

NAVAL OPERATIONS

A Close Look at the Operational Level of War at Sea

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Today's American navy writes prolifically about maritime strategies but has not devoted equal attention to campaign plans or analysis that tests the strategies' viability. We illustrate herein how the operational—or campaign—level links policy and strategy to the tactical and technological elements of war at sea. First, we relate how the U.S. Navy reluctantly came to accept the existence of an operational level of warfare but having done so will find it useful. Second, we describe important properties of naval operations in terms of constants, trends, and variables in warfare at and from the sea. Third, we demonstrate how operational-level planning would help if the Navy and the nation were to adopt six clearly stated, twenty-first-century strategies that would serve present and future national policies better than do current strategy documents.

VIEWS OF NAVIES REGARDING THE OPERATIONAL LEVEL OF WAR

In both peace and war, we frequently carry out our roles through campaigns [that] focus on the operational level of war. . . . There are three levels: tactical, operational, and strategic. . . . The operational level concerns forces collectively in a theater.

GENERAL C. E. MUNDY AND ADMIRAL F. B. KELSO

The Operational Level of War at Sea Introduced and Described

The U.S. Navy first acknowledged the existence of an operational level of war at sea when Admiral Kelso, as Chief of Naval Operations, and General Mundy, Commandant of the Marine Corps, signed the first “naval doctrine publication,” entitled *Naval Warfare*, in the spring of 1994.¹ In part the change had come from

pressure for common terminology after World War II. In part it had come at the urging of the Marine Corps, which saw the advantage of applying “operational art,” standing between strategy and tactics. The second edition of *Naval Warfare*, issued in 2010, reaffirms the three levels of war and concentrates specifically on the operational level as its doctrinal domain.²

The three elements of war, in the Navy’s eyes, had previously been strategy, tactics, and logistics. Part of the reason that logistics were prominent was the geographical span of naval operations. Distances scarcely imagined by ground force commanders are involved at sea; a map of a maritime theater generally covers a geographical area an order of magnitude larger than that for a ground campaign. The activities of a naval campaign (or operation) are probably at least 80 percent the processes of operational logistics. Therefore it is reasonable—and clarifying—to say that the American navy’s three levels of war at sea have now become strategy, operational logistics (or merely operations), and tactics. In what follows, we apply this utilitarian perspective of three levels of war to describe *naval* operations. We make no reference to operational art in past U.S., German, or Soviet army applications for ground operations. Nor do we have space to describe how naval operations are linked to joint operations. We are consistent, however, with the quite adequate descriptions of joint operations in *Naval Warfare* (NDP-1).³

The Traditional View of Navies

Sir Julian Corbett and American admirals Bradley Fiske and J. C. Wylie, among others, thought strategy included the operations in a naval campaign. This viewpoint permeates Corbett’s *Some Principles of Maritime Strategy*.⁴ Fiske’s *The Navy as a Fighting Machine* describes his vision of a fleet this way: “Imagine now a strategical system . . . so that the navy will resemble a vast and efficient organism, all the parts leagued together by a common understanding and a common purpose; mutually dependent, mutually assisting, sympathetically obedient to the controlling mind that directs them toward the ‘end in view.’”⁵ Wylie is the most explicit. He points out that in most of history naval theorists have said that tactics apply when the opposing forces are in contact. Then, “the plans and operations are ‘tactical.’ Everything outside of contact is ‘strategic.’”⁶

Among non-American examples there are no better illustrations than Italian admiral Romeo Bernotti’s two fine books on tactics and strategy written in the first decade of the twentieth century. While still a lieutenant and instructor in the art of naval war at the Royal Italian Naval Academy, Bernotti wrote his highly respected *Fundamentals of Naval Tactics*. In 1911 followed *Fondamenti di strategia navale* (Fundamentals of Naval Strategy). The latter has never been published in English, but both books apply quantitative analysis so effectively that Bernotti’s biographer, Brian Sullivan, says they foreshadowed operations analysis that we

usually date from World War II. Bernotti's untranslated book on strategy is almost entirely devoted to naval *operations*—that is, campaign planning and execution. The text is replete with geometric and mathematical guides for operational activities that include “strategic” reconnaissance and search procedures, along with the distinction between strategic and tactical scouting methods; strategic mobility, cruising speeds, and combat radii; and logistical activities, accompanied by a quantitative comparison between serial replenishment at sea and support from nearby bases.

In the years prior to World War II, most professional studies at the U.S. Naval War College, in Newport, Rhode Island, emphasized either tactics (and technology) or operations (and logistics). The war games played there—over three hundred of them between 1919 and 1940—were intended either to execute a presumed strategy in a campaign or to teach and test battle tactics. These games revealed early on that the strategy then intended to guide the campaign in the Pacific was unexecutable. They correctly showed that a strategy of rapid relief of the Philippines (under Japanese attack, of course) would take too long. Over twenty years a change to a more realistic Pacific strategy took place, slowly but relentlessly. There was no wishing-will-make-it-so in Naval War College strategic thinking, because execution was tested for feasibility by strategic (i.e., operational) games.⁷ The operational level, tested in “battles” at the tactical level, had evaluated the intended strategy and found it wanting.

The U.S. Navy's skills at operational planning and methods for conducting campaign analyses have greatly expanded since the days when Naval War College gaming was so central. Analytical successes achieved during the Cold War were valuable in refining plans for nuclear deterrence and protecting the sea-lanes to Europe.⁸

Kinds of Naval Operations

A categorization broadly applicable to most states is that navies perform one or more of four tasks. Every navy's composition will be, or ought to be, constructed on the basis of its intended contribution to the following functions:

On the seas . . .

1. Ensure safety of goods and services: navies protect the *movement* of shipping and means of war on the oceans and safeguard *stationary* forces, to include nuclear-powered ballistic-missile submarines (SSBNs) and coastal patrols.
2. Deny safety of enemy goods and services: navies prevent the movement of enemy shipping and means of war and threaten enemy forces, such as SSBNs.

From the seas . . .

3. Deliver goods and services: navies put land forces ashore to seize and hold territory and deliver air and missile strikes for a variety of purposes. (Recently our own navy has added delivery of disaster assistance as an explicit “core competency.”)
4. Prevent enemy delivery of goods and services: navies protect the homeland from threats coming by sea.

American Naval Operations

Before examining operations in the contemporary scene, it is useful to review the traditional views of sea power, because the U.S. Navy is now emerging from an anomalous period, one that began in 1945, in which it performed two functions only. The first was defending the sea lines of communication that linked members of the North Atlantic Treaty Organization (NATO) on both sides of the Atlantic. The second was projecting power from sea to land in many places. The first function was never put to the test. The second was performed without loss and almost flawlessly in support of a great many land operations overseas.

The oceans are very large, two-dimensional highways for commercial shipping. Whoever controls the seas has a great advantage, the loss of which leads to dire consequences. There is incontestable historical evidence that sea powers usually defeat land powers. See any of A. T. Mahan’s works, commencing with *The Influence of Sea Power upon History, 1660–1783*—they show the sweeping effect of command of the seas in history, from Greek and Roman times through the Napoleonic Wars. A more recent book to this point is John Arquilla’s landmark *Dubious Battles*. Arquilla quantifies an even bolder assertion, that in wars since 1815 not only have sea powers usually defeated land powers but land powers more often than not initiated the wars that they then lost.⁹

Both Mahan and Arquilla offer rich explanations of the strategic reasons why. For example, a land power usually must maintain a substantial army. Only the most prosperous of land powers can simultaneously field an army and deploy a navy—as, for example, when France, the great land power of the eighteenth century, was confronted at sea by Britain’s Royal Navy. Neither Mahan nor Arquilla, however, explains the operational advantages that a sea power exploits over a land power. We will explain the advantages explicitly, under two great constants: *operational maneuver* and *efficiency of movement*.

The Traditional Composition of a Fleet

In the past, naval operations have been carried out by four categories of naval forces. The first three are described best by Julian Corbett, the preeminent naval writer of a century ago.

A *battle fleet*, capital ships and accompanying forces, meets and destroys the enemy's battle fleet. Mahan said, correctly, that the purpose of a battle fleet is to destroy the enemy's fleet in order to achieve command of the sea. But a battle fleet was usually ill suited to perform other roles. Corbett famously identified two other kinds of forces as well.

The first of these (and the second category of forces) comprised *cruisers*, which attack enemy commerce or defend our own from attack. Capital ships of the battle fleet have been inefficient at or incapable of defending "trade," even

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after establishing unchallenged command of the seas. Raiders, pirates, and privateers were historically the threat. Since World War I surface raiders have been replaced by submarines and also,

since World War II, by long-range, shore-based aircraft or missiles. A state that could not challenge a big navy for sea control could resort to *guerre de course*, a guerrilla war at sea, threatening commerce and denying to the sea power risk-free operations. Hence, defensive "cruisers" represented a necessary navy component, sufficient in numbers, speed, and radius of action to defeat cruiser-raiders. Submarines that supplanted surface raiders had to be opposed by large numbers of antisubmarine forces, which are also "cruisers" in Corbett's terminology. Mine warfare is another form of cruiser warfare.

Corbett also pointed to *flotillas* that operate in littoral waters too dangerous for capital ships. A flotilla consists of small combatants with short radii of action but considerable firepower. It survives less by armor or defensive firepower than by numbers of units and stealthiness, exploiting the coastal "terrain" and attacking in coordinated operations that we now call "swarms."

The emphasis of Mahan and Corbett is on control of the oceans—Functions 1, 2, and, indirectly, 4. To serve Function 3, the *amphibious force*, a fourth category of fighting fleet, was introduced and developed by the Navy and Marine Corps for World War II, when it comprised assault transports, tank landing ships, medium landing craft, and the like. But Function 3, the delivery of goods and services from the sea, is much broader than an amphibious force's opposed-assault capability. Since the last opposed landing, at Inchon in 1950, the nation has enjoyed near-flawless success in safe, unopposed delivery of ground and air forces from the sea. Books by P. H. Colomb and Frank Uhlig make clear that this category of operations—power projection for land operations—is what dominant navies have been concerned with most of the time.¹⁰ Throughout history, influencing events on land has been a function sometimes as important and performed as frequently as safeguarding the sea-lanes. And why not? "The seat of purpose is on the land"

has been and remains a cornerstone for every navy, a tenet to remember even when a contest for command of the sea temporarily dominates its operations.¹¹

It is clarifying to distinguish the amphibious *assault* ships intended for forcible entry by marines from the many more and different kinds of ships for the amphibious *lift* that delivers and sustains army, marine, special forces, and air forces overseas. Mahan and other writers of his era emphasized that sea power included a merchant fleet. This was in part because when he wrote a commercial fleet was the means of delivering armies overseas.

An Incongruity and Its Significance for the Twenty-First Century

Observe there is no evident congruence between the four functions and four traditional force types—that is to say, between the ends and means of naval operations. A nation’s operating forces are its means of achieving its maritime (or national) strategy’s ends. Though the functions will abide, there is no inherent reason why the force categories of the past must hold in the future. The U.S. Navy may wish to examine whether the paradigm of a battle fleet of capital ships physically concentrated to achieve decisive battle is obsolete. It would be highly useful to explore whether Functions 1 and 2—safeguarding the movement of ships at sea and denying safe movement to the enemy—can be achieved without capital ships, such as ships of the line, battleships, or aircraft carriers. No one knows with certainty, because the U.S. Navy’s command of the seas has not been recently challenged. Even the formidable Soviet navy concerned itself mainly with sea denial, rarely with sea control. Later we will suggest that a more distributable and survivable navy for the twenty-first century might do triple duty as battle fleet, cruisers, and—at least in part—flotilla. Such a fleet cannot serve, however, for efficient projection of sea power to the land.

To pursue the several relationships would constitute a study in itself. It is a subject we have no space to consider in detail, but it is pertinent that the nature of future ships, aircraft, and sensors in a missile-age navy derives as much from operational as from tactical considerations.

OPERATIONAL CONSTANTS, TRENDS, AND VARIABLES

Understanding the processes of combat is a better approach to tactics [than principles are]. Processes are the navigator’s science and art; principles are the stars he uses to find his way. . . . The key to fruitful study . . . is an appreciation of how battles transpire in time and space.

WAYNE P. HUGHES, JR.

The principles of war—and from Sun Tzu until now there have been at least twenty-two sets of them—must by definition apply to war at sea, but because they are general and abstract they inherently have limited practical value.¹²

Operational *constants*—things that abide—are more utilitarian, because they can be deduced from the history of naval operations. *Trends*—things that change from age to age in one direction—are likewise deduced from history, are usually brought about by new technology, and apply as much at the operational level as the tactical level at sea.¹³ The sinking of the Israeli destroyer *Eilat* by small Egyptian missile boats on 21 October 1967 was an abrupt indicator of the lethality of small missile ships and their power to take out more than their weight of enemy warships at sea.¹⁴ The fatal attack foretold a swift change, an abrupt transformation of naval combat. The significance was grasped at once by the Israeli navy, which ordered small *Sa'ar* combatants armed with Gabriel missiles and employed them nearly flawlessly in the 1973 Arab-Israeli War.

There is a third category we shall call *variables*. Variables at the operational level of war stem not from technology but from social and political change. Variables are not a trend in one direction but change according to geopolitical circumstances. The present interest in irregular warfare and resistance to terrorist attacks, such as the one on USS *Cole* (DDG 67) at Aden, brought about a great change of emphasis in the world's navies (and armies), but throughout history there have been many examples of sneak attacks in ports or restricted waters. The well named “Long War of the Twenty-First Century” appears to have durability, but any historian will say that what is wrought by societies and geopolitics will change in direction. The rise of China and its well documented interest in sea power is one such impending change, one that ought to temper any single-minded U.S. Navy emphasis on projection of power and, relatedly, humanitarian operations.

No catalog of constants, trends, and variables in naval operations has been compiled as has been done at the tactical level, but it is useful to offer salient examples of each.¹⁵

Two Great Constants: Operational Maneuver and Efficiency of Movement

“Operational maneuver from the sea” is a modern term coined by the U.S. Marine Corps, but the efficacy of expeditionary operations and the efficient support of land forces operating across oceans have been and remain constant advantages of maritime superiority. Twenty-five years ago, in the heyday of the NATO alliance, a thoughtful German army officer named Otto Bubke wrote a short essay describing the operational reasons why command of the sea is so advantageous.¹⁶ On one hand, he argued, sea control prevents an enemy from attacking from the sea. On the other, it gives a maritime state the power to choose its scene of action, somewhere on a land power's coast.¹⁷ The reason for the latter, he stressed, was the operational-movement advantage of ships over ground transportation. At sea an amphibious force moves around five hundred nautical miles a day. Fast containerships move farther still, though in the twentieth century the norm for

merchant ships was more like four hundred. On land an army moving at operational speed against weak opposition advances about twenty-five statute miles a day. The famous German blitzkriegs in Poland and France in 1939 and 1940 moved no faster than that. The ancient Roman road system was designed to allow a legion to move thirty miles a day.¹⁸ In 1066, King Harold of England had to rush north to defeat a Norwegian attack near York and then immediately back south to face William of Normandy at Hastings (where William would earn the epithet

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“the Conqueror”). Harold’s army averaged thirty miles a day during the round-trip. In DESERT STORM, the American army’s famous “left hook” crossed Kuwait to reach the

Iraq border eighty miles away in four days, thus moving at twenty miles a day. A decade later, in Operation IRAQI FREEDOM, American ground forces advancing against light to moderate opposition took twenty-one days to reach Baghdad, which was 250 miles from the Kuwait border—a rate of advance of twelve miles per day.

Thus, in speed of operational movement ships have more than an order-of-magnitude advantage over armies advancing against no or light resistance. They always have and likely always will. The number of logistical personnel required to move a force to the scene of action and sustain it there is probably two orders of magnitude less for ships than for land transport. In weight of combat potential carried per unit of energy expended, the advantage of ships may be as much as three orders of magnitude. The introduction of aircraft and aerial logistics complicates this simplified description, but aircraft have never changed the threefold advantage of ships over ground transportation sufficiently to offset a sea power’s operational advantage. Ballistic missiles with nuclear warheads potentially attenuate a sea power’s advantage if they are used intercontinentally, but to date they have not significantly altered the advantage of naval operations in speed or efficiency of movement.¹⁹

Otto Bubke did not say, nor do we, that the sea power’s advantage is the power to attack a strong land power’s physical center of gravity, because the land power will know what that vital spot is and defend it. Nor does the sea power’s advantage always allow it to strike quickly and decisively; Great Britain found out that it could not land on German soil in World War I, and even an alternative operation against the Dardanelles proved too ambitious. In World War II the Normandy landings had to be deferred until 1944. But Bubke shows with rare clarity that because a sea power cannot be invaded, it does not have to maintain a large standing army, and it can often find and fund allies for coalition operations against the dominant land power that threatens them all.

Another Constant: Two Different Campaign Processes

J. C. Wylie was the first to distinguish two different “strategies,” or ways of conducting a campaign. One is “sequential,” in which each operational success is another step toward victory, and a battle won becomes the foundation of the next. The classic example is the sweep of the Fifth and Third Fleets across the Central Pacific in amphibious assaults from the Gilbert Islands to the Philippines in less than a year. Mahan spoke of achieving one decisive battle, but in the last two centuries two or more “decisive” battles have been necessary to achieve command of the sea.

The other way of conducting a campaign described by Wylie is through the “cumulative” results of many small actions. The world wars’ submarine campaigns in the Atlantic, Pacific, and Mediterranean are representative, and all *guerres de course* are antecedents. Those who do not find the distinction self-evident will find a thorough discussion in Wylie’s classic *Military Strategy*.²⁰ Wylie also points out the advantage of pursuing both operational modes in concert.

Sequential and cumulative campaigns were common in the age of fighting sail, the battleship era, and aircraft-carrier era. Although there have been no big sea battles in the missile age, this operational constant continues to hold. A sequence of short, sharp missile battles occurred in the eastern Mediterranean in the 1973 Arab-Israeli War, and it deserves careful study. A sequential campaign on the open ocean in the missile age was waged by the British navy in the Falklands War. It started at sea and ended on land. A superb introduction to it is by its operational commander, Admiral Sandy Woodward, Royal Navy. His felicitous memoir, *One Hundred Days*, is the best and very nearly the only personal description of the burdens of modern command at sea—long-range aircraft, short-range Exocet missiles, and a submarine put unrelenting pressure on him at the operational level, and sometimes the tactical level as well.²¹

A long cumulative maritime campaign that transpired during most of the 1980s (actually, a pair of identical and opposing ones) was conducted by Iraq and Iran against shipping in the Persian Gulf. It included many—over a hundred—missile attacks.

One More Constant: The Importance of Espionage for Operational Effectiveness

We will examine below as a great trend the improvements in operational reconnaissance and surveillance. There can be little doubt, however, that clandestine information gathering—espionage—with a similar goal has affected states and naval operations for a very long time. A prominent tool of espionage has been code breaking, illustrated by MAGIC’s effect in determining Japanese operational intentions. In the Battle of the Atlantic, ULTRA on the Allied side—though offset at times by code breaking on the German side—created big swings in the loss

rates of Allied shipping and German U-boats. In the Cold War, U-2 and SR-71 flights were prominent in “strategic” (i.e., operational) early warning. The important observation for our purposes is that the value of espionage is not tactical but operational. It may bring about battles—for example, the battle of Jutland and other North Sea engagements in World War I—but it rarely affects battle tactics or outcomes.

A Great Trend: Changes to Scouting Effectiveness

The scouting process enjoys a trend, stemming from advances in technology, to greater detection range and accuracy. “Scouting” is the gathering and delivery of information; that once-popular term is more compact than “intelligence, surveillance, and reconnaissance” (even though often abbreviated as “ISR”). Throughout most of naval history operational scouting was difficult for fleets. When a blockaded fleet escaped to sea, the blockading fleet was hard put to regain contact. After the French fleet escaped Admiral Horatio Nelson’s blockade of Toulon and other French ports in 1798, he spent weeks sailing all over the Mediterranean trying to track it down before he finally found and destroyed it in the battle of the Nile.²² Until the first decades of the twentieth century, privateers, raiders, and pirates preyed on shipping without untoward risk. A great transformation occurred between 1910 and 1920 with the introduction of aerial reconnaissance for wide-area search, accompanied by instant wireless-radio reporting.²³ Within a decade surface raiders became obsolete, and *guerre de course* at sea, to be successful, had to be conducted by submarines, which could to a much greater extent remain undetected by aircraft. Locating an enemy fleet and even individual surface raiders became much less of a guessing game. Aerial scouting at sea changed the nature of naval operations irrevocably.

And the trend continues, with satellites, unmanned aerial vehicles (UAVs), and other means to enhance surveillance at sea. Electronic intercept exacerbates the vulnerability of radiating warships to detection. Processing the information has now become a greater challenge than collecting it. Thus the current trend is a shift of emphasis from the means of scouting—to collect comprehensive data—to the fusion and interpretation of massive amounts of information into an essence on which commanders may decide and act.

Tactical and operational scouting overlap to no small extent—in fact so much so that they can be distinguished only by their effects. A UAV may be in the air for surveillance and operational warning of an approaching threat, or it may serve the tactical purpose of guiding weapons to the target. The initial efficacious campaign against the Taliban in Afghanistan is a good illustration of operational and tactical scouting conducted with the same aircraft.

The watchword of operational scouting is *comprehensiveness*. The watchword of tactical scouting is *timeliness*.

Three More Trends

Increasing Range of Land-to-Sea Threats. Increasingly the sea is subject to attack and even domination from the land. At first land-based aircraft were not very effective unless their crews were specifically trained to navigate and hit moving targets afloat. For the past thirty or forty years vulnerability to land attack has grown because of the tactical-operational trend toward increasing range and accuracy of scouting systems (or ISR), accompanied by the increasing range and accuracy of guided missiles, both ballistic and cruise. Today's defender is increasingly hard put to deal with either kind of antiship missile, let alone both. This leads to the possibility of a coastal no-man's-land where neither shipping can flow nor surface warships can operate until command of the sea, including air superiority over the adjacent land, has been established. The trend restores emphasis on Function 1 (secure seas), which in large measure was taken for granted in the U.S. Navy after 1990, when Function 3 (projecting power) was the sole focus of attention.

Increased Port Vulnerability. Strikes into ports and airfields ashore have, over the past seventy years, virtually eliminated the "fleet in being," held safely in reserve. Starting with the British strikes on Italian battleships in Taranto in 1940, the hazard to ships in port has grown. A recent example is the use of missiles in two Indian attacks on Pakistani ships in Karachi in 1971. In the realm of irregular warfare, the terrorist attack on *Cole* in port at Aden and U.S. Navy efforts to prevent recurrences point to an important change of operational perspective that applies even in "peacetime."

Growth of Claims to Ocean Ownership. In the past "ownership" was a question largely restricted to land war. Today the question of ocean dominion—accompanied by increasing claims of ocean sovereignty—is a visible trend that will continue. Fishing rights have long been contentious, but now seabed mineral resources have led to expanding international claims and counterclaims that threaten to curtail freedom of transit on the high seas or to lead to conflict at sea.

A Variable: Changed Operational Plans Due to Social and Political Developments The current emphasis on irregular warfare is a change that is not a trend. It does not stem from scientific progress; its cause is human, not technological. Non-state terrorist attacks and other criminal activity, such as smuggling, have led the world's armed forces to act against a threat different from those the U.S. Navy prepared to oppose in the twentieth century. The problem's maritime aspect is represented by piracy, stolen cargoes (for example, Nigerian petroleum), and terrorist threats to shipping. Maritime forces contend with drug running and illegal immigration, including "boat people" fleeing unstable societies. At present, however, our navy's most frequent role is to deliver and sustain forces contending

on land in irregular warfare for purposes of stability, security, and reconstruction. Meanwhile, the foremost role of a great sea power—presently the United States—presumably is still the security of all nations’ shipping on the high seas.

Navies have conducted small wars to suppress rebellion, piracy, and slave trading many times in the past. But it is prudent to anticipate that fleet actions will occur again in the future, because China must and will go to sea to achieve great-power status.

Part Variable, Part Trend: Fewer Battles at Sea

Sea battles for maritime supremacy in Greek and Roman times were much more prevalent than today. This was also true in the Mediterranean in the fifteenth and sixteenth centuries, when Ottoman Turks and the leading powers of Europe—Spain, France, and the Holy Roman Empire—contended with each other in prolonged and bitter operations on land and sea. In the seventeenth century, the Dutch and English fought repeated wars almost completely restricted to the seas. The phenomenon was tied to technology: at the time, a new fighting fleet could be built in just a few years. A wealthy state’s defeated navy could be back in action soon after having suffered a crushing and “decisive” defeat.

The nineteenth century was a transition, one in which the ships became bigger, more expensive, and more heavily armed. It became harder for a defeated state to replace its losses or construct a new navy. In the early twentieth century the trend of fewer battles continued throughout the battleship era. This led to a startling phenomenon. From 1890 to 1910 no fewer than seventy-four *classes* of pre-*Dreadnought* battleships were built. Yet during the entire battleship era only seven decisive battles for command of the sea occurred.²⁴

But the variables of statecraft too are responsible for fewer battles and less conflict on the high seas. In part the trend may be traced to the dominance of Great Britain and its policy of enlightened self-interest during the Pax Britannica, during which the Royal Navy protected the shipping of all friendly nations. A period nearly free of sea battles lasted from 1815 to early in the twentieth century. The infrequency of fleet actions explains to a large extent why capital-ship designs in the battleship era were so numerous, so experimental, and sometimes so foolish. The stability of the Pax Britannica was finally destroyed before World War I by the rise of Germany and its High Seas Fleet, along with the navies of many other states who felt compelled to compete. The existence of many fleets continued through World War II and generated many naval operations and battles. After World War II, American naval dominance created a new era of stability and an absence of decisive fleet actions—although there was no lack of naval operations, as the ascending U.S. Navy and other, declining navies projected their power overseas.

Thus the infrequency of naval battles is due in part to technology that spawned bigger and more expensive warships, aircraft, satellites, and command-and-control systems. In part it is the product of a nontechnical, social phenomenon in which states have been content to let one dominant sea power protect their sea-lanes. But that is changing. There has been reluctance in other states to rely on big, expensive American warships to protect against piracy, for example. As the societal variables wax and wane, we should also anticipate a resurgence of confrontations at sea that will accompany the rise of a peer competitor against a dominant sea power, which, of course, are currently the Chinese People's Liberation Army Navy and the American navy, respectively.

THE PROCESSES OF OPERATIONAL COMMAND THAT GOVERN A CAMPAIGN

A fairly careful scrutiny of the opponent's thought patterns and their underlying assumptions should be an early component of our own planning process. . . . An examination of this type might uncover something crucial in reaching toward establishment of control.

J. C. WYLIE

Clear Decisions and Integrated Actions

In theory, strategists determine the desirable aims in a theater of operations, specifically where and when to act and why.²⁵ They also normally decide the forces to commit to the campaign. The tactical commander determines how to confront and fight the enemy at the scene of action by transforming the combat potential of forces into combat power. Lying between strategic intent and tactical fulfillment, the operational commanders' role is to assure for themselves sea control for safe transit and delivery of the forces carrying combat potential to the strategists' scene of action and to sustain them for the duration of the campaign. What we take from Wylie is that we cannot determine how best to control an enemy until we know the opponent sufficiently to get inside his mind and methods. Abstract enemies at unspecified locations will not take us far in concrete planning.

In practice, the three levels are an overlapping web of responsibilities and authority. Before a campaign is initiated, some combination of strategic and operational thinking estimates the combat potential needed to achieve the objective against the expected opposition, then calculates whether that quantity can be delivered and sustained. It is a responsibility of the operational commander to tell the strategist realistically how fast the forces containing the requisite combat potential can be brought to the scene of action. Of course, the strategist has a staff to make these estimates, but the staff does not have to perform the acts

of delivery and sustainment, and the operational commander's staff usually has better local knowledge of the temper and talents of the opposition. Tactical commanders will also make their own estimates about sufficiency and will have their own opinions about the enemy as they construct battle plans to create combat power and employ it.

Seamless Planning and Execution

One is struck by the seamlessness of the discussions of war on and from the sea in the writings of the best authors. They also emphasize the difference between operations and tactics at sea and those on land. The closer one looks, the more one detects overlap between the policy-strategy, operational-logistical, and tactical-technological elements in the successful conduct of war at sea. That does not obviate the advantage of artificially distinguishing separate purposes for strategy, operations, and tactics, as long as the officer corps does not become pedantic about isolating responsibilities in different decision-making bins.

Let us look at two familiar, critical junctures in the Pacific War through a new lens to show the separate but interwoven characteristics of strategy, operations, and tactics. Both examples are taken from 1942, when Japanese and American forces were evenly matched in quantity, quality, and tactical prowess.

Illustration of Actions by Defenders

Through the spring of 1942, the United States was on the defensive in the Pacific while the Imperial Japanese Navy conducted a swift, successful campaign of conquest in French Indochina, the British Malay States, and the Dutch East Indies, while concurrently establishing a maritime perimeter to protect its resource base in Southeast Asia.²⁶ Through the battle of Midway, the Japanese navy decided where and when to act. Commander in Chief, U.S. Pacific Fleet—the operational commander, Admiral C. W. Nimitz—had the role of marshaling our defenses. The strategist, Admiral E. J. King in Washington, had plenty to say, but the formal role he pursued, and vigorously, was to send reinforcements, from the Atlantic and from new construction, to the theater as rapidly as possible.

A curious thing about the battle for Midway Island is the dual role played by Nimitz before the battle. A close reading of his decisions shows that he was at the outset his own tactical commander. He positioned the carrier task forces of R. A. Spruance and F. J. Fletcher and assigned their aircraft carriers specific and different tactical roles; he directed all the long-range reconnaissance; and he ordered the air attacks from Midway Island. These were not operational decisions; they were tactical decisions and crucial to our success. Only Nimitz at Pearl Harbor had the power to control long-range air search and activate the initial air attacks from Midway, which were ineffective but valuable in that they distracted Admiral

Chuichi Nagumo. Nimitz did not and could not let go of the tactical reins until the task forces' three lurking, undetected carriers, constrained by radio silence, had themselves detected the Japanese Striking Force's four carriers. When it was possible for Fletcher to assume tactical command, Nimitz backed off. Then when Fletcher's command suite was crippled, he did not hesitate to pass the conn, seamlessly, to Spruance.²⁷

Illustration of Actions by Attackers

The campaign for Guadalcanal was the first time the United States exercised significant strategic choice in the Pacific. The extended campaign for Guadalcanal and the larger Solomon Islands campaign are splendid examples of the interre-

lated roles of strategy, operational (or logistical) support, and tactics, in all of which sea, air, and ground forces all collaborated.

States have been content to let one dominant sea power protect their sea-lanes. But that is changing.

The Joint Chiefs of Staff, urged

on by Admiral King, decided after the battle of Midway that the geographical area around the Solomon Islands in the southwest Pacific was of supreme importance and a suitable location for a fighting defense, known later as the offensive-defensive phase of the Pacific War. Because the Japanese, though licking their wounds suffered at Midway, were also constructing an airfield on Guadalcanal from which to dominate the surrounding airspace, King wished to block their advance by a swift assault to seize the airfield before it became operational. Time was critical, so the landing was specified for early August 1942.

Admiral Nimitz, the theater commander, had to decide whether the forces envisioned would be adequate. There were ample ground forces in the Pacific but enough transport to deliver and sustain only one Marine division as far away as the Solomons. It would be the task of the tactical commanders, notably Admirals Fletcher and R. K. Turner and Marine general A. A. Vandegrift, to land the 1st Marine Division, establish a perimeter on Guadalcanal, and activate the airfield (to be known as Henderson Field). Much of the Pacific Fleet would be committed to support the landing and block a Japanese response.

Thereupon came about a bitter six-month-long campaign for Henderson Field—a reaction from the Japanese navy had been predicted but not its vigor. Historians have covered the campaign in detail but have not said enough about the initial operational constraint on the American side, the lack of transport. On the Japanese side the failure lay in an initially piecemeal, if swift, response, sending too little too late to push the Marines into the sea. This was in part due to mismatch at the strategic level between the importance of the end and willingness to send tactical commanders the means to destroy the American

fleet and beachhead. This confusion arose in part because Japanese intelligence underestimated the American forces ashore and afloat, and in part because the Japanese army and navy underestimated the resolve of American land, air, and sea forces, which, after a shaky start, fought well and exhibited a very high degree of interservice cooperation.

Then the reason for Japanese failure became logistical. The decisive American campaign advantage was that the United States could reinforce and sustain its lodgment with food, fuel, and ammunition because it controlled the air in daylight hours, while the Japanese were forced to reinforce and support their troops only at night. Taking nothing away from the Marines, who had to defeat the Japanese army in every battle on the perimeter of Henderson Field, the campaign was won by the decisive *operational* effects of starvation and disease suffered in the many Japanese battalions on the island.²⁸

Tension between United Action and Delegated Authority

The ideal in a war is to achieve similar collaboration of all commanders vertically and laterally, so that cohesive action results. It should be easy to understand why perfect unity is hard to achieve, because prosecution of a campaign entails decentralized authority and responsibility. The art of fencing, or samurai swordsmanship, is a poor analogy for a military operation because swordsmen are in sole control of their actions and do not have to cooperate with anybody else. A better analogy is football, because it is a team effort in a campaign (the game) comprising a series of battles (the plays).

Evidently the ideal is rarely attained. The best, but imperfect, results come from:

- Sound *doctrine* that fosters operational and tactical unity of action.
- Sound *training* that prepares all echelons for teamwork. The basis of cohesion is notably unobtainable at high echelons when government officials neither know nor care about the intricacies involved in cooperative action in a maritime campaign or about the difficulty of retraining to a new operational objective.
- Sound *experience* that comes from enough of the right kind of war making to know what to expect of companions in positions of authority and responsibility. This is a great limitation when interpersonal experience has been in fighting an inapplicable kind of war.

These three cornerstones of success are preparations at the *operational* level, not the responsibility of tacticians—at least not at sea.

AMERICAN NAVAL OPERATIONS TODAY AND IN THE FUTURE

This is a static [Roman] world. Civilized life, like the cultivation of Ausonius's magnificent Bordeaux vineyards, lies in doing well what has been done before. Doing the expected is the highest value—and the second highest is like it: receiving the appropriate admiration of one's peers for doing it.

THOMAS CAHILL

Two Underappreciated Transformations

In *How the Irish Saved Civilization* Thomas Cahill uses the poet Ausonius as a foil to show why gentrified Romans could not see that changes all around them would soon lead to their empire's collapse.²⁹ Naval operations are not poetry, and American perspectives are far from those of the Roman Empire, but this is not a time for U.S. leadership to be admired for *doing the expected* in planning the Navy's future. The American navy has not been contested at sea since 1945. In all subsequent operations—including major conflicts in Korea, Vietnam, and Southwest Asia—it has enjoyed the unconstrained benefits of delivering combat power from a safe sea sanctuary. With few exceptions, its doctrine, training, and preparation for fighting enemy ships in missile combat have had to be based vicariously on the experiences of other navies. That probably explains why our navy has not recognized the significance of two big transformations.

A *tactical transformation* was from the carrier era to the missile era of warfare, along with two additional complications: the impending influence of robotic systems and of cyber operations. The combat effects of missile warfare at sea were not crucial until the *geopolitical transformation* in East Asia, which now impels a reconsideration of the American strategy to influence China and our Asian allies in the twenty-first century.

The operational solution to retain strategic influence in the western Pacific must reflect China's growing antiaccess tactics and also anticipate that China, for quite logical reasons, will soon construct a sea-control navy of its own.

The fundamental changes in East Asia are accompanied by U.S. fleet obligations in many and varying places around the world—first, to fight irregular wars; second, to maintain coastal presence for peacemaking; and third, to attain local sea control and deliver combat power from the sea. The latter is the U.S. Navy's familiar post–World War II role, of course, in which combat power, manifested in ground and air forces, was delivered unfailingly and efficiently at every scene of action—and was consistently taken for granted.

We have emphasized the decisive shift to missile warfare. We have not as yet spoken of undersea warfare, which has been neglected in the U.S. Navy for two decades. Antisubmarine and mine forces need to concentrate on the difficult

waters of the Persian Gulf, the Strait of Hormuz, the Yellow Sea, and the China Sea, where mine, submarine, and antisubmarine operations must be conducted amid bottom clutter and surface-craft noise in waters as shallow as thirty fathoms. Submarines in greater numbers must burnish old-fashioned skills to sink ships of many kinds in deep and shallow seas. A lot of catch-up is needed to exploit new technological opportunities in undersea warfare.

The Content of Viable Strategies

Service documents list six “core capabilities” for the U.S. Navy: Forward Presence, Deterrence, Sea Control, Power Projection, Maritime Security, and Disaster Response.³⁰

When the first four capabilities were first described in the 1970s, our primary opponent was well known in the way Wylie prescribes; the national military strategy to constrain the Soviet Union was well defined, Navy campaign analyses were extensive, and fleet exercises were frequent and generated well documented, influential results. Today the desirability of such capabilities is inarguable, but the taxonomy is useless as a guide for future fleet configuration. The capabilities are too vague to be tested without specifying locations or enemies, and they say nothing about weight of effort—the forces and tactical skills that must be devoted to each. To date the list of core capabilities has had no effect whatsoever on U.S. fleet composition. It does nothing to help develop an affordable navy to support national strategies.

In the twenty-first century the nation will need clearly expressed, testable strategies affecting the naval component of American forces. For purposes of illustration, I suggest that the following six strategies would adequately describe the primary ends and means of a comprehensive national security plan.

For China. Forces with the power to influence China and our friends in Asia and to ensure freedom of the seas for all nations would serve as the means to the end of maintaining effective American presence in the western Pacific. Insofar as possible, the same forces must be designed to limit any conflict to China’s own seas in a way that avoids abrupt escalation into a long, debilitating war.

For Iran. Forces to deter any form of aggression by Iran ought to embody clearly the air and missile power needed to wreak destruction on the Iranian economy and means of war, as well as the naval power to isolate Iran by winning control of the Strait of Hormuz and seas on both ends of it. The forces for such an air-sea strategy will probably provide the best affordable means to respond to any other state threatening violence, while avoiding a costly war on the ground.

For Irregular Warfare. Forces can be deployed in many distributable packages and maintained economically for long-lasting antipiracy, antidrug, and antismuggling

operations or to support short, successful operations such as those conducted by ground forces in Grenada, Panama, and the first Lebanon crisis.

For Nuclear War. Navy forces are part of a national capability to deter an attack with nuclear weapons by any of a growing number of states that have them. Navy SSBNs and ballistic-missile-defense ships should contribute according to the provisions of that strategy. In addition, the strategy ought to specify how to combat terrorists and nonstate actors—presumably, as in the past, by denial to terrorists of weapons of mass destruction insofar as possible.

For Cyberspace. The nature of national cyberspace “forces” is not the only thing that makes this strategy different from the others. The White House and Defense Department have both issued cyberspace doctrines, which they call “strategies.” The former aspires to be international policy, but (despite its title) it is not a testable strategy. The latter is probably adequate as a strategy that can serve as the basis of campaign planning and testing. For example, it explicitly calls for training and experimentation.³¹ A cyberspace strategy and campaign plans are desirable because international, nonlethal cyberwarfare is going on right now. An executable national strategy is desirable because, first, cyberspace operations affect daily commercial, social, and government activities; second, cyberwar will play a significant role in a shooting war; and third, we have a peacetime opportunity to learn more about how electronic “forces” defend our systems and can attack an enemy in a fast-changing virtual environment. Yet the capabilities for defending and attacking cyber links are different in nature from the more tangible, countable objects of the other five strategies. Vice Admiral Arthur W. Cebrowski probably had such a distinction between links and objects in mind when he espoused “network-centric warfare.”³²

For Homeland Defense. Vital, difficult, and expensive though it is to keep homeland defenses up to date, the strategy ought not to affect U.S. fleet design. There are those who think Navy vessels for overseas irregular warfare should contribute to defending our coasts. Perhaps so, but let the national government first design a comprehensive homeland-defense strategy that emphasizes the Coast Guard and domestic law-enforcement agencies. Then we can see how an affordable Navy might contribute—for example, with collaborative research and the development of tools for coastal action.

This is a personal set of strategies to illustrate what is meant by having enough content and focus to be translated into executable war plans and tested by campaign (operational-level) analyses: simulations, war games, transparent mathematical representations (“models”) of the process, and experiments at sea. It may not be the best list. For example, the strategies do not include major ground

combat operations like Operations DESERT STORM, ENDURING FREEDOM, or IRAQI FREEDOM. Paradoxically, those operations illustrate how planning and campaign analysis are done. Because they were tested in real war, they show both the rich reward and severe limitations of campaign studies that estimate the forces needed, help design the operational scheme, and forecast the casualties and time it will cost to execute the plan.³³

An Appraisal of Consequences

Observe that a strategy without testing is merely a desire—a hypothesis. Campaign planning and analysis help find out whether a strategy is viable and whether assigned forces are suitable to execute it. It is not our purpose to discuss

In the twenty-first century the nation will need clearly expressed, testable strategies affecting the naval component of American forces.

shortcomings in today's forces. We will merely assert that it is possible to design a better fleet to fulfill the U.S. Navy's role in the first four strategies, and within the current

shipbuilding budget envelope. We have not especially concerned ourselves herein with the budgetary implications of future navy forces—costing is not inherent in the planning of current operations. But it takes only a quick reminder of coming national financial pressures to observe that future defense strategies must adapt to the nation's means to pay for them.

Observe, next, that each of the six is a *national* strategy. Though our emphasis here is on maritime activities, the Navy can neither express a strategy as policy nor implement it alone. Still, that is no reason why it should not be aggressive in describing the strategies and helping to test them for executability. The U.S. Navy can—indeed, it must—anticipate each strategy and build forces that serve as long-lived means to support it.

Observe that to be effective the strategies must be unclassified and widely read—by opponents, so they understand their feasibility and potential impact; by international friends, so they know our faithfulness and desire for collaboration; and by American policy makers, to engender unity of purpose. An advantage of distinguishing three levels of war is in separating a strategy that can (and must) be widely disseminated from the often-secret operational plans and actions needed to execute it.

Observe that the unified combatant commands cannot determine strategies even for their own theaters. A theater commander's task is to develop *operational* plans with the forces assigned. For influencing China, U.S. Pacific Command is the focus, and its commander will naturally work with the Joint Chiefs of Staff to develop and test effective operations in peace and war, with emphasis on maintaining long-term American influence in East Asia. In executing his peace-time responsibilities, the Pacific combatant commander will also anticipate and

describe combat capabilities better suited for the future, presumably in the form of more distributed and more survivable surface ships, submarines, aircraft, and ISR elements.

The fleet intended to influence China must be capable of serving many and varying American policies, from cooperation to competition, confrontation, or conflict. Yet its ships and aircraft must be constructed with thirty- and forty-year lifetimes. Even the simplest policies of cooperation applied to the People's Republic of China and the Republic of China have been deliciously multifaceted in the ways they have been executed by past American presidents and the Department of State. Their strategic thinking comprises wheels within wheels of subtlety. Cooperation implies port visits, joint exercises, humanitarian assistance, and other ways of signaling friendship. But in prior manifestations the Navy has also been employed as a tool to send confrontational signals with warships. Moreover, every American policy variant must be prepared to react to Chinese initiatives with a single, robust fleet composition.

Observe that each strategy must be designed so that most nations welcome, or even insist on, American action. This is not as difficult as it may seem, if one structures each strategy with that in mind. Twenty-first-century American strategies should include collaborators, reflecting that felicitous term, now out of favor, "a thousand-ship [international] navy."

Observe the issue of pace in the first four strategies. American navy planning during the Cold War placed the fleet forward in substantial numbers, because a Soviet attack would demand an instant NATO response before escalation to nuclear war. By contrast, exploration of deployments today is likely to show that for each of those four strategies a modest peacekeeping force at the scene is more desirable, if it can be followed by a formidable air and sea buildup. Our national strategies should be designed to signal substantively—as distinct from the mere use of threatening words—in time of crisis that the United States, backed by world opinion, intends to act forcefully. To some readers this will be a jarring point of view, because it has not been practiced by the U.S. Navy since before World War II, but it has advantages in both campaign flexibility and affordability. Patience is usually a greater virtue than immediate response when preparing to apply overwhelming force.

THE UNIFYING ROLE OF OPERATIONAL ART

The operational level of war at sea introduced as doctrine in 1994 by the Commandant of the Marine Corps and the Chief of Naval Operations is useful. It promotes congruence between campaign planning and execution. It heightens awareness of operational logistics. It clarifies the roles of theater commanders. It disciplines policy and strategy, by showing that until a strategy is tested by

campaign analysis and fleet exercises it is only a hypothesis and a desire. It countenances open publication of a strategy, while leaving room to develop secret operational plans for its execution.

We have seen that a useful way to appreciate how naval operations differ from strategy and tactics is to describe their distinguishing constants, trends, and variables. We have observed that the conduct of a successful maritime campaign falls outside the explanatory three levels of warfare but instead must be an artful, integrated web of decisions and actions.

At the tactical level, future plans must recognize the impending influence of robots and cyber operations in the missile age of warfare. We have inferred that these changes will lead to a more distributable fighting force of scouts, submarines, ships, and aircraft configured for mutual support and survival. The future fleet must be capable of safeguarding the movement of worldwide commercial shipping and of achieving command of any sea—eventually. Smaller, offensively potent elements that will probably constitute the next battle fleet may also serve as “cruisers” and part of “the flotilla.” We will not know until our strategic aims are clearly stated and the fleet is designed. Then campaign analysis will be able to test the tactical employment as well as the operational deployment of future naval forces.

Some strategists and policy makers may wish to arrange the six strategies in a grand mosaic. For example, a strategy against terrorists sometimes heard is “homeland defense, overseas offense.” A comprehensive antiterrorist strategy will embrace components of irregular warfare, cyber operations, and homeland defense. There is nothing wrong with this ultimate goal, but our purpose here is not to arrive at a comprehensive strategy. Our purpose has been to illustrate the vital role of operational art in testing every strategy.

NOTES

1. Epigraph from U.S. Navy Dept., *Naval Warfare*, Naval Doctrine Publication 1 (Washington, D.C.: 28 March 1994) [hereafter NDP-1 (date of revision)].
2. NDP-1 (March 2010).
3. *Ibid.*, pp. iii, 15–18.
4. Julian Corbett, *Some Principles of Maritime Strategy* (1911; repr. Annapolis, Md.: Naval Institute Press, 1988).
5. Bradley Fiske, *The Navy as a Fighting Machine* (1916; repr. Annapolis, Md.: Naval Institute Press, 1988), p. 220. In the third section we will discard Fiske’s ideal of a single controlling mind, but the metaphor of a navy as a complicated fighting machine is near-perfect.
6. J. C. Wylie, *Military Strategy: A General Theory of Power Control* (Piscataway, N.J.: Rutgers Univ. Press, 1967; repr. Annapolis, Md.: Naval Institute Press, 1989), p. 43. The reprint has an introduction by John Hattendorf, a postscript by Wylie, and a short essay by him from the U.S. Naval Institute *Proceedings* entitled “Why a Sailor Thinks like a Sailor.” It should be no surprise that Wylie immediately goes on to say ground forces have a different mind-set.

7. Two excellent authorities are Michael Vlahos, "Wargaming, an Enforcer of Strategic Realism: 1919–1942," *Naval War College Review* 39, no. 2 (March–April 1986), pp. 7–22; and E. S. Miller, *War Plan Orange: The U.S. Strategy to Defeat Japan, 1897–1945* (Annapolis, Md.: Naval Institute Press, 1991).
8. This is not the place to elaborate on the techniques and successes, but a comprehensive discussion of the various methods of campaign analysis to support planning at the operational level may be found in Jeffrey Kline, Wayne Hughes, and Douglas Otte, "Campaign Analysis: An Introductory Review," in *Wiley Encyclopedia of Operations Research and Management Science*, ed. J. Cochran (Hoboken, N.J.: Wiley, 2010). For a primer describing methods used for every manner of defense decision making, from tactical to policy and from military operations to programming and budgeting, see Wayne P. Hughes, Jr., ed., *Military Modeling for Decision Making*, 3rd ed. (Alexandria, Va.: Military Operations Research Society, 1997).
9. John Arquilla, *Dubious Battles: Aggression, Defeat, and the International System* (Washington, D.C.: Crane Russak, 1992). Arquilla had at one time proposed as its title "Why Losers Start Wars."
10. P. H. Colomb, *Naval Warfare: Its Ruling Principles and Practice Historically Treated* (1891; repr. Annapolis, Md.: Naval Institute Press, 1990); Frank Uhlig, *How Navies Fight: The U.S. Navy and Its Allies* (Annapolis, Md.: Naval Institute Press, 1994).
11. For the "seat of purpose," see the author's *Fleet Tactics and Coastal Combat* (Annapolis, Md.: Naval Institute Press, 1999), pp. 34–35.
12. Hughes, *Military Modeling for Decision Making*, app. B. (The epigraph appears on p. 87.) The sets are from Capt. Stuart Landersman, "Principles of Naval Warfare" (thesis, Strategic Studies Group, Naval War College, Newport, R.I., 1982), app. E; and Barton Whaley's study of deception and surprise, *Stratagem: Deception and Surprise in War* (Boston: Artech House, 1969), pp. 122–26.
13. A. T. Mahan believed that the trends of new technology changed tactics and the nature of combat but that the constants of strategy and sea power were "laid as upon a rock." He was wrong, as World War I demonstrated within thirty years after he reached this conclusion in his famous *The Influence of Sea Power upon History, 1660–1783*. There were unanticipated results in the sea battles of World War I, but there were almost no changes in fleet tactics. The formations, screens, and other doctrinal particulars of the British and German battle fleets were employed as planned. The big changes were strategic (i.e., operational), and they were brought about by new technology, among them the effects of U-boats and mines, the coming effects (not fully developed) of aircraft, and the effects (almost invisible and unnoticed) of wireless and wireless intercept.
14. The signal of that transformational change in 1967 was as tactically indicative and operationally consequential as had been the abrupt arrival of the aircraft-carrier age, signaled by the sinking of anchored Italian battleships in air attacks at Taranto in November 1940 and of two British capital ships under way off the Malay Peninsula in December 1941.
15. See Hughes, *Fleet Tactics and Coastal Combat*, pp. 172–73, 224–27. To keep a long essay from growing longer I have omitted other examples some readers may think of.
16. Otto Bubke, *Clausewitz and Naval Warfare* (Bergisch Gladbach, West Ger.: Federal Armed Forces Office for Studies and Exercises, August 1987).
17. There is a third, but tactical, advantage of a superior navy—geographical effects at sea are muted or absent. There are no defensive positions as they exist in land combat, so a small initial advantage in combat power is more likely to be decisive. John Arquilla noted in *Dubious Battles* the case of a land power whose naval leaders spoke boldly of what they would do until the war started and then abruptly turned cautious.
18. Rates of advance of land forces are more complicated and variable than at sea. In 1990, R. L. Helmbold completed a comprehensive four-volume study that will likely never be exceeded in its thoroughness. For our purposes the first volume is the most relevant: *Rates of Advance in Historical Land Combat Operations* (Bethesda, Md.: CAA, June 1990). There is nothing comparable published on the rate of movement of naval forces at sea, and probably there need not be.

19. For a more detailed look at the movement advantage of ships, see Wayne P. Hughes, Jr., "Naval Maneuver Warfare," *Naval War College Review* 50, no. 3 (Summer 1997), pp. 25–49.
20. Wylie, *Military Strategy*, see esp. chap. 3 and a subsequent appraisal (p. 101) found in a chapter, "Postscript: Twenty Years Later," written for the reprint edition.
21. Sandy Woodward with Patrick Robinson, *One Hundred Days: The Memoirs of the Falklands Battle Group Commander* (Annapolis, Md.: Naval Institute Press, 1992).
22. Another example was the Trafalgar campaign, in which Napoleon intended to seduce Nelson to the West Indies with Villeneuve's fleet, so that the French could dominate the English Channel long enough to get Napoleon's invasion army on English soil. But Nelson deduced Napoleon's operational aim and moved too fast for the French, leading to the destruction of the French and Spanish fleets off Cape Trafalgar, inducing Napoleon to abandon his cross-channel invasion and to campaign instead against Austria and Prussia in the east.
23. The short operational lives of *Graf Spee* and *Bismarck* early in World War II show a failure in Germany to perceive this transformation.
24. There were two decisive fleet actions in the Sino-Japanese War (1894), two in the Spanish-American War (1898), and two in the Russo-Japanese War (1905), but only one, the battle of Jutland (1916), in World War I. We dismiss several engagements, including Coronel, Falklands, Dogger Bank, and Heligoland Bight, as cruiser warfare or skirmishes. Before any more significant sea battles were fought, the battleship era was over.
25. Wylie, *Military Strategy*, pp. 77, 78, and 97 (the epigraph is found on p. 87). Wylie here is more general, saying the aim of strategy is to achieve some degree of control (or influence, or domination) for a purpose. A strategy, then, is "a plan for doing something to achieve some known end." Our working definition above avoids a long development, while reflecting the way orders are frequently issued to operational commanders for execution.
26. We ignore raids by American carriers in the first six months, regarding them as a form of cruiser warfare.
27. Readers of the several drafts have sharpened this article. Most would have added points for which there is no space. One of the astute comments contrasted Nimitz's role with that of Adm. Isoroku Yamamoto, "who could have been of far more use had he not been in EMCON [i.e., radio silence] aboard *Yamato*. . . . The person in the best position to make a decision [must put himself where he can] do so."
28. Far more casualties were suffered on both sides from sickness than from combat. On the Japanese side, by December the troops were literally starving, because we had almost severed their sea communications.
29. Thomas Cahill, *How the Irish Saved Civilization* (New York: Random House, 1995).
30. For example, NDP-1 (March 2010), pp. 25–30.
31. U.S. President, *International Strategy for Cyberspace* (Washington, D.C.: May 2011); and U.S. Defense Dept., *Department of Defense Strategy for Operating in Cyberspace* (Washington, D.C.: July 2011).
32. Vice Admiral Cebrowski (1942–2005) was, especially as President of the Naval War College (1998–2001) and after retirement from active duty as director of the Office of Force Transformation in the Department of Defense, a leading advocate of the broad transformation of the U.S. military, especially along the lines of the concept of web-based network-centric warfare. See James R. Blaker, *Transforming Military Force: The Legacy of Arthur Cebrowski and Network Centric Warfare* (New York: Praeger, 2007).
33. The poor estimates of casualties and time to completion are nothing new, but they demonstrate the need to pursue a war's design and objectives to a conclusion despite uncertainties.



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