued for itself, but for what it adds to offensive and defensive operations.[52] Achieving information superiority increases the speed of command thus preempting adversary options, creating new options, and improving the effectiveness of selected options. The result is an increased tempo of operations.[53]

Battlespace Entities

All military personnel and equipment that can interact in the infostructure are known as battlespace entities and they are grouped according to their primary functional

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[49] United States. Dept. of Defense, *Information Operations*, Vol. 3-13 (Washington, D.C.: Chairman of the Joint Chiefs of Staff, 2006), Various pagings, http://www.dtic.mil (accessed 23 March 2007).I-5

[50] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 34

[51] Ibid., 55

[52] David S. Alberts and others, *Understanding Information Age Warfare* (Washington, D.C.: CCRP Publication Series, 2001), 312, http://www.dodccrp.org/html3/pubs_download.html (accessed 12 March 2007), 31

[53] Ibid., 281

modes as sensors, actors and decision makers.[54] It is these sensors, actors and decision makers that comprise the infostructure and it is the extent and nature of their interactions that generates the power of NCW.[55]

Sensors include all entities that contribute to battlespace awareness, from satellites to "eyes on the ground." Actors are those entities that have the primary function of generating combat power through lethal and non-lethal means. Decision makers do exactly that and exist at all levels of the organization.[56] Each entity adds value by contributing to either battlespace awareness or knowledge, command and control, and decision making or execution. Thus, the sensor entities contribute information which forms the basis for battlespace awareness and knowledge; the decision entities exercise command and control through planning and battle management; and the actors execute the plan.[57]

These same entities are found on the conventional battlespace; however, the major difference is that in NCW actors do not inherently own sensors and decision makers do not inherently own actors. Within NCW, all three types of entities work collaboratively in response to the dynamics of the battlespace to achieve commanders' intent.[58] Ideally, NCW, by linking all entities, will merge battle management, planning, and execution into an integrated, dynamic adaptive process. The result, argue proponents, is a more agile force and a compression of the strategic, operational, and tactical levels of war.[59]

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[54] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 75 p11
[55] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 93
[56] Ibid., 116
[57] Ibid., 123
[58] Ibid., 120
[59] Ibid., 121

Battlespace Awareness and Knowledge

Battlespace knowledge is derived from shared battlespace awareness and a Common Operating Picture (COP), a view of the battlespace that is shared by all battlespace entities. NCW theory demands that the COP be an accurate portrayal of the battlespace and delivered in time to aid decision-making. The COP is the product of the collecting, analyzing, and transmitting information from multiple sources in such a way that it can be rapidly understood and used.[60] Actors and decision entities must therefore be equipped and trained to understand and exploit this information. Thus, battlespace awareness is not merely what is displayed on the COP but exists in the mind of the commander, part of both the cognitive and information domains.[61]

Command and Control

The CCRP described Command and control as an "iterative decision making process, as feedback from the battlespace is incorporated into plans and corrective actions."[62] Traditionally, the biggest concern a commander has been in recognizing and understanding the exact nature of a problem in a complex battlespace. To address this issue the traditional approach has been to decompose the process, to break it into a series of steps. This essentially linear process tackles a complex military campaign by carving it up into manageable pieces leaving decision-makers to deal with these smaller problems or tasks.[63]

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[60] Ibid., 133
[61] Alberts and others, *Understanding Information Age Warfare*, 139
[62] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 69
[63] David S. Alberts and Richard E. Hayes, *Power to the Edge: Command and Control in the Information Age* (Washington, DC: CCRP Publication Series, 2004), 259, www.dodccrp.org. p44

The view of the CCRP is that the information age and political realities have made this approach obsolete by collapsing the once clear separation among the strategic, operational, and tactical levels of war.[64] Warfare, they argue, is no longer a series of sequential events but one of continuous and concurrent activity all taking place at an increased tempo where the traditional linear planning process is inadequate to deal with a non-linear world.[65] NCW, by reducing or eliminating fog and friction can help to solve this problem. This will involve greater integration between the planning and execution processes and demand collaborative decision making to increase combat power. [66] To leverage this increased battlespace awareness new methods of command and control will be required that in turn will require changes in doctrine and the very structure of military organizations. [67]

These changes in command and control have not yet been implemented in a system to take advantage of NCW; however the potential problems are readily evident. In particular, adjustments will have to be made in order to keep the span of control at workable level. Traditionally, large organizations have created many levels of management for just this reason. It is well recognized, however, that this slows information flow making the organization ungainly. To speed up the flow of enormous amounts of information available under NCW, levels of management will have to be eliminated.[68]

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[64] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 70

[65] It is by no means universally accepted that war was a strictly linear phenomenon prior to the information age. See Leonard in *The Art of Maneuver Warfare*.

[66] Ibid., 70

[67] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*. The need for new C2 structures in light of the Information Age is the book's underlying premise.

[68] Ibid., 182

This will be made even more important as sensors and actors will be decoupled from one another and their supporting platforms resulting in a great increase in the number of battlespace entities. This proliferation would slow choke a conventional command and control system with the need for increased layers. The resulting loss of agility and slowing of information flow would be unacceptable. NCW organizations will have to flatten hierarchies to free information flow and increase the speed of command.[69]

Under a NCW construct, the C2 process would focus on the sharing of the decisions a commander makes, the commander's perception of the situation, and his intent. This will be vital as the speed of operations, particularly those of the enemy, and the drive to increase tempo cause C2 and execution processes to merge into a single, integrated process. The C2 system must therefore take advantage of collaborative planning and execution and self-synchronized operations to create increased combat power.[70]

These opportunities to revolutionize the C2 will come about for a variety of reasons. Firstly, decision entities (C2 elements) and actor entities will be more knowledgeable and they will be better connected than ever before. Equally important, the sensor entities will be more responsive and the footprint of all entities will be much smaller.[71] This will permit a decision-making process that focuses on the enemy and not on self-protection.

CCRP asserts that any new model of Command and Control will have to consider a number of concepts that will impact on operations. One concept is Speed of Command,

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[69] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 82
[70] Ibid., 157-8
[71] Ibid., 158

the time it takes to recognize, understand, decide and act. Generally, the faster the better and it directly impacts tempo, a key advantage of NCW. The decoupling of platforms, sensors and actors will give a larger engagement envelope, including beyond line of sight engagement, at the same time reducing exposure to fires and increasing tempo. More importantly, the ability to mass effects without massing actors must be factored into the C2 system.[72]

Of primary importance to any NCW C2 structure is to account for and optimize the concept of self-synchronization. Self-synchronization occurs as a mode of interaction between two or more entities when, armed with guidance and a rule set, they work together towards a common goal without explicit instructions to do so (self-synchronization will be discussed in detail in chapter 4).[73] Self-synchronization provides the "ultimate in achieving increased tempo and responsiveness."[74] In general, the American view is that all of these efforts can be used to increase tempo.[75]

Any of these improvements, by themselves, will have only a small effect on combat power; however, taken together the effects are highly synergistic. This means that should a networked force operate according to the tenets and principles of NCW it will be able to generate significantly more combat power. Proponents claim that this will have a marked effect allowing the "possibility of moving beyond a strategy based upon attrition, to one based upon shock and awe."[76] Shock and awe is predicated on the use of

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[72] Ibid., 163-183
[73] Alberts and others, *Understanding Information Age Warfare*, 219
[74] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 175
[75] Ibid., 180
[76] Kagan, *War and Aftermath*, 21 March 2007.

overwhelming, decisive force usually combined with spectacular displays of power that attempt to paralyze the adversary and destroy his will to fight. [77]

This future battlespace will be fast-paced and complex but NCW advocates see important new tools to deal with this complexity. System behaviours can become unpredictably unstable or chaotic but they believe that NCW gives the commander more to work with to tame complexity.[78]

Tenets and Principles of Network-Centric Warfare

Vital to this leveraging of technology is a co-evolution of organization, doctrine, and technology to unleash the full potential of this concept.[79] It is the tenets and principles that form the basis for developing NCW doctrine to obtain a warfighting advantage. The Office of Force Transformation identifies four tenets. Firstly, a robustly networked force improves information sharing. Secondly, this improved information sharing enhances the quality of information and creates a shared situational awareness. Thirdly, by building this shared situational awareness, collaboration and self-synchronization become possible, and sustainability and speed of command are enhanced. Fourthly, these properties result in a dramatic increase in combat effectiveness.[80]

The Office of Force Transformation in *Implementation of Network-Centric Warfare* proposes a set of governing principle to supplement the tenets.[81] The most basic

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[77] Harlan K. Ullman, James P. Wade and L. A. Eddy, *Shock and Awe: Achieving Rapid Dominance* (Washington, DC: National Defense University Press, 1996), 199. The authors provide a detailed overview of the shock and awe concept.
[78] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 161
[79] Ibid., 3
[80] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 7
[81] Ibid., 8-10

principle is to fight first for information superiority by creating an information advantage through timeliness, accuracy and relevancy of the information exchanged. This is essential for if a force cedes the information domain to the enemy it would be cultivating defeat. This information must then be used to create a shared awareness. This requires an organization that is able to translate information into knowledge and a common understanding and situational awareness for all participants. Information advantage should also be used to promote speed of command by creating processes and procedures not possible for non-networked organizations. Shared awareness and the commander's intent can be used to facilitate self-synchronization to allow low-level forces to operate nearly autonomously and to take initiative.

Forces should be dispersed and de-massed. Dispersed forces will make non-contiguous operations possible as combat power moves from the linear to the non-linear battlespace and demassification will move operations away from an approach based on geographic massing of forces to one based upon massing effects. This reduces the vulnerability of friendly forces to enemy fires.

A Network-Centric force must take advantage of deep sensor reach, expanding the use of deployable, distributed, and networked sensors that detect actionable information on items of interest at operationally relevant ranges. This helps to compress operations at all levels of war and creates the need to eliminate procedural boundaries between Services and within processes so that joint operations are conducted at the lowest organizational levels possible to achieve rapid and decisive effects.

Finally, a Network-Centric Force must be willing to alter initial conditions at higher rates of change. By exploiting the principles of shared awareness, self-

synchronization, dispersed and de-massed forces, deep sensor reach, compressed operations and levels of war, and rapid speed of command, joint forces will be able to swiftly identify, adapt to, and change an opponent's operating context to their advantage. Warfare, as a complex system, is highly path-dependent on initial conditions hence the imperative to control these conditions.[82]

These principles are intended to augment rather than supplant the time-honoured principles of war such as Selection and Maintenance of the Aim, Morale and Economy of Force. The success of Network-Centric Warfare will depend in large part upon reconciling these new principles with those in use today.[83]

CONCLUSION

There can be no doubt that networked operations provide increased information flow and can dramatically improve at least the perception of situational awareness. This was amply reflected by the ground forces commander, General Franks, when commenting on the ability of the Blue Force Tracking (BFT) system to provide near-real-time locations of his forces: "… I've died and gone to heaven and seen the first bit of net-centric warfare at work!"[84] The challenge for NCW advocates is to translate this information bonanza into increased warfighting capacity.

The Office of Force Transformation sees the power of NCW in the linking of battlespace entities together such that they will each create more combat power than if they were not linked, i.e. we will get more out of each platform. More importantly, the

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[82] Ibid., 9-10
[83] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 7
[84] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 17

synergistic effects of linking all entities, as we have seen, will make the overall effect far greater than the sum of the parts.

This happens as near real-time information sharing among nodes enables potential combat power to be increased and generates shared awareness with increased quality. This in turn allows better decisions to be made more rapidly by the network (i.e. collectively) rather than by individual entities. The power of NCW is derived from empowering all the decision makers rather than just a few. This, advocates claim, combines with the ability to hit many high value targets simultaneously making "Shock and Awe" a viable strategy that can bring a situation to a conclusion far more rapidly than an attrition based approach.[85]

In summary, it is primarily advances in information technology in the areas of command and control, intelligence, surveillance, and reconnaissance, and precision weapons delivery that will deliver the promise of NCW. Proponents claim NCW has the potential to accelerate the decision cycle by linking sensors, communications networks, and weapons systems via an interconnected grid, thereby enhancing our ability to achieve information and decision superiority over an adversary during the conduct of military operations. This will allow not just an increase in the pace of decision making but also the quality of those decisions allowing a higher tempo of military operations. Commanders at all levels will be able to quickly develop and maintain situational awareness and understanding, rapidly communicate critical information to friendly

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[85] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 107

combat forces, and marshal the appropriate capabilities to exert massed effects against an adversary.[86]

To the Office of Force Transformation, NCW offers a promising opportunity to both improve the effectiveness of military operations and to reduce their costs (measured in terms such as number of casualties, collateral damage, and strategic fallout). They believe it promises to raise the art of war to new heights and enables us to compress military campaigns into time frames more consistent with the 21st century world.

[86] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 18

CHAPTER 3

THE NATURE AND THEORY OF WARFARE

INTRODUCTION

Nature of War

Writing in *The Power of Personality in War* in 1911, von Freytag-Loringhoven observed that, "in the future as in the past, war will be conducted man against man; the form will change, the essence will not."[87] That statement, made on the eve of World War I, has proven prophetic as even today, despite our technological advances, war remains a human endeavour. Von Freytag-Loringhoven could have gone farther, however, in describing the unchanging attributes of war for war has not only remained an inherently human endeavour but, as General Paul Van Riper describes it, a "terrible, uncertain, chaotic, bloody business."[88] This too has remained unaffected by technology. Throughout recorded history all wars have contained these elements of violence, chaos, uncertainty and humanity leading to the conclusion that they constitute the true and unchanging nature of war.

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[87] Hugo von Freytag-Loringhoven, *The Power of Personality in War*, trans. Translated from the German by the Historical Section, Army War College, September 1938, under the direction of Oliver L. Spaulding (Harrisburg, PA: Military Service, 1955), 167

[88] Willis, *Battle Plan Under Fire/A New York Television Production to NOVA* General Paul Van Riper is a former president of the Marine Corps University and the Red Force Commander during Exercise Millennium Challenge.

Despite this there have been countless times when various authorities have indeed proclaimed the end of war as we know it.[89] These proclamations have usually followed in the wake of significant changes in technology, economic systems or societal changes. The call for the end-of-warfare-as-we-know-it has followed the industrial revolution, the French revolution, the introduction of the tank, and nuclear weapons. In particular, the pronouncement that a radically new technology will change the fundamentals of war is a time honoured pastime.[90]

This idea of the primacy of technology in influencing (i.e. improving) the conduct of war and its doctrines is deeply ingrained in Western thinking and its modern expression is embodied in the concept of the Revolution in Military Affairs. The idea that it is primarily technology that drives military innovation is evident in the work of prominent thinkers such as John Arquilla and David Ronfledt.[91] They claim in their book *In Athena's Camp* when talking about the period between the two world wars "it was also a time of major technological changes-with improvements in tanks planes and electronic warfare leading to new doctrines that would optimize their use (i.e. blitzkrieg)."[92]

While it is true that tactics and procedures did change to accommodate the new technology, the fundamental doctrine behind blitzkrieg was not new to the Germans, the foundation for blitzkrieg having been laid during the First World War. In blitzkrieg the Germans were applying maneuverist theories of war, the result of lessons learned in WWI, to defeat the attritionist doctrines of the allies. Technology had not given birth to

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[89] Paul K. Van Riper and Robert H Scales, Jr., "Preparing for War in the 21st Century," *Parameters, US Army War College Quarterly* 27, no. 2 (Autumn 1997, 1997), 4

[90] Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, 12

[91] John Arquilla and David Rondfeldt have both written extensively on the RMA.

[92] Arquilla and Ronfeldt, *In Athena's Camp: Preparing for Conflict in the Information Age*,.1

blitzkrieg; rather blitzkrieg had made use of the available and emerging technologies.[93] Regardless of how blitzkrieg arose it can hardly be considered to have changed the nature of war. So, while technology has changed the way we fight wars it is probably true that no technological advance "can change the true nature of war."[94] Certainly the evidence that any have done so to date is less than convincing.

Returning to von Freytag-Loringhoven, he says that the form of war can change and this certainly does seem to apply to technological advances however, it raises the question of how it should be categorized.[95] It seems intuitive that the forms of war will change with time however; theories of war should stand the test of time. If true, the challenge then is to find a theoretical construct of a complex and chaotic system that embodies both science and art. Simply treating war as a science and applying Newtonian mechanics or chaos theory will be insufficient to truly understand war. A theory of war must encompass both the science and the art of war and, if the theoretical framework is to have any lasting meaning or normative value, it must be applicable to war in all its myriad forms.[96]

THEORIES OF WAR

Proponents of Network-Centric Warfare have claimed that it is "an emerging theory of war."[97] To examine that claim, to determine if NCW does represent something new or can be categorized using an existing theory, there are an almost infinite number of

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[93] Frans B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York, NY: Routledge, 2007), 151

[94] Milan Vego, "Net-Centric is Not Decisive," *United States Naval Institute. Proceedings*. 129, no. 1 (January, 2003), http://proquest.umi.com (accessed 19 December 2006), 1

[95] Richard E. Simpkin, *Race to the Swift: Thoughts on 21st Century Warfare* (Washington, D.C.: Brassey's Defence, 1985), 5

[96] Clayton R. Newell, *The Framework of Operational Warfare*, eds. Michael Krause and Andrew Wheatcroft (New York, NY: Routledge, 1991), 9

[97] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 15

theoretical frameworks available today. It is possible to examine NCW using the theories of Clausewitz or Jomini, Sun Tzu or Mahan. With the current "War on Terror" it would seem appropriate to use a theory that embraces the concept of the importance of terrorist and sub-national organizations. The concept of "Generational Warfare" with particular emphasis on 4th Generation warfare might also foot the bill.[98] All of these have limitations. Clausewitz and Jomini are only concerned with conflicts between nation states; Mahan seems suited only for Sea power. Sun Tzu suffers from losses in translation and the distance of time and culture. Generational warfare is only concerned with modern war. If the fundamentals of warfare have not changed then it should be possible to develop a framework that covers all warfare throughout written history. In this respect, the most prominent, comprehensive theory of warfare is articulated by John Boyd in his *Patterns of Conflict* presentation.

Boyd's theories provide and excellent basis to determine whether NCW is attritionist or maneuverist (falls within Boyd's definitions) or is an entirely new theory of war (cannot be explained or categorized using Boyd). This approach is desirable as it is consistent with the claims of NCW itself. The CCRP has drawn heavily on some of the ideas of Boyd including the OODA loop (somewhat disguised at times), tempo, and mission command and uses these NCW concepts to promote the concept as a way to

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[98] William S. Lind and others, "The Changing Face of War: Into the Fourth Generation," *Marine Corps Gazette* 73, no. 10 (October, 1989), 22-26, http://proquest.umi.com (accessed 4 April). The article describes the generations as: 1st Generation - tactics of line and column; which developed in the age of the smoothbore musket; 2nd Generation - tactics of linear fire and movement, with reliance on indirect fire; 3rd Generation- tactics of infiltration to bypass and collapse the enemy's combat forces rather than seeking to close with and destroy them; and defense in depth; 4th Generation - a return to the uncontrolled combat of pre-modern times with non-state actors.

avoid attrition warfare.[99] Also, Boyd's theories, because they address conflict and competition on a fundamental level, are able to deal with not just historical cases but emerging concepts, such as 4th generation warfare.

BOYD'S THEORIES OF WAR

John Boyd is considered by some to be the foremost strategist of the twentieth century, on a par with Sun Tzu.[100] His theories form the basis for Marine Corps and British Defence Doctrine and his Observe, Orient, Decide and Act (OODA) Loop is featured, often without attribution, in a number of US doctrinal publications.[101]

Boyd's theories are ideally suited for assessing NCW or any other new doctrine/technology for Boyd was a synthesizer of ideas gaining insight and inspiration from such diverse fields of study such as physics and philosophy, mathematics and history.[102] Given this it is not surprising that Boyd's theories are considered to have application in areas far removed from the traditional arenas of war embracing business and virtually all forms of human competition.[103]

Based on his historical analysis of war, Boyd hypothesised the existence of three types of conflict or warfare, each of these types is characterized by the conditions (physical and mental) that it seeks to create or exploit, by what the payoff is for creating these conditions and by their ultimate aims. Boyd identified these types of warfare as attrition, maneuver and moral.

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[99] Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War*, 558 p158-183 dismisses the OODA Loop as a somewhat simplistic tactical tool and then proceeds to develop his own model with some striking similarities to Boyd's work.

[100] Robert Coram, *Boyd : The Fighter Pilot Who Changed the Art of War* (Boston: Little, Brown, 2002), op. cit., p.445

[101] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 3

[102] David S. Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis* (Maxwell AFB, AB: Air University Press,[1995]), http://www.maxwell.af.mil (accessed 12 January 2007), 14

The most familiar though somewhat misunderstood is attrition warfare. The First World War is the most obvious example but attrition warfare has been practiced by man for millennia. It is the rise of the nation state and the impact of industrial revolution that has allowed attrition to reach it full destructive potential. Maneuver warfare has also been used throughout history by such diverse groups and individuals as the Mongols, General Stonewall Jackson during the Civil War, and Generals Guderian, Mainstein and General Patton during WWII. Finally, moral warfare is probably much less well known but its significance is enormous. It forms the basis for most insurrections and has been employed successfully by some counter insurgencies.[104]

MANEUVER WARFARE

Boyd's vision of maneuver warfare differs markedly with many other viewpoints.[105] His views are more temporal and psychological than physical and spatial.[106] Despite this de-emphasis of the spatial domain Boyd's "approach tracks extremely well with the nonlinear dynamics of war."[107]

Sun Tzu is generally considered to be the conceptual father of Boyd's ideas. Boyd drew heavily from his work, intrigued by such concepts as the orthodox and unorthodox approach (what Sun Tzu referred to as the cheng/ch'i).[108] Sun Tzu's influence and writings are particularly evident in Boyd's thinking on maneuver warfare.

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[103] Grant Tedrick Hammond, *The Mind of War : John Boyd and American Security* (Washington, DC: Smithsonian Institution Press, 2001), 194
[104] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 166
[105] Simpkins and Leonard, while both advocates of maneuver warfare as was Boyd, differed significantly in some of their definitions. See *Art of Maneuver Warfare* and *The Race to the Swift*
[106] Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, 14
[107] Dr. Linda P. Beckerman, "The Non-Linear Dynamics of War," Science Applications International Corporation, http://www.belisarius.com (accessed December/18, 2006), 9
[108] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, .35

In *Patterns of Conflict*, Boyd defined maneuver warfare (or conflict). He viewed the essence of maneuver conflict was to create, exploit, and magnify ambiguity, deception, novelty, fast transient maneuvers and effort. Ambiguity was necessary to ensure there were alternative or competing impressions of events as they may or may not be. Deception was to leave the enemy with an impression of events as they are not. Novelty helps to leave the enemy with impressions associated with events/ideas that are unfamiliar or have not been experienced before. Fast transient maneuvers are irregular and rapid or abrupt shifts from one maneuver event or state to another. Effort (cheng/ch'i) is defined as an expenditure of energy or an eruption of violence—focused into, or thru, features that permit an organic whole to exist.[109]

Boyd saw that the payoff for these actions would be a disorientation of the enemy as he perceives a mismatch between events he observes and events to which he must react. The enemy will also be disrupted which Boyd described as the "… state of being split-apart, broken-up, or torn asunder." Finally the profusion of threats will push the enemy beyond his mental or physical capacity, a state Boyd referred to as "overload" which he defined as a welter of threatening events/efforts beyond one's mental or physical capacity to adapt or endure.[110]

The aim of this activity is not to destroy the enemy center of gravity as Clausewitz advocates but to "… generate many non-cooperative centers of gravity …" and disorient, disrupt, or overload those that the enemy depends upon.[111] This will "…magnify friction, shatter cohesion, produce paralysis, and bring about his collapse …"

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[109] John R. Boyd, "Patterns of Conflict" (PowerPoint Presentation, tdaxp.com, 1996), http://www.tdaxp.com (accessed 22 March 2007), slide 117
[110] Ibid., slide 117

or expose and create opportunities to exploit weaknesses to fragment the adversary.[112] Boyd hypothesized that maneuver could lead to victory by using "… ambiguity, deception, novelty, mobility, and violence (or threat thereof) …" to generate shock and surprise. These elements would overload the adversary's mental or physical capacities. Fire and movement are used to "… tie-up, divert, or drain-away adversary attention and strength." The intention is to expose the adversary's weaknesses in order to exploit them.[113]

Unlike attrition warfare the indications of a successful application of these principles will usually be more be qualitative rather than quantitative. Success will be manifested in confusion and disorder, enemy units cut off and surrounded, large numbers of prisoners and other indications that the adversary is not adapting to changing circumstances.[114]

At the heart of Boyd's approach is the idea that conflict resides in a time competitive domain. William Lind championed this theory and agreed with Boyd that the essence of maneuver warfare as being made up of "… time-competitive observation-orientation-decision-action cycles."[115] Simply stated, each actor observes his surroundings and then uses this information to orient himself. On the basis of this orientation the actor makes a decision and then carries out that decision (acts). This is a very crude approximation of the OODA (Observer-Orient-Decide-Act) loop first described by Boyd.

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[111] Ibid., slide 117
[112] Ibid., slide 117
[113] Ibid., slide 114
[114] Ibid., slide 114
[115] William S. Lind, *Maneuver Warfare Handbook* (Boulder, CO: Westview Press, 1985), 5

On the surface this does not seem to relate directly to maneuver warfare theory yet the OODA loop is a powerful concept. The key to success in any conflict according to Boyd is found in cycling more rapidly (and accurately) through the loop.[116] The actor that is able to do so more quickly or with more rapidity than his adversary will be creating new conditions while the slower actor is still responding to the original (now changed) conditions. Over time the slower actors actions become more and more inappropriate. The eventual result is mental confusion as the slower actor's orientation, his model of the world, gets farther and farther from reality resulting in a collapse of will.[117] This leads to the conclusion that in Boyd's understanding, maneuver warfare exists much more in the psychological rather than the physical.

This is the basic concept behind the OODA loop and how it applies to conflict, however, a deeper understanding is necessary to comprehend its application to Network-Centric Warfare.

The Observe-Orient-Decide-Act Loop

The OODA loop is composed of the four stages of Observe, Orient, Decide and Act. All living organisms observe (or more correctly sense) the environment, collecting data on the surroundings, the self and interactions. The act of observation is guided and controlled by how one is orienting oneself to the environment, the decisions one makes and the actions one takes. As circumstance unfold, one's observations change. In other words, observing is governed by its interactions with all the other components of the

[116] Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, 16
[117] Lind, *Maneuver Warfare Handbook*, 5-6

OODA loop. These observations are then fed forward into orientation.[118] One's orientation or situational awareness is not an entirely cold rational analysis of observed phenomenon. It is, as Boyd points out, a "… many-sided implicit cross-referencing …" of cultural traditions, genetic heritage, new information, previous experience and analysis and synthesis.[119] Orientation is the "…process of destruction (analysis) and creations (synthesis)…"[120] In Boyd's words it is the process of "... examining the world from a number of perspectives so that we can generate mental images or impressions that correspond to the world."[121] This process is used to formulate decisions about how to respond to the environment. It is through this process of analysis and synthesis, feedback and feed forward that decisions are made.[122] Orientation is the focus of the OODA Loop as it not only selects the action or decision it controls the range of possible actions.[123]

The decision process is driven by inputs from orientation and, in the absence of implicit guidance, is the process of selecting from the competing courses of action that are the products of orientation. More than that, it is the process of analysis and synthesis that allows the actor to arrive at a hypothesis that leads to the optimum solution or interaction.[124] In the scientific sense, if orientation and decision making involve building

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[118] Grant Tedrick Hammond, "From Air Power to Err Power: John Boyd and the Opponent's Situational Awareness" in *Air Power Leadership : Theory and Practice*, eds. Peter W. Gray and Sebastian Cox (London: The Stationery Office, 2002), 115

[119] Chet Richards, *A John Boyd Sampler*Tarkenton and Addams,Inc., 2004), http://www.d-n-i.net/ (accessed 23 March 2007), slide 22

[120] Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, 17

[121] John R. Boyd, *The Strategic Game of ? and ?*, eds. Chet Richards and Chuck Spinney (Atlanta, GA: Defense and the National Interest, 2006), http://www.d-n-i.net/ (accessed 20 February 2007), slide 10

[122] Hammond, *From Air Power to Err Power: John Boyd and the Opponent's Situational Awareness*, 115

[123] Richards, *A John Boyd Sampler,* slide 24

[124] Hammond, *From Air Power to Err Power: John Boyd and the Opponent's Situational Awareness*, 116

a hypothesis, then action is the test of that hypothesis.[125] Action puts the cognitive processes in touch with the real world.

Orientation is clearly the key to the OODA loop as it shapes observations, decision and action while being shaped by the feedback from these processes. It is the tool for analysis and synthesis in complex settings.[126] Key to this understanding of the importance of orientation is the vital role played by implicit guidance and control. The OODA Loop diagram (fig. 2) shows "… a couple of implicit guidance and control arrows, reflecting that most decision making can and should be implicit, and that quite often, orientation controls action directly without any need for explicit decisions at all."[127] It is through this implicit "decision making" that OODA loop speed can be truly exploited but understanding why the orientation function is the pathway to exploiting the adversary's decision cycle is key to unlocking the power of the OODA loop concept.[128]

> The OODA defined by John Boyd captures this iterative nature of warfare. It recognizes that the result of our actions is not just the direct effect on the adversary, but it is his adaptations to our actions, and his subsequent actions (or at least our observation of them) become part of the next input. It includes as inputs several feedback loops with which to reorient.[129]

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[125] Ibid., 116
[126] Ibid., 117
[127] Chester W. Richards, *Certain to Win: The Strategy of John Boyd Applied to Business* (Philadelphia, PA: Xlibris, 2004), 64
[128] Franklin C. Spinney, "Genghis John," *Proceedings of the U.S. Naval Institute* 123, no. 7 (July 1997, 1997), http://proquest.umi.com, 7
[129] Beckerman, *The Non-Linear Dynamics of War*, 3

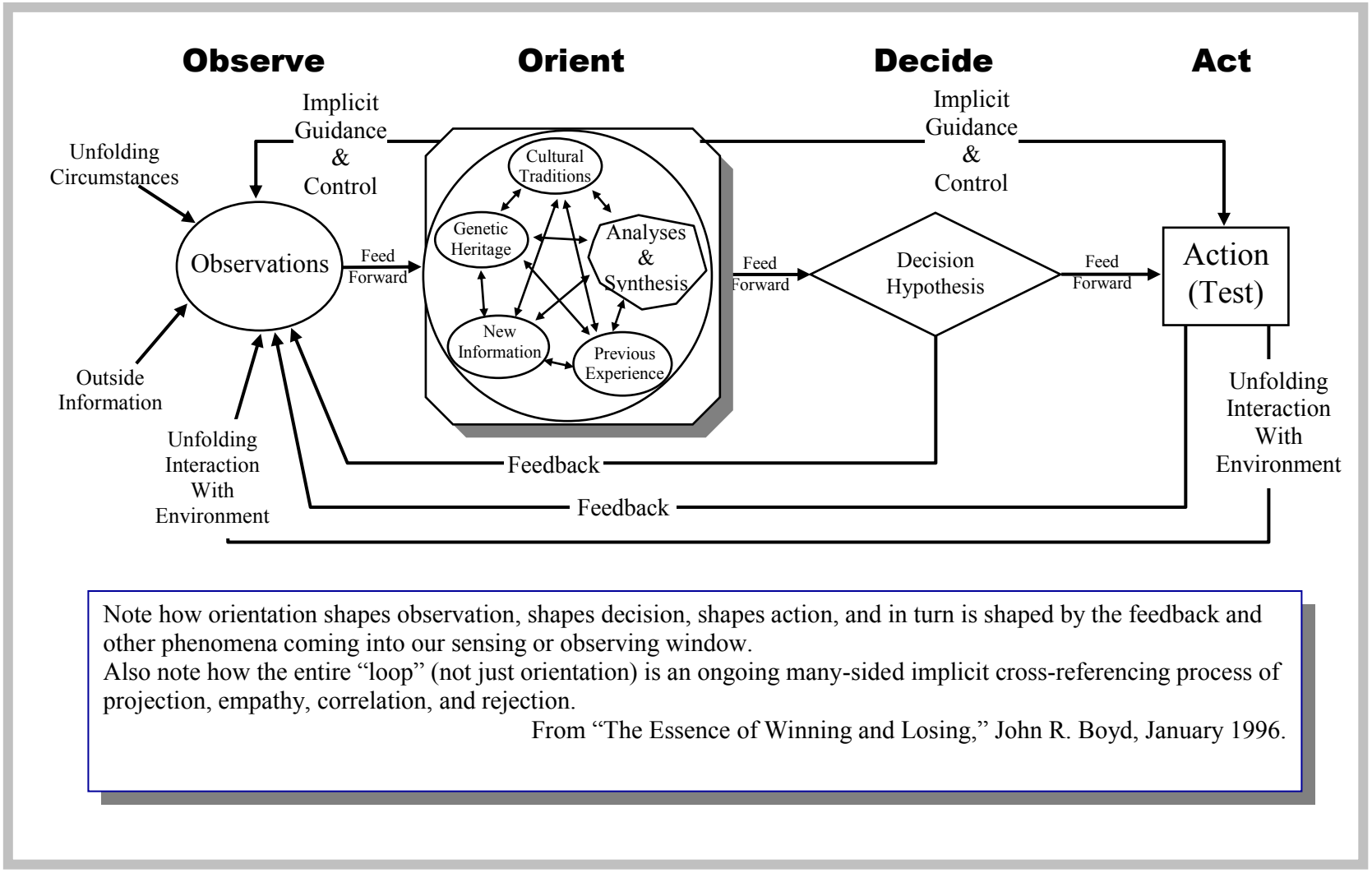

Figure 2

Source: Defense and the National Interest, http://www.d-n-i.net, 2006

Using the Power of the OODA Loop

Boyd described the aim of maneuver warfare was to isolate the enemy – physically, mentally, morally – from his external environment. He saw the most efficient way to do this was to attack his orientation.[130] In this sense, Boyd saw all conflict as a competition between OODA loops. He argued that these "… cycles create continuous and unpredictable change," and advocated that tactics, strategy, and technologies should be aimed toward that end, toward shaping the adversary's orientation.[131]

Boyd also argued that it was not enough to merely operate one's OODA loop more quickly than one's adversary, that it was essential to move through the loop more inconspicuously and with greater irregularity, in other words, less predictably. This will gain the initiative as well as shape and shift the main effort. The goal of shifting the main effort is to take advantage of weaknesses uncovered by the main effort and to exploit them repeatedly or, alternatively, used to draw enemy resources away from the main effort. The goal is to create or uncover vulnerabilities and focus the main effort against them.[132]

The value of moving through the OODA loop in this way is that enormous gains can be achieved by going more quickly than one's adversary. The adversary is continually disrupted and unable to respond effectively. The adversary becomes "…enmeshed in a world of uncertainty, doubt, mistrust, confusion, disorder, fear, panic, chaos,…and/or fold adversary back inside himself so that he cannot cope with

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[130] Spinney, *Genghis John*, 7
[131] Ibid., 7
[132] Boyd, *Patterns of Conflict*, slide 128

events/efforts as they unfold."[133] Note the emphasis on the psychological state of the enemy.

The idea that Boyd saw in all this was to "destroy [an] adversary's moral-mental-physical harmony, produce paralysis and collapse his will to resist."[134] With the aim to "render [an] adversary powerless by denying him the opportunity to cope with unfolding circumstances."[135] By moving more quickly and accurately through the OODA loop it is possible to create these conditions. The key elements are that Boyd saw maneuver warfare as time competitive whose means were both physical and psychological with the psychological being the more important.

MORAL WARFARE

The idea of Moral warfare has not received nearly the interest that maneuver warfare theory has generated. This should not be surprising since it is not a doctrine that would fit easily with the US or other western militaries although they have and are currently engaged in exactly these types of conflicts. Unfortunately, most apparently would prefer to conduct them using attritionist methods. Moral warfare is related to but not exclusive to insurrections and guerrilla wars and usually viewed with some scepticism by military men due to their generally asymmetric nature. Boyd identifies five elements of moral conflict; moral strength, moral victory, moral defeat, moral values and moral authority.

Moral strength is the mental capacity to overcome menace, uncertainty and mistrust. Moral Victory is the triumph of courage, confidence, and spirit de corps over fear, anxiety, and alienation when confronted by menace, uncertainty, and mistrust.

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[133] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 186
[134] Boyd, *Patterns of Conflict*, slide 136

Moral Defeat is the triumph of fear, anxiety, and alienation over courage, confidence, and spirit when confronted by menace, uncertainty, and mistrust. Moral Values are the human values that permit one to carry on in the face of menace, uncertainty, and mistrust. Finally, Moral Authority is a person or body that can give one the courage, confidence, and spirit to overcome menace, uncertainty, and mistrust.[136]

The essence of Moral Conflict is to manipulate the five elements to "… destroy the moral bonds that permit an organic whole to exist."[137] The reliance here is upon friction. By creating, exploiting and magnifying menace, uncertainty and mistrust one can bring forth fear, anxiety and alienation in the enemy. This will generate many co-operative centers of gravity and subvert those the enemy relies upon, greatly magnifying friction.[138] A practical application can be found in Iraq today. By conducting suicide bombings the terrorists seek to undermine moral authority by showing the populace that the government cannot protect them. At the same time the bombings create fear, anxiety, uncertainty, and mistrust leading to moral defeat within the populace. This creates to non-cooperative centers of gravity, the government and the people, leading to friction. The purpose is to defeat the existing regime by demonstrating that it lacked the moral authority or competence to govern.[139]

Moral warfare lies at the heart of 4th Generation warfare. The success Al Qaeda has had in undermining the legitimacy of the US as a world leader is stark testimony to its power.

ATTRITION WARFARE

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[135] Ibid., slide 136
[136] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 177
[137] Ibid., 171
[138] Boyd, *Patterns of Conflict*, slide 122

Attrition is as old as warfare itself.[140] Boyd defined attrition warfare as a method where destruction is king. Mobility is used to bring firepower to bear or to avoid enemy fires. Measures of success are in easily codified metrics such as body counts.[141] The payoff for this is that the widespread destruction of the enemy's forces and infrastructure has the ability to break his will to resist and to seize and hold terrain.[142] Contrary to some thinking, a war of attrition does not require excessive losses on both sides. An attrition campaign could involve wreaking orders of magnitude more destruction on the enemy than that suffered by friendly forces. This would still be a form of attrition, albeit, a very efficient one. It is by seeking victory through the destruction of the enemy (usually his fielded forces but any aspect of his warfighting capacity could be a target) that we differentiate attrition from maneuver or moral warfare.

Attrition is much more physically oriented than moral or maneuver warfare. Therefore, in attrition warfare the object is to create and exploit destructive physical force of weaponry while protecting friendly forces against the enemy's destructive force. Protection entails the ability to minimize the enemy's destructive force by taking cover behind natural or manmade obstacles, by dispersion of people and resources, and by being obscure using camouflage, smoke, etc. The purpose of mobility is to use speed or rapidity to focus one's own destructive force or move away from the adversary's destructive focus. The payoff is frightful and debilitating attrition via widespread

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[139] Hammond, *The Mind of War : John Boyd and American Security*, 45
[140] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*, 18
[141] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 166
[142] Boyd, *Patterns of Conflict*, slide 113

destruction in order to break the enemy's will to resist and seize and hold terrain objectives. The aim is to compel the enemy to surrender and sue for peace.[143]

Robert Leonard in *The Art of Maneuver Warfare* adds further amplification noting that attrition exists at the strategic, operational and tactical levels but is executed at the tactical level.[144] He further defined it in Clausewitzian terms as aimed at defeating the enemy by the destruction of his mass, by destroying his Center of Gravity. Thus in attrition it is essential to bring the enemy to battle and defeat him. This reinforces the concept that attrition is essentially a tactical view of war, a "bottom up" approach. For an attritionist the focus must always be on the battle. This also leads to a mathematical approach to war where victory can be determined by reference to concepts such as initial-force ratios, loss ratios, and fractional exchange ratios.[145] Attrition seeks to improve the force ratio by achieving an acceptable loss ratio. War's intangibles (shock, morale, initiative) are simply seen as enablers to fight the battle better.[146]

Thus the essence of attrition warfare, according to Boyd and Leonard, can be found in the reverence with which it holds combat power. In attrition warfare the destructive force (firepower) is king. The use of protection is to weaken or dilute effects of enemy firepower. Mobility is an important element only as it applies to firepower and protection as an attritionist uses movement to bring firepower to bear or to evade enemy fire. Success is generally measured in quantitative means such as "body counts" or tanks destroyed. Finally, terrain is generally seen as more important than the enemy or his will

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[143] Ibid., slide 113
[144] Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, 19
[145] Ibid., 19
[146] Simpkin, *Race to the Swift: Thoughts on 21st Century Warfare*, 20-22

to fight, objectives usually being framed in terms of terrain rather than the enemy.[147] The relationship between fire and movement is best summed up as "in attrition, movement is only there to facilitate fighting, its value only related to its ability to lead to an advantageous fire position."[148]

Not surprisingly, as the pre-eminent military whose strength rests on superior technology to provide overwhelming fire power and protection, the US "… deifies the battle, fair fighting and attrition."[149] It is always in a quest for decisive battle so that it may match strength against strength; although the US does seek the advantage of position prior to the battle this is part of their effort to overwhelm the enemy.

This kind of thinking has be the bane of western history from the time of the Spartans; an inability to see beyond the battle. Not surprisingly, the US has had difficulty coming to grips not only with the operational art, a tenet of which is to accept battle only when necessary, but also with maneuver warfare, which entails avoiding an enemy's strength in favour of striking at his weakness.[150]

Overview

It is the means of achieving victory by which Boyd defined types of conflict. Attrition seeks physical destruction of the enemy, maneuver seeks to defeat the psychology of the enemy and moral conflict seeks victory by undermining the legitimacy of the adversary.

THE AMERICAN WAY OF MAKING WAR

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147 Boyd, *Patterns of Conflict*, slide 112
148 Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, 88
149 Ibid.,35
150 Ibid. 14

"The object of all operations is to destroy the opposing force."[151]

To understand the American way of war one needs to look no farther than a former Chairman of the Joint Chiefs, General Colin Powell. He became famous for coining the "Powell Doctrine", a doctrine that perfectly sums up the preferred American way of war: "...no military commitment without decisive force …." ""You've got to do it right. You've got to go in massively."[152]

This reliance on overwhelming force has resulted in a strategy of attrition from the Civil war to the Gulf War and Kosovo.[153] If the US seems to favour attrition over maneuver there are good historical and practical reasons for it to do so.

The US military during the Revolutionary War was in at least some respects a maneuverist military (and moral conflict also played a large part) but by the Civil War the US, primarily the North, was almost exclusively attritionist. It relied on a preponderance of men and weapons to crush the South in what is still America's bloodiest war. Victory was defined as the destruction of the Confederate military and economy. The result was nearly 400,000 Union and 260,000 Rebel casualties out of a combined fighting force of 3,000,000.[154]

It is unlikely that the US military or political leaders made a conscious decision to wage wars of attrition, quite the contrary.[155] They were as horrified by the bloodshed of WWI as anyone else, however, by the end of that war the US was the greatest industrial

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[151] Richard M. Swain, "Filling the Void: The Operational Art and the U.S. Army" in *The Operational Art: Theories in the Development of Warfare*, eds. B. J. C. McKercher and Michael A. Hennessy (Westport, CN: Praeger, 1996), 159

[152] Karen DeYoung, *Soldier: The Life of Colin Powell*, 1st ed. (New York, NY: Random House, Inc, 2006), 210

[153] Owens, *Lifting the Fog of War*, 138, 182. Admiral Owen, an advocate of the RMA, classifies both the Gulf War and Kosovo as attritionist in his book Lifting the Fog of War. This view is by no means shared by everyone.

[154] Ibid.,78

power on earth and its lead was growing, fuelled vast natural resources and a capitalist system that encouraging innovation and growth. It is logical that the US would see industrial might, their strength, as the key to victory in future wars and that an essential component of that might be the airplane, specifically the strategic bomber.

Intended as a way to avoid the bloodshed of the trenches, strategic bombardment proved to be just as costly. Not only did bombing of the adversary's economy and population result in hundreds of thousands of non-combatant deaths, the accompanying air war proved to be a hard slog, a true battle of attrition, first for bombers to fight their way to the targets and later a battle to gain control of the air. Thus, the US solution to the attrition warfare of WWI had in fact to become more proficient at it during WWII. Victory seldom results in introspection and this was essentially true with the US after WWII. The Korean War gave birth to the philosophy of "expend fire and steel, not men," an attempt to reduce casualties on the US side but an admission that victory would only come about by the physical destruction of the enemy.[156]

This philosophy would reach its zenith in Vietnam where the US would try to break an insurgency by destruction of its forces in the field. This period was epitomized by the phrase "search and destroy." Although there were also "hearts and minds" campaigns the US had no other concept of how to defeat the enemy other than by killing him. The Vietnam War was the low point for the US military. So demoralized was the US that there were those, some in uniform, that claimed the conventional military force

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[155] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*, 23
[156] Owens, *Lifting the Fog of War*, 81

and strategy was irrelevant in a world of nuclear weapons and wars of national liberation.[157]

The end of the Vietnam War saw the rise of reform efforts but the reliance on technology and destruction remained at the core of US military thinking. The so-called "offset strategy" devised by then Secretary of Defense Harold Brown epitomized this thinking. A fundamental part of the strategy was to use technology to offset the Soviet quantitative advantage in the event of a Warsaw Pact attack. The US was worried about their ability to defeat the three to one advantage the Soviets had in armour and personnel.

The offset Strategy was more than simply:

> … to use "high technology" to build better weapon systems than those of the Soviet Union…The offset strategy was based instead on the premise that it was necessary to give these weapons a significant competitive advantage over their opposing counterparts by supporting them on the battlefield with newly developed equipment that multiplied their combat effectiveness.[158]

The US pursued this basic strategy until the end of the Cold War. [159]

This technological attritionist thinking manifested itself in not just weaponry but in doctrine as well. Active Defense, the precursor to the AirLand Battle, provides an indication of both the US infatuation with destructive power and technology (i.e. weapons systems) and consequently attrition. The Active Defense was criticized for being too dependent upon firepower, to the detriment of maneuver. Advocates of this view thought this was appropriate given the tremendous destructive powers of the latest weapons. They believed that maneuver had lost relevance on the modern battlefield due

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[157] Russel F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington, IN: Indiana University Press, 1977), 475-7

[158] William J. Perry, "Desert Storm and Deterrence," *Foreign Affairs* 70, no. 4 (Fall 1991), .69

[159] Alan Stephens, *The End of Strategy: Effects-Based Operations* (Canberra, AU: Strategic and Defence Studies Centre, Australian National University,[2003]).

to the lethality of modern weapons. This hypothesis, that maneuver was "dead" due to the lethality of the battlefield, had been advanced, and disproved, before. Others argued that maneuver was still an important part of the doctrine and that "bold maneuver" was an essential part of both attack and defense.[160]

Both these points of view, however, only strengthen the argument of the US as being attritionist for the term maneuver was being used to describe movement made in order to fight (fire) more effectively. Maneuver to fight is an attritionist dictum; fight to maneuver is maneuverist.[161]

This thinking continued with AirLand Battle. Designed to counter the numerically superior Soviet forces in central Europe it based winning a war defined by "battle calculus." This was essentially a computer program that assisted in assessing the success of doctrine in defeating the Soviets but the very parameters of the simulations were attritionist. John Romjue in *From Active Defense to AirLand Battle: Development of Army Doctrine, 1973-1982* describes the system:

> In battle calculus, measurable quantities were computed and analyzed in terms of minutes into the battle. Analytical categories included ratios of opposing forces by troop strength and weapon type, rate of enemy advance, intervisibilities across terrain, best ranges of fire by weapon type, comparative rates of fire, number and opportunities to fire, number of commander decisions, and time and lengths to call for and receive attack helicopter support and Air Force Close Air Support.[162]

With all intangibles removed it was impossible to expect that any non-attritionist approach would defeat the Soviets in the simulations. Regardless, the simulations kept showing that NATO would be defeated. They simply could not engage enough targets

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[160] Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, 135
[161] Ibid., 135
[162] Ibid., 136

rapidly enough before being overwhelmed. The answer was to add depth to US doctrine but not in the sense that a maneuverist would understand. In AirLand battle, depth does not mean depth of maneuver but depth of fires, a responsibility that fell to the Air Force since the army did not possess the weapons to engage targets beyond the immediate battlefield. In general, the USAF was satisfied with this as it concurred with most air power theorists. Most USAF officers believed that, regardless of studies to the contrary the best use of air power, when not engaged in strategic bombing, was interdiction.[163] Engaging the Soviets beyond the battlefield was consistent with Air Force doctrine.[164]

These lines of thinking have been challenged by many such as Boyd, Lind and others and there have been some movement towards maneuverist ideas.[165] The Marine Corps Doctrine released in 1989, advocated a maneuverist approach to war and directly attributes both Boyd and Lind, but the desire to solve problems using technology remains strong throughout the US military and society. Technology invariably means newer weapons that have to be assessed and the assessments are invariably quantitative. This necessitates a very methodical, numerical approach to war for the only workable method to assess these weapons is to measure their destructiveness or how they contribute to the destructiveness of other weapons. While weapons themselves are neither inherently attritionist nor maneuverist (the tank being an excellent example when one considers the very different ways they were used by the Germans and the French in 1940), this

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[163] Coram, *Boyd : The Fighter Pilot Who Changed the Art of War*, 196-7

[164] Hammond, *The Mind of War : John Boyd and American Security*, 154. There are those, such as Hammond, who argue that the AirLand Battle doctrine was maneuverist however I believe that the view of Leonard as explained in The Art of Maneuver Warfare, labelling it attritionist is more in keeping with the views of Boyd and Lind.

[165] Dave Richard Palmer, *Summons of the Trumpet: U.S.-Vietnam in Perspective* (San Rafael, CA: Presidio Press, 1978), 117

approach usually leads to procuring the most lethal weapons which encourages attrition warfare.[166]

Another obstacle to the US military abandoning attrition warfare can be found in the definitions in use (those developed by Boyd are not universally accepted). No less than Admiral Owen, author of *Lifting the Fog of War*, described attrition as "the steady application of military violence until the adversary ceases to possess a combat-effective military force," a definition in agreement with Boyd. However, he then defines maneuver as "the directing of firepower at carefully identified and selected parts of the enemy force in an effort to destroy the enemy's command and control structure, or disrupt the enemy's planned sequence of operations" an approach that still emphasises destruction and does not recognize that the enemy can be defeated psychologically. [167] Or consider the writings of LTC Jeffery Springman of the US Army who defines maneuver warfare as:

> … characterized by the search for decisive battle. The antagonists, or at least one antagonist, maneuver against each other to gain a position of advantage. They meet after one side has gained its desired position or when one decides the time is right to fight. … it is the decisive battle that determines the war's outcome and consumes the majority of resources, especially personnel. … the war's outcome is decided because one antagonist is willing to accept the results of the battle. They accede to the demands of the other either because their national power has been reduced below an acceptable level or the cost of continuing is considered too high.[168]

This actually describes attrition warfare as defined by Boyd since the means to victory are still the destruction of the enemy. Given this description of maneuver it

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[166] Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, 138-155
[167] Owens, *Lifting the Fog of War*, 137
[168] Jeffery Springman, *The Rapier Or the Club: The Relationship between Attrition and Maneuver Warfare* (Carlisle, PA: U.S. Army War College,[2006]), http://www.strategicstudiesinstitute.army.mil/ (accessed 8 March 2007), 2

should be no surprise that he argues that wars of attrition may be the preferred method under certain circumstances.

There have been changes however. During Operation Iraqi Freedom, the major combat operations showed many elements of maneuver warfare, particularly those conducted by the USMC.[169] Unfortunately, the implementation of NCW, something that was meant to move the US away from attritionist warfare may be doing the opposite and returning to an emphasis on attrition.[170] In general, technology has been used to perfect attrition warfare not abandon it, but war, as Boyd said, is about people, ideas and hardware, in that order.[171] By placing equipment ahead of people the operations of the US military will remain primarily attritionist, even post 9/11.[172]

Grant Hammond effectively summed up the historical American viewpoint. The US, he said, favours:

> …technology, attrition and mass. It dislikes the political aspects of war and would rather apply military forces to targets selected. The syllogism runs like this: Strategy equals targeting. The number and nature of the targets destroyed [is the] best measure of success. When all targets are destroyed, the war is over. It is playing checkers not chess. It is an attrition approach to war…the Air Force in particular sees war as science, not art, and are disposed to treat it as such.[173]

Or more succinctly put, the American way is of war is more a "way of battle than an actual way of war."[174]

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[169] J. F. Bing West, "Maneuver Warfare: It Worked in Iraq," *Proceedings of the U.S. Naval Institute* 130, no. 2 (February 2004, 2004), http://www.military.com/ (accessed 20 March 2007).
[170] Ralph Peters, "In Praise of Attrition," *Parameters, US Army War College Quarterly* 34, no. 2 (Summer, 2004), 24-32, http://proquest.umi.com (accessed 11 April 2007). Peters discusses at length the value of attrition particularly in counterinsurgency operations. Responses to his article published in Parameters were largely supportive of the idea.
[171] Coram, *Boyd : The Fighter Pilot Who Changed the Art of War*, 354
[172] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*, 17
[173] Hammond, *The Mind of War : John Boyd and American Security*, 207

CONCLUSION

In attempting to understand and study war, the theories of the late Colonel John Boyd are among the most useful for the professional military officer. Boyd's theories encompass war in all its myriad forms making it ideal for examining war in a historical context as well as a future one. Deceptively simple, he divided conflict up into three general classes, attrition, maneuver and moral. Each approaches war with a different method for achieving victory. For Boyd, all forms of war that seek victory through destruction of the enemy are attritionist, a much broader view of attrition than is traditionally used. He defined maneuver warfare as a method that seeks to defeat the enemy by attacking his perceptions. The third category, moral warfare, seeks to undermine the authority of the ruling regime in the minds of the populace.

Of particular importance in understanding Boyd's theory of conflict is to understand the OODA Loop. Commonly expressed as observation-orientation-decision-action cycle this simplification of a complex idea has caused no end of confusion. The concept of the OODA loop is the foundation for all of Boyd's thinking on competition and conflict.

To understand the current thinking on NCW it is useful to understand the American military's preference for attrition. Since the US Civil War, America has primarily fought wars of attrition, pursuing victory through the destruction of the enemy. Given the economic and military might of the US this has proven a relatively effective method of winning wars. In wars where US vital interests were at stake the US has always prevailed. However, the Soviet quantitative superiority of the 1970's and the

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[174] Antulio J. Echevarria II, *Toward an American Way of War* (Carlisle, PA: Strategic Studies Institute, 2004), 37, http://www.carlisle.army.mil/ssi/ (accessed 18 January 2007), V

defeat in Vietnam caused a rethinking of this strategy and various forms of maneuver warfare were proposed. These have not fully taken hold as many still advocate the attritionist approach. Given the history of the US way of war making, it should not be surprising if the latest theory of war is attritionist as well.

CHAPTER 4

ANALYSIS OF NETWORK-CENTRIC WARFARE AS A THEORY OF WAR

INTRODUCTION

Network-Centric Warfare as envisioned by the Office of Force Transformation is capable of generating widespread destruction with pin-point accuracy. By using the extended ranges of its sensors and weapons and extensive communications nets, it protects friendly forces from the enemy's destructive capacity by dispersion. At the same time it is able to mass fires with little or no maneuver. Extremely mobile, both in units and fires, it can use maneuver to bring both fires on the enemy or escape the adversary's weapons. NCW is clearly capable of achieving victory using the destruction of the enemy as the means to victory, a philosophy which closely describes attrition warfare as envisioned by John Boyd.[175] Yet proponents claim that NCW is an emerging theory of war that will take the US military beyond attrition warfare.[176] A closer analysis will determine if NCW, as proposed by the Office of Force Transformation, is truly able to live up to their claims or if it can be more properly labeled an extremely efficient form of attrition.

METHODOLOGY

To determine the categorization of NCW according to Boyd's theories, two methodologies will be presented. First, the attributes of NCW were compared to the

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[175] Boyd, *Patterns of Conflict*, 113
[176] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 17

individual attributes of Boyd's three types of conflict to establish if NCW could be broadly categorized. This was followed by a more in-depth look at three significant claims or attributes of NCW to confirm the earlier categorization.

COMPARATIVE ANALYSIS

The following (Table 1) provides an analysis of Network-Centric Warfare, as envisioned by the US military, against Boyd's theories. Each warfare type can be distinguished by reference to Focus, Emphasis, Nature, Means, Ends, Requirements and Characteristics.

Focus

The focus of NCW is on the battlefield although the battlespace may encompass the entire theatre of operations. Regardless, it is the massing of fires to achieve the desired effects that define NCW.[177] Consequently, loss ratios, despite the reluctance of the DOD to provide body counts, are implicitly important in weighing the benefits of NCW. In traditional attrition warfare the force ratios have been of the utmost importance, however, in NCW they have been replaced by technological ratios. The enemy can now be attrited not by overpowering him with mass but with smaller, more lethal forces. In NCW, information dominance equates to technological dominance (although the importance of training and doctrine is also noted).

The results of NCW are measured in both qualitative terms such as enhanced situational awareness and the quality of information exchanges as well as quantitative

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[177] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 16

Table 1. Comparison of Attrition, Moral and Maneuver Warfare.

	Attrition Warfare	Moral Warfare	Maneuver Warfare
Focus	**Battle: fielded forces, force ratios and loss ratios, quantity**	**Public opinion, legitimacy of authorities**	**Enemy's cohesion; mental, moral, physical stability; quality**
Emphasis	**Military capability, planning: overwhelming by superiority, mass**	**Moral authority of leadership, support of public**	**Trust, innovation, speed,; win by OODA loop dislocation**
Nature	**Tactical**	**Strategic[178]**	**Strategic, operational, tactical**
Means	**Destruction of adversary forces and war waging ability**	**Create menace, uncertainty, mistrust**	**Creation of perception that adversary cannot win**
End	**Destruction of adversary**	**Undermining legitimacy of authorities**	**Creation of a new paradigm**
Requirements	**Massive firepower, technology, industrial might, centralized control**	**Initiative, Adaptability, harmony**	**Trust, professionalism, individual leadership**
Characteristics	**War is Jomininian, a science quantifiable, systematic**	**War is psychological, political qualitative, nonlinear**	**War is Clausewitzian, an art, qualitative, nonlinear**

Source: Adapted from Hammond, "The Mind of War: John Boyd and American Security," 191

means such as tanks destroyed.[179] There is no attempt to measure effects in terms of the enemy, other than physical destruction.

[178] David W. barno, "Challenges in Fighting a Global Insurgency," *Parameters, US Army War College Quarterly* 36, no. 2 (Summer 2006, 2006), 15-29, http://proquest.umi.com/ (accessed 1 November 2006), 19 Barno graphically illustrates the strategic nature of insurgency operations.

[179] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 168

Emphasis

NCW seeks to overwhelm the enemy with superior technology and massed effects. This is effectively illustrated in fig 3.[180] The results clearly show the emphasis of experiment on the destruction of targets and the improved efficiency that NCW offers. Although speed is emphasised it is used to destroy, not dislocate the enemy. The OODA Loop implications of speed are invoked but not in a way that Boyd would approve.[181]

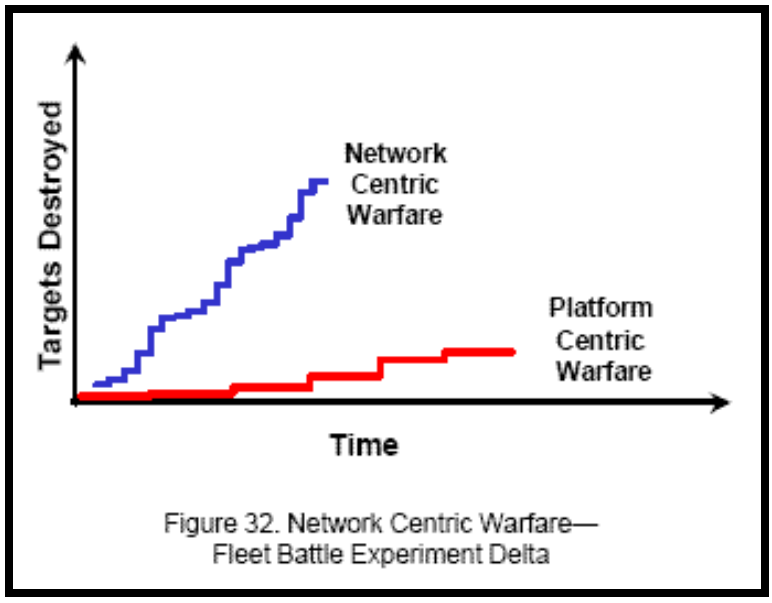

Figure 3 Example of NCW Measures of Success
Source: Smith, *Network-Centric Warfare: Where's the Beef*, 7.

Nature

NCW compresses the levels of war. The tactical, operational and strategic levels are intermixed which inevitably emphasizes the direct impact of tactical actions on strategic goals. Consequently, strategic commanders are "encouraged" to in tactical

[180] Dr. Edward A. Smith Jr, "Net-Centric Warfare: Where's the Beef," IWS - The Information Warfare Site, http://www.iwar.org.uk/ (accessed November/19, 2005).
[181] Alberts and others, *Understanding Information Age Warfare*, 131-3 The description of the OODA loop offered by Alberts et al simplifies the concept to the point of making it virtually meaningless.

decision making leading to tactical actions that tend to be characterized by combat and fires.[182] This melding of strategic with tactical inevitably leads to a strategy of target selection.

Means

NCW seeks victory by destroying the enemy through the massing of effects (fires). The emphasis must therefore be on generating combat power as a means to create the desired outcome of the battle, something that is primarily concerned with the destruction of the enemy.[183]

End

The end in NCW is the destruction of the adversary in order to break his physical or mental capacity to endure. There is little requirement for maneuver in traditional sense as NCW offers the ability to maneuver fires in lieu of material or personnel.[184]

Requirements

NCW relies on technology to enable the massing of fires, a key component of the American NCW construct. While other organizations are able to act in a networked manner with commercially available technology, the US doctrine requires specifically tailored technology to function properly.[185] Not surprisingly, only an industrial nation with an information age economy is capable of developing the expensive and technologically advanced systems that the US style of NCW demands.

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[182] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 10
[183] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2
[184] Ibid., 184

In WWI the large technological organizations required centralized control in order to synchronize the combat power necessary to penetrate enemy defenses. NCW does not necessitate centralized control, however the possibility to centralize control is inherent. The emphasis on self-synchronization indicates the desire to synchronize, necessary if the emphasis is on generating combat power. Without some form of centralized control it is unlikely that self-synchronization can be effective in larger units which may unfortunately lead to commanders to enforce synchronization to maximize combat efficiency.

Characteristics

Not surprisingly, given the roots of NCW in the business world, NCW is ultimately seen as amenable to systematic and quantifiable analysis.[186]

Conclusion

The results clearly show that NCW can be labelled as attritionist under Boyd's theoretical framework. It should be expected that any theory that is specific enough to offer practical solutions to problems will, in all likelihood, not fit neatly into one category and NCW is no exception. Certain aspects of NCW are in fact maneuverist in nature, however, the overwhelming number of key characteristics mark NCW as attritionist.

That NCW can be further categorized as attritionist can be demonstrated by the way it deals, both theoretically and practically, with three key concepts of both maneuver and attrition warfare. These traits, including the generating of combat power, its

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[185] Clayton D. Saunders, "Al Qaeda: An Example of Network_Centric Operations" (Joint Military Operations, Naval War College), , http://www.au.af.mil (accessed December 18, 2006), 16

[186] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 284

emphasis on the tactical arena of war, and the application of the concept of self-synchronization, were investigated in depth to confirm the categorization of NCW theory as attritionist.

ANALYSIS OF THREE NETWORK-CENTRIC WARFARE TRAITS

EMPHASIS ON GENERATING COMBAT POWER

The current US Army's definition of combat power is found in the FM 3-0. It reads:

> Combat power is the ability to fight. It is the total means of destructive or disruptive force, or both, that a military unit or formation can apply against the adversary at a given time. Commanders combine the elements of combat power— maneuver, firepower, leadership, protection, and information— to meet constantly changing requirements and defeat an enemy…Defeating an enemy requires increasing the disparity between friendly and enemy forces by reducing enemy combat power. Commanders do this by synchronizing the elements of friendly force combat power to create overwhelming effects at the decisive time and place… Massed effects created by synchronizing the elements of combat power are the surest means of limiting friendly casualties and swiftly ending a campaign or operation.[187]

Combat power is thus the capacity to inflict physical destruction and, to a lesser extent, psychological influence, on the enemy. Generating or increasing combat power is found throughout the US literature on NCW in particular "*Network-Centric Warfare: Developing and Leveraging Information Superiority"* where the value of NCW to increase combat power is mentioned no less than 33 times.[188]

When the Office of Force Transformation or the CCRP touts that the advantages of NCW have been proven in experimentation, operational demonstrations and high intensity conflict, they are invariably concerned with increased combat power:

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[187] United States, Department of the Army, *Operations*, 4-3

> A significant and growing body of data provides evidence that the following conditions are valid across a broad spectrum of mission areas.
> Improved Information Position Inc(t) > Ipc(t)
> Increased Shared Situational Awareness SSAnc(t) > SSApc(t)
> Increased Operational Tempo OPTEMPOnc > OPTEMPOpc
> Increased Loss Exchange Ratio Rnc > Rpc
> (nc = network-centric, pc = platform-centric).[189]

The first three conditions are applicable to all types of conflict, however loss exchange ratio is a mechanistic, lanchestrian approach to combat.[190] Of course, reducing friendly causalities is desirable in any theory of war but the concept of the loss exchange ratio is merely to lose less than the enemy. It values not the outcome of the war, but the battle and is thus primarily an attritionist approach war.

Other writers provide definitions for combat power or combat efficiency that differs from those of the US Army and are somewhat at odds with the preceding paragraph. Edward Smith, who sees NCW as not a new theory of war but as an enabler of Effects-based Operations or warfare defined combat efficiency as:

> … how successful a given unit of combat power was in inducing the enemy to react in a desired way. This measure is more complicated than the traditional Lanchestrian tallies bombs dropped versus forces destroyed, but drives to the heart of the role of precision in warfare. It says that effective power is not a function of how fast we attrite an opposing military force, but of how well we force the enemy to yield – and by extension how successful we are in avoiding an attrition exchange altogether.[191]

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[188] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*. To indicate how important increased combat power is to NCW theory, self-synchronization, a cornerstone of the theory, is mentioned 25 times.

[189] John Garstka, *Realizing Integrated Knowledge-Based Command and Control* (SAFTI Military Institute, Singapore: POINTER, Journal of the Singapore Armed Forces, 2003), http://www.mindef.gov.sg (accessed 4 April 2007), 4

[190] Simpkin, *Race to the Swift: Thoughts on 21st Century Warfare*, 79-80. Lanchester equations allow conflict to be mathematically decomposed into numbers and mass. The result is always a war of attrition since there is no way to victory other than the destruction of the enemy.

[191] Smith, *Net-Centric Warfare: Where's the Beef*? Smith has written on NCW and EBO for the CCRP.

Of course, it is entirely possible to engage in attrition warfare while vastly outnumbered and still prevail. Small forces do not necessitate the abandonment of attrition warfare if there is a sufficient technological advantage (the Battle of Rorkes Drift during the Zulu wars being an excellent example).[192] As discussed, what defines attrition warfare is not the number of casualties (although attrition warfare is generally associated with higher casualties) but the method of securing victory. The idea of defining combat efficiency as something beyond combat power, the ability to destroy the enemy, is more suggestive of maneuver or moral warfare. This claim of Smith's that combat power in NCW is no longer concerned with physical destruction is undermined by some of its adherents and its conceptual foundation. In fact, the very manner in which NCW is depicted serves to characterize it as attritionist.

Smith develops his concepts from the early work of Vice Admiral Arthur Cebrowski. Cebrowski envisioned "conventional" military operations as composed of planning (time) and execution cycles. These cycles effectively form a series of steps with the area under the line (or staircase) representing combat power. In this depiction the time spent planning is seen as lost combat power. Cebrowski hypothesises that combat power can be increased by improving speed of command (shortening the planning cycle) and self-synchronization (generating the "lost" combat power). Figure 4 depicts the concept graphically.

The effect of self-synchronization is to "recover" the combat power "lost" when the synchronization must be planned centrally. The implication is the combat power

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[192] Geoffrey Parker, "Arms and Men: Inventing Volley Fire," *MHQ: The Quarterly Journal of Military History* 18, no. 1 (Autumn 2005, 2005), http://proquest.umi.com (accessed 23 March 2007), 60. British defending Rorke's Drift in South Africa in 1879 held off attacks by some four thousand Zulus, using the standard infantry battle drill. The Zulus had 500 casualties, the British just 17.

applied more rapidly (effect of speed of command line, fig 4) will result in an advantage. The curve generated by self-synchronization is known as the Combat Power Curve.[193]

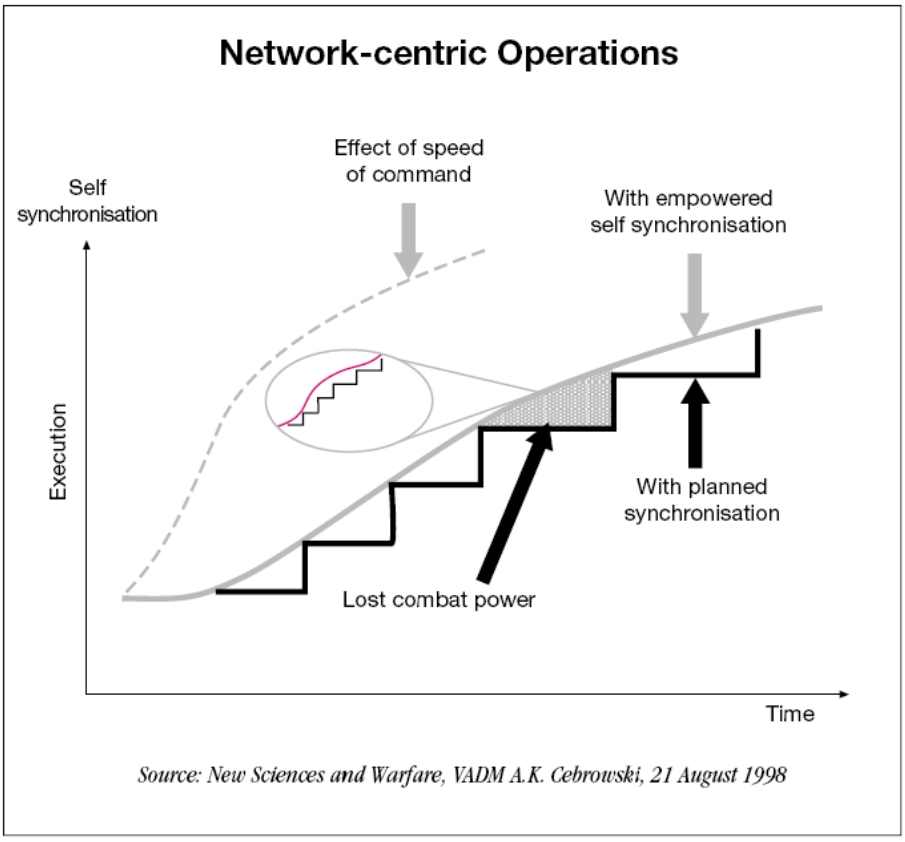

Figure 4. Self-Synchronization and Speed of Command
Source: Smith, *Network-Centric Warfare: Where's the Beef?* 6.

Smith further refines this concept by applying Boyd's OODA loop (figure 5) to describe the planning/action cycles. Each step is now portrayed as an OODA Loop cycle with the horizontal axis representing Observe, Orient and Decide and the vertical "riser" corresponding to Act. Note that the vertical axis is now total force applied to the enemy.[194]

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[193] Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War*, 77
[194] Smith, *Net-Centric Warfare: Where's the Beef*, 7-9

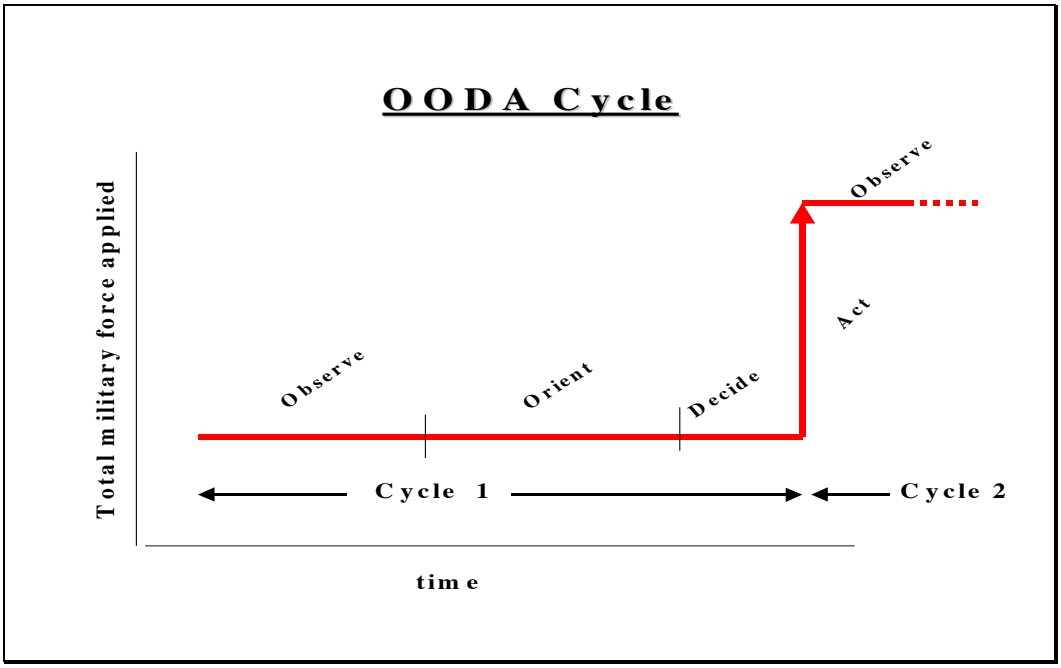

Figure 5. The OODA Loop
Source: Smith, *Network-Centric Warfare: Where's the Beef?* 8.

It is immediately obvious that each cycle of the OODA loop is concerned with the application of force (and that every cycle actually applies force effectively as there appears to be neither fog nor friction in the NCW world!). Actions that do not result in the application of force are seen as non-productive and would not contribute to defeating the enemy (this should not be taken to mean that such aspects as logistics are not important to NCW, however, it clearly implies that any actions that result in only maneuver without fire does not contribute to victory).

Smith describes it this way:

> The lesson is clear. Optimizing the OODA cycle and increasing our "speed of command" is as much a question of finding out how to organize the information we need and how to accelerate the process of generating combat power and moving it to target as it is of speeding the forces'

> communications. Increasing combat efficiency, therefore, must necessarily be a multi- pronged effort.[195]

Thus the OODA loop is seen as a way to generate combat power. Not surprisingly, Smith then concedes that this adds up to "little more than a more efficient form of attrition."[196] To escape the attrition trap he offers the concept of the second level of combat efficiency. The second level is not achieved by applying even greater amounts of combat power over shorter periods of time. It instead proposes to focus on the enemy will to resist rather than his physical means. This could shorten the period of combat if the enemy surrenders before he has lost his means to resist. He then goes on to point out that this is a psychological operation, not a physical one and refers again to the OODA Loop and specifically operating inside the enemy's loop, in the hopes of achieving lockout.[197]

In order to achieve "lock out" he suggests not applying more combat power but to do so in smaller yet more rapid increments. This would be accomplished not by shortening the OODA cycles, which can only be reduced so much due physical constraints such as refuelling time for aircraft, time to move, etc, but by allowing units to execute their own OODA loops at their optimum speed. The result would be multiple, overlapping acts, stimuli, which would force the enemy to continually react. This "swarm" would provide so many stimuli that the adversary would spend all of his time orienting himself to the latest stimuli and be unable to act, to be "locked out".[198] The "swarm" would have to be self-synchronized and self-adaptive to enable it to work

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[195] Ibid., 12
[196] Ibid., 12
[197] Ibid., 13. Lockout refers to the psychological state of the enemy where he can no longer react coherently to threats.
[198] Ibid., 16-18

towards a common goal. Smith suggests that it would present the adversary with so many stimuli that by being forced to constantly restarting his OODA loop, he would eventually be unable to act coherently (figure 6).[199]

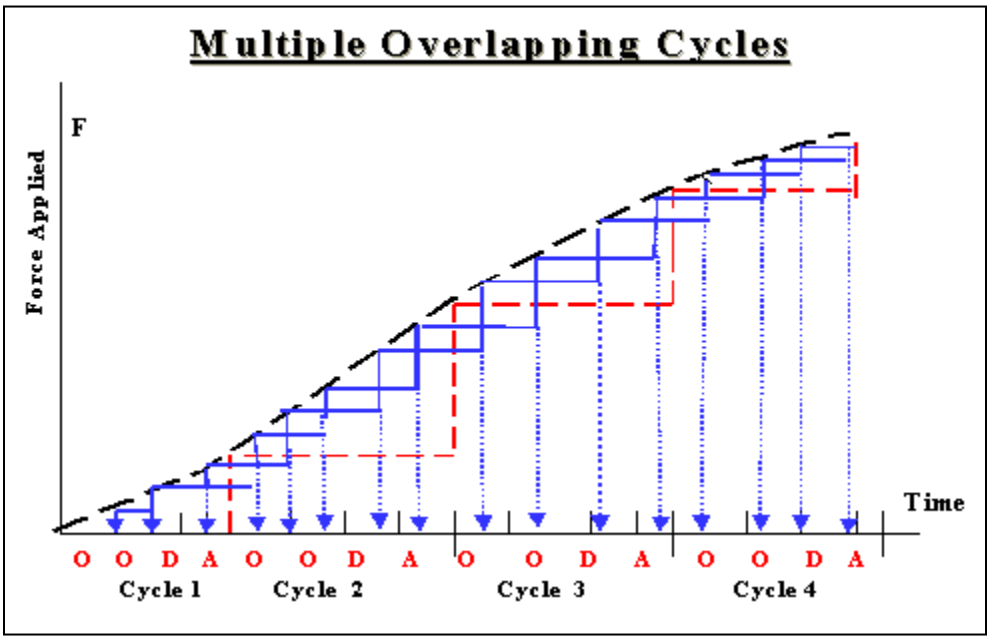

Figure 6
Source: Smith, *Network-Centric Warfare: Where's the Beef?,* 20.

There are at least two problems with this depiction of the effects of NCW. To begin with, the conclusions that Cebrowski draws from this graphical depiction are flawed. Cebrowski shows that combat power is the area under the curve (note the depiction of "lost combat power in fig 4). This has two consequences if true. Firstly, combat power must be cumulative i.e. the combat power expended during the first cycle is somehow part of the second cycle. Thus fresh units just entering into combat would presumably be at a disadvantage to those who had already been in combat. Holding a reserve would be valueless since it would not be creating combat power. Secondly, the cumulative power under the curve is <u>less</u> the faster the cycles run, exactly the opposite of

[199] Ibid., 18

what Cebrowski is attempting to demonstrate. According to the diagram if one were able to shorten the OOD portion of the cycle to zero, cumulative combat power would approach zero!

If we approach this from Smith's view point (figure 7), that the curve represents instantaneous application of combat power or efficiency (i.e. the height of the curve, not the area under it) this makes more sense. By comparing the x-axis components of both the friendly and adversary curves we could see a difference in the combat power generated between the two. The faster generation of combat power offered by NCW would equate to the advantage. Still, this approach sees combat power as cumulative, definitely an attritionist point of view, the wearing away of the enemy.

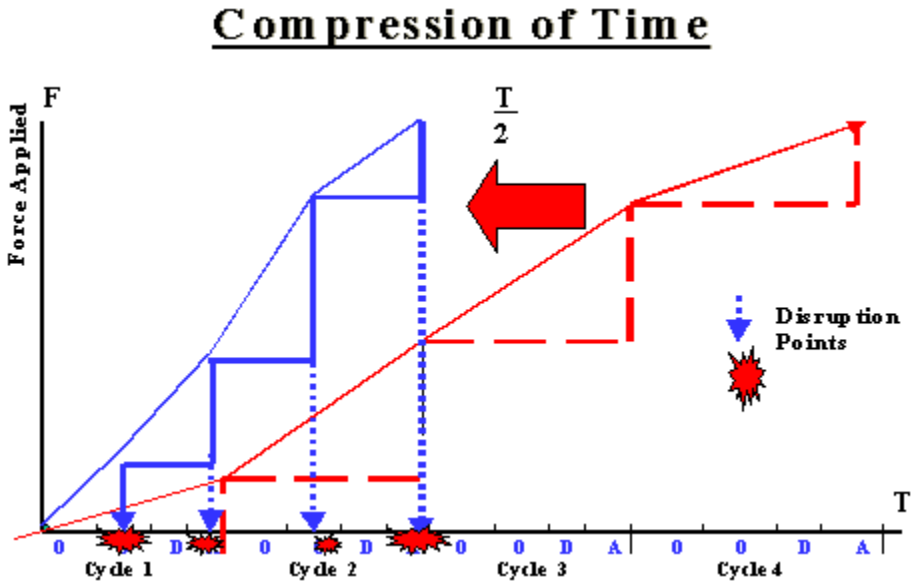

Figure 7 Compression of Time
Source: Smith, *Network-Centric Warfare: Where's the Beef?,* 21*:*

At this point, Smith's comment that of these "better, faster, more" attributes by themselves still add up to little more than a more efficient form of attrition becomes

obvious. The second level of efficiency Smith proposes is thus required to permit NCW to operate in other than an attritionist manner. The span of this paper, however, was to examine OFT concepts of NCW and determine if it constitutes a new theory of war. According to both OFT and CCRP documents, "Effects-Based Operations" or EBO is a new theory in its own right and that NCW can be an enabler of EBO.[200] While EBO may well offer operations beyond attrition examining the potential for NCW when used as part of EBO is beyond the scope of this paper.

The central importance of combat power in NCW theory is amply illustrated by the measures and examples the CCRP and OFT use. As an example, an analysis conducted on time critical targeting indicated "… a 50-fold increase in the percent of targets destroyed in 100 hours can be achieved given the development of a netted force over the next 20 years."[201] Similar claims are made for other measures of combat power or effectiveness.[202] There can be little doubt that one of the primary selling points of NCW is that it will be more effective at destroying the enemy than non-networked forces, a clearer indication of its attritionist nature.

EMPHASIS ON THE TACTICAL ARENA OF WARFARE

Since the time of Moltke or earlier there has been recognition of three levels of war, the tactical, operational and strategic which correspond to decision making levels.

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[200] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 4

[201] Saunders, *Al Qaeda: An Example of Network_Centric Operations* p15 quoted from Chief of Naval Operations Strategic Studies Group XX, FORCEnet and the 21st Century Warrior (Newport, R.I., November 2001)

[202] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 16. The OFT goes so far as to say that in events, exercises, training cycles, etc "the outcomes have consistently been decisive in favor of forces that are robustly networked." This seems at odds with what is known of Exercise Millennium Challenge 2002

The levels differ in consequences and authority; consequently, the decision makers at each level differ in experience, education and training. [203]

The idea that NCW will compress the levels of war is agreed to by both proponents and detractors alike eventually eroding the traditional lines between the strategic, operational and tactical levels of war.[204] This will eventually result in the tacticization of strategy – the situation where strategy is defined by tactical considerations.[205] The result of this compression could be the loss of operational art and the conversion of war into one long continuous tactical engagement or battle, a war of attrition.

Compressing the levels will eventually make tactical events strategic in nature or, alternatively, the strategic engagement will also be a tactical engagement. Since tactical engagements emphasize fire and movement, we should expect that the strategic arena will also be governed by fire and movement. Since a principle advantage of NCW is the ability to mass fires (sometimes euphemistically referred to as effects) it is likely that fires will take precedence over movement.[206] The net result of this will be strategic level commanders engaged in tactical target selection in order to achieve strategic and operational effects.

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[203] Robert S. Bolia, Michael A. Vidulich and W. Todd Nelson, *Unintended Consequences of the Network-Centric Decision Making Model: Considering the Human Operator* (Wright-Patterson AFB, OH: Air Force Research Laboratory,[2006]), http://www.dodccrp.org (accessed 23 February 2007), 6-7

[204] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 84

[205] Vego, *Net-Centric is Not Decisive*, 53

[206] Alberts, Garstka and Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 90. Although the word effects is used throughout the document, the context clearly equates effects with fires .i.e. "As the ranges of our sensors and weapons increase and as our ability to move information rapidly improves, we are no longer geographically constrained. Hence, in order to generate a concentrated effect, it is no longer necessary to concentrate forces." This is clearly referring to fires.

Decision making and compression of levels of war

Ultimately, this will result in the parallel compression of decision making. NCW touts this as an advantage, the ability to strip middle layers of military "management" creating a leaner organization with superior decision-making ability.[207] This seems to ignore the fact that decision making requirements at each level vary considerably in time allotted, the higher the level the more time allotted and presumably the more rational the decision making and analysis. At the tactical level time constraints force the decision making to be "recognition-primed" and decisions are characterized by the implicit guidance and control of the OODA loop.[208] The tactical level of war values speed of decision-making over quality.[209]

This leads an organization, capable of decentralized execution to move toward more centralized control. Decentralized organizations increase uncertainty at the top. It is human nature to seek certainty and the desire for certainty increases with the greater the consequences of the decision. A strategic decision will require more certainty, given the consequences, than a tactical decision thus organizations will be driven to greater centralized control.[210] This will be a repeat of the "long distance screwdriver" that commanders experienced during the Vietnam War.[211]

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[207] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*, 177

[208] Bolia, Vidulich and Nelson, *Unintended Consequences of the Network-Centric Decision Making Model: Considering the Human Operator*, 5

[209] Owen Connelly, *On War and Leadership: The Words of Combat Commanders from Frederick the Great to Norman Schwarzkopf*,(Princeton: Princeton University Press, 2002), 125. Pattons warning "A good solution applied with vigour now is better than a perfect solution applied ten minutes later" is widely accepted as true by military commanders

[210] Gregory A. Roman, *The Command Or Control Dilemma: When Technology and Organizational Orientation Collide* (Maxwell AFB, AB: Air War College Air University, 1997), 33, http://www.au.af.mil/ (accessed 12 December 2006), 10

[211] Raymond C. Bjorklund, *The Dollars and Sense of Command and Control* (Washington, DC: National Defense University Press, 1995), 79

NCW, by compressing the levels of war will force tactical decision makers into strategic decisions or strategic decision makers to make tactical decisions. This has already occurred in Kosovo and Afghanistan. During Operation Allied Force (OAF) the Supreme Allied Commander Europe (SACEUR), General Wesley Clark, became renowned for his micromanagement confirming the tendency by some to believe that tactical decisions could have strategic impact.[212] Clarke noted:

> What we discovered increasingly was that the political and strategic levels impinged on the operational and tactical levels…sometimes even seemingly insignificant tactical events packed huge political wallop. This is a key characteristic of modern war.[213]

The result of this kind of thinking is strategic and operational commanders making tactical decisions the results of which invariably become exercises in target selection. This tendency was brought home in an amusing manner by Lieutenant General Michael Short, Joint Forces Air Component Commander during OAF during a panel discussion at the Air Force Association National Symposium in 2000. He related the following anecdote:

> About 45 days into the war, Predator was providing great coverage for us. …we had live Predator video of three tanks moving down the road in Serbia and Kosovo. We had a FAC [Forward Air Controller] overhead and General Clark [Gen. Wesley K. Clark, SACEUR] had the same live Predator video that I had. "Mike, I want you to kill those tanks." I quickly responded, I had something else in mind, "Boss, I'll go after that for you." When shift time came… I was there because the SACEUR wanted those three tanks killed. We had a weapon school graduate on the phone talking direction to the FAC on the radio. [The] call went something like this: "A lot of interest in killing those tanks, 421. I'd like you to work on it." "Roger." Two or three minutes went by, and 421 clearly had not found those tanks. The young major's voice went up a bit and said, "ComAirSouth, and SACEUR are real interested in killing those tanks.

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[212] Matthias Alfons Altmeier, *The Perils of Network-Centric Warfare: Micromanagement, Morale and Combat Power in the Age of Infomation Technology* (Toronto, ON: Canadian Forces College,2004),12

[213] Wesley K. Clark, *Waging Modern War: Bosnia, Kosovo, and the Future of Combat* (New York, NY: Public Affairs, 2001), 10-11

> Have you got them yet?" "Negative." About two more minutes went by and the weapons school graduate played his last card. "General Short really wants those tanks killed." And a voice came back that I've heard in my house for the better part of 30 years and he said, "[expletive deleted], Dad, I can't see the [expletive deleted] tanks! [214]

The story clearly demonstrates how the availability of information can elevate tactical decisions to operational and strategic decision makers.

The same type of interference was experienced in Afghanistan leading the senior officer on the ground, Maj General Hagenbeck to remark that the micromanagement conducted by CENTCOM during OPERATION ANACONDA was very "disruptive."[215]

The CCRP book, *Power to the Edge* argues, however, that the decision making will be pushed to lower levels.[216] If this is true, in spite of what we have seen so far, the problem is not resolved for tactical decision makers, trained to apply combat force to destroy the enemy, and would be required to deal with operational and strategic problems. Inevitably they will revert to their training and experience and apply the tools they know best. This is likely to increase the use of combat power to address problems through destruction of the enemy.[217]

By compressing the levels of war decision making we risk reducing all decisions to tactical decision making, regardless of the appropriate level of the decision or decision maker.

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[214] Anthony J. Cotton, *Information Technology-Information Overload for Strategic Leaders* (Carlisle Barracks, PA: U.S. Army War College, 2005), http://handle.dtic.mil/100.2/ADA431929 (accessed 12 January 2007), 6

[215] Altmeier, *The Perils of Network-Centric Warfare: Micromanagement, Morale and Combat Power in the Age of Infomation Technology*, 15 As cited from Ricks, Thomas E., Beaming the Battlefield back home, Washington Post, 26 March 2002

[216] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*. The book, a product of the CCRP, proposes applying the flattened structures of Information Age businesses to networked military organizations.

SYNCHRONIZATION AND SELF-SYNCHRONIZATION

Synchronization

To understand self-synchronization it is necessary to understand synchronization. Synchronization is one of the tenets of US Army operations.218 The FM 3-0 defines the concept:

> Synchronization is arranging activities in time, space, and purpose to mass maximum relative combat power at a decisive place and time. Without synchronization, there is no massing of effects. Through synchronization, commanders arrange battlefield operating systems to mass the effects of combat power at the chosen place and time to overwhelm an enemy or dominate the situation. Synchronization is a means, not an end. Commanders balance synchronization against agility and initiative; they never surrender the initiative or miss a decisive opportunity for the sake of synchronization.… Though separated in time and space, commanders closely synchronize such actions to mass overwhelming effects at the decisive time and place. Synchronization often requires explicit coordination and rehearsals among participants.[219]

Synchronization is thus a method by which the commander optimizes combat power by making maximum use of every resource toward the objective. This can often mean that the effects of one activity are a precondition for subsequent action.[220] Since the Civil War this ability to generate combat power has been of prime concern for commanders as they sought the enemy Centre of Gravity and the decisive battle, hurling strength against strength.[221]

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[217] Bolia, Vidulich and Nelson, *Unintended Consequences of the Network-Centric Decision Making Model: Considering the Human Operator*, 6
[218] United States, Department of the Army, *Operations*, 4-15
[219] Ibid, 4-17
[220] United States, Department of the Army, *Operations*, Vol. FM 100-5 (Washington, D.C.: Headquarters, Department of the Army, 1993), http://www.fs.fed.us (accessed 23 March 2007), 2-9
[221] Weigley, *The American Way of War: A History of United States Military Strategy and Policy*.

In effect synchronization is an attempt to take an inherently uncertain, random, chaotic, and frictional event and achieve certainty, precision, order and optimization. Unlike maneuver warfare, which is time competitive, synchronization is event driven relying on the ability to predict the actions of the enemy.[222] This requires planning staff to modify the framework to continually fit the ever shifting situation in order to effect synchronization or, alternatively, rationalizing the situation as fitting within the existing framework.[223]

Synchronization is essential at small unit levels. In this respect combined arms tactics are good examples. The coordination of attacks composed of differing arms, armour, infantry, artillery, presents the enemy with a tactical dilemma, i.e. tactics useful for defeating tanks leave them open to defeat by artillery, etc. and it becomes possible to overwhelm them. Synchronization is vital for that.[224]

Problems with synchronization

In the 1990's the discussion in US military circles showed many similarities with the doctrine of the Soviet Union. At the foundation of both synchronization and Soviet military doctrine is that the commander must always achieve efficiency on the battlefield, to optimize the application of force. Recognizing the unpredictable nature of war, Western militaries have adopted the Intelligence Preparation of the Battlespace process to allow the commander to rapidly adjust his understanding of battlespace, and thereby

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[222] Maj John F. Schmitt, "Out of Sync with Maneuver Warfare," *Marine Corps Gazette* 78, no. 8 (1994), 19

[223] Maj Eric M. Walters, "Synchronization: The U.S. Inheritance of Soviet Military Doctrine," *Marine Corps Gazette* 78, no. 8 (1994), 25

[224] Leonard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, 91-8. Leonard discusses the value of synchronization using the combined arms model as a dialectic.

achieve this optimization.[225] What made this dialogue especially interesting was the realization that the kind of top down control necessary to achieve synchronization was not compatible with maneuver theory.[226]

The problem for synchronizers was one of time. Given the inability to foresee all possibilities, subordinate commanders are bound to encounter situations for which they are not "synchronized." It is highly probable, given the emphasis that the US Army places on synchronization that some units will wait for direction in uncertain situations. Conceptually, synchronization is in conflict with the maneuver warfare tenets of tempo and initiative.[227]

For maneuver warfare advocates, synchronization suffers from four major problems. Firstly, the process is predicated on the ability to anticipate the enemy and other actors. Synchronization stops once a decisive point is reached that has not been anticipated and can not proceed until the planning process is completed anew. Secondly, maneuver warfare is time competitive and seeks to establish a faster tempo than the adversary. Synchronization, on the other hand, is inherently event driven. The result of synchronizing, unless the enemy has been anticipated to a high degree of accuracy, is inevitably to slow tempo. Thirdly, synchronization treats war as linear in nature when it is clearly a complex system. The human element is removed and the assumption is that operations will unfold in a predictable, logical fashion. Unfortunately, complex, adaptive systems, such as the enemy or war itself, do not function in that way. The final flaw is that it misleads us into beliefs that are inconsistent with reality.[228] *FMFM-1 Warfighting*

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[225] Walters, *Synchronization: The U.S. Inheritance of Soviet Military Doctrine*, 23
[226] Schmitt, *Out of Sync with Maneuver Warfare*, 22
[227] Walters, *Synchronization: The U.S. Inheritance of Soviet Military Doctrine*, 25
[228] Schmitt, *Out of Sync with Maneuver Warfare*, 19-20

highlights this "…war gravitates naturally toward disorder … it is an integral characteristic … It is precisely this natural disorder which creates the conditions ripe for exploitation by and opportunistic will."[229]

By trying to create order out of chaos on the inherently chaotic battlefield, through its systematic and methodical approach, synchronization will actually hamper performance.[230] CCRP has proposed an alternative to top-down control and direction that they call self-synchronization.

Self-synchronization

"The ultimate goal of NCW is self-synchronization: shared situational awareness that leads to shared situational understanding and allows forces to organize and synchronize from the "bottom-up".[231] Under this construct command is exercised not through detailed orders but rather through the commander's intent, a shared situational awareness, authoritative resource allocation and rule sets.[232] Self-synchronization, despite the novelty of the word and the fact that it has evolved from the relatively new field of complexity theory, is not new to military operations. It appears to have been an inherent characteristic of operations at the small-unit level throughout history.[233]

This concept appears to represent a break with traditional attritionist view points where control and synchronization were top down, a requirement in order to generate the required combat power. The concept of self-synchronization appears on the surface to

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[229] United States, Marine Corps, *Warfighting*, Vol. FMFM-1 (Washington, D.C.: Marine Corps Headquarters, 1997), 8-9

[230] Schmitt, *Out of Sync with Maneuver Warfare*, 21

[231] Maj Charles D. Costanza, *Self-Synchronization, the Future Joint Force and the United States Army's Objective Force* (Fort Leavenworth, KS: US Army School of Advanced Military Studies,[2003]), http://stinet.dtic.mil/ (accessed 20 March 2007), 1

[232] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*, 27

more closely resemble Boyd's concepts of harmony implemented under mission command rather than the synchronization of WWI Generals.[234]

The foundations of the concept of self-synchronization lie in complexity theory and the associated theory of self-organization.[235] Proponents argue that military units are capable of self-organizing behaviour and thus should be structured in accordance with complexity theory's premise that complex, adaptive enterprises are best organized from the bottom-up.[236] In short, complexity theory suggests that greater synchronization can be achieved by organizing from the bottom up rather than from the top down, hence the term self-synchronization. In order to prevent chaos, this should only be done if certain conditions exist. The four assumptions to ensure productive self-synchronization are: "A clear and consistent understanding of command intent; High quality information and shared situational awareness; Competence at all levels of the force; and Trust in the information, subordinates, superiors, peers, and equipment."[237] While the concept may be relatively new, NCW proponents point to historical examples to prove the validity of the concept, the Battle of Trafalgar being perhaps the most commonly cited.[238]

Attritional orientation of self-synchronization

The CCRP publications that promote self-synchronization are clear that the organizational climate espoused by Boyd is also vital to the effective implementation of

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[233] Nancy J. Wesensten, Gregory Belenky and Thomas J. Balkin, "Cognitive Readiness in Network-Centric Operations," *Parameters*, no. Spring (2005), 94-105, http://carlisle-www.army.mil/usawc/Parameters/05spring/wesenste.pdf (accessed 20 March 2007), 10

[234] Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 182. Boyd defined harmony as: Power to perceive or create interaction of apparently disconnected events or entities in a connected way.

[235] Costanza, *Self-Synchronization, the Future Joint Force and the United States Army's Objective Force*, 2. Costanza provides an excellent non-mathematical explanation of complexity theory and its application to military operations.

[236] Ibid., 11

[237] Alberts and Hayes, *Power to the Edge: Command and Control in the Information Age*, 27

self-synchronization. But it is in this very concept that we find the flaw in self-synchronization for the organizational culture and focus must be in alignment. As we have seen, complexity theory leads us to believe that synchronization, given certain conditions, can be better performed from the bottom up rather than from the top down, hence the term self-synchronization. We also know that the goal of synchronization is to optimize combat power. Therefore, if self-synchronization is to achieve the same aim as synchronization then that must be to optimize combat power. The optimization of combat power has already been demonstrated to be an attritionist concept.

This problem has been recorded during both exercises and combat operations. The RAND Corporation did two studies of units conducting NCO using self-synchronization, one at the Joint Readiness Training Center (JRTC) and the other during Operation Iraqi Freedom.

The JRTC exercise involved Stryker Brigade Combat Team (SBCT) conducting Certification Exercise (CERTEX) in May 2003. The Exercise included the digitized and networked SBCT and an analog light infantry brigade. Of interest is how self-synchronization was used on the battlespace. Although the report generally supports the hypothesis that self-synchronization increases opportunities to "exploit an opportunity and surprise the enemy" it provides only one example.[239] This involved an attack that was conducted 13 hours ahead of schedule when the SBCT infantry battalion commander bypassed enemy forces and isolated the objective. The battalion commander stated "I could see (on the COP) the lead battalion had accomplished its mission early. I moved up

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[238] Ibid., 27

[239] Daniel Gonzales and others, *Network-Centric Operations Case Study: The Stryker Brigade Combat Team* (Santa Monica, CA: Rand Corp., 2005), 94

our attack time to maintain momentum."[240] Note two things in this scenario. The emphasis is not on the unit that bypassed the units in the disruption zone (dislocated the enemy through maneuver) but that *combat power* was synchronized, that the attack was synchronized earlier than originally scheduled.

The second study involved actual combat operations during Iraqi Freedom. The study, in part, measures increases in synchronization to determine "Degrees of Effectiveness."[241] Data was gathered through face-to-face interviews so what was reported indicates to some degree how important participants viewed the event. Again, although there was a general assertion that self-synchronization was successful and improved effectiveness there was only one example provided.[242]

The case selected to highlight this success is, however, instructive. It involves a Brigade Combat Team (BCT) delaying its attack because the other BCT had been delayed up to 18 hours. Instead of advancing and securing the bridgehead, the BCT set up a hasty defense until the operation could be conducted, something that would not have been possible without the information that NCO provided. Two points are salient here. Firstly, this is an example of how self-synchronization can be used to *slow* tempo, not increase it. Secondly, as in the SBCT study, self-synchronization was used to increase combat power. This is not to critique the actions of the BCT commander.[243] One has to assume that given the tactical situation the commander made the best possible decision given the information available. What should be of interest is that, in what some are

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[240] Ibid., 96

[241] The use of the term synchronization is synonymous with our concept of self-synchronization in this example.

[242] Gonzales, *Network-Centric Operations Case Study: US/UK Coalition Combat Operations during Operation Iraqi Freedom* (Santa Monica, CA: Rand Corp., 2005), 8-1

[243] Gonzales and others, *Network-Centric Operations Case Study: The Stryker Brigade Combat Team*, 5-5

calling an overall outstanding example of maneuverist warfare, the showcase example of self-synchronization was in fact attritionist, focusing on combat and synchronization with slower units.[244]

These two examples illustrate likely trends for self-synchronizing units. Firstly, units will sacrifice tempo and initiative in order to effect synchronization precisely because it offers the greatest opportunity for combat power. The continual reference to increased combat power cannot help but drive a culture of maximum combat efficiency and the massing of fires. Boyd's OODA Loop and his emphasis on orientation suggests the importance of culture in guiding decisions. In short, as commanders go through their OODA loops one should expect that their cultural orientation will drive them towards optimizing combat power, their cultural norm.

Secondly, synchronization will usually be a less risky tactical path than initiative. This may often prove to be the most attractive but it is generally the most predictable and not necessarily the most beneficial in the operational sense. So self-synchronization will drive, through organizational culture, to mass fires to ensure destruction, move in order to more effectively mass fires and gain protection (although ultimately protection will be afforded by attempting to remain beyond enemy fires by engaging as extended ranges).

CONCLUSIONS

Relating Boyd's Theories of conflict to NCW it becomes clear that NCW, as currently envisioned and practiced by the US military, can be classified as a form of attrition warfare whereby the means of victory is the destruction of the enemy's physical

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[244] J.F. Bing West, *Maneuver Warfare: It Worked in Iraq*, 37. According to West the USMC conduct of the operation was classic Maneuver but no thanks to NCW. He claims the fighters on the ground were disconnected from network-centric command and control.

capacity to resist. In focus, emphasis, nature, means, ends, requirements and characteristics it conforms to the attributes that emphasize battle and destruction of the enemy. NCO is capable of generating widespread destruction. Units will tend be lightly armored so they will seek protection from the enemy's weapons through dispersal and ability to mass fires without massing forces and engage at extended ranges. Additionally, units will use speed or rapidity to maneuver fires and effect self-protection.[245]

When key aspects are examined the attritionist nature becomes even more apparent. The emphasis on generating combat power and the way that its use is envisioned leads even some proponents to admit that NCW is merely an enabler of EBO, that by itself it is solidly attritionist. NCW's' ability to compress the levels of war has already resulted in tactical decisions being made by strategic decision makers and it is unlikely this will stop as long as the capability to do so exists. This will stifle initiative thus slowing tempo while reducing war to a series of tactical problems, a situation that will inevitably emphasize target selection over operational design. The use of self-synchronization is advertised as a method to increase tempo but self-synchronization is a bottom up approach to synchronization and synchronization is a top down approach to optimize combat power. Regardless of where the synchronization derives from it must slow tempo if it is to result in increased combat power, as illustrated in the examples.

Based on the Office of Force Transformation and the CCRP's vision of Network-Centric Warfare and Boyd's theories of warfare, it is clear that NCW is not a new theory of war but a form of attrition warfare.

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[245] Boyd, *Patterns of Conflict*, Slide 113

CHAPTER 5

CONCLUSION

Network-Centric Warfare is not a new theory of war; rather NCW can be categorized as form of attrition warfare within the definition offered by military reformer John Boyd. Network-Centric Warfare is capable of generating fires across large areas with extreme accuracy, speeding up the command "cycle" and tempo while protecting its own forces through dispersion. At the core of this system is the ability to create unparalleled situational awareness for all actors through the maintenance of an extensive infostructure. It is extremely mobile, both in units and fires, and can use this to both bring fires on the enemy and escape from the adversary's weapons. The CCRP vision of NCW, however, is ultimately geared toward the destruction of the enemy as the means to victory, a form of attrition.

There is little doubt that networking provides increased information flow and can dramatically improve situational awareness. NCW theory and practice is responsible for translating this information bonanza into increased warfighting capacity. It is primarily advances in information technology in the areas of command and control; intelligence, surveillance, and reconnaissance; and precision weapons delivery that will deliver the promise of NCW. Proponents of NCW claim that it has the potential to accelerate the decision cycle by linking sensors, communications networks, and weapons systems via an interconnected grid, thereby enhancing our ability to achieve information and decision superiority over an adversary during the conduct of military operations. This will facilitate not just an increase in the pace of decision making but also quality allowing a

higher tempo of military operations. Commanders at all levels will be able to quickly develop and maintain situational awareness and understanding, rapidly communicate critical information to friendly combat forces, and marshal the appropriate capabilities to exert massed effects against an adversary.[246] The OFT believes that these attributes, particularly the central importance of information, qualifies NCW as a new theory of war.

Regardless of what technology may bring to the warfighter the fundamental nature of war remains unaltered. It is a human endeavour subject to violence, chaos and uncertainty, something that NCW will not change. It is, however, possible for NCW to substantially change or add to our theory of war but to determine if this is actually occurring NCW must be analyzed with reference to existing theories. While there have been any number of theories of war proposed over time, among the most useful are those of the late Colonel John Boyd.

Boyd's theories encompass war in all its myriad forms making it ideally suited for the examination of new theories. He divided conflict up into three general classes, attrition, maneuver and moral, according to their method for achieving victory. For Boyd, all forms of war that seek victory through destruction of the enemy are attritionist while maneuver warfare seeks to defeat the enemy by attacking his perceptions. Maneuver is an inherently time competitive method of fighting, a further differentiation from attrition theory. Boyd's third category, moral warfare, seeks victory by de-legitimizing the authority of the ruling regime in the minds of the populace.

Of particular importance to maneuver theory and Boyd's understanding of conflict is the OODA Loop. In the simplest terms, the OODA loop is the by now familiar observation-orientation-decision-action cycle that has spawned a number of offspring.

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[246] Office of Force Transformation, *The Implementation of Network Centric Warfare*, 75 p.18

The concept of the OODA loop is far more powerful than this simple construct and forms the basis of Boyd's understanding of competition.

Relating Boyd's Theories of conflict to NCW it becomes clear that NCW as currently envisioned and practiced by the US military, can be classified as a form of attrition warfare whereby the means of victory is the destruction of the enemy's physical capacity to resist. In focus, emphasis, nature, means, ends, requirements and characteristics it conforms to the attributes that emphasize battle and destruction of the enemy.

When key aspects are examined the attritionist nature becomes even more apparent. The emphasis is heavily weighted toward generating combat power. Additionally, NCW's' ability to compress the levels of war results in tactical decisions being made by strategic decision makers and vice versa, stifling initiative and emphasizing target selection as a war winning formula. Self-synchronization, while advertised as a method to increase tempo actually seeks to optimize combat power, again slowing tempo.

Based on the Office of Force Transformation and the CCRP's vision of Network-Centric Warfare and Boyd's theories of warfare, it is clear that NCW is not a new theory of war but a form of attrition warfare.

The intent of his paper has not been to critique the wisdom or efficacy of the technology of networking or even the employment of that technology in conflict. Rather it seeks to explore the type of war that NCW, as advocated by the US military, will bring to the battlefield. Understanding the attritionist nature of NCW raises serious questions for further investigation.

Attrition and maneuver (and to a lesser extent moral) warfare represent differing approaches to the same problem, fighting and winning wars. As the means to victory differ so too should the ways leading one to believe the doctrine, training, manning and equipping would differ as well. In short, the type of war you are preparing for will determine your "strategies, technologies, doctrines and organizations."[247] Conversely, and perhaps more importantly, these things will determine the type of war you can fight. Thus, since NCW is attritionist it follows that the US will be consigned to fighting attritionist wars for the foreseeable future.

General McCaffery's recent analysis of the conditions on the ground in Iraq paints a bleak picture not only for US prospects but for the advocates of NCW and attrition:

> Although we have arrested 120,000 insurgents (hold 27,000) and killed some huge number of enemy combatants (perhaps 20,000+) --- the armed insurgents, militias, and Al Qaeda in Iraq without fail apparently re-generate both leadership cadres and foot soldiers. Their sophistication, numbers, and lethality go up--- not down--- as they incur these staggering battle losses.[248]

Attrition warfare is neither inherently good nor bad. Its value is related to its utility in winning wars. Therefore, before embarking irrevocably down the NCW road the US should determine if an attritionist strategy is truly in the best interests of US policy. The decision is an important one that will have ramifications for years to come.

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[247] Hammond, *The Mind of War : John Boyd and American Security*, 152

[248] Barry R. McCaffrey, *After Action Report—General Barry R McCaffrey USA (Ret); VISIT IRAQ AND KUWAIT 9-16 March 2007* (West Point, NY: United States Military Academy,[2007]), http://media.washingtonpost.com (accessed 1 April 2007), 4 General (retired) McCaffrey was a division commander during Gulf War I and recently traveled to Iraq to assess progress in the war.

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