

CHAPTER 14

AIRPOWER AS STRATEGIC LABORATORY

This chapter highlights the unique strategic nature of American airpower, tracing its evolution over the last century and examining the changing role it plays in national security.

Airpower is a broad concept, as described by Billy Mitchell when he wrote “Air power is the ability to do something in or through the air,” and encompasses not only military power but civil and industrial might.

INTRODUCTION

The readings presented here concentrate on the Air Force definition of airpower as “the ability to project military power or influence through the control and exploitation of air, space, and cyberspace.” The historical development of airpower provides a useful case study in strategic leadership by analyzing how the US Air Force successfully evolved over time as a result of visionary strategic leadership.

General Carl Spaatz was a brilliant combat leader who played a central role in the establishment of the US Air Force as an independent Service, separate and equal to the Army and Navy. His treatise “Strategic Air Power: Fulfillment of a Concept” sets the stage by validating the importance of a well-thought-out strategy in achieving one’s objectives. In presenting his argument, General Spaatz asserts that Germany lost World War II due in part to its misuse of airpower and he warns of the importance of maintaining a strong and prepared Air Force in peacetime.

The second article, “Warden and the Air Corps Tactical School: What Goes Around Comes Around,” presents two striking examples of airpower theorists relying upon their unique strategic perspectives to conceptualize the battlespace and apply a systems approach to strategy.

This article builds on the systems thinking article you read in chapter 12. Through contrast and comparison the author identifies similarities, strengths, and shortcomings of the Air Corps Tactical School’s ideas promoted throughout the 1930s and those of Colonel John Warden’s Five-Ring Theory published in the late 1980s.

Having surveyed the history of the US Air Force as an independent service in the first two articles, we will next turn our attention to how airpower is being redefined today. In “Cyberspace: The New Air and Space?” the author explores the cyber domain and the important role information technology plays in national security. Today’s airpower advocates view cyberspace as a natural complement to the traditional airpower mediums of air and space used to project military power.

Our fourth reading comes directly from Air Force doctrine, and in it one can trace the influences of the transformational airpower leaders of the past, great captains like Hap Arnold, Jimmy Doolittle, and Tooeey Spaatz, as well as less familiar visionaries such as George Kenney, William Tunner, and Alexander de Seversky. The selected excerpts from AFDD 1 summarize how the US Air Force role has expanded over time to incorporate twelve core functions that embody what the world’s most powerful military force manifests across the range of military operations.

The final reading raises a challenging issue for current and future air-minded leaders. For decades the US has relied upon a nuclear triad of land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and bomber aircraft to provide deterrence for our nation and its allies. Some have called upon the US to divest itself of these expensive and complex weapon systems on a path toward nuclear disarmament. In his article “Should the United States Maintain the Nuclear Triad?” Dr. Adam Lowther examines this debate and its strategic implications.

CHAPTER OUTLINE

This chapter’s readings are:

Strategic Air Power:

Fulfillment of a Concept

Gen Carl Spaatz, “Strategic Air Power: Fulfillment of a Concept,” *Foreign Affairs* 24 (1945/1946): 385-396.

Warden & The Air Corps Tactical School:
What Goes Around Comes Around

Maj Howard D. Belote, “Warden and the Air Corps Tactical School: What Goes Around Comes Around,” *Airpower Journal* (Fall 1999): 39-47.

Cyberspace: The New Air & Space?

Lt Col David A. Umphress, “Cyberspace: The New Air and Space?,” *Air & Space Power Journal* (Spring 2007): 50-55.

Air Force Basic Doctrine

US Air Force, AFDD-1, *Air Force Basic Doctrine*, (Maxwell AFB, AL: Air University, October 2011).

Should the US Maintain the Nuclear Triad?

Dr. Adam B. Lowther, “Should the United States Maintain the Nuclear Triad?,” *Air & Space Power Journal* (Summer 2010): 23-29.

CHAPTER GOALS

1. Summarize the evolution of American airpower over the last century.
2. Appreciate the role of information, space, and cyberspace in modern airpower theory.
3. Develop an understanding of the Air Force’s core functions.

14.1 Strategic Air Power: Fulfillment of a Concept

By General Carl Spaatz

OBJECTIVES:

1. List Germany's three critical mistakes in its use of airpower, as determined by Gen Spaatz.
2. Define the term "strategic bombing."
3. Name the three principles of combat that strategic bombing takes advantage of.
4. Describe, in your own terms, five lessons that the United States learned from the use of strategic air power in World War II.

World War II might have ended differently had our enemies understood and made correct use of Strategic Air Power.

In the elation of victory it is well for us to remember the year 1942 when the conquests of the Axis Powers reached their apogee. Europe was a Nazi fortress, mined and ribbed with the latest improvements in surface defense, over which the Luftwaffe reigned supreme. In the German view, science had made that fortress impregnable. Astonishing feats of logistics had enabled the Wehrmacht to stretch from the Pyrenees to the Volga and the Caucasus; and Italian contingent armies in North Africa approached the Nile. Japan also was a fortress; and outside it, the Japanese reach extended from Burma in a vast arc to the Aleutians.

The outlook for the Allies was grim. By all time-tested and "proven" methods of warfare the combined might of the Axis Powers seemed unconquerable. Their resources in manpower and materiel were such that they could ward off exhaustion for an indefinite period of time. Sea blockade, therefore, could not be counted on to have the strangling effect it produced in World War I. Our land and sea forces, supported by air, could be expected to contain the most advanced echelons of our enemies, and gradually to drive back their main armies into their heavily fortified citadels. But the essential question remained. How was their military power to be crushed behind their ramparts without undertaking an attritional war which might last years, which would cost wealth that centuries alone could repay and which would take untold millions of lives? The man in the street asked, with reason: "How can we ever beat them? With what?"

The development of a new technique was necessary. Some new instrument had to be found, something untried and therefore "unproven," something to "spark the way" to early and complete victory. The outcome of the total war hung in the balance until that new technique had been found and proved decisive in all-out assault. The new instrument was Strategic Air Power. In 1942 it was already in the process of development.

II. THE GERMAN STRATEGIC FAILURE, 1940

The effectiveness of the new technique had been given negative demonstration by Germany's history-making mistake in 1940. After Dunkirk, Hitler stood on the threshold of his goal, the domination of all Europe. Which way would he strike next? France was prostrate; Spain was not unfriendly. Two trained German parachute divisions were on the alert to drop on Gibraltar, the capture of which would have corked up the western exit of the British Mediterranean fleet. The war on Britain's life stream of shipping could then have been increased to unbearable intensity. On the other hand, there, just across the Channel, lay Britain, without the thousand new field guns which the B.E.F. had left behind in Belgium. Guarding the narrow strip of water were powerful elements of the British Navy, and an unknown number of British fighter airplanes. Hitler made his choice: it was to let Gibraltar wait, and to try for a "knock-out" blow against Britain from the air as a preliminary to turning on Russia. It was his historic opportunity, which was never to return.

Fortunately for us, neither Hitler nor the German High Command understood the strategic concept of air power or the primary objective of a strategic air offensive. The Germans had air supremacy on the Continent. They also had air superiority in numbers over Britain; but they were unable to establish control of the air, and this was essential to carry out sustained operations. The German bombers were lightly armed. The German fighters were used in close support of the bombers. The British had the surprise of radar and eight-gunned fighters. Technically and tactically the R.A.F. was superior. Air control can be established by superiority in numbers, by better employment, by better equipment, or by a combination of these factors. The Germans might have gained control of the air if their fighters had been used in general support instead of close support of the bombers, or if their bombers had done more accurate and effective bombing (e.g. on the British airfields), or if all the German air force had been directed against Britain.

It was apparent to observers in 1940¹ that the German leadership was wedded to the old concept that air power was restricted to support of fast-moving ground troops and that it did not have an independent mission of its own. This tactical concept had been successfully implemented against Poland and France by the Stuka-Panzer combination, under conditions of German air supremacy. The bombing of Britain, on the other hand, was a strategic task, for the successful accomplishment of which German control of the air first had to be established. The Germans disregarded this absolute necessity. First, they had not built heavy bombers which could carry enough armament to be relatively secure. The lightly-armed Ju 88's, He III 's and Do 17's which carried the bombs were no match for the British eight-gunned fighters, aided by the warnings of secret radar. They were shot down in swarms. Second, the German fighters outnumbered the R.A.F. Hurricanes and Spitfires. Their proper function was to destroy R.A.F. fighters. Instead, they kept close formation to cover the inadequately armed bombers — a defensive role which could never win control of the air.

Viewed historically, the German failure in the Blitz demonstrated the wrong technique for strategic bombing. The German mistakes were: 1, inadequate armament on the bombers; 2, no capability for precision bombing; 3, use of the fighters in close support of the bombers instead of in general support.

Germany had the industrial capacity and skill to build properly armed heavy bombers before and during the early years of the war. The four-engined Focke-Wulf was in operation, but was used against shipping from Norway and France. The He 177, with two propellers on four motors, was a failure, and wasted two years of effort. Consequently, the Luftwaffe attempted the strategic reduction of Britain from the air with means which could have been successful only through the proper use of German fighter superiority. But the Nazi war leaders (to whom the Luftwaffe was completely subservient, which meant that independent air thinking was in abeyance) did not grasp the strategic concept. If they had understood it, and had built heavy well-armed bombers, and had used their fighters to gain control of the air, they could actually have reduced Britain to a shambles in 1940. Later, by applying the strategic lessons, they probably would have been able to hold the line of the Volga by bombing Russian war plants in the Urals and beyond. Once the success of strategic air warfare had been demonstrated, it is conceivable that Hitler would not have declared war on America when he did. In any case, we would have been too late for this particular war, and we would have been deprived of the use of the United Kingdom as a base when the time came for us to fight.

The historic penalty paid by the Nazis for their mistake was that they have passed into oblivion and Germany lies in ruins.

III. THE STRATEGIC CONCEPT: THE IDEA AND THE WEAPON

Strategic bombing, the new technique of warfare which Germany neglected in her years of triumph, and which Britain and America took care to develop, may be defined as being an independent air campaign, intended to be decisive, and directed against the essential war-making capacity of the enemy. Its immeasurable advantage over two-dimensional techniques is that its units (heavy bombers and fighter escorts) are not committed to position in battle; on the contrary, they carry out their assigned missions, and then return to base to prepare for fresh assault.

What makes strategic bombing the most powerful instrument of war thus far known is its effective application of:

1. The principle of mass, by its capacity to bring all its forces from widely distributed bases simultaneously to focus on single targets. Such concentration of combat power has never been possible before.
2. The principle of objective, by its capacity to select for destruction those elements which are most vital to the enemy's war potential, and to penetrate deep into the heart of the enemy country to destroy those vital elements wherever they are to be found. These main objectives, reached during hostilities by strategic bombing following the establishment of control of the air, have not been attained historically by surface forces until toward the end of field campaigns.
3. The principle of economy of force, by its capacity to concentrate on a limited number of vital target systems instead of being compelled to disperse its force on numerous objectives of secondary importance, and by its capacity to select for destruction that portion of a target system which will yield the desired effect with the least expenditure of force.

Strategic bombing is thus the first war instrument of history capable of stopping the heart mechanism of a great industrialized enemy. It paralyzes his military power at the core. It has a strategy and tactic of mobility and flexibility which are peculiar to its own medium, the third dimension. And it has a capacity, likewise peculiar, to carry a tremendous striking force, with unprecedented swiftness, over the traditional line of war (along which the surface forces are locked in battle on land and sea) in order to destroy war industries and arsenals and cities, fuel plants and supplies, transport and communications — in fact, the heart and the arteries of war economy — so that the enemy's will to resist is broken through nullification of his means.

British air leaders had this strategic concept in mind at the beginning of the war. But they lacked the means to

carry it out. Their daylight raids on German industrial targets in 1940 resulted in prohibitive losses. Accordingly, the R.A.F. turned to night bombing, which was feasible despite the Luftwaffe's air supremacy over Germany because effective night fighters had not yet appeared. The British developed the most effective heavy night bomber, the Lancaster, which went into action in 1943 and remained the greatest load-carrier of the air war in Europe.

The strategic concept had also been the focus of studies and planning in the United States Army Air Forces in the 1930's. The American version was built around the B-17 for precision bombing by daylight. Daylight bombing was still regarded with skepticism in some quarters because of the German experience in the 1940 Blitz and the British experience over German targets. Both our weapon and our organization remained untried. It was feared that the losses in daylight bombing would be prohibitive. Accordingly, there was an inclination on the part of experienced war leaders to put all Allied strategic bombers on the night run.

The critical moment in the decision whether or not this should be done came on January 21, 1943. On that date the Combined Chiefs of Staff finally sanctioned continuance of bombing by day and issued the Casablanca directive which called for the "destruction and dislocation of the German military industrial and economic system and the undermining of the morale of the German people to the point where their capacity for armed resistance is fatally weakened." To implement this directive there was drawn up a detailed plan, "The Combined Bomber Offensive Plan," which was approved by the Combined Chiefs of Staff, June 10, 1943, and issued to British and American air commanders. Strategic bombing at last had the green light; and it possessed a plan of operations of its own, with an approved order of priorities in targets, to achieve the objectives of the Casablanca directive. That plan called for bombing by night and by day, round the clock.

IV. FULFILLMENT OF THE CONCEPT

As far back as the time of Pearl Harbor the Army Air Forces had the Idea; but the Idea still remained to be worked out by experiment in the grim practice of war. In order to do this we first had to "forge" the weapon, develop the proper technique to make it decisive in battle, prepare the necessary bases within operational range of the proposed targets, and then establish control of the air before proceeding to the all-out assault. All these things took time. The building of the Air Forces with sufficient striking power to carry out the strategic tasks, as ultimately outlined in the Combined Bomber Offensive Plan, required a national effort of unprecedented magnitude, and two and a half years of time. Those years were provided

by the unwavering resistance of our Allies to our common enemies.

It took time to "forge" the weapon. The portion of America's industrial power devoted to the manufacture of airplanes and their equipment had already been stepped up by British and French war orders. This capacity was shifted to fulfillment of our own needs. Constant technical research made for improved designs and for modifications, based on experience in battle, to arrive at an all-weather weapon capable of self-defense. At the peak of our strength, in 1944, there were nearly 80,000 airplanes of all types under the control of the A.A.F., of which more than half were in combat. The heavy bombers, the B-17's and the B-24's, along with the fighters (P-51, P-47, and P-38) which provided the long-range escort beginning in the autumn of 1943, accomplished the decisive strategic task in Europe. The B-29, the most powerful airplane ever built, accompanied by the P-51, was equally decisive in destroying Japan's capacities to wage war. The quantity production of the heavy bomber in three types and of the necessary long-range fighter escorts was an achievement which will stand to the historic credit of America's industrial genius in support of air power.

It took time to acquire a new technique for the effective employment of the chosen weapon. There never had been a strategic air war on the scale projected. The proper methods had to be learned by experiment. The Army Air Force, which had 1,300 flying officers of the Regular Army on active duty in 1940, expanded to reach a total of 2,300,000 personnel in 1944. Technical training was necessary in the organization of air and ground crews (the backbone of an air force) to man the 220 groups projected, as well as in intelligence and target selection, in communications, weather, radio, radar, tactical air doctrine, etc. Gradual mastery of the new technique kept pace with production of the weapons.

It took time to prepare bases within operational range of the enemy's vital war potentials, and to build up the supply system and the supplies necessary to sustain operations. In its global war the A.A.F. needed bases in such widely distributed theaters that the allocation of materiel was a constant problem. The European theater was given top priority in airplanes, but circumstances at times dictated diversions to the Pacific. The base in the United Kingdom had to be established in spite of the enemy submarine menace in 1942. The "Torch" operation in North Africa in November 1942 depleted the Eighth Air Force, both as to airplanes and personnel, but led one year later to the creation of a second strategic base in Italy. The activation of the Fifteenth Air Force in Italy in November 1943 made possible the coordination of bombing attacks from two theaters on the same German targets, thus implementing the principle of mass. In the Pacific, bases for

the B-29's were first in China, and later were moved to the Marianas and Okinawa as the surface attack on Japanese forces closed in on Japan proper. The A.A.F. operational air bases around the world represented a triumph of American engineering ingenuity, whether by the laying of huge runways for the super-bombers, or by the conversion of swamps and deserts into air strips by means of steel mats.

Finally, it took time to gain control of the air, the absolutely necessary prerequisite for sustained strategic bombing. The German Air Force, although designed primarily to support ground troops, was a formidable defense — a fighting wall in the air. The task was to smash the wall, not only in order to clear the way for our heavy bombers over Germany, but also so as to remove the threat of air attack on our surface forces during and after the planned invasion. The duel with the German Air Force ensued.

In July 1943 an effort was made to get on with the first big task — the destruction of the German fighter system. These battles were a slugging match. A decision might have been forced if the Allies had had enough strength to continue beyond the one week of concentrated attack. During this period the line of battle was pushed back by whittling tactics of attrition from mid-Channel to the interior of Germany. Toward the end of 1943 there was at last sufficient force in hand. The long-range fighters needed to combat the enemy fighter defenses had been perfected, equipped with additional fuel tanks. Other equipment had likewise been modified under battle conditions. The Strategic Air Forces were ready to smash the German air wall, and then to proceed with the Combined Bomber Offensive.

On February 20, 1944, there began six days of perfect weather which were utilized for a continuous assault on the widely-dispersed German aircraft-frame factories and assembly plants. This sustained attack, called "The Big Week," fatally reduced the capabilities of the Luftwaffe. German aircraft production recovered; but the Allies retained control of the air throughout the remaining 14 months of hostilities.

In the minds of our air leaders the Big Week was the turning point in the war. That is, the success of the Big Week confirmed belief in the strategic concept. What had been in doubt was now a certainty. We knew now that we could destroy the German capacity to make war.

Having achieved control of the air, the Strategic Air Forces were employed on a twofold mission: 1, preparation for D-Day by the systematic destruction of the enemy's transport and communications; and 2, progressive destruction of his synthetic oil plants and other elements immediately vital to his continued resistance.

On April 16, 1945, the Headquarters of the U. S. Strategic Air Forces issued an order ending strategic bombing. The strategic air war in Europe was over; the concept had been fulfilled.

The lessons learned in the air war over Germany were applied with increasing vigor over Japan. The B-29 assault on the war industries in Japan proper began in the summer of 1944 with small attacks from China; these were augmented by attacks of similar weight from the Marianas beginning in November. The all-out mass offensive by the Twentieth Air Force began with the first low-level incendiary attack of March 9, 1945, and continued at accelerated frequency and intensity until Japan's capitulation on August 14, 1945. An invasion by the surface forces was not necessary. This air campaign will remain the classic prototype of the strategic concept as fulfilled in World War II.

V. APPRAISALS

The United States Strategic Bombing Survey, after nearly a year of study and six months of investigations in Germany, issued the following over-all judgment: "Allied air power was decisive in the war in Western Europe." Certain authoritative enemy judgments may be cited in support of this view.

The German reaction was well summed up by Lieutenant General Linnarz, Commander of the crack 26th Panzer Division, when he was interrogated on June 26, 1945, as follows:

The basic conception of winning a war through strategic air power is sound. Historically, the strategic objective of any war has been to destroy the enemy's armies in the field. With increasing technological development, however, and the military fact that wars are no longer exclusively decided by generalship and battles, but by a nation's material might and war potential, it is obvious that in the future the first strategic objective in war cannot be the destruction of the armies in the field, but the destruction of the enemy's resources and war arsenals. Without these, the armies in the field are doomed to eventual defeat. A war might conceivably start with the attempt to destroy a nation's material power through employing a powerful weapon of long-range striking power. In this war, such a weapon was the long-range heavy bomber. In the future war it could conceivably be a type of perfected V-bomb.

In my opinion, you might have won the war through strategic bombing alone — granted adequate bases, tactically secured. Since you wanted to end the war quickly,

you did not rely on strategic bombing alone; you fought the war in combined operations on land, sea and air. At the beginning of the war we failed to see that the material power of the coalition against us was strong enough to destroy our war industries by strategic air attacks, even if we took the whole Continent. As our leaders couldn't see this, and as you were unwilling to rely entirely on strategic bombing, you brought the war to an early and successful close by both strategic and tactical use of air power.

Professor Willi Messerschmitt, designer of the famous Me 109, 110, etc., stated when interrogated:

One of the strategic mistakes was the failure to construct a fleet of long-range bombers to supplement submarine warfare in the Atlantic and thereby to deny the United States the ability to set up an operating air force within range of German industrial centers.

Albert Speer, Reich Minister for Armaments and War Production, said:

The planned assaults on the chemical industry (synthetic oil) which began on May 13, 1944, caused the first serious shortages of indispensable basic products and therefore the greatest anxiety for the future conduct of the war. Actually, this type of attack was the most decisive factor in hastening the end of the war. . . . The attacks on the synthetic oil industry would have sufficed, without the impact of purely military events, to render Germany defenseless. Further targets of the same kind were to be found in the ball-bearing industry and in power stations. . . . The dispersal of important industries from west and northwest Germany to central and eastern Germany was carried out in 1942 and 1943. From 1944 onward, vital key industries were transferred to caves and other underground installations. Production was hindered not so much by these dispersals as by the shattering of transport and communication facilities. Consequently it can be said in conclusion that a bomb load is more effective if it is dropped upon economic targets than if it is expended upon towns and cities.

VI. LESSONS OF STRATEGIC AIR POWER

What are the chief lessons of our experience with the strategic use of air power in this last war? (Note the restricted field covered; consideration of the tactical use of air power in support of ground forces would require additional space beyond the scope of the present article.)

1. One lesson is that the time we were given to make our preparations was an absolutely essential factor in our final success. We had warning in 1939, and by 1941 had made notable progress. Following Pearl Harbor, with the United States actually at war, we had two and a half years more to build the striking force necessary to fulfill the strategic concept. The total time allowed us to prepare for the final all-out assault was four and a half years. It is unthinkable that we should ever again be granted such grace.

Under the A.A.F. expansion program after Pearl Harbor, the total personnel, the number of combat groups and the number of aircraft mounted steadily. On the other hand, the tonnage of bombs dropped in a month did not begin to rise significantly until early in 1944. It reached a peak around D-Day, only to slacken off during the winter fogs of 1944-45, before attaining the all-time high prior to V-E Day. The gap between expansion in planes and personnel and the actual dropping of bombs tells the story of preparation for battle, of training, of technical supply, of adaptation and modification, of experimentation, of winning control of the air. It represents the time lag between the formation of tactical units and their conversion into striking power over the targets.

Had our peacetime air force been maintained during the 1930's at the level it attained even as early as the date of Pearl Harbor, and had it in consequence been prepared to act in the first year of war on the level it attained in mid-1942, then the tremendous and costly effort of the next two and a half years would have been enormously lessened. We would have struck at the heart of the enemy much earlier. It is even conceivable that the fact of an American air force in being, with full potential in 1939, might have prevented the outbreak of war.

In the next war, should there ever be one, four and a half years will not be allowed us in which to build up an air force, insured by the resistance of our Allies to common enemies. America will be Target Number 1; we will stand or fall with the air force available in the first crucial moment.

2. Air power in this war developed a strategy and tactic of its own, peculiar to the third dimension. It achieved the principle of mass, in the highest degree ever known, by its capacity to concentrate all its available units of striking power from widely distributed bases over one point — the enemy's heart. Any other force, operating in two dimensions, must strike at the periphery, the traditional line of war, and can reach the enemy's heart only after successful field campaigns. Air power at full potential overcomes the advantage of interior lines which centrally located countries previously enjoyed. It is not committed to battle, but returns to its base in preparation for a renewal of the assault. No other instrument of war has equivalent characteristics.

3. The first and absolute requirement of strategic air power in this war was control of the air in order to carry out sustained operations without prohibitive losses. The strategic offensive would not have been possible without the long-range fighter escort.

4. We profited by the mistakes of our enemies. The Germans were land-minded. In planning their aggression they did not allot their air force an independent mission of strategic offensive. Consequently they failed to meet their one historic opportunity to win decisively and quickly in 1940. Possibly their military leaders were fatally handicapped by the Nazi dictatorship. At any rate, they never recovered the advantage of air superiority in numbers over Britain, which later was to become the American base. They discovered too late the fatality of their lack of heavy bombers. They had been diverting plant capacity from making fighters to making V-1's and V-2's. But these arrived too late to affect the course of the war. Had they used the V-1 against shipping in the British ports prior to D-Day the invasion might perforce have been postponed for another year. After our inspection of their underground installations, we realized that their manufacture of jet fighters, and even jet bombers, could have reached dangerous proportions in another six months. These had been assigned first priority on the dwindling German oil supply. Given the super-speed of the jet-fighters, and given a sufficient supply of them (planned production: 1,200 per month), the Germans might have regained control of the air over Germany while we were waiting for our own jet production to catch up. In that contingency anything might have happened. Certainly, the end of the war would have been delayed.

To rely on the probability of similar mistakes by our unknown enemies of the future would be folly. The circumstances of timing, peculiar to this last war, and which worked out to our advantage, will not be repeated. This must not be forgotten.

5. Strategic Air Power could not have won this war alone, without the surface forces. The circumstances of timing did not permit. The full potential of sufficient striking

power was attained only in the winter of 1943-44. By 1944 much of German war industry was going underground. Further, the invasion by land was necessary in order to force the diversion of German manpower from production, and even from manning the Luftwaffe. Thus, this war was won by the coordination of land sea and air forces, each of the Allies contributing its essential share to the victory. Air power, however, was the spark to success in Europe. And it is interesting to note that Japan was reduced by air power, operating from bases captured by the coordination of land, sea and air forces, and that she surrendered without the expected invasion becoming necessary.

Another war, however distant in the future, would probably be decided by some form of air power before the surface forces were able to make contact with the enemy in major battles. That is the supreme military lesson of our period in history.

NOTES

1 *Editor's Note [to Original Article]*: General Spaatz, then a Lieutenant-Colonel, was air observer, attached to the American Embassy in London, from May to September 1940. His official report that the Blitz would fail through German misuse of air power was one of the influential predictions of the war.

ABOUT THE AUTHOR

General Carl A. "Tooey" Spaatz was the top operational airman in charge of strategic bombing during WWII. After the war, he became the first Chief of Staff of the newly-created U.S. Air Force, and later served as CAP's first Chairman of the National Board.

From: Gen Carl Spaatz, "Strategic Air Power: Fulfillment of a Concept," *Foreign Affairs* 24 (1945/1946): 385-396. Used with permission.

14.2 Warden and the Air Corps Tactical School:

What Goes Around Comes Around

By Major Howard D. Belote, USAF

OBJECTIVES:

5. List the two questions of airpower theory that the Air Corps Tactical School sought to answer.
6. Define the operational context in which the ACTS theorists developed their airpower theories.
7. Define the operational context in which Col John Warden developed his airpower theories.
8. Describe, in your own terms, Kenneth Walker's "inviolable principle" for bombers.
9. Describe the major thematic differences between ACTS theory and Col Warden's airpower theory.
10. Name the three pathologies of airpower that affect both ACTS and Col Warden's contributions.

What has been will be again, what has been done will be done again; there is nothing new under the sun.

--Ecclesiastes 1:9

Between 1926 and 1940, officers at the Air Corps Tactical School (ACTS) created the theory and doctrine which would undergird the air strategies practiced in World War II. The "Bomber Mafia," which included Robert Olds, Kenneth Walker, Donald Wilson, Harold Lee George, Odas Moon, Robert Webster, Haywood Hansell, Laurence Kuter, and Muir S. Fairchild, sought to answer two basic questions of airpower theory. In the words of Lt Col Peter Faber, they asked, "What are the vital elements of an enemy nation's power and how can airpower sufficiently endanger them to change an opponent's behavior?"¹ To answer those questions, ACTS theorists portrayed nation-states as interconnected economic systems containing "critical points whose destruction will break down these systems" and posited that high-altitude precision bombing could effect destruction sufficient to achieve strategic objectives.²

Similarly, in the late 1980s, Col John A. Warden III developed the theoretical basis for the successful air strategy used in the Gulf War. Before the war, he wrote *The Air Campaign: Planning for Combat*, a balanced study of why and how to achieve air superiority. After becoming director of Checkmate, a Pentagon air strategy think tank, Warden focused on the strategic use of airpower. He created his "five rings" model and based Instant Thunder, Desert Storm's air operations plan, on it. Warden subsequently promulgated his ideas in essays such as "Air Theory for the Twenty-first Century" and "The Enemy as a System,"³ which, like ACTS theory, depict strategic entities as definable systems with centers of gravity whose destruction can influence the system as a whole.

As examples of war-tested, uniquely American airpower theory, ACTS and Warden merit special examina-

tion. Interestingly, despite the 50 years separating their development, the theories have much in common in context and content. To demonstrate these similarities, this article compares and contrasts the history, central ideas, and assumptions of the theories. It then highlights their common strengths and weaknesses. Finally, those parallels are used to suggest lessons for twenty-first-century airpower thought.

BACKGROUND OF THE THEORIES

Historically, the two theories developed in similar contexts. As Faber notes, the ACTS theorists wrote to create a central role and mission for the fledgling Air Corps. Rapid demobilization after World War I had left the Air Service "chaotic, disorganized, [and] tangled," lacking both the equipment needed for training and "coherent theory, strategy, and doctrine upon which airmen could base the future development of American airpower."⁴ Without such a working theory, airpower was likely to remain subordinate to Army traditionalists, who considered airplanes as a tool of the corps commander. Under Army control, airpower would be used primarily for observation and artillery spotting – certainly not for the strategic bombing concepts promoted by radicals like Billy Mitchell. Facing that threat, ACTS theorists posited a decisive strategic role for the precision bomber.

Similarly, John Warden wrote to fill a void in airpower discourse and to counter a trend of increasing subordination to the Army. Following the development of the atomic bomb, airmen left theory to civilians like Thomas Schelling and Bernard Brodie and tended to concentrate on technological issues. The airmen appeared content with Brodie's observation that nuclear weapons made Giulio Douhet relevant, and they sought new and better ways of delivering atomic devastation to the enemy. However, when war experience in Korea and Vietnam proved

that strategic bombing was insufficient, the focus gradually shifted from strategic to tactical airpower.

Faced by the Soviet threat during the 1970s and 1980s, American air leaders let the Army take the lead in developing doctrine. The result was the doctrine of AirLand Battle, and the Air Force accepted a supporting role. In *The Generals' War: The Inside Story of the Conflict in the Gulf*, Michael R. Gordon and Bernard E. Trainor note that in 1990 the commander to Tactical Air Command, Gen Robert D. Russ, and Lt Gen Jimmie Adams, Air Force deputy chief of staff for plans and operations, “believed that the Air Force’s main role was to support the Army.”⁵ Warden, however, found both the old nuclear doctrine and the new supporting, attrition-based scheme “too limiting” and set out to prove that airpower, precisely directed against centers of gravity, could coerce political concessions from an enemy. In suggesting that airpower could dominate a conflict, Warden received the same cold shoulder the ACTS theorists had gotten 60 years earlier. His boss, General Adams, let Warden know that “his theorizing was radical.”⁶

Interestingly, these contextual similarities – filling a theoretical gap while trying to avoid subordination to ground forces – gave rise to similar theories. Both ACTS and Warden used metaphors to describe, in Faber’s words, “the vital elements of an enemy nation’s power.” Both theories focused on the enemy’s will and capability to fight and portrayed states as closed systems that can be disrupted or paralyzed by destroying key targets. Finally, both theories prescribed courses of action based on similar assumptions. Examination of the central propositions of these theories will show that, despite some differences, the “industrial web” and the “five rings” are kindred spirits.

CORE PROPOSITIONS

Central to the ACTS theory was the notion that economic destruction would lead to social collapse and enemy capitulation. ACTS theorists described enemy systems variously as a “precision instrument,” “wispy spider’s web,” or “tottering house of cards.”⁷ Haywood S. Hansell fleshed out the argument as follows:

1. Modern great powers rely on major industrial and economic systems for production of weapons and supplies for their armed forces, and for manufacture of products and provision of services to sustain life in a highly industrialized society. Disruption or paralysis of these systems undermines both the enemy’s *capability* and *will to fight* [emphasis in original].
2. Such major systems contain critical points whose destruction will break down these systems, and bombs can be delivered with adequate accuracy to do this.
3. Massed air strike forces can penetrate air defenses without unacceptable losses and destroy selected targets.

4. Proper selection of vital targets in the industrial/economic/social structure of a modern industrialized nation, and their subsequent destruction by air attack, can lead to fatal weakening of an industrialized enemy nation and to victory through air power.⁸

The “fatal weakening” resulting from these attacks against enemy capability and will was so important that it precluded using bombers in any other role. Kenneth Walker set forth an “inviolable principle”: The bomber must only fly against “vital material targets” deep in the enemy heartland and never in Army support.⁹ To do otherwise would be to squander the bomber’s power.

To focus the bomber’s power appropriately, the ACTS theorists sought to identify those critical points that would bring down the enemy system. Harold Lee George first suggested that by attacking “rail lines, refineries, electric power systems, and (as a last resort) water supply systems...an invader would quickly and efficiently destroy the people’s will to resist.”¹⁰ Robert Webster and Muir Fairchild refined George’s list of “will” targets. They focused specifically on “national *organic systems* on which many factories and numerous people depended” [emphasis in original].¹¹ According to Hansell, organic systems included production and distribution of electricity, fuel, food, and steel; transportation networks; and certain specialized factories, especially those producing electrical generators, transformers, and motors.¹² Despite a lack of economic intelligence – theorists identified the foregoing systems by studying the United States – ACTS predicted victory for those who followed the “industrial web” prescriptions.

Roughly half a century later, John Warden applied a new metaphor to the ACTS vision of the enemy as a system. Fortified by his knowledge of military theory – specifically, that of J. F. C. Fuller – and modern communications technology, Warden followed a traditional practice and likened the enemy system to the human body. Rather than an amorphous “web” or “house of cards,” Warden described an enemy (indeed, every life-based system) as an entity with a brain, a requirement for “organic essentials,” a skeletal-muscular infrastructure, a population of cells, and a self-protection mechanism. He arranged these components into the now-familiar model of five concentric rings, with each ring dependent on the ones inside it. Warden’s major addition to ACTS theory – the brain, or leadership ring – controlled the entire system. If the center ring could be killed (Fuller’s “shot through the head”), or isolated by severing communications links, the entire system would crumble.¹³

Just like the ACTS theorists, Warden focused on the enemy’s will and capability to fight. “It is imperative,” he argued, “to remember that all actions are aimed against the enemy system as a whole.” Furthermore, “when the command element cannot be threatened directly, the task

becomes one of applying sufficient indirect pressure so that the command element rationally concludes that concessions are appropriate, realizes that further action is impossible, or is physically deprived of the ability to...continue combat.”¹⁴ If unable, then, to attach the center leadership ring directly, Warden recommended attacks on organic essentials such as power production and petroleum – precisely the targets identified by ACTS. He proposed that damage to organic essentials could lead to “collapse of the system” or “internal political or economic repercussions that are too costly to bear”¹⁵ – in other words, to the “fatal weakening” suggested by ACTS. Finally, just as the ACTS theorists refused to squander bombing on Army support operations, Warden emphasized that “engagement of the enemy military...should be avoided under most circumstances.” Fighting an enemy’s military “*is at best a means to an end and at worst a total waste of time and energy*” [emphasis in original].¹⁶

In essence, Warden just updated ACTS theory. The major thematic difference between the theories is the addition of a new “vital center” – the leadership ring – and two new destructive mechanisms to influence that center of gravity: *decapitation and parallel war*. Nuclear strategists coined the first term to describe the killing or isolation of enemy leaders; Warden created the second to describe the overwhelming-force strategy to use when the leaders were unreachable. A “death of 1,000 cuts” would suffice to collapse an enemy system whose center ring was protected, just as ACTS proposed to disrupt the industrial web. Technology improved the execution of the strategy, however, allowing airmen to inflict those cuts nearly simultaneously. Warden noted that Desert Storm air forces “struck three times as many targets in Iraq in the first 24 hours as Eighth Air Force hit in Germany in all of 1943.”¹⁷

UNDERLYING ASSUMPTIONS

Given the similarities in context and content that connect these bodies of airpower thought, it should not be surprising to discover that they rest on similar assumptions. Most importantly, they presuppose a rational actor, or, to use Graham Allison’s term, *Model I enemy*. Warden proposed that “enemies, whether they be states, criminal organizations, or individuals all do the same thing: they almost always act or don’t act based on some kind of cost-benefit ratio.”¹⁸ Faber made the same observation about ACTS, whose theorists overlooked the fact that an enemy might operate based on “potentially obscure organizational, bureaucratic, or emotional” Model II/III factors.¹⁹ Faber also pointed out that ACTS theory rested on a “mid-Victorian faith in technology” and “wrongly assumed that revolutionary bomber-related technologies would produce almost ‘frictionless’ wars.”²⁰ Warden

echoed this faith, consigning friction to the Napoleonic era. In Warden’s combat equation, modern airmen could ignore morale (and friction, a morale-related factor) because physical factors \times morale = outcome. When physical factors approach zero due to technologically superior attacks, output of the enemy war machine will be zero, regardless of morale factors – and friction is therefore irrelevant.²¹

Clearly, these assumptions lead to problems. Due to its simplicity, a rational-actor model cannot adequately describe or predict the behavior of many state and non-state actors. Faber, for example, asks, “Is it not possible... that a state might continue to struggle – at higher costs – to demonstrate its resolve in future contingencies?”²² If a strategist cannot determine how an opponent will react to pressure – if the Model I analysis is faulty – then he cannot effectively target the opponent’s will or force him to change his mind à la Warden and ACTS. A belief in frictionless war seems fraught with peril, as well. Gordon and Trainor devote a full chapter to describing numerous instances of friction in the Gulf War; Lt Col Barry D. Watts uses an entire book to show how twentieth-century warfare is characterized by friction. “The very structure of human cognition,” he concludes, “argues that friction will continue to be the fundamental atmosphere of war.”²³ These flawed underlying assumptions cast doubt on the validity of both theories and suggest additional questions. Do the ACTS and Warden theories share other flaws? If they do, are they relevant to airpower strategists in the coming years?

HOLES IN THE LOGIC

The theories do, in fact, contain additional related flaws that highlight lessons for future strategists. Faber characterizes these flaws as the “three pathologies” of airpower theory. One of the pathologies is an overreliance on metaphor in place of logical argumentation.²⁴ ACTS theorists and Warden provided little evidence to support their “web” and “body” analogies. Warden merely rearranged a tabular presentation of system components into rings and claimed – without empirical data – that the diagram proved “several key insights,” namely that the rings were interdependent, the center was most important, that the military was merely a shield for the others, and effectiveness lay in working inside-out vice outside-in.²⁵ Warden also failed to provide proof that a nation-state, like a body, could be killed through decapitation. Similarly, the ACTS theorists described an economic “house of cards” using a sample size of one – the American economy of the 1930s.

Critiquing Warden, Dr. Lewis Ware notes that such unsupported metaphors are inadequate as analytical instruments. Their “arguments rest on principled belief

rather than on reason, and principled belief – however powerful or well intended – is by definition not susceptible to rational explanation.”²⁶ Faber points out that, unlike a human body, a society can substitute for lost vital organs; he further notes that metaphor-based theories have led to faulty employment of airpower in war because they fail to see that conflict is nonlinear and interactive.²⁷ The message for strategists is clear: Examine theoretical metaphors carefully. Ensure that verifiable cause-and-effect relationships exist between the parts of a metaphor that provide its explanatory power, especially if the metaphor is used to plan an air strategy. Finally, remember that enemies react. Decision makers should not expect an Iraqi-style rollover.

ACTS and Warden share Faber’s second “pathology” as well: They both “made a fetish of quantification and prediction in war.”²⁸ As Faber notes, the ACTS instructors who wrote Air War Plans Division – Plan I calculated precisely how to defeat Germany: 6,960 bombers attacking 154 target sets would produce victory in six months. Likewise, Warden claimed that “with precision weapons, even logistics become simple...[S]ince we know that all countries look about the same at the strategic and operational levels, we can forecast in advance how many precision weapons will be needed to defeat an enemy.”²⁹

Political scientist Robert Pape has highlighted the problem with such quantification. Strategists who rely on predictions like the forecasts cited above confuse combat effectiveness with strategic effectiveness. Operators should be concerned with the first, which concerns target destructions, while strategists and commanders must focus on the second and ask whether or not said destruction achieves political goals. Strategists cannot allow a quantitative focus to obscure their understanding of the human interaction that constitutes both war and politics. Despite Warden’s claims to the contrary, technology has not invalidated Clausewitz; war is still unpredictable.

The unwavering devotion with which ACTS theorists and Warden clung to the aforementioned “pathologies” highlights their susceptibility to Faber’s final pathology. Faber notes that “air theorists sought to develop hoary maxims that would apply to all wars, regardless of time and circumstance. The ACTS ‘Bomber Mafia,’ for example, adopted ‘a Jominian, mechanistic view of war – a view of war as a mathematical equation whose variables can be selectively manipulated to achieve success.’”³⁰ Warden’s previously cited “outcome” equation and his claim that the five rings are “general concepts not dependent on a specific enemy” suggest that he also believed in a universally applicable strategic formula. Both theories, however, ignore the role of historical, cultural, and moral context, and that limits their universality.³¹ More importantly, their claims of universality have led to widespread skepticism.

Arguably, that skepticism underlies the current battles over airpower’s role in joint doctrine. Gen Ronald R. Fogleman has said that, due to the claims of airpower visionaries, “we found ourselves in a position where there were a lot of unfulfilled promises and false expectations relative to what airpower could and could not do.” He further admonished airmen not “to let our enthusiasm for our primary mediums of operations blind us to the advantages that can be gained by using airpower in support of land and naval component objectives.”³² He suggested that airmen are partly to blame for current interservice battles. In other words, the adherence of air theorists to “hoary maxims” has hampered the development of joint doctrine. Future air strategists can alleviate that problem by claiming less universality for airpower ideas.

THE BOTTOM LINE

Do these pathologies inherent in the ideas of ACTS and Warden invalidate the theories? No. Warden critic Lewis Ware admits that Warden’s “reductionism has immense practical value for the successful prosecution of an air action.”³³ Col Richard Szafranski is more blunt: “Purism matters less to action-oriented people than the verifiable consequences of action...Try as critics might, they cannot eradicate the objective reality of the Desert Storm air battles. They worked.”³⁴ Similarly, after a long trial and midcourse adjustments, ACTS theory succeeded. By late 1944, attacks on fuel production and transportation nearly prevented German forces from flying or driving at all. Szafranski’s critique of Warden applies equally to ACTS: Each “dares to offer us a map for air warfare. Its imperfections does not erase its utility... [If] ‘bold ideas, unjustified anticipations, and speculative thought are our only means...we must hazard them to win our prize.’”³⁵ ACTS theorists and John Warden provided frameworks for winning air campaigns.³⁶ Despite their common flaw, the theories provide valuable understanding of air warfare and starting points for further theoretical development.

In the 1920s and 1930s, ACTS theorists proposed an answer to the “two basic questions of airpower theory”: (1) What are the vital elements of an adversary’s power? (2) How can airpower influence them? Writing to prevent a subordinate role for airpower, the ACTS instructors suggested that nations could be coerced or destroyed by precision bombing of their “industrial web.” In the 1980s and 1990s, John Warden updated ACTS theory. He wrote in a similar context, added a leadership ring to the economic target list, and echoed ACTS’s claims about precision. Both theories lay on questionable assumptions about enemy rationality and technology’s ability to overcome friction, and both fell prey to Faber’s “pathologies” of airpower theory – overreliance on metaphor and quan-

tification, and a Jominian claim to universality. In the final analysis, however, both worked. Air strategists can, therefore, learn much from the shortcomings and strengths of the airpower theories of the Air Corps Tactical School and Col John Warden – and future theorists have therein a ready-made, battle-tested foundation for shaping the aerospace power of the next century.

NOTES

1. Lt Col Peter Faber, "Competing Theories of Airpower: A Language for Analysis," paper presented at the Air and Space Power Doctrine Symposium, Maxwell AFB, Ala., 30 April 1996. Available on-line from <http://www.airpower.maxwell.af.mil/airchronicles/presentation/faber.html>
2. Lt Col Peter Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," in Col Phillip S. Meilinger, ed., *Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, Ala.: Air University Press, 1997), 217.
3. Col John A. Warden III, "Air Theory for the Twenty-first Century," in Kari P. Magyar, ed., *Challenge and Response* (Maxwell AFB, Ala.: Air University Press, 1994), 311-32; and "The Enemy as a System," *Airpower Journal* 9, no. 2 (Spring 1995): 40-55.
4. Faber, "Interwar US Army Aviation," 185.
5. Michael R. Gordon and Bernard E. Trainor, *The Generals' War: The Inside Story of the Conflict in the Gulf* (Boston: Little, Brown, and Co., 1995), 79.
6. *Ibid.*
7. Faber, "Competing Theories," 1-2.
8. Quoted in Faber, "Interwar US Army Aviation," 217.
9. *Ibid.*, 219.
10. *Ibid.*, 194.
11. Hansell, quoted in *ibid.*, 219.
12. *Ibid.*
13. Warden, "Air Theory," 311-32; and "The Enemy as a System," 40-55. For Fuller's influence on Warden, see Lt Col David S. Fadok, "John Boyd and John Warden: Airpower's Quest for Strategic Paralysis," in Meilinger, 361.
14. Warden, "The Enemy as a System," 49.
15. *Ibid.*
16. Warden, "Air Theory," 317-18.
17. *Ibid.*, 324. Of course, there are other differences between the theories; for example, ACTS assumed total war with maximum destruction, while Warden foresaw limited war with minimum collateral damage – another update which reflected better technology and, perhaps, the "CNN factor." These differences are peripheral, however.
18. *Ibid.*, 314.
19. Faber, "Interwar US Army Aviation," 221. See also Graham Allison, *Essence of Decision: Explaining the Cuban Missile Crisis* (Boston: Little, Brown and Co., 1971) for discussion of Models I, II, and III (Rational Actor, Organizational Process, and Bureaucratic Politics) analyses.
20. *Ibid.*, 220. ACTS instructors did, in fact, include "fudge factors" in their calculations, but they turned out to be far too small.
21. Warden, "The Enemy as a System," 42-43.
22. Faber, "interwar US Army Aviation," 221.
23. Lt Col Barry D. Watts, *The Foundations of U.S. Air Doctrine: The Problem of Friction in War* (Maxwell AFB, Ala.: Air University Press, 1984), 93.
24. Faber, "Competing Theories," 1-2.
25. Warden, "Air Theory," 315-17
26. Dr. Lewis Ware, "Ware on Warden: Some Observations of the Enemy as a System," *Airpower Journal* 9, no. 4 (Winger 1995), 92.
27. Faber, "Competing Theories," 2.
28. *Ibid.*, 1.
29. Warden, "Air Theory," 327-28.
30. Faber, "Competing Theories," 1; internal quotes from Col Thomas A. Fabyanic, "War Doctrine and the Air War College – Some Implications for the U.S. Air Force," *Air University Review* 37, no. 2 (January-February 1986).
31. See Faber, "Competing Theories," 1; and Ware, 91, on the lack of contextual understanding of ACTS and Warden, respectively.
32. Gen Ronald R. Fogleman, "Aerospace Doctrine – More Than Just a Theory," keynote address to the Air and Space Power Symposium, Maxwell Air Force Base, Alabama, 30 April 1996. Available on-line from <http://www.airpower.maxwell.af.mil/chronicles/presentation/doctrel.html>.
33. Ware, 89.
34. Col Ricahrd Szafranski, "The Problem with Bees and Bombs," *Airpower Journal* 9, no. 4 (Winger 1995): 96.
35. *Ibid.*, 97. Szafranski attributes the internal quotation to Karl R. Popper as cited in Timothy Ferris, ed., *The World Treasury of Physics, Astronomy, and Mathematics* (Boston: Little, Brown and Company, 1991), 799.
36. It is true that the Gulf War theater planners in the "Black Hole" made substantial additions to Warden's original scheme; they certainly deserve credit for their contributions to airpower theory and coalition victory.

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Howard D. Belote wrote this article while a student at the prestigious School of Advanced Airpower Studies at Maxwell AFB, Ala. Before retiring in 2010, Col Belote completed command assignments at the squadron, group, and wing levels.

From: Maj Howard D. Belote, "Warden and the Air Corps Tactical School: What Goes Around Comes Around," *Airpower Journal* (Fall 1999): 39-47. Used with permission.

14.3 Cyberspace: The New Air and Space?

By Lt Col David A. Umphress, USAFR

OBJECTIVES:

11. Define the term “cyberspace.”
12. List two benefits of operating in a rich cyberspace environment.
13. Describe the four fundamental principles of cyberspace.

The mission of the United States Air Force is to deliver sovereign options for the defense of the United States of America and its global interests—to fly and fight in Air, Space, and Cyberspace.

—USAF Mission Statement

In late 2005, the Air Force altered its mission statement. As before, the service flies and fights in air and space, but now it also flies and fights in *cyberspace*. We have long recognized that information serves as a center of gravity for the military. Although military operations may involve aircraft, guns, tanks, ships, and people, information is the “glue” that tells each aircraft what sortie to fly, each tank where to go, and each ship where to sail. The revised mission statement represents a bold move if for no other reason than the fact that its explicit mention of cyberspace brings to the forefront the role played by information and information technology in the modern Air Force. Indeed, the statement elevates the notion of cyberspace and its attendant infrastructure to the level of importance occupied by air and space. Whereas, formerly, the Air Force perceived itself as carrying out kinetic operations, the latest version of its mission statement places the service squarely in the nonkinetic arena as well.

We have an intuitive sense of how the Air Force operates in air and space since both are physical in nature. Less clear is the relationship between the Air Force and cyberspace. What is cyberspace? Why is it important? What are the rules under which it operates?

CYBERSPACE DEFINED

In the early 1980s, writer William Gibson coined the term cyberspace to describe a fictionalized computer network containing vast amounts of information that could be tapped for wealth and power.¹ In his cyberspace, the physical world and the digital world become blurred to the point that human users perceive computer-generated experiences that have no real existence, and sentient digital beings affect the physical world. Although Gibson’s depictions of computer-simulated reality, cybernetically

enhanced humans, and artificially intelligent entities remain in the realm of science fiction, the concepts of “exploring” vast amounts of data and “visiting” remote computers do not. Moreover, the premise that computer networks contain information that people can exploit—for good and ill—is very real.

We need a physical infrastructure of computers and communication lines to implement cyberspace. In other words, cyberspace runs “on” computers. However, what resides “inside” computers provides the greatest leverage: we measure the true value of cyberspace in terms of the information contained within that infrastructure. The crucial characteristics of cyberspace include the fact that (1) information exists in electronic format, and (2) computers can manipulate (store, search, index, process, etc.) that information.

Cyberspace has thus become a metaphor for the digital society made possible through computers and computer networks. When referred to abstractly, it connotes the sum total of information available electronically, the exchange of that information, and the communities which emerge from the use of that information. When used in reference to a particular military operation, it signifies the information available to a specific audience.

Cyberspace need not be publicly accessible although the public does have access to the predominant implementation of cyberspace—the Internet. Military units can operate private networks that constitute their own limited versions of cyberspace. In fact, many disconnected “cyberspaces” can exist simultaneously, each servicing its own community of users.

WHY CYBERSPACE IS RELEVANT

Marshall McLuhan’s aphorism “the medium is the message” characterizes our expectations of cyberspace. He points out that “societies have always been shaped more by the nature of the media by which humans communicate than by the content of the communication.”² Since computers and electronic communication networks en-

courage the rapid and widespread exchange of information, it naturally follows that they would also influence military operations.

It is interesting to observe the evolution of the medium-is-the-message effect on the Air Force's perception of cyberspace. Initially, government policies equated cyberspace with the communication hardware comprising computer networks, concentrating on hardening to protect against infiltration. Later policies envisioned cyberspace not only as networks but also as the data transmitted across them, which led to a focus on data integrity. The change in the Air Force's mission statement to include cyberspace implies that we now perceive it as *content*—something more than hardware and data.

The electronic encoding of information in cyberspace, rather than on physical media, permits wider interchange of those data. This is the foundation of an information-driven society proposed over the last 30 years by so-called new-age pundits such as McLuan, John Naisbitt, Alvin Toffler, and Don Tapscott, to name a few.³ The premise of the information society is that information itself has economic value, with a corollary which holds that information has operational value to the military. The more efficiently and effectively we manage information, the more benefit we derive from it.

The military has recognized this idea by declaring “information superiority” as one of its core values.⁴ It has moved to organize and equip itself so as to improve the management of information. The specific organizational approaches have various names—net-centric, knowledge management, battlespace, infosphere, and so forth—but the general concept remains the same: create a rich cyberspace (with tools, sensor-provided data, quality of information, etc.) in which to make decisions.⁵

Ideally, two primary benefits become evident from operating in such an information-driven environment. First, the organization can be decentralized as much as is feasible within a military context. Everyone operates within cyberspace and has access to the appropriate information needed to make decisions. We no longer have to make decisions at the point in the organization determined by the nexus of suitable information, but at the point most affected by the decision. Second, the organization can function as a coalition of semi-independent agents whose environment drives their operations.

For every benefit, however, a host of side effects exists. Technology that relies on information encoded in electronic format remains central to supporting information superiority. That technology does not exist in any integrated fashion today. We carry out information-related functions with a patchwork collection of software and

hardware tools. We also struggle with a number of questions: How do we manage massive amounts of information? How do we prevent the mining of large amounts of unclassified data for classified information? How do we “compartmentalize” cyberspace so that the right information gets to the right decision makers? What information can we transmit over unclassified civilian networks versus tightly controlled, classified military networks? How do we integrate information coming through official military networks with information coming from “back-channel” sources? How computer savvy do users of cyberspace have to be? What mechanisms are in place to detect information tampering?

FUNDAMENTAL PRINCIPLES OF CYBERSPACE

The Air Force's announcement of its revised mission statement prompted a considerable amount of discussion regarding the precise definition of *cyberspace* and the way it relates to air and space. In the midst of this discussion were debates about what constitutes the bounds of cyberspace, whether it can function as a medium for weapon delivery, how the Air Force *flies* through cyberspace, and the like. That this discussion arose demonstrates that the concept of cyberspace is very much open to debate. As with the proverbial blind men giving their interpretations of the elephant, we have a number of ways of looking at cyberspace, depending on our perspective. Regardless of how we ultimately view cyberspace, though, we must recognize that it operates under some fundamental principles.

Information Is the Coin of the Realm in Cyberspace

Since cyberspace deals with information, the latter naturally determines the “economy” of the particular cyberspace in which it resides. In other words, we can think of information as having “value,” which depends on its inherent usefulness as a stand-alone piece of information as well as the way it relates to other information, both within cyberspace and without. Changes in the availability or usefulness of the information alter its value.

For example, content on an intranet page may gain in value if it leads to other information of equal or greater value. Similarly, it may lose value if it is duplicated or contradicted somewhere else. In the absence of relationships with other information, the value of information in cyberspace generally decreases over time because it has a greater chance of having been put to some use.

We need not restrict the notion of value to factual information. There is no guarantee regarding the accuracy or truthfulness of information in cyberspace. Consequently, *disinformation* intended to disguise the worth of legitimate information has value.

We may not explicitly know the value of a particular piece of information in cyberspace. Certainly, if it has a security classification, we understand the inherent risk if that information is compromised. We thus attach an arbitrarily high value to such information. However, it is computationally infeasible to compare one piece of information to all other combinations of pieces of information within cyberspace in order to determine value. We cannot know, a priori, when we can combine a particular piece of information, classified or not, with another piece of information to form intelligence higher in value than the individual pieces separately. To complicate things further, hardware and software appliances that “sniff” networks and intercept data transmissions often prevent us from determining if someone has obtained a piece of information illicitly, thereby unknowingly altering its value. Encryption and other information-assurance measures mitigate such occurrences to a great extent but don’t prevent them.

Paradoxically—at least in terms of economic theory—the ever-increasing supply of information available within cyberspace does not decrease the value of information. Instead, its value increases due to the scarcity of time and resources required to find useful information from the overall supply. This phenomenon has given rise to “technopower,” the concept that power and control are in the hands of people able to use cyberspace technology effectively to obtain high-value information.⁶

Cyberspace Shapes Authority

Although information itself defines value in cyberspace, access to that information determines power and, consequently, shapes authority. Economists portray information as falling into one of three categories: free, commercial, and strategic.⁷ Free information is available to whoever seeks it; commercial information to people willing to pay for it; and strategic information only to those specially entrusted to have it. Outside the context of cyberspace, strategic information has the greatest persuasive value because its restricted availability can serve as a source of influence and power over those who don’t have it. Holders of strategic information serve as gatekeepers, doling it out as necessary for their own purposes.

The emergence of cyberspace has altered this balance of power, providing a mechanism for disseminating information widely and freely. Previously, we funneled and filtered valuable information through gatekeepers; now, however, we can bypass them altogether, thus permitting peer-to-peer communication of information. Given this model, strategic information will undergo almost instantaneous devaluation if we put it into cyberspace without providing some sort of protection because it becomes

available to all users of that cyberspace. Further, making information freely available means it becomes more accessible and has the potential to reach a larger audience.

This scenario has had societal effects, the most profound of which are virtual communities. Whether implemented as a private network supporting military operations or as a public Internet, cyberspace connects people. Users of a military cyberspace are fairly homogeneous; their goals address a specific military operation. As the user base of cyberspace becomes larger and more public, not only do user goals diversify, but also communities form within cyberspace.

Take the Internet, for example. With an estimated audience of 1.8 billion users across 225 countries, it has transformed the globe into a virtual village.⁸ People can communicate with each other regardless of physical location. In so doing, they are able to form and join social networks consisting of individuals with similar interests. The popularity of Web-based social networking tools such as Facebook (7 million users), Xanga (40 million), MySpace (108 million), and Hi5 (40 million) demonstrates the potential of cyberspace to bring people together.⁹ [*Obviously these figures are dated.*]

This ability is not lost on nonstate actors, who use the Internet as a meeting place, recruiting tool, and conduit for propaganda. For example, Hezbollah has leveraged cyberspace technology quite effectively, sponsoring a number of Arabic and English Web sites that describe world events from a Hezbollah perspective. Its graphic pictures, video clips, and news articles of the Israel-Lebanon conflict in July 2006 are clearly designed to portray Israel as a terrorist puppet of the United States.¹⁰ Realizing that many Israelis visit these sites, Hezbollah uses them to demoralize this Israeli audience while simultaneously boasting of its victories to the Arab audience.¹¹

Cyberspace Operates under Nontraditional Physics

The juxtaposition of cyberspace with air and space in the Air Force’s mission statement almost depicts cyberspace as a physical means for conducting operations. True, it is useful at some level of abstraction to conceptualize cyberspace as a medium. After all, cyberspace works through the medium of computers and networks. However, drawing too close an analogy between a physical entity (air and space) and a logical one (cyberspace) can be dangerous. Cyberspace operates on entirely different laws of physics than does physical space. For example, information doesn’t weigh anything. It has no physical mass. It can instantaneously pop into—and out of—existence. It can be replicated without cost, accumulated without human intervention, and divorced from its physical location. Information does not, in itself, kill. It does so only when we use

it to influence physical players in air and space. Because of the nonphysical nature of information, placing it in cyberspace gives it instant, global availability to all users of that cyberspace. We often cannot determine whether information we obtain from a source in cyberspace is original or has been copied from somewhere else within cyberspace.

Cyberspace—particularly the Internet—is a global phenomenon. Information that the United States does not wish to reveal may be available through sources located in countries outside its purview. We cannot necessarily control all information, nor can we necessarily remove a piece of information. We can only regulate information within our own span of control.

Cyberspace Brings the Front Line to the Front Door

Census and survey data indicate that 54 million households in the United States have at least one personal computer and that roughly two-thirds of Americans actively use the Internet in some fashion.¹² Fifty-seven million employed Americans—62 percent of the workforce—report using a computer at work, 98 percent of whom have access to electronic mail.¹³ Of those, the majority reports trusting the content of electronic mail when it contains at least one item of personal information other than first name. We can reasonably assume that these statistics generally represent the Air Force workforce, given the 15 million personal computers in the Department of Defense's inventory, combined with the leadership's vision of a net-centric force.¹⁴

We can access public cyberspace literally from within our own homes or places of employment. For the first time in history, we have a vast amount of information at our fingertips. Also for the first time, we have the front line of a battle at our front door. Prior to cyberspace's rise in popularity, the main participants in military operations were soldiers physically engaged in conflict. News reports that portrayed the results of military action to civilians at home dealt with events happening outside the country's borders. With cyberspace within easy reach of ordinary citizens, those who wish to use it for ill gain have direct entrée into the home. This situation is particularly poignant since empirical studies have shown that computers, at home or otherwise, are probed for security vulnerabilities during the first 20 minutes of their connection to a public network.¹⁵

Contrary to the prevailing picture painted by the media, "war" in cyberspace will not likely manifest itself as an electronic Pearl Harbor, causing massive destruction. More probably, cyberwar will take the form of influence rather than lethality. Cyber warriors will not destroy infrastructure because that would be self-defeating, partic-

ularly within the United States. Instead, they will more likely obtain information they can use to manipulate happenings in the physical world to their advantage.

Those who choose to operate in cyberspace have a number of asymmetrical advantages. First, the "battlefield" is large and easy to hide in. Second, the effects of attacks are disproportionate to their costs. Using cyberspace is neither material- or capital-intensive. Individuals can access it with inexpensive computers, free software, and consumer-ready communication equipment. They can launch attacks from across the globe almost with impunity because of the difficulty of determining the exact origin of the attack or the identity of the attacker. Third, the one-sided nature of cyber attacks forces potential victims into assuming a defensive posture. The victim curtails his computer and communication services to within what his governance structure deems "acceptable," based on its perceptions of the prevailing dangers—real or not. In case of an attack, the victim probably will not launch an in-kind offensive action since, even if he can identify the attacker, he probably lacks the computer infrastructure to make a counterattack worthwhile.

CONCLUSION

Perhaps the greatest lesson we can derive from the Air Force's revised mission statement is that it warns all Airmen of the reality of cyberspace. The statement requires us to understand the implications of an information-reliant military. It also challenges us to look for ways to best use cyberspace and to understand that we can attain "throw weight" by finding new ways to make the best use of cyberspace technology.

B. H. Liddell Hart's admonition that a "strategist should think in terms of paralyzing, not killing" remains as relevant today as it ever was.¹⁶ Although Liddell Hart spoke of paralyzing armies of people and the economies of states, his words nevertheless apply to the individual Airman. Never in history have so many people found themselves intimately tied to a weapon system—cyberspace—that is limited only by the human imagination.

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From: Lt Col David A. Umphress, "Cyberspace: The New Air and Space?," *Air & Space Power Journal* (Spring 2007): 50-55. Used with permission.

14.4 Basic Air Force Doctrine

AF Doctrine Document 1-1 (2011)

Selections from Air Force Doctrine Document 1, *Air Force Basic Doctrine, Organization, and Command*, Chapters 2 & 5

OBJECTIVES:

14. Define the term “air power.”
15. Describe how air power has evolved from strategic (kinetic) bombing to encompass information, space, and cyberspace operations.
16. Identify key attributes of air power.
17. Define the term “airmindedness.”
18. Recall some practical applications of airmindedness for Airmen.
19. List and briefly define the twelve Air Force core functions.

The other services have air arms—magnificent air arms—but their air arms must fit within their services, each with a fundamentally different focus. So those air arms, when in competition with the primary focus of their services, will often end up on the short end, where the priorities for resources may lead to shortfalls or decisions that are suboptimum. It is therefore important to understand that the core competencies of [airpower] are optional for the other services. They can elect to play or not play in that arena. But if the nation is to remain capable and competent in air and space, someone must pay attention across the whole spectrum; that is why there is a US Air Force.

— General Ronald R. Fogleman, USAF, retired

AIRPOWER

Airpower is the ability to project military power or influence through the control and exploitation of air, space, and cyberspace to achieve strategic, operational, or tactical objectives. The proper application of airpower requires a comprehensive doctrine of employment and an Airman’s perspective. As the nation’s most comprehensive provider of military airpower, the Air Force conducts continuous and concurrent air, space, and cyberspace operations. The air, space, and cyberspace capabilities of the other Services serve primarily to support their organic maneuver paradigms; the Air Force employs air, space, and cyberspace capabilities with a broader

focus on theater-wide and national-level objectives. Through airpower, the Air Force provides the versatile, wide-ranging means towards achieving national objectives with the ability to deter and respond immediately to crises anywhere in the world.

Airpower exploits the third dimension of the operational environment; the electromagnetic spectrum; and time to leverage speed, range, flexibility, precision, tempo, and lethality to create effects from and within the air, space, and cyberspace domains. From this multi-dimensional perspective, Airmen can apply military power against an enemy’s entire array of diplomatic, informational, military, and economic instruments of power, at long ranges and on short notice. Airpower can be applied across the strategic, operational, and tactical levels of war simultaneously, significantly increasing the options available to national leadership. Due to its range, speed, and flexibility, airpower can compress time, controlling the tempo of operations in our favor. Airpower should be employed with appropriate consideration of land and maritime power, not just during operations against enemy forces, but when used as part of a team that protects and aids friendly forces as well.

Much of what airpower can accomplish from within these three domains is done to critically affect events in the land and maritime domains—this is the heart of joint-domain integration, a fundamental aspect of airpower’s contribution to US national interests. Airmen integrate capabilities across air, space, and cyberspace domains to achieve effects across all domains in support of Joint Force Commander (JFC) objectives. For example, a remotely piloted aircraft operating from a ground station in the continental US relies on space and cyberspace capabilities to support operations overseas. While all Services

rely more and more on such integration, cross-domain integration is fundamental to how Airmen employ airpower to complement the joint force.

Airmen exploit the third dimension, which consists of the entire expanse above the earth's surface. Its lower limit is the earth's surface (land or water), and the upper limit reaches toward infinity. This third dimension consists of the air and space domains. From an operational perspective, the air domain can be described as that region above the earth's surface in which aerodynamics generally govern the planning and conduct of military operations, while the space domain can be described as that region above the earth's surface in which astrodynamics generally govern the planning and conduct of military operations. Airmen also exploit operational capabilities in cyberspace. Cyberspace is a global domain within the information environment consisting of the interdependent network of information technology infrastructures, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers. In contrast to our surface-oriented sister Services, the Air Force uses air, space, and cyberspace capabilities to create effects, including many on land and in the maritime domains, that are ends unto themselves, not just in support of predominantly land or maritime force activities.

The evolution of contemporary airpower stems from the Airman's original vision of combat from a distance, bypassing the force-on-force clash of surface combat. Originally manifest in long-range aircraft delivering kinetic weapons, airpower has evolved over time to include many long-range supporting capabilities, notably the conduct of networked information-related operations. This evolution has accelerated as Airmen conduct a greater percentage of operations not just over-the-horizon but globally, expanding operations first through space and now also in cyberspace. Just as airpower grew from its initial use as an adjunct to surface operations, space and cyberspace have likewise grown from their original manifestations as supporting capabilities into warfighting arenas in their own right.

The Foundations of Airpower

Airpower provides the Nation and the joint force with unique and valuable capabilities. **Airmen should understand the intellectual foundations behind airpower and articulate its proper application at all levels of conflict; translate the benefits of airpower into meaningful objectives and desired effects; and influence the overall operational planning effort from inception to whatever post-conflict operations are required.**

Airpower stems from the use of lethal and nonlethal

means by air forces to achieve strategic, operational, and tactical objectives. The Air Force can rapidly provide national leadership and joint commanders a wide range of military options for meeting national objectives and protecting national interests.

Elevation above the earth's surface provides relative advantages and has helped create a mindset that sees conflict more broadly than other forces. Broader perspective, greater potential speed and range, and three-dimensional movement fundamentally change the dynamics of conflict in ways not well understood by those bound to the surface. The result is inherent flexibility and versatility based on greater mobility and responsiveness. Airpower's speed, range, flexibility, and versatility are its outstanding attributes in both space and time. This combination of attributes provides the foundation for the employment concepts of airpower.

With its speed, range, and three-dimensional perspective, **airpower operates in ways that are fundamentally different from other forms of military power.** Airpower has the ability to conduct operations and impose effects throughout an entire theater and across the Range of Military Operations (ROMO), unlike surface forces that typically divide up the battlefield into individual operating areas. Airmen generally view the application of force more from a functional than geographic standpoint, and classify targets by generated effects rather than physical location.

By making effective use of the third dimension, the electromagnetic spectrum, and time, airpower can seize the initiative, set the terms of battle, establish a dominant tempo of operations, better anticipate the enemy through superior observation, and take advantage of tactical, operational, and strategic opportunities. Thus, airpower can simultaneously strike directly at the adversary's centers of gravity, vital centers, critical vulnerabilities, and strategy. Airpower's ability to strike the enemy rapidly and unexpectedly across all of these critical points adds a significant impact to an enemy's will in addition to the physical blow. This capability allows airpower to achieve effects well beyond the tactical effects of individual actions, at a tempo that disrupts the adversary's decision cycle.

Airpower can be used to rapidly express the national will wherever and whenever necessary. Within 36 hours of the deployment order, Air Force F-15s were flying combat air patrols over Saudi Arabia in response to the Iraqi invasion of Kuwait in 1990. More recently, Air Force forces demonstrated that same rapid-response capability by airlifting desperately needed supplies into tsunami-stricken areas of South and Southeast Asia and

earthquake-stricken Haiti. The world at large perceives American airpower to be a politically acceptable expression of national power which offers reasonable alternatives to long, bloody ground battles while making an impact on the international situation. While a “boots-on-the-ground” presence may often be required, airpower makes that presence more effective, in less time, and often with fewer casualties. Increasingly, US national power and international influence are gauged in terms of what we can or cannot accomplish with this capability.

The Air Force provides national leadership and joint commanders with options, the threat of which may accomplish political objectives without the application of lethal force. The means is embedded in the ability to respond rapidly to crises anywhere in the world and across the ROMO. An obvious example is the deterrent role played by the Air Force’s nuclear-armed bombers and intercontinental ballistic missiles against the Soviet Union during the Cold War. More recently, B-52 and B-2 bombers have rotated into Guam to provide a ready and visible presence.

The Air Force provides the unique ability to hold at risk a wide range of an adversary’s options and possible courses of action; this is increasingly the key to successful joint campaigns. Airpower is increasingly the first military instrument brought to bear against an enemy in order to favorably influence the overall campaign. Frequently, and especially during the opening days of a crisis, airpower may be the only military instrument available to use against an enemy; this may be especially true if friendly ground forces are not immediately present in a given region.

Air Force forces can respond rapidly to apply effects. The same spacecraft which Airmen employ to observe hostile territory prior to the outbreak of hostilities provide key intelligence to battle planners. The same aircraft which provide visible deterrence to a potential aggressor can be employed immediately to defend or attack should deterrence fail. The shift from deterrent force to combat power is near-instantaneous. From ready deterrent to bombs-on-target is only a question of command and control and flight time.

Airpower is more than dropping bombs, strafing targets, firing missiles, providing precision navigation and timing, or protecting networks. It is also a way of influencing world situations in ways which support national objectives. To most observers in the post-Cold War world, the use of military power is politically less acceptable than in previous times. This is true even if we act in a purely humanitarian endeavor or influence a given international political situation with a modest show of

force. In international disasters, natural or man-made, from the Berlin Airlift to earthquake relief operations in Pakistan, the Air Force is the only military force in the world which has the airlift and air refueling capability to provide immediate relief supplies and personnel in response to global emergencies. Air Force aircraft delivering relief supplies serve not only to alleviate the immediate situation, but also to provide a visible symbol of the care, concern, and capability of the US. Through careful building of partnerships, Air Force forces can favorably shape the strategic environment by assessing, advising, training, and assisting host nation air forces in their efforts to counter internal or external threats. The perception of credible US forces underpins many deterrence and assurance strategies. Such activities lead to greater regional stability and security.

Within the broad sweep of history, the benefits of this instrument of military power are relatively new. Up until the latter part of the 20th century, naval forces provided the primary symbol of American military power and resolve; powerful warships making port calls throughout the world were visible symbols of the strength and capability of the US. Today, airpower plays a very similar role—and not just in those nations with major seaports. In numerous humanitarian operations, Airmen have provided relief, demonstrated resolve, and helped to shape the attitudes of world leaders and their people.

This influence is more than just airplanes. US space-based assets are a non-intrusive method of providing up-to-the-minute warning and information on the maneuver of hostile military forces or other potentially dangerous actions. The US often shares this information with friendly nations in response to potential adversaries to defuse points of conflict before they result in hostilities. US air, space, and cyberspace capabilities provide the means to alert allies of a potential aggressor’s hostile intentions or impending attack when in-country physical presence is unwarranted. They can influence potential adversaries by stripping them of the ability to hide hostile military activity without violating national sovereignty.

Airpower’s speed, range, flexibility, precision, and lethality provide a spectrum of employment options with effects that range from tactical to strategic. This range of effects is an important contribution. A surface-centric strategy often seeks its outcome through the destruction of hostile land forces and the occupation of territory. However, destruction of hostile land forces may be only a tactical or operational objective and may not achieve the desired strategic outcome. Further, territorial occupation, with its attendant large cultural footprint, may not be feasible or politically acceptable. Sea power, with its ability to project force and disrupt the economic

lifeline of a maritime-capable adversary, also provides the potential for strategic results. However, slow surface speeds can constrain its capability to respond rapidly from one theater to another. In addition, it may be extremely vulnerable in littoral regions. Often, in such circumstances, the political risks outweigh the actual military risks.

Airpower, on the other hand, has been successfully used to influence strategic political outcomes in many world crises since the Berlin Airlift of 1948. Throughout the Cold War, and continuing under various international arms control agreements, Air Force assets have been used to observe and verify compliance, leveraging our ability to negotiate and influence diplomatically. If force becomes necessary, Air Force assets can secure strategic outcomes at any time by overflying surface forces and thus bypassing geographical boundaries, or striking with precision at the critical vulnerabilities within an adversary's political, military, and industrial centers of gravity. Even in situations when joint strategy requires large-scale destruction of enemy surface forces, Air Force forces can deliver the bulk of that destruction. It can do these things sooner than can other military forces, and it has been demonstrated that the earlier the application of effects, usually the less total force required. In humanitarian cases, the earlier the relief, the better the effect.

Operating in a seamless medium, there are no natural boundaries to constrain air, space, and cyberspace operations. Through centralized control of Air Force assets and decentralized execution, commanders reap the benefits of airpower throughout the ROMO, wherever most needed at any given time.

Airpower has a degree of versatility not found in any other force. Many aircraft can be employed in a variety of roles and shift rapidly from the defense to the offense. Aircraft may conduct a close air support mission on one sortie, then be rearmed and subsequently used to suppress enemy surface-to-surface missile attacks or to interdict enemy supply routes on the next. In time-sensitive scenarios, aircraft en route to one target, or air mobility aircraft in support of one mission, can be reassigned new targets or re-missioned as new opportunities emerge. Multirole manned and unmanned platforms may perform intelligence, surveillance, and reconnaissance (ISR), command and control (C2), and attack functions all during the same mission, providing more potential versatility per sortie. Finally, aircraft can be repositioned within a theater to provide more responsiveness, while space and cyberspace capabilities can be reprioritized.

Joint campaigns rely upon this versatility. However, many airpower capabilities are limited in number; dividing or

parceling out airpower into "penny-packets" violate the tenet of synergy and principle of mass. To preserve unity of effort, JFCs normally vest a single air commander with control of all airpower capabilities.

Historically, armies, navies, and air forces massed large numbers of troops, ships, or aircraft to create significant impact on the enemy. Today, the technological impact of precision guided munitions enables a relatively small number of aircraft to directly achieve national as well as military strategy objectives. When combined with stealth technologies, airpower today can provide shock and surprise without unnecessarily exposing friendly forces. To destroy a single target, we no longer need the thousand-plane bomber raids of World War II or the hundreds of sorties of Vietnam. Today's air forces can provide accurate and assured destruction of vital targets with far fewer aircraft, sometimes multiple targets with a single aircraft. Moreover, that capability can be delivered from within the theater or around the globe if necessary. Whether in the skies of Iraq and Afghanistan, delivering United Nations peacekeeping troops to Africa, or monitoring nuclear weapons proliferation and development, Air Force forces have a far-reaching presence and the ability to produce direct and immediate effects.

With all those characteristics considered, one should remember that **air, space, and cyberspace superiority are the essential first ingredients in any successful modern military operation.** Military leaders recognize that successful military operations can be conducted only when they have gained the required level of control of the domains above the surface domains. Freedom to conduct land and naval operations is substantially enhanced when friendly forces are assured that the enemy cannot disrupt operations from above.

Control of the air, space, and cyberspace domains is not a goal for its own sake, but rather a prerequisite for all other military operations. Air mastery has allowed American land, naval, and air forces to operate where they want, at their own tempo, while creating the environment for success.

"Airmindedness"

The perspective of Airmen is necessarily different; it reflects a unique appreciation of airpower's potential, as well as the threats and survival imperatives unique to Airmen. The study of airpower leads to a particular expertise and a distinctive point of view that General Henry H. "Hap" Arnold termed "airmindedness."

Airmen normally think of airpower and the application of force from a functional rather than geographical

perspective. Airmen do not divide up the battlefield into operating areas as some surface forces do; air-mindedness entails thinking beyond two dimensions, into the dimensions of the vertical and the dimension of time. Airmen think spatially, from the surface to geosynchronous orbit. Airmen typically classify targets by the effect their destruction would have on the adversary instead of where the targets are physically located. This approach normally leads to more inclusive and comprehensive perspectives that favor strategic solutions over tactical ones. Finally, Airmen also think of power projection from inside the US to anywhere on the globe in hours (for air operations) and even nanoseconds (for space and cyberspace operations).

Air-mindedness impacts Airmen's thoughts throughout all phases of operations. It is neither platform- nor situation-specific. Air-mindedness enables Airmen to think and act at the tactical, operational, and strategic levels of war, simultaneously if called for. Thus, the flexibility and utility of airpower is best fully exploited by an air-minded Airman.

The Airman's Perspective

The practical application of "air-mindedness" results in the Airman's unique perspective, which can be summarized as follows.

- **Control of the vertical dimension is generally a necessary precondition for control of the surface.** The first mission of an air force is to defeat or neutralize the enemy air forces so friendly operations on land, sea, in the air, and in space can proceed unhindered, while at the same time one's own military forces and critical vulnerabilities remain safe from air attack.
- **Airpower is an inherently strategic force.** War and peace are decided, organized, planned, supplied, and commanded at the strategic level of war. Air Force forces can hold an enemy's strategic centers of gravity and critical vulnerabilities directly at risk immediately and continuously. Airpower also has great strategic capability for non-lethal strategic influence, as in humanitarian relief and building partnership activities.
- **Airpower can exploit the principles of mass and maneuver simultaneously to a far greater extent than surface forces.** There are no natural lateral boundaries to prevent air, space, and cyberspace capabilities from quickly concentrating their power (physically or in terms of delivered effects) at any point, even when starting from widely dispersed locations. Airpower dominates the fourth dimension—time—and compresses the tempo of events to produce physical and psychological shock.
- **Airpower can apply force against many facets of**

enemy power. Air Force-provided capabilities can be brought to bear against any lawful target within an enemy's diplomatic, informational, military, economic, and social structures simultaneously or separately. They can be employed in support of national, combined/joint, or other component objectives. They can be integrated with surface power or employed independently.

- **Air Force forces are less culturally intrusive in many scenarios.** Surface forces are composed of many people and vehicles which, when arrayed for operations, cover a significant area. Thus, their presence may be very visible to local populations and may create resentment during certain types of stability operations and in counterinsurgency operations. Air Force forces, operating from bases over the horizon or from just a few bases in-country, have a smaller footprint for the effects they provide. Space and cyberspace forces have a negligible in-theater footprint relative to the capabilities they provide.
- **Airpower's inherent speed, range, and flexibility combine to make it one of the most versatile components of military power.** Its versatility allows it to be rapidly employed against strategic, operational, and tactical objectives simultaneously. The versatility of airpower derives not only from the inherent characteristics of air forces themselves, but also from the manner in which they are organized and controlled.
- **Airpower results from the effective integration of capabilities, people, weapons, bases, logistics, and all supporting infrastructure.** No one aspect of air, space, and cyberspace capabilities should be treated in isolation since each element is essential and interdependent. Ultimately, the Air Force depends on the performance of the people who operate, command, and sustain air, space, and cyberspace forces.
- **The choice of appropriate capabilities is a key aspect in the realization of airpower.** Weapons should be selected based on their ability to create desired effects on an adversary's capability and will. Achieving the full potential of airpower requires timely, actionable intelligence and sufficient command and control capabilities to permit commanders to exploit precision, speed, range, flexibility, and versatility.
- **Supporting bases with their people, systems, and facilities are essential to launch, recovery, and sustainment of Air Force forces.** One of the most important aspects of the Air Force has proved to be its ability to move anywhere in the world quickly and then rapidly begin operations. However, the need for mobility should be balanced against the need to operate at the deployment site. The availability and operability of suitable bases can be the dominant factor in employment planning and execution.

- **Airpower’s unique characteristics necessitate that it be centrally controlled by Airmen.** Airpower can quickly intervene anywhere, regardless of whether it is used for strategic or tactical purposes. Thus, Airmen tend to take a broader view of war, because the capabilities they command have effects at broader levels of war. Airmen apply airpower through the tenet of centralized control and decentralized execution.

CORE FUNCTIONS

A modern, autonomous, and thoroughly trained Air Force in being at all times will not alone be sufficient, but without it there can be no national security.

— General H. H. “Hap” Arnold

Recently the Air Force refined its understanding of the core duties and responsibilities it performs as a Service, streamlining what previously were six distinctive capabilities and seventeen operational functions into twelve core functions to be used across the doctrine, organization, training, materiel, leadership and education, personnel, and facilities spectrum. These core functions express the ways in which the Air Force is particularly and appropriately suited to contribute to national security, but they do not necessarily express every aspect of what the Air Force contributes to the nation.

- Nuclear Deterrence Operations
- Air Superiority
- Space Superiority
- Cyberspace Superiority
- Command and Control
- Global Integrated ISR
- Global Precision Attack
- Special Operations
- Rapid Global Mobility
- Personnel Recovery
- Agile Combat Support
- Building Partnerships

Nuclear Deterrence Operations

The purpose of Nuclear Deterrence Operations is to operate, maintain, and secure nuclear forces to achieve an as-

sured capability to deter an adversary from taking action against vital US interests. In the event deterrence fails, the US should be able to appropriately respond with nuclear options. The sub-elements of this function are:

- Assure/Dissuade/Deter
- Nuclear Strike
- Nuclear Surety

Air Superiority

Air Superiority is that degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, air, and special operations forces at a given time and place without prohibitive interference by the opposing force. The sub-elements of this function are:

- Offensive Counterair
- Defensive Counterair
- Airspace Control

Space Superiority

Space superiority is the degree of dominance in space of one force over another that permits the conduct of operations by the former and its related land, sea, air, space, and special operations forces at a given time and place without prohibitive interference by the opposing force. Space superiority may be localized in time and space, or it may be broad and enduring. Space superiority provides freedom of action in space for friendly forces and, when directed, denies the same freedom to the adversary. The sub-elements of this function are:

- Space Force Enhancement
- Space Force Application
- Space Control
- Space Support

Cyberspace Superiority

Cyberspace Superiority is the operational advantage in, through, and from cyberspace to conduct operations at a given time and in a given domain without prohibitive interference. The sub-elements of this function are:

- Cyberspace Force Application
- Cyberspace Defense
- Cyberspace Support

Command and Control

Command and control is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. This core function includes all of the C2-related capabilities and activities associated with air, space, cyberspace, nuclear, and agile combat support operations to achieve strategic, operational, and tactical objectives.

Global Integrated Intelligence, Surveillance, and Reconnaissance

Global Integrated ISR is the synchronization and integration of the planning and operation of sensors, assets, and processing, exploitation, dissemination systems across the globe to conduct current and future operations. The sub-elements of this function are:

- Planning and Directing
- Collection
- Processing and Exploitation
- Analysis and Production
- Dissemination and Integration

Global Precision Attack

Global Precision Attack is the ability to hold at risk or strike rapidly and persistently, with a wide range of munitions, any target and to create swift, decisive, and precise effects across multiple domains. The sub-elements of this function are:

- Strategic Attack
- Air Interdiction
- Close Air Support

Special Operations

Special Operations are operations conducted in hostile, denied, or politically sensitive environments to achieve military, diplomatic, informational, and/or economic objectives employing military capabilities for which there is no broad conventional force requirement. These operations may require covert, clandestine, or low-visibility capabilities. Special operations are applicable across the ROMO. They can be conducted independently or in con-

junction with operations of conventional forces or other government agencies and may include operations through, with, or by indigenous or surrogate forces. Special operations differ from conventional operations in degree of physical and political risk, operational techniques, mode of employment, independence from friendly support, and dependence on detailed operational intelligence and indigenous assets. The sub-elements of this function are:

- Agile Combat Support
- Aviation Foreign Internal Defense
- Battlefield Air Operations
- Command and Control
- Information Operations
- Intelligence, Surveillance, and Reconnaissance
- Military Information Support Operations
- Precision Strike
- Specialized Air Mobility
- Specialized Refueling

Rapid Global Mobility

Rapid Global Mobility is the timely deployment, employment, sustainment, augmentation, and redeployment of military forces and capabilities across the ROMO. It provides joint military forces the capability to move from place to place while retaining the ability to fulfill their primary mission. Rapid Global Mobility is essential to virtually every military operation, allowing forces to reach foreign or domestic destinations quickly, thus seizing the initiative through speed and surprise. The sub-elements of this function are:

- Airlift
- Air Refueling
- Aeromedical Evacuation

Personnel Recovery

Personnel Recovery (PR) is defined as the sum of military, diplomatic, and civil efforts to prepare for and execute the recovery and reintegration of isolated personnel. It is the ability of the US government and its international partners to affect the recovery of isolated personnel across the ROMO and return those personnel to duty. PR also enhances the development of an effective, global capacity to protect and recover isolated personnel wherever they are placed at risk; deny an adversary's ability to exploit a nation through propaganda; and develop joint, in-

teragency, and international capabilities that contribute to crisis response and regional stability. The sub-elements of this function are:

- Combat Search and Rescue
- Civil Search and Rescue
- Disaster Response
- Humanitarian Assistance Operations
- Medical Evacuation/Casualty Evacuation

Agile Combat Support

Agile Combat Support is the ability to field, protect, and sustain Air Force forces across the ROMO to achieve joint effects. The sub-elements of this function are:

- Ready the Total Force
- Prepare the Battlespace
- Position the Total Force
- Protect the Total Force
- Employ Combat Support Forces
- Sustain the Total Force
- Recover the Total Force

Building Partnerships

Building Partnerships is described as Airmen interacting with international airmen and other relevant actors to develop, guide, and sustain relationships for mutual benefit and security. Building Partnerships is about interacting with others and is therefore an inherently inter-personal and cross-cultural undertaking. Through both words and deeds, the majority of interaction is devoted to building trust-based relationships for mutual benefit. It includes both foreign partners as well as domestic partners and emphasizes collaboration with foreign governments, militaries and populations as well as US government departments, agencies, industry, and non-governmental organizations (NGOs). To better facilitate partnering efforts, Airmen should be competent in the relevant language, region, and culture. The sub-elements of this function are:

- Communicate
- Shape

CONCLUSION

If there is one attitude more dangerous than to assume that a future war will be just like the last one, it is to imagine that it will be so utterly different that we can afford to ignore all the lessons of the last one.

— Air Marshall Sir John C. Slessor

More and more often, our national leadership is calling upon airpower as the military instrument of first choice, and they are asking it to accomplish tasks previously held unworkable—to coerce and to compel. Airpower offers joint force commanders options, including the ability to go to the heart of an enemy and attain a variety of effects directly at the strategic level. To support our national leadership, Airmen, as military professionals, must think about how to accomplish a spectrum of missions. We must understand the potential of airpower, and be able to plan and employ it to its maximum effect, and to articulate it within the context of joint operations. This is especially true in contemporary irregular warfare operations, in which airpower plays an important role, but largely complementing surface operations.

Air Force doctrine development is never totally complete—it is a continuous work in progress. We must remain aware of the lessons of the past—alert and receptive to future technologies and paradigms that may alter the art of air, space, and cyberspace warfare. We should not assume that things have not or will not change; above all, doctrine should be continually interpreted in light of the present situation. A too-literal reading of doctrine may fail to accommodate new operational realities.

Doctrine application requires informed judgment. Certain principles—like unity of command, objective, and offensive—have stood the test of time. Other ideas—like unescorted daytime bombing, decentralized command, and the preeminence of nuclear weapons—have not. If we ignore the potential of integrated air, space, and cyberspace operations and the global and strategic potential of airpower, we may commit the same sins as our forebears by preparing for the “wrong war.” If we ignore the reality that adaptive, thinking adversaries will seek asymmetric strategies, anti-access capabilities, and favorable arenas within which to influence and engage us, we risk failure. Tomorrow, a new set of conditions and requirements will likely emerge. In fact, some new conditions and environments are already emerging, and national security requirements are changing. The best hedge is an institutional commitment to learn from experience and to exploit relevant ideas and new technologies so we may be ready for the future, while retaining those fundamental principles that remain constant over time.

14.5 Should the US Maintain the Nuclear Triad?

By Dr. Adam B. Lowther

OBJECTIVES:

20. Name the components of the nuclear triad.
21. Describe the background and intent of President Eisenhower's "New Look" policy.
22. Define the concept of "assured destruction."
23. In your own terms, relate the author's stated reasons for keeping the nuclear triad in place.

In the first week of Pres. Barack Obama's new administration, the White House released his agenda, stating the policies the president will pursue regarding the nuclear arsenal. The agenda includes three foci: securing loose nuclear material from terrorists, strengthening the Nuclear Non-Proliferation Treaty, and moving toward a nuclear-free world.¹ Pushing the president in the direction of a "world without nuclear weapons" are such paragons of past political power as former senator Sam Nunn and former secretaries of state George Shultz and Henry Kissinger.² Adding a host of Washington's think-tank analysts to this list produces a crescendo of voices calling for "global zero." They challenge not only the current size of the arsenal but also the very need for a nuclear triad. Much of the recent scholarship shows a clear preference for moving to a monad composed solely of submarines armed with submarine-launched ballistic missiles (SLBM) until the United States ultimately disarms.³

Some past and present members of the military leadership hold a view that supports the nuclear arsenal. Senior leaders have given a number of public speeches and interviews outlining what it will take to maintain and modernize the most advanced and secure nuclear arsenal in the world.⁴ A key aspect of the general position held by supporters of the arsenal includes retaining the triad and replacing aging platforms.

In the ongoing debate over the appropriate size and purpose of the nuclear arsenal, abolitionists—clearly in the ascendancy—make six basic arguments that would ultimately lead to creation of a nuclear monad before reaching total disarmament:⁵

1. Post-Cold War presidents have failed to alter nuclear policy for the current security environment.
2. Terrorism, not Russia, is the primary threat facing the United States. Nuclear weapons do not deter terrorists.
3. America's advanced conventional capabilities can accomplish the same objectives as nuclear weapons.

4. As a signer of the Nuclear Non-Proliferation Treaty, the United States must move toward nuclear abolition.

5. Only nuclear disarmament can overcome the threats of accidental detonation, miscalculation leading to nuclear war, and proliferation of nuclear weapons and material.

6. The safest and most secure leg of the nuclear triad is the sea-based one. Thus, it should become the sole delivery platform for the nuclear arsenal.⁶

Admittedly, each of these arguments has some element of truth; they do not, however, represent a complete understanding of the strategic role played by nuclear weapons in ensuring the sovereignty of the United States or the specific contribution of each leg of the triad. Although each of the abolitionists' arguments deserves a detailed refutation, a focus on the relevance of the triad must suffice.

DEVELOPMENT OF THE TRIAD

In 1947, the year the United States Air Force became an independent service, the American military was attempting to develop sound tactical, operational, and strategic doctrine for the use of nuclear weapons. Just two years earlier, a new and devastating weapon had changed the face of warfare, but the full implications of the atom bomb were yet to be realized. In a flurry of activity, the academic, military, and policy communities undertook much writing and studying as the nation sought to understand nuclear weapons while also confronting the Soviet Union. As technology developed over the following decades, the nation moved from depending on a fleet of long-range bombers as the sole method of delivering nuclear weapons (1945–59) to a nuclear triad composed of bombers, intercontinental ballistic missiles (ICBM), and SLBMs.⁷

During the 1950s, Pres. Dwight Eisenhower believed that an American effort to maintain conventional parity with the Soviet Union would destroy the US economy and bankrupt the federal treasury.⁸ Thus, his administration

turned to the nuclear arsenal as a substitute for conventional parity. In the president's view, the United States could effectively deter Soviet aggression by placing greater emphasis on nuclear weapons in American national security policy. Commonly called the "New Look," the president's emphasis on the growth of advanced nuclear weapons and delivery platforms led to development of a large fleet of nuclear bombers and, by the end of the Eisenhower administration, the nuclear triad.⁹ Composed of three legs, the triad provides the United States with three distinct delivery platforms for nuclear weapons.

The first and oldest leg includes the nation's long-range bombers and their payload of gravity bombs and air launched cruise missiles. At its apex in the early to mid-1960s, Strategic Air Command included more than 1,300 nuclear-capable bombers, including 700 of the then-new B-52s.¹⁰ By 1990 the nation's long-range bomber fleet had declined to 347 total aircraft.¹¹ Today, nuclear-capable bombers account for about half of the Air Force's bomber fleet of 162 aircraft.¹²

A second leg became part of the nation's nuclear arsenal in 1959 with deployment of the first six Atlas D ICBMs. Just three years later, the first Minuteman I deployed. Not until 1970 did America's ICBM force reach its peak with a mix of 1,054 Titan II and Minuteman I, II, and III missiles—most of which carried three to 12 warheads. These numbers remained constant until 1982.¹³ Since then, the number of operationally deployed ICBMs has steadily declined to its current size of 450.¹⁴

The addition of the Polaris SLBM in 1960 completed the triad. Like the other two legs, SLBMs waxed at the height of the Cold War and waned as it ended. By 1967 the United States had deployed 656 SLBMs aboard 41 ballistic missile submarines (SSBN). When the Soviet Union collapsed in December 1991, the sea leg of the triad remained largely intact with 33 SSBNs carrying 608 SLBMs.¹⁵ Today, however, only 14 *Ohio*-class submarines remain, each carrying 24 Trident II nuclear missiles.

Throughout the Cold War, the United States maintained a substantial inferiority in conventional military forces but enjoyed the protection of a sizable nuclear umbrella. As the Cold War progressed and American thinking about nuclear conflict developed, "assured destruction" took precedence as the approach of choice. Developed by Thomas Schelling and others while he worked for the RAND Corporation in the 1960s, the concept of assured destruction purposefully left the United States vulnerable to a first strike, yet the nation maintained a credible second-strike capability.¹⁶ Although nuclear policy evolved throughout the Cold War, its essential nature remained much the same. Because of the exorbitant fiscal cost of

building a large underground industrial infrastructure, for example, the nation chose to accept the risk of an unprotected public—but only as long as it was defended by bombers standing at alert, ICBMs protected in their reinforced silos, and submarines quietly prowling the world's oceans. In the end, deterrence seems to have worked.

A second aspect of American nuclear policy—often overlooked in the current debate—dates back to the earliest days of the North Atlantic Treaty Organization (NATO) when the United States and its European allies made a conscious decision to forgo creation of a NATO military equal in strength to that of the Warsaw Pact. Instead, the European members of NATO chose to rely on America's strategic nuclear weapons—based in the United States and at sea—as well as tactical nuclear weapons, based in Europe, as a guarantor that Eastern Bloc troops would not roll through the Fulda Gap on their way to Paris.¹⁷ Extended deterrence, as it came to be known, enabled Western Europe to focus on economic development instead of heavy investment in national security. Although this type of deterrence often proved unpopular with European publics, governments throughout Western Europe depended upon the security provided by basing nuclear weapons throughout the West.

ENTERING THE POST-COLD WAR ERA

In the immediate aftermath of the Cold War, assured destruction and related nuclear strategies that had served the nation well for more than two generations were almost forgotten as the euphoria that engrossed America took hold.¹⁸ With it, the triad fell into decline. As the former Soviet Union sought to stabilize its deteriorating economy by lowering its military expenditures, the United States joined Russia in making dramatic reductions to the overall size of the nuclear arsenal. The "peace dividend" promised to the American people by presidents George H. W. Bush and Bill Clinton led to a refocusing of US foreign policy. With the Russian Bear focused on internal struggles, the United States was free to take on the role of global hegemon and concentrate its efforts on serving as the world's policeman. The 1990s saw the US military intervene in a number of failing or failed states such as Somalia, Haiti, Bosnia, and Serbia, while also emphasizing democratization of the former Soviet Union and globalization of the international economy.¹⁹

As Francis Fukuyama suggested in his article "The End of History?" "What we may be witnessing is not just the end of the Cold War, or the passing of a particular period of postwar history, but the end of history as such: that is, the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final

form of human government.”²⁰ Democracy had apparently won; socialism had apparently lost. Continuing to focus on the nuclear triad and nuclear conflict seemed passé.

Between 1991 and 2009, the nuclear arsenal shrank by more than 75 percent. Few members of Congress or the military objected since it appeared that the single greatest purpose for nuclear weapons was gone. Even in the wake of the terrorist attacks of 11 September 2001, Pres. George W. Bush signed the Strategic Offensive Reduction Treaty, which obligates the United States and Russia to reduce their operationally deployed strategic weapons to between 1,700–2,200 each by 2012. President Obama is promising to follow suit and continue reductions in the nuclear arsenal as the United States eventually moves to zero.²¹

Although President Obama’s speech of 5 April 2009 may give the impression that he has adopted the stance of nuclear abolitionists, one should not forget that Pres. Ronald Reagan once said that he “dream[ed]” of a “world free of nuclear weapons.”²² Just as Reagan shepherded the United States to victory in the Cold War, so, hopefully, will President Obama act responsibly and not put the national security of the United States at risk by reducing the nuclear arsenal to a point that nuclear deterrence loses the credibility that enables its success.

THE CURRENT DEBATE

In an era dominated by non-state actors (terrorists, international criminal gangs, and insurgents), rogue regimes, and rising powers, some members of the Air Force are asking whether the triad is still relevant or whether nuclear abolitionists are correct in suggesting that the United States adopt a monad as the nation moves toward zero. The answers to these questions deserve considerable attention. In short, however, the triad is as relevant today as it was at the height of the Cold War. Nevertheless, before offering a justification for maintaining the triad, one should explain the position of nuclear abolitionists.

The Abolitionists’ Position

According to the most recent reports and studies published by advocates of nuclear abolition, the United States should initiate complete disarmament by taking the following actions.²³ First, abolitionists desire to remove the 76 remaining B-52H and 19 B-2 bombers from nuclear-capable service.²⁴ By maintaining an arsenal of 500–1,000 warheads, as abolitionists suggest, the United States no longer needs the bomber leg of the triad. Additionally, the nation’s long-range bombers are slow to reach their targets, cannot penetrate advanced anti-air defenses (with the exception of the B-2), and are expensive to procure and maintain.

Second, abolitionists seek to dismantle the nation’s 450 ICBMs, which need expensive upgrades or replacement and present the nation’s adversaries a target on US soil.

Third, abolitionists are willing to accept, for the near term, a nuclear deterrence strategy that relies solely on a dozen Ohio-class SSBNs (after downsizing from the present 14), each armed with 24 Trident II SLBMs.²⁵ According to their strategy, the United States will maintain half of its SSBNs at sea at any given time while the other half is in port at one of two designated submarine bases.

Abolitionists are willing to accept a submarine-based monad because they consider submarines the most secure leg of the triad. These vessels also obviate the need for operationally deployed nuclear weapons on US soil. Supposedly, the absence of these weapons would reduce the likelihood of a counterforce strike against the homeland.

Because these arguments seem reasonable and each contains an element of truth, they have wide appeal. But if the United States were to adopt a monad, the nation’s ability to deter current and future adversaries would decline precipitously for four key reasons.

The Counterview

First, deterrence, the capstone of American foreign policy since the end of World War II, relies on effectively making an adversary believe that the risks involved in changing the status quo outweigh any potential rewards. To achieve effective deterrence, the United States must have the capability and, most importantly, credibility to create the desired psychological effect. Moving to a nuclear deterrence strategy that effectively depends on a half dozen deployed submarines undermines both capability and credibility. Contrary to the admonitions of abolitionists, adopting a monad sends a clear signal to America’s adversaries that the nation does not value nuclear weapons to the degree it once did and will be more reluctant to use a diminished arsenal in the future. This emboldens adversaries and decreases the confidence that US allies have in the nation’s extended deterrence.

Successful deterrence depends *completely* upon simply and effectively communicating desire and intent to allies and adversaries. Dramatically reducing the size of the arsenal and killing two legs of the triad, while claiming that the United States remains serious about nuclear deterrence, would send a mixed signal. The historical record does not offer analogous examples of arms reductions leading to the maintenance of credibility. On the contrary, the Washington Naval Treaty (1922), which limited the tonnage of major world navies, may have played a key role in leading the Japanese to attack Pearl Harbor.²⁶ Admittedly, such counterfactual claims are difficult to prove.

Second, since signaling intent is a vital aspect of successful deterrence, eliminating the bomber leg of the triad would be a mistake. Designed to remain hidden from the view of an adversary, ICBMs and SSBNs offer no effective way of conveying American resolve or an escalation/de-escalation in posture, should an adversary move toward conflict. The bomber fleet, however, effectively demonstrates resolve. For example, if an adversary were to openly challenge the status quo, the president could order the nation's B-52s and B-2s on alert, put them in the air, and/or deploy them to forward bases. All of these actions are visible signals of American intent, designed to lead to a de-escalation of tensions. Without question, bombers are the most effective tool for overtly demonstrating resolve.

A related point arises. Nuclear-capable bombers are one of the best tools for assuring allies that the United States remains committed to providing a credible extended deterrent. Neither ICBMs nor submarines can provide a visible show of resolve in the face of danger. Deploying nuclear bombers to an ally's air base not only assures America's friends but also deters the nation's foes.

Third, ICBMs offer two distinct benefits that a submarine force cannot replicate. On the one hand, they raise the cost of entry into the nuclear club as a peer of the United States. ICBMs require expensive and advanced missile technology, which may prove too costly for many potential proliferators. On the other hand, they increase risks for an adversary by driving him to a strategy (counterforce) requiring the elimination of American ICBMs in an effort to prevent a US counterstrike. Forcing an adversary to strike the United States in order to eliminate its nuclear arsenal serves as a strong deterrent when the enemy considers a nuclear attack. Moreover, these missiles are the only leg of the triad that can hit any spot on the earth within half an hour.

Fourth, should the United States adopt the plan advocated by abolitionists, the nation's adversaries would know full well that half the nuclear arsenal would be in port at any given time, vulnerable to destruction by a single nuclear missile targeting each of the two designated nuclear submarine bases. Contrary to what Americans are led to believe, Russia and China maintain advanced submarine-detection capabilities that may enable either nation to detect, track, and sink the half of the nuclear arsenal (six submarines) at sea.²⁷ Moving to a submarine-based monad will also encourage adversaries of the United States to focus technological development on advanced sonar and torpedo technology. Doing so will simplify the calculation for an adversary seeking to neutralize the American arsenal.

The United States may soon face a real scenario in which two nuclear missiles and a half dozen torpedoes can destroy

the entire operationally deployed strategic nuclear arsenal—something no American should desire. Redundancy, which the triad provides, offers a level of protection that a submarine-based nuclear arsenal would greatly diminish.

Increasing American vulnerability and decreasing American capability do not represent a strategy for successful deterrence. As history demonstrates, deterrence works when the United States effectively convinces its adversaries that an attack on America will fail to carry out the desired objectives and will invoke massive retaliation. Any other approach to deterrence is doomed to failure.

Relying on what abolitionists refer to as “minimum deterrence” is a recipe for placing the American people at greater risk, not less.²⁸ Even though the United States will likely suffer a terrorist attack, it is certainly not the most dangerous threat the nation faces. With the nuclear club expanding and likely to gain new members hostile to the United States, weakening the nuclear triad is unwise. Doing so not only will undermine American credibility but also will cause allies to doubt America's commitment to extended deterrence. This could lead allies to pursue their own nuclear arsenals as a hedge against American weakness and perceived threats yet to materialize.

Even though we Americans are generous, well-intentioned people, others do not necessarily wish us well. We would be wise to remember that fact. As the great Roman strategist Vegetius once wrote, “*Si vis pacem para bellum*” (If you desire peace, prepare for war).

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