

*The
Fairchild Papers*



Recapitalizing the Air Force Intellect

Essays on War, Airpower, and
Military Education

Dennis M. Drew
Colonel, USAF, Retired



**MUIR S. FAIRCHILD RESEARCH
INFORMATION CENTER**



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Fairchild Paper

Air University Press
Maxwell Air Force Base, Alabama 36112-5962

May 2008

Muir S. Fairchild Research Information Center Cataloging Data

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Dedicated To

*Muir S. Fairchild (1894 –1950), the first commander of
Air University and the university’s conceptual father.
General Fairchild was part visionary, part keen taskmaster,
and “Air Force to the core.” His legacy is one of confidence
about the future of the Air Force and the central
role of Air University in that future.*

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Foreword

This anthology provides a fitting capstone to the remarkable career of a most unusual Airman. Dennis Drew came to Air University as a student at the Air Command and Staff College (ACSC) in 1977. He was a veteran of the war in Vietnam, an experienced Cold Warrior from the missile silos of the Strategic Air Command, and already designated as an officer with bright, if conventional, career prospects. As it turned out, there was to be nothing conventional about his career or his enormous impact on Air University and the entire US Air Force.

After graduating from ACSC with honors, he remained on the faculty for five years teaching in the classroom and later developing curriculum. He garnered considerable attention by writing and publishing his first three articles in the *Air University Review*—one of which is included in this anthology. As a result, the Air University commander selected him to direct the newly formed Airpower Research Institute, where he remained for eight very productive years directing important research efforts and building his portfolio of published journal articles, research papers, and his first three books.

In 1991 yet another Air University commander selected him to become the dean of the newly formed School of Advanced Airpower Studies, now the School of Advanced Air and Space Studies (SAASS). Caught in the post-Cold War military downsizing, he retired from active duty in 1992 as a full colonel and was immediately hired back as the civilian associate dean of SAASS. During the following 16 years at SAASS, his writing and lecturing continued apace as the school grew, prospered, and established itself as an outstanding academic institution. His second retirement in 2008 was marked by this anthology containing some of his most memorable and influential articles and speeches from the previous three decades.

His career path has been unusual, but what sets him apart are his unique accomplishments over his 30 years at Air University. He authored, coauthored, and edited six books and several book chapters and monographs. Additionally, he authored numerous articles published in the leading professional journals both in the United States and abroad, many more newspaper articles, plus the usual book reviews expected from an academic.

FOREWORD

He is one of the most published and quoted faculty members in the history of Air University. He has also been a lecturer in great and consistent demand both at Air University and overseas. He has lectured to well over 100,000 students at Air University, a record that is likely never to be surpassed.

His academic accomplishments as well as his leadership did not go unrewarded. In 1989 he was promoted to the academic rank of full professor, an honor made even more remarkable by the fact that he did not have a PhD. Although no records on this statistic are kept, we believe he is the first person without the capstone degree to be so honored in the history of Air University. In 2003 Queen Beatrix of The Netherlands bestowed royal honors by making him a Knight in the Order Orange-Nassau for his work with the Royal Netherlands Air Force and its professional education program.

The essays and speeches in this volume are some of his best and most important. They reflect the struggle over the past 30 years to relate classical military theory to modern airpower, the difficulties of dealing with the new realities of the post-Cold War era, the struggle to understand the true nature of airpower and put it into perspective, and finally the importance of educating Airmen and raising their thinking above the tactical level.

This book has been 30 years in the making. My prediction is that it will be of significant value for more than 30 years into the future.



STEPHEN R. LORENZ
Lieutenant General, USAF
Commander, Air University
March 2008

Preface

Thirty-one years ago I had the great good fortune to be selected to attend ACSC at Air University. Many of my contemporaries who were also selected to attend the staff college believed that the real prize was being *selected* to attend and that actually attending was an unfortunate 10-month hiatus in their fast-moving careers. For those classmates (and there were many), the staff-college experience probably was little more than 10 months of marking time. Those same 10 months totally



Dennis M. Drew

changed the direction and focus of my Air Force career. For all of its faults (and there were many), I learned a great deal at the staff college, including how important professional education (vice training) *should* be to the Air Force. The challenge of improving the Air Force's professional military education and the prospect of helping to make Air University the intellectual centerpiece of the Air Force were intriguing. The ultimate goal would be to make the real prize actually attending Air University because of the quality of the professional education students would receive.

The new vector was set by volunteering to remain at the staff college as a member of the faculty. No one suspected that Air University's academic circle would be my professional home for the next 30 years, first completing a career in uniform and then staying on as a civilian scholar to retire yet again. Although teaching and lecturing at Air University and at similar institutions around the world was great fun and very rewarding, it was even more important that the years at Air University allowed me to think, write, and publish. This look back is meant to provide you, the reader, with the unusual genesis for this anthology of articles published and speeches delivered over the past 30 years.

The articles and speeches in this anthology were chosen because of their continuing relevance despite the passage of time and the changing of circumstances. In many ways it is discouraging that problems railed about in print nearly three decades ago remain relevant. Their continuing relevance points out the intrac-

PREFACE

table nature of some problems and the difficulty in nudging a very large and very bureaucratic organization onto a slightly altered flight path.

Much credit for all that appears in this volume—and for my other writings as well—must go to my mates on the faculty of ACSC in the early 1980s, the members of the Airpower Research Institute within the Center (now the College) for Aerospace Doctrine, Research and Education (CADRE) during the mid to late 1980s, and all my fellow faculty members at SAASS since the early 1990s. Without their advice, inspirational examples, and encouragement, none of what appears in this volume would have been possible.

My commanders over the past 30 years also deserve a special tribute. The subjects I wrote about and the stances I took on many difficult issues were often considered controversial in some parts of the Air Force. My commanders never caved in to pressure from above and consistently encouraged me in my efforts over the years. They are real heroes.

Much credit for this book and other books I have published through Air University Press must go to the outstanding editors and illustrators who often made silk purses out of sow's ears. Their hard work is often unappreciated by readers, but never unappreciated by authors.

Finally, Sue, my wife of 45 years (so far), deserves the greatest tribute for putting up with me, for encouraging me, for always believing in me, and for bringing great joy to every day of my life. Few men have ever been so fortunate.

My hope is that this collection will inspire some young Airmen to follow my rather odd but productive career path and convince some senior leaders to let them do so. If nothing else, this collection should provide historical context for future Airmen who will deal with problems similar to those which inspired each page in this volume.

A handwritten signature in black ink, appearing to read 'D. M. Drew', with a long horizontal flourish extending to the right.

DENNIS M. DREW
Colonel, USAF, Retired
Montgomery, Alabama
February 2008

Introduction

Some readers may wonder at the title of this volume. It was inspired, in a somewhat roundabout way, by Air Force chief of staff T. Michael Moseley, who struggled mightily during his tenure to, in his words, “recapitalize the fleet” of aging USAF aircraft during a period of significant budget constraints. Recapitalization of the intellect describes what Air University attempts to do every day and why the articles in this volume were first written and published and have now been selected for republication. In a world of rapid change and confounding problems that threaten all of mankind, intellectual recapitalization of the Air Force has become critical to survival and success and is at least equal in importance to the recapitalization of the aircraft fleet. Thus did the title of this volume evolve.

Many of the articles in this collection have been edited slightly to help the contemporary reader. One article, “The Essence of Aerospace Power: A New Perspective from a Century of Experience,” had been heavily edited to meet the space limitations of the journal in which it was published. The “full up” version is published here. The three speeches have been edited to delete the obligatory introductory material required in a speech, and thus they now take the reader quickly to the heart of the message.

The essays and speeches are grouped into four broad subject areas, within which they are arranged chronologically. Part 1, *Considering the Past—Contemplating the Future*, examines some classical military themes and their relationship to modern military problems and the use of modern airpower. Airpower is a child of technological development, and Airmen are in love with their high-tech gadgetry. Technological fascination is not limited to Airmen, of course, but Airmen have raised that fascination to the status of a fetish, often to the exclusion of fundamental military thinking that could profitably inform them about the employment of airpower above the tactical level. The essays in part 1 address these issues. All were written and published during the 1980s.

Part 2, *The End of the Cold War*, looks at problems that were a consequence of this historical development. Although cause for much joy and relief, the fall of the Berlin Wall, the self-liberation of the former Soviet empire, and the dissolution of the Soviet Union

also caused great angst in the US military. It was almost immediately clear to those with any insight that as the new millennium (in one sense of that word) was about to begin, the old millennium (in another sense of that word) had not yet departed. Local and regional politico-military struggles long suppressed by the Cold War superpowers raised their ugly heads as the stability of the Cold War gave way to the near chaos of the post Cold War. Faced with an enormous amount of uncertainty, the US military had to re-evaluate its size, composition, and essential missions, all of which fostered spirited debate within and among the services. The essays and speeches in part 2 illustrate these concerns from an Airman's point of view and are representative of the kinds of jockeying for position (and funding) that went on between the services. These essays and speeches were all written between 1990 and 1993.

The demise of our arch adversary, the upheaval of the Cold War regime, and the uncertainty that ensued prompted fierce competition for what all assumed would be drastically reduced military budgets. To make the case for maintaining a strong air arm in the post-Cold War era, it was prudent to begin thinking about the fundamentals of airpower, its impact during the twentieth century, and its potential to make important contributions during the post-Cold War era. Thus the essays in part 3, *The Nature and Impact of Airpower*, reexamine these issues and attempt to identify what airpower is really all about and what makes it so fundamentally different from land and sea power. These essays, written between 1988 and 2002, examine the impact of airpower and how it influenced national and military strategy since it came of age in the middle of the twentieth century.

Finally, the essays and speech selected for part 4, *Educating Airmen*, reflect the primary focus of my career for 30 years and the fundamental reason for writing every essay in this volume as well as every other essay, monograph, and book I have written. Although we are much better at educating Airmen today than ever before, the Air Force as an institution pays much more attention to training than to education, and senior leaders within the Air Force often fail to appreciate the crucial differences between the two.

Part 1

***Considering the Past—
Contemplating the Future***

Overview

Land and naval forces proudly trace their lineages to antiquity, and their ideas and concepts about warfare are born of their long and often glorious histories. Air forces, on the other hand, may often have glorious histories, but they are certainly not long ones. Because of their vastly greater experience, soldiers and sailors not surprisingly (1) often have a far more realistic and nuanced view of war and its intimacy with politics, (2) are more schooled in and appreciative of the theories and principles of war, and (3) realize that although superior technology may be crucially important, it neither dictates victory on the battlefield nor ensures achievement of political goals.

Airmen also suffer from some self-inflicted wounds. Far too many of them are overly infatuated with their “toys” and have almost reverential regard for superior technology, not unreasonable since it is a technological gadget that gets Airmen into the air in the first place. Further, at least at the tactical level of war, superior technology in the air has often provided the narrow margin of difference between victory and defeat and between life and death. Many Airmen, including many very senior Airmen, are poorly schooled in the history of warfare and, more specifically, the history of airpower in war, a deficit which produces their assumption that their tactical skills plus the latest and greatest technology will win both the battles and the war.

The essays in part 1, written between 1982 and 1987, illuminate these issues and their importance. Unfortunately, as of this writing, these issues still bedevil Airmen even at the most senior levels. As an illustration of the problem, shortly after the turn of the twenty-first century, a *very* senior Air Force general officer (now long retired) who was visiting Air University from the nation’s capital declared, in effect, that studying any military history prior to 1990 is a waste of time. Such attitudes are the result of viewing airpower only through a technological lens. Such myopic views of warfare and airpower must change, and hopefully the essays in part 1 can contribute to that change.

War, Politics, and Hostile Will

Thoughtful American military professionals look on the Air Corps Tactical School (ACTS) of the 1930s with justifiable awe. It was there that a group of relatively junior officers, battling an entrenched military bureaucracy, logically constructed the justification and doctrine for the aerial warfare that would play such a decisive role in subsequent conflicts. Of particular importance was their justification for strategic bombing, a mission independent of other military operations and the cornerstone of a separate and independent Air Force.

Lost in the admiration for the faculty's accomplishments is an appreciation of their basic assumptions about the purposes of war itself, assumptions that continue unchallenged to the present time and provide the philosophical foundation for the way we think about war. The advent of nuclear weapons and the reappearance of limited war give us cause to consider whether those unchallenged basic assumptions remain valid. In the aftermath of Vietnam and in the face of a future beset by dangers from every quarter, it is particularly appropriate to challenge our assumptions about the object of war and the role of the military.

The assumptions of the ACTS were essentially Clausewitzian. Like the Prussian master, the pioneer airpower theorists considered war a political act of violence undertaken to achieve policy objectives. They considered war to be the ultimate sanction, engaged in only after all normal means had failed to achieve the objectives of policy. Thus the object of war was to overcome an enemy's hostile will toward our policies. Of course, the Tactical School faculty also noted that airpower provided a new and better way to wage war. Airpower could overcome the enemy's hostile will directly by striking at the heart of the enemy nation. As a result, the enemy's deployed armies and navies—the vestiges of hostile will—could be bypassed.¹

The question of airpower's superiority relative to other military means is not at issue here but does offer a perspective that will be important later in this article. Several things, however,

Originally published in a slightly different form in *Air University Review* 33, no. 3 (March–April 1982): 33–39.

are at issue. The first is an unspoken assumption about the objective of war. The second is a definitional problem concerning hostile will. Finally, the last and most important issue centers on the obvious assumption that hostile will can be overcome by military means.

The Unspoken Assumption

If war is undertaken as a last resort to achieve policy objectives, then the unspoken assumption is that a successful war will result in a better state of peace. It is difficult to deny that this unspoken assumption exists. Logic dictates that fruition of our policies will result in a more favorable situation, from our point of view, or we would pursue different policies. Logic also dictates that we favor peace over war, for if we did not, war would not be a last resort. Thus the ultimate purpose of war is to achieve a more favorable situation in the peace that follows.

One might argue that if we are the victim of aggression, our ultimate purpose could be to end the war and return the situation to status quo ante. However, this argument flies in the face of logic. A return to status quo ante means a return to the situation that precipitated the aggression. Surely if we prefer peace to war, we would not seek a situation that threatens us with aggression. Although discussion of the unspoken assumption may appear trivial at this point, the concept of a better state of peace will assume more importance in relation to the second issue, hostile will.

Hostile Will

The most common definition of *will* refers to a desire or inclination to do something. In the context of war and its purposes, that hostile *something* is the enemy's inclination or desire to resist our policies. It is important to note that defining the enemy's hostile will as the inclination to resist our policies does not indicate the form of resistance. The events of recent decades have repeatedly demonstrated the effectiveness of many different forms of resistance. It is also important to note that the inclination to resist contrasts sharply with the ability to resist in any specific manner. The enemy can manifest hostile

will in a form commensurate with his capabilities, whatever they may be.

Knowing what hostile will is solves only part of the problem. To complete the picture, we must know where that hostile will is harbored. Referring to the enemy's hostile will treats the enemy state as if it were a single organism rather than a societal organization. To the contrary, it would seem we face at least two types of hostile will. First, there are a vast number of individual hostile wills among the enemy population. Second, there is the hostile will harbored by the enemy's leadership elite. Both centers of hostility would seem to be interrelated to some degree.

The formation of hostile will and the relationships among the various centers of hostile will are subjects far beyond the scope of this discussion. Despite this limitation, it is appropriate to express the notion that a better state of peace requires that both types of hostile will be overcome. Eliminating the hostile will of the leadership elite may have the immediate impact of temporarily ending organized resistance to our policies. Over the long term, however, continuing hostile will among the enemy's general population may give rise to new leaders and resumption of organized resistance.

The Military Role

Can military means be used to attack an enemy's hostile will effectively? The ACTS faculty thought so. They viewed overcoming hostile will in terms of compelling the enemy to do our bidding. But does compelling policy compliance necessarily produce a better state of peace in the long term? The evidence of relatively recent history indicates that military actions which compel policy compliance cannot by themselves effectively attack an enemy's hostile will. Such a contrary statement requires substantiating evidence.

First, in the American Civil War, the Confederacy surrendered at Appomattox after four years of gallant, sometimes brilliant resistance against overwhelming odds. The South had been starved, burned out, and pillaged. Her once-powerful armies had finally crumbled under ceaseless Union blows, and the South lay militarily and economically prostrate. Yet the hostile will—resistance to Union policies—remained for many

years. Some would even contend that vestiges of this resistance remained until very recent times. Consider, for instance, the revolt of the Dixiecrats in the 1948 presidential election or the governor of Alabama standing in the schoolhouse door in defiance of federal court orders. The hostile will of the Confederacy was not overcome by crushing military defeat. Only time and changing circumstances could heal the wounds.

Also consider Germany at the conclusion of World War I. Here was another nation starved with its field armies in full retreat, facing total disaster if the war continued. Hostile will, however, remained. One sees the turn to passive resistance, as demonstrated by the Germans in opposing French occupation of the Ruhr. Economic resistance, the willful inflation of German currency, was also used to resist the French. One must remember that despite the horrors of World War I, all that was required to set the stage for the second great war was residual hostile will, a scapegoat, economic problems, and a skillful demagogue willing to exploit the situation.

Finally, recall the French experience during the Second World War, when the French Army suffered a stunning total defeat and major portions of the country were occupied by the Nazi conquerors. Yet French hostile will remained, best exemplified by expatriate forces and the internal resistance movement. The Nazi war machine had crushed the French military but had not overcome French hostile will.

The parallels in these three examples are obvious. Yet there is one parallel that may be less than obvious: the harsh extramilitary policies of the victors toward the vanquished. After the Civil War, the difficult Reconstruction period with its carpetbaggers and scalawags was long and remembered bitterly by Southerners. After World War I, the peace settlements imposing not only guilt but also severe economic penalties did little to win the hearts and minds of the German people. Finally, the outrages of Nazi occupation in France are still too fresh a memory.

Evidence also exists that military means can, in certain circumstances, be counterproductive in terms of overcoming hostile will. The classic example is the Japanese attack on Pearl Harbor. Although a military stroke of tactical genius, it was an act of incredible strategic stupidity. Previously ambivalent American attitudes toward Japanese expansion in Asia and the

Western Pacific were solidified into vigorous opposition by perceived Japanese perfidy and deceit. The attack on Pearl Harbor virtually guaranteed that the United States would not be satisfied until the Japanese had been totally defeated.

We can find in recent history, however, examples of total military defeat accompanied by the collapse of enemy hostile will. At the conclusion of World War II, both the German and Japanese military forces had been badly beaten, while their civilian populations had been bombed, burned, starved, and, in two instances, vaporized in atomic blasts. Yet both the Germans and Japanese quickly became important American allies. Disregarding minor quarrels among friends, these supportive relationships have lasted for three and one-half decades. Clearly, German and Japanese hostile will was overcome. How does one account for this development, which is so startling when compared with previous examples?

There were many differences, of course, between the aftermath of World War II and the circumstances of Reconstruction, the post-World War I peace settlements, and the Nazi occupation of France. However, it would seem that the most significant and pervading differences were in the character of the policies of the Western victors toward the vanquished Axis powers. After World War II, immediate humanitarian efforts to relieve suffering were quickly evident. Punishment was carefully reserved for war leaders rather than for entire populations. Perhaps most important, economic policies were obviously aimed at restoring the self-sufficiency of the German and Japanese economies rather than extracting plunder. Such enlightened policies can be contrasted sharply with those of the Soviets in their area of European occupation. Harsh Soviet actions led many Germans to resist with their feet by fleeing to the West. The East Berlin riots of 17 June 1953 and the need to build an escape-resistant wall are further evidence of the continuing German will to resist Soviet policies.

One may argue that the presence of a supernumerary Soviet threat played a decisive role in the attitudes of the vanquished Axis powers after World War II. The existence of such a threat on their eastern border may help explain the attitude of the West Germans, but it does not adequately explain the postwar Japanese experience.

What useful conclusions can be drawn from this discussion? If experience gives any indication—and it is the only indicator available—one can reasonably conclude that military action, by itself, does not overcome hostile will and thus lead to a better state of peace. Military action can destroy the capability of an enemy to offer some forms of resistance, or it can suppress some forms of resistance and thus compel policy compliance, but these are interim measures. A better state of peace requires policy acceptance, unless we are willing to follow the example of Scipio the Younger at Carthage and literally destroy the enemy, or unless we are willing to pay the price of continuous compulsion.

Framed in such a manner, we can begin to appreciate the true significance of overcoming hostile will. The task is to change an enemy's attitude or mind-set so that our policies are accepted. If we take experience as a guide, the key to this task appears to be the character of the policies used in conjunction with military actions. Although the object of war is to overcome hostile will, the practical military objective in war is limited to the elimination of the enemy's ability to resist militarily. Based on the experience of Pearl Harbor, we may also conclude that the form of military action can at times be as important as its substance in terms of hostile will.

Recognition that military action by itself cannot overcome hostile will in no way denigrates the importance of successful military operations in war. If war is a last resort, what reason is there for the enemy nation (either the power elite or the citizenry as a whole) to even consider accepting our policies without successful military actions on our part? In war, military success often sets the preconditions required for policy acceptance. For example, in a struggle with a totalitarian state, military removal of the power elite and its controlling infrastructure may be required if the enemy's general population is to accept our policies. Although military actions are only part of war, they are the dominant part that differentiates war from any other political activity.

Before leaving this point, one caveat is in order concerning military success. Military success does not always mean traditional military victory. Fabius illustrated this point as he led Hannibal on a frustrating chase through Italy. In our own time,

military success for the North Vietnamese fighting Americans meant merely inflicting casualties and avoiding total defeat. Our frustrations and casualty roles combined with skillful North Vietnamese propaganda slowly eroded our national will. Thus military success takes many forms.

If these are the conclusions, what significance do they hold? Clearly, the conclusions demonstrate the unitary nature of war and politics. War is a continuation of political activity with the addition of military combat operations. This concept is significant because it is the antithesis of traditional American attitudes concerning war and normal political activity. Perhaps in rebellion against the dynastic wars of their European forefathers, Americans have, for the most part, regarded the military as a necessary evil.² Americans have considered war an aberration not to be confused with normal political activity. Military action has been reserved for occasional crusades against some clearly defined malevolence. With such a stark view of the enemy and a crusader's disposition, the traditional American objective in war became the total overthrow of the enemy, a strategy of annihilation.³ Americans seemed to assume that the total overthrow of the enemy would automatically result in a better state of peace. Thus separated from normal political activity, the object of war became, in a sense, the war itself rather than the peace that followed.

But as the examples indicate, the total overthrow of the enemy does not necessarily overcome hostile will and result in a better state of peace. The American tendency to separate war from politics and treat war as a purely military crusade can be counterproductive in terms of both military operations and war's aftermath. The demand for unconditional surrender of the Axis powers in World War II is a case in point. As General Eisenhower said, "If you are given two choices—one to mount the scaffold and the other to charge twenty bayonets, you might as well charge twenty bayonets."⁴ More reasonable terms, from the German viewpoint, might still have resulted in the Nazi downfall but at a much earlier date with far fewer casualties. Equally important, an earlier end to the war would have meant less time for the Nazi death camps to pursue their grisly work. Finally, an early negotiated settlement might have prevented an ideologically hostile Soviet Union from standing astride Eastern Europe at the war's end.

The notions that war and politics are one and the same and that military power is a political instrument used for political purposes are particularly important in an era of limited wars for limited objectives. By definition, annihilation cannot be the objective in these situations. Military actions must be coupled with enlightened nonmilitary policies if we are to achieve satisfactory and lasting settlements of the issues in dispute.

Meaning to the Military

Our final concern must be the meaning of the foregoing to the military professional. Much of the material in the preceding paragraphs is foreign to the American military, cutting across the grain of the American military tradition that there is no substitute for victory. Although there is no substitute, I have attempted to point out that military victory is not enough. Certainly the nearly unbroken series of military victories in Vietnam followed by an ignominious conclusion to our efforts there illustrates the point vividly.

The unity of war and politics holds great significance for the military professional. If the military is only one instrument of power used in war, then the various instruments of power must be made to work in concert. If military victory does not necessarily overcome hostile will, then the military can no longer pay only lip service to the "other war," that is, the battle for people's minds. If the instruments of power are to work in concert, they must have a common objective. This brings us back to the absolute and unparalleled importance of the objective ends desired. As we have seen, however, Americans have often confused means with ends in war.

Description is always easier than prescription. If one is to offer prescriptive advice to the military, it would seem the place to begin is with the objective. Thus any military leader should ask, What is the objective? It does not seem flippant to add that, having received an answer, the second question should be, What is really the objective? It is difficult to overstress the importance of a clear understanding of the objective. If we are to be successful in war, everything should flow from the objective.

One can also offer prescriptive advice concerning professional horizons. If we are to meld military expediency with post-

war objectives, the professional horizons of the military must not be limited to the narrow confines of the battlefield. Only by expanding our horizons can the military fully appreciate how non-military instruments of power can contribute to winning both the war and the peace. Perhaps equally important, expanded horizons can aid us in recognizing how the different instruments of power can work at cross-purposes and thwart our pursuit of the objective. In sum, the military must broaden its professional horizons if it is to understand that winning the war is far different from winning the peace that follows.

Broader professional horizons saddle the professional military with a special burden in both an individual and institutional sense. From the individual's viewpoint, the military leader's capabilities and expertise are already heavily taxed by the scale, speed, destructiveness, and complexity of modern warfare. Broadening professional horizons to include political, economic, and technological considerations (among others) imposes an even heavier burden, requiring serious study and deep reflection. Institutionally, the need for broad horizons and complex traditional skills places a heavy burden on the military education and training system. The curricula offered by these institutions must, on one hand, provide a broad-based but integrated education concerning war and its many ramifications and, on the other, provide training for the peculiar technical skills required to prosecute combat operations. These are difficult tasks to which the military must devote considerable resources.

Finally, returning to the challenge of the ACTS assumptions at the beginning of this article, did the school faculty accurately define the purposes of war? The answer is affirmative but with qualifications. If the ultimate purpose of war is to achieve a better state of peace, then these pioneer airpower theorists were correct when they proclaimed that the objective of war is to overcome the enemy's hostile will. The faculty's error was in equating compulsion with overcoming hostile will; they followed the American tradition of assuming that winning the war equated to winning the peace. To them, the fundamental issue concerned the relative abilities of land power, sea power, and airpower to win the war. Not even this brilliant group fully understood that the fundamental issue concerned the use of all

political power instruments, military and nonmilitary alike, to truly overcome hostile will and win a better state of peace.

For many of the professional military, this most fundamental issue is not yet clear. If we do not, at long last, gain an understanding of the relationship among war, politics, and hostile will, we will condemn American fighting men and women to die in vain as we win each war while losing the peace that follows.

Notes

1. Perhaps the best firsthand account of the ACTS philosophy is found in Maj Gen Haywood S. Hansell, Jr., *The Air Plan that Defeated Hitler* (Maxwell AFB, AL: Air University, 1973). See in particular Hansell's quotation from a lecture by Lt Col (later Lt Gen) Harold L. George, 32–34.

2. There are many sources for this conclusion. For a discussion related specifically to US foreign policy, see John W. Spanier, *American Foreign Policy since World War II* (New York: Praeger, 1971), 3–20.

3. This was Russell F. Weigley's main theme in *The American Way of War* (New York: Macmillan, 1973).

4. Quoted in R. E. Dupuy, *Men of West Point: The First 150 Years of the United States Military Academy* (New York: Sloane, 1951), 324.

Military Art and the American Tradition

The Vietnam Paradox Revisited

How can a nation win every battle and yet lose the war? This question expresses the paradox of the American experience in Vietnam, a paradox that still baffles the American military establishment. To be sure, many critics have offered explanations. Some blame the generals and their strategies; many others blame the politicians and their meddling, while still others point to a collapse of public will and hint at basic flaws in the character of American society. Each of these explanations contains a grain of truth, but none of them offers a totally satisfactory explanation. The paradox remains.

The American effort in Vietnam was the best that modern military science could offer. The array of sophisticated weapons used against the enemy boggles the mind. Combat units applied massive firepower using the most advanced scientific methods. Military and civilian managers employed the most advanced techniques of management science to support combat units in the field. The result was an almost unbroken series of American victories that somehow became irrelevant to the war. In the end, the best that military science could offer was not good enough—thus the paradox.

The ultimate clue to unraveling the Vietnam paradox may lie in the term *military science*. No knowledgeable observer in this age can doubt the importance of military science to the success of military operations. The firepower provided by sophisticated weapon systems dominates the modern battlefield. The procurement, management, support, and application of these weapons have become complex sciences in themselves. However, successful military operations generally are the product of military art as well as military science.

What is the difference between military art and military science? It is difficult to define either term precisely because both

Originally published in a slightly different form in *Air University Review* 34, no. 2 (January–February 1983): 31–34.

are very broad at the conceptual level and tend to overlap somewhat at the application level. However, they are different. Military science, as the term implies, is a systematic and exact body of knowledge about the conduct of military affairs. The realm of military science includes those subjects, issues, or functions that can be quantified with a considerable degree of precision. For example, military science deals with such areas as munitions consumption rates, weapon system design and procurement, ballistic trajectories, weapon accuracy, probability determination, and ubiquitous cost-effectiveness calculations. In general, military science deals with the question of what one can or cannot do in terms of military operations—the technical and managerial aspects of developing, deploying, and employing military forces.

While military science is reasonably exact, military art is relatively inexact and often abstract. Military art is the studied and creative planning and conduct of military affairs. It deals with those functions and issues that generally cannot be quantified and thus requires creative thought and the ability to deal with abstractions rather than the technical skills and hard data points required by military science. For example, military art is deeply involved in strategy (including tactics), political-military affairs, leadership, morale, and other such inexact subject areas. In general, military art concerns what military forces should or should not do and why.

A Proper Balance

Successful military campaigns result from some sort of balance between art and science. The balance required may well depend on the status of the contending forces. If a reasonable parity exists between opposing forces, military art—the creative aspect of military operations—may make the difference between success and failure. For example, it was Napoleon's genius, not his knowledge of military science, that made him master of the European continent. Napoleon's ability to marshal the forces of an entire nation, his creativity in combining old tactics into new combinations, and his sense of timing were crucial to his success.

The German invasion of France in 1940 provides another clear example. Forces were relatively well matched, but German military art proved superior. The Germans knew how to integrate land and air forces, how to use tanks more effectively, and where to strike the decisive blow. The victor in the Battle of France was determined by superior military art, not by superior military science.

Reasonable parity, of course, may not exist between opposing forces. Clearly, the inferior side must rely on superior military art to achieve victory. Military history is replete with examples of military art overcoming superior resources. Stonewall Jackson's Shenandoah Valley campaign in the American Civil War is a classic example. Faced with an enemy vastly superior in both numbers and firepower, Jackson's foot cavalry quickly marched and countermarched to isolate and defeat individual Union formations and their befuddled commanders.

In the modern era, the North Vietnamese and Vietcong had no choice but to rely on superior military art. In the face of an American enemy with far greater resources and vastly superior technology, the Vietnamese Communists avoided catastrophic defeat, mobilized the peasantry (or at least enforced their neutrality), and attacked American morale. In short, the Communists confronted their American foes with a baffling package of political, psychological, economic, and military warfare. The results bear witness to the triumph of military art over military science.

Finally, the superior side in an unequal military confrontation may naturally be prone to rely on military science. With superior forces, one might easily assume that victory requires only the efficient application of superior firepower. As pointed out, however, if the inferior opponent applies superior military art, the efficient application of firepower may not be possible or may be totally irrelevant.

In regard to the Vietnam paradox, it is reasonably clear that the American effort applied a great deal of the most sophisticated military science but very little successful military art. American forces used superior weapons and employed devastating firepower delivered with great precision. The general logistical effort was incredibly well done in spite of enormous difficulties. However, American political objectives were con-

fused and poorly understood, a circumstance which led naturally to confusion concerning military objectives. The military strategy and tactics used were designed for a far different kind of war, and political-military relations were strained at best. Finally, as casualty lists grew with no end in sight, morale in the field declined, and, more important, support for the war effort evaporated on the home front.

The American Tradition

Although the outcome was unexpected, the American effort in Vietnam fit well with the American military tradition. Since the Civil War, the US military has concentrated on the sciences of developing, deploying, and employing America's overwhelming resources. As a result, the US military has not had to be exceptionally clever in terms of military art because it could drown its opponents in a sea of personnel, weapons, firepower, and logistics. This is the tradition inherited from Ulysses S. Grant, who hammered away at Robert E. Lee in northern Virginia and overwhelmed the Confederate forces with the vastly superior physical resources of the Union Army.

The American military's traditional reliance on military science rather than military art continues today, which is not at all surprising. American military academies are primarily engineering schools. Other commissioning programs place major emphasis on recruiting potential officers with educational backgrounds in science and engineering. With an officer corps educated in such a manner, no one should be surprised that Americans always seem to frame solutions to military problems in terms of new technology or revised organizational structure rather than clever strategy.

Why is all of this a matter of concern? The problem is that the American tradition no longer fits reality. No longer can the United States rely on overwhelming its opponents. At the highest level of the conflict spectrum, the military objective has changed to deterrence rather than traditional victory in combat. At the conventional war level, it is very doubtful that the United States can overwhelm its principal opponent. Even lesser opponents have an advantage because worldwide commitments place considerable strain on finite American forces

and resources. At the lowest level of the conflict spectrum, protracted guerrilla-style war poses a problem the US military has been unable or unwilling to solve. Protracted warfare assumes weakness on the part of the guerrilla forces and seems almost invulnerable to firepower. The guerrilla objective is to achieve victory simply by avoiding overwhelming defeat. Protracted-war strategy is a masterpiece of military art.

If the American military tradition is no longer effective, then the American military establishment must place more emphasis on the creative abilities typical of military art if it is to deal successfully with the world model. The American military must master the “should,” “should not,” and “why” in addition to the technicalities of “can” and “cannot.” The question is, of course, how does one master military art?

Mastering Military Art

Military art—the art of warfare—is discovered through the study of military history. The great creative military minds of the modern era were, almost without exception, first-rate interpreters of military history. Clausewitz, Mahan, J. F. C. Fuller, Liddell Hart, and Brodie all fit this mold. Field commanders such as Patton and Montgomery also had a deep and abiding interest in military history. Although the list goes on, the argument for the study of military history as a basis for military art relies on more than just testimonial examples.

Military history is not merely the study of obscure facts and footnotes. The intelligent study of military history provides insight into the evolution of strategic thought, the political and military objectives of warfare, the influence of technology on operational concepts, and the capabilities and limitations of military forces. History provides examples of success and failure in military operations and clues relating to the reasons for the success or failure. History provides the foundation for military doctrinal beliefs. It also provides illustrated examples of leadership—both good and bad—in very different situations. Thus the intelligent study of military history can provide a fundamental understanding of strategy, tactics, doctrine, political-military relations, and leadership. Such are the elements of military art.

But of what benefit is a foundation in military art? First, a thorough understanding of the purposes, capabilities, and limitations of military power forms the foundation required to provide political leaders with sound and believable military advice. The American military must be able to do more than say “can do” or, on rare occasions, “cannot do.” The military must also be able to say “should do” and “should not do” as the situation warrants. Only if well founded in the “why” of warfare can the military offer this sort of professional advice and have it accepted.

Second, but perhaps most important, a sound knowledge of the art of war provides a conceptual framework for analyzing strategic and tactical problems, technological developments, and the impact of related issues on military operations. Perhaps with a better grounding in military art, the United States could have avoided the debacle in Vietnam. Perhaps American military and political leaders could have learned something from the French experience in the “first” Vietnam War, or from the British experience in Malaya, or from Mao’s experiences in China. Perhaps American leaders might also have learned something from the experience of fighting the British in the American Revolution. After all, revolutionary heroes such as Nathanael Greene and Francis Marion were early masters of protracted guerrilla warfare.

The future success of the American military lies in the mastery of military art and its application in concert with military science. The key to the mastery of military art is the intelligent and diligent study of military history. Thus the key to the future is found in the past. If Americans learn the lessons of the past, they may again learn how to win both the battles and the war.

A Matter of Principles

Expanding Horizons Beyond the Battlefield

War is more than battle. War is more than the panoply of military and industrial actions that prepare and bring armed forces to battle. Rather, war is an all-encompassing struggle between societies, and battle is only its most obvious and deadly manifestation. America's experience in the Vietnam War illustrated that the impact of war on the fabric of society rivals the importance of events on the battlefield. In this sense, the Vietnam experience confirmed Clausewitz's most famous dictum that war is a continuation of political activity with the addition of other means.

Traditionally, Americans have had considerable difficulty in accepting that war is anything more than battle writ large. The American principles of war reflect this attitude. In theory, these principles are axiomatic doctrinal beliefs that offer fundamental guidance for the conduct of America's military crusades. In reality, they are principles of battle that present basic factors military commanders should consider before sending or leading their forces into combat. Principles such as mass, maneuver, and surprise apply directly to battlefield situations but have only a tenuous relationship to the broader concept of a nation at war.

The American experience in Vietnam demonstrated that victory in battle does not necessarily lead to victory in war. Time and again, American forces defeated the enemy in battle. At the high point of our involvement, we could transport our troops anywhere in South Vietnam, engage any enemy force, and be confident of victory. We controlled the seas around Vietnam and the skies above. Nevertheless, we were unable to translate tactical victory into strategic victory. We were unable to win the war even though we won the battles. Thus one wonders if the Vietnam experience might indicate some higher order of principles—more than simply forces on the battlefield—that governs a nation at war and shapes the war's outcome. This essay explores that possibility and focuses on four higher-order principles of war that are specifically

Originally published in a slightly different form in *Air University Review* 36, no. 2 (January–February 1985): 24–29.

related to the Vietnam experience. Other analysts may not agree with the formulation of these four principles. The important point, however, is that each of these principles offers evidence that factors far beyond the confines of battlefields affect the outcomes of wars. Taken as a group, these principles suggest that the American military establishment must expand its horizons beyond the blood and smoke of combat.

Expositions of the traditional principles of war make the point that the *objective* is the master principle. Folk wisdom about the Vietnam conflict holds that American objectives were ill defined and thus formed the root cause of our problems. This assertion is debatable. Careful examination of the record indicates that broad American political objectives were clearly and consistently articulated from the late 1940s through the fall of Saigon in 1975. It is more accurate to state that the American military found it difficult to translate those political objectives into military objectives in the peculiar circumstances of the war. Worse, the American people found the political objectives unworthy of support in the face of the heavy costs of the war. This analysis indicates that just as the objective is the master principle of battle, the political objective is the master principle of war.

The political objective is of paramount importance for at least three reasons. First, political objectives and enemy resistance to those objectives form the reasons for resorting to war. Political objectives define the goals of war and thus imply and circumscribe, but do not necessarily define, the objectives of military operations. In effect, political objectives assign broad roles and missions to the armed forces during hostilities. In the Vietnam conflict, political objectives controlled both the basic conduct of the war (e.g., North Vietnam would not be invaded) and many of the operational details of military operations (e.g., restrictions on the bombing of North Vietnam). Although many Americans prefer to believe that the restrictions imposed on the military in Vietnam by political objectives were unique to that war, the fact is that political objectives and politicians have had considerable control over military operations in virtually every American war.

One need only look to the Mexican War to find a president dictating strategy from the White House. In the Civil War, the political desire for quick victory played a part in the early Union

disasters in northern Virginia. Lincoln personally hired and fired his generals as he sought decisive action on the battlefield. In 1898 Pres. William McKinley went so far as to establish a war room in the White House from which he directed military preparations with messages sent out via 25 telegraph lines installed specifically for that purpose. In World War II, the shape of the Allied effort (e.g., “Europe first” and the invasion of North Africa) was dictated as much by political considerations as by military exigencies. Finally, the political restrictions placed on military efforts in the Korean War offered an immediate foretaste of what would follow in Southeast Asia.

The second reason for the importance of political objectives is that they affect the relationship among the various instruments of power and determine whether or not military actions are appropriate. In some cases, political objectives either cannot or should not be pursued by military means. In crisis situations, the national leadership must determine not only whether successful military action will achieve the desired objective but also what nonmilitary actions are appropriate and how those actions can work in concert with military power. In the Vietnam conflict, it was clear that much more than military success was required if South Vietnam was to remain an independent state. A strong and independent South Vietnam required governmental reform, economic reform, military reform, and political stability, along with military success.

The third reason for the importance of political objectives has to do with motivation and morale. War is not to be undertaken lightly, for its consequences include the expenditure of human life and the destruction of things that mankind values. If the American people are to support such a costly undertaking, they must be presented with political objectives that they can support with both their blood and their treasure. To ensure this support, political objectives should meet three standards. First, they should be simple and straightforward. In the ideal case, they should be reducible to a short catchphrase, such as “hang the Kaiser.” Second, political objectives should be, or at least appear to be, morally and politically lofty. Americans wage crusades rather than wars and need objectives that fit the crusading image. Finally, political objectives must be perceived as vital to the interests of the United States. The American people will

not and should not sacrifice their blood and treasure for trivial objectives.

In the Vietnam conflict, American political objectives failed to meet any of the three criteria. There was nothing simple and straightforward about the reasons for American involvement. The best catchphrase for our objectives was "to contain communism," which somehow paled beside "hang the Kaiser" and other earlier war cries. Our objectives may have been morally lofty, but they were tarnished by the corruption and political infighting of those we were trying to assist. Finally, most Americans had great difficulty associating America's vital interests with a civil war in a small former French colony 10,000 miles across the Pacific.

The motivation and morale of society, which begins with well-conceived political objectives, can have a decisive effect on the nation's ability and will to prosecute a war successfully, particularly when the war spans a considerable length of time. In the Vietnam conflict, home-front morale crumbled as the war continued with no end in sight. In the final analysis, it was the American body politic, not the Vietcong or the North Vietnamese, that forced the withdrawal of American fighting forces from Vietnam.

Absent another Pearl Harbor, even the most carefully constructed political objectives will not result in unanimous American support for military action. Although Americans are fond of viewing the fractious political debate that surrounded our participation in the Vietnam conflict as something unique in American history, deeply divided political opinion has actually been the rule rather than the exception in the history of American warfare. Beginning with the Revolution in 1776, every major American war has caused great rifts in the citizenry, with the possible exceptions of the two world wars.

The problem is to *maintain* public support for the war effort. American popular support is contingent on the clear recognition that the sacrifices of the nation are leading, however slowly, to ultimate victory. For this reason, *perceived* progress becomes very important in a war of any significant length. It has been postulated that democratic societies cannot sustain long wars. However, this thesis has not been proved in the American experi-

ence. What has been demonstrated is that Americans have little patience with long struggles that seem to make little headway.

The first three years of the American Civil War caused terrible bloodshed but yielded few dramatic results. In Virginia, Union forces met with little but embarrassing defeat. In the West, Union forces had been very successful but still had not penetrated deeply into Dixie. War weariness swept the Union, and Lincoln's reelection was in some doubt. Finally, in 1864 Sherman was able to march on Atlanta and, after its capture, devastate the heart of Georgia. After three years, Union forces had finally attacked a vital center within the Confederacy, emerged as victors, perhaps ensured Lincoln's reelection, and kept the Union in the war. Progress could finally be perceived clearly.

In World War II, Americans faced an equally long and arduous struggle, but determination never seemed to wane. Progress was clear as battle maps showed Allied forces marching relentlessly toward the heart of both German and Japanese power. Three years after Pearl Harbor, American troops were on the Rhine and had returned to the Philippines. Progress was easily perceived.

Vietnam was a far different story. American forces won one battle after another, but the enemy never seemed defeated. Every area in Vietnam seemed to be contested year after year. After three years of continuous American victories, the enemy somehow managed to launch the massive Tet offensive in 1968, which was the final straw. It mattered little to the American people whether Tet was a victory or defeat. What mattered was that after three years of pounding by the world's foremost military superpower, the enemy was still able to launch such a massive and well-coordinated attack. American progress in the war was difficult to perceive, and the American withdrawal began in 1969.

To perceive progress, observers must have an accepted standard of measurement. The traditional military standard was conquered territory, which had the added convenience of being easily displayed on a map for the public. In Vietnam, the insurgent nature of the war (at least during some of its phases) made territorial claims an inaccurate barometer of success. The substitute for conquered territory was the number of dead enemy bodies. Unfortunately, body counts suffered from two crucial shortcomings as symbols of success. First, body-count accuracy was always suspect. When career advancement depended

on success and success meant a large body count, many believed that the statistics were inflated. Second, high body counts could be interpreted as a lack of progress. In a war in which the enemy stood and fought only when he wanted to do so, high body counts indicated that the enemy was both able and willing to sacrifice his manpower against superior American firepower. In this sense, high body counts meant that the enemy recruiting and resupply program was continuing to succeed.

One could speculate that a much better measure of success would have been low body counts and a low level of enemy activity. Such a situation would indicate both success in destroying the Vietcong infrastructure that provided many recruits and success in interdicting the flow of men and materiel from North Vietnam. It appears that we chose the wrong threads from which to weave the fabric of success, and in the eyes of the American people, the Tet offensive revealed that the emperor had no clothes.

The main point this line of reasoning leads us to is that American strategy in the Vietnam War was seriously flawed. The decision-making process linking political ends with appropriate means somehow went awry. In the peculiar circumstances of the Vietnam War, the United States could not apply the various instruments of national power, including military power, in such a way as to translate battlefield victory into strategic victory. This inability suggests the critical importance of understanding the circumstances of the conflict.

The key to understanding the circumstances in the Vietnam War was to understand the motivation of the enemy. Our adversaries in Vietnam were organized by the harsh discipline of Communist ideology, but they were motivated by the passions of long-suppressed Vietnamese nationalism. Politically, their objectives were unlimited as they sought nothing less than unification of Vietnam under Hanoi's leadership. Ho Chi Minh and his followers had been waging the struggle for more than two decades by the time American troops arrived in force, and they were willing to accept the challenge of American arms. They waged an unlimited war in virtually every respect. North Vietnamese society was mobilized for the long struggle. On the battlefield, their troops used every military means at their disposal. They were ready to endure, to sacrifice, and to persevere.

In retrospect, it would seem that the United States did not understand the circumstances of the Vietnam conflict and that the means we used were inappropriate as well as unsuccessful. Unlike our opponents, the United States fought a limited war in virtually every respect. Our strategy was based on the belief that gradually increased military pressure and the not-so-subtle threat of limited patience would convince the North Vietnamese that they could not win and should negotiate a reasonable settlement. However, viewed through lenses colored by Vietnamese national passion, American restraint connoted both a reluctance to fight and something less than total commitment.

America's enemies in Vietnam understood the circumstances of the war. They understood that a guerrilla army wins when it is not defeated and a conventional army loses when it does not win. They understood the problems faced by democratic governments when waging long foreign wars. Their answer, in these circumstances, was to continue the struggle and avoid decisive defeat until time, casualties, and frustration destroyed the American commitment altogether.

The misguided American strategy played directly into the enemy's strong suit. Gradual escalation and attrition warfare require considerable time and patience. They also can extract a high price in blood and treasure. The American body politic would not tolerate such slow results requiring such a high price. As the war dragged on, it became very clear that the United States did not have a clear vision of how the war would or should end and had no firm plan concerning the end of the American involvement. Rather than a deliberate and well-planned ending to the American effort, it was the American people who decided they had suffered enough and the United States must get out.

The United States spent four years, from 1969 through 1972, in a slow withdrawal while making feverish but belated attempts to prepare the South Vietnamese to defend themselves. In 1975, when the enemy armies were overrunning South Vietnam, the American people made it very clear that we would not become reinvolved. Thus the American involvement in Vietnam ended not with a flourish but with a whimper and a sigh of relief.

Even the whimpering was full of confusion. As pressure mounted in the United States to end the bloodshed in 1972, the

peace negotiations came to a head. But it was clear that we had not even come to an agreement with our principal ally, the South Vietnamese, on the shape of an acceptable settlement. The result, even after the intensive bombing campaign against Hanoi and its environs in December 1972, was a ceasefire unsatisfactory to the South Vietnamese and satisfactory to the United States only in the sense that the American travail was over.

The confusion that resulted in such an unsatisfactory conclusion to a long and costly struggle suggests the importance of considering conditions of termination. Termination should be considered up front, preferably at the same time a nation considers the option of going to war. Conditions of termination are particularly important in the current era of limited war—limited at least from the perspective of the United States. Limited wars for limited objectives are rarely fought to absolute and complete victory. Rather, these wars typically end with negotiations and compromises. An early consideration of termination conditions should clarify what is negotiable and what is not. Among allies, whose objectives will differ at least in some details, early consideration of acceptable outcomes should clarify those differences and make it possible to present a united front to the adversary during negotiations.

Understanding the desired conditions of termination is part of understanding the circumstances of the war and thus is also a critical step in determining strategy. Early consideration of termination conditions forces the objectives of the war into sharper focus, which, in turn, should help define the best means and methods to achieve those objectives.

It is worth repeating that the importance of the four principles discussed in this essay lies not in the principles themselves. Rather, their importance lies in the realization that factors far removed from combat can determine success or failure in war. Political objectives set the stage for all other actions. Understanding the circumstances and defining the conditions of termination play key roles in shaping the course of the war. Finally, a war of any length requires the continuing public support generated by perceived progress. In essence, although these four principles have little to do with battle, they have everything to do with war.

When we look back on the Vietnam conflict, it is clear that our vision of the war was limited to the battlefield. This narrow vision was evident in a president who personally selected individual bombing targets and in military professionals who still do not understand that winning the battles does not equate to winning the war. The price of our failure in Vietnam was paid in blood, treasure, prestige, and influence. America cannot afford more failures. We must expand our horizons beyond the bloody confines of the battlefield. We must learn, at long last, that war is more than battle.

Two Decades in the Airpower Wilderness

Do We Know Where We Are?

What are the most important dates in the history of American airpower? That is one of those intriguing questions for which there are no right or wrong answers, only opinions. Popular choices might include dates for the Wright brothers' first flight, Gen William "Billy" Mitchell's demonstration bombing of the battleship *Ostfriesland* (or his court-martial), any year in either of the world wars, or the dates for a number of significant events in space exploration. Few of us would include among our choices the year 1965, even though that fateful year marked a dramatic turning point for American airpower. In 1965 American airpower began the Rolling Thunder bombing campaign in North Vietnam. Before that campaign began, American Airmen were convinced they understood how best to use airpower to achieve decisive results in war. Since 1965 and the failure of the Rolling Thunder campaign, American Airmen have been unsure of their beliefs, and the Air Force has wandered in a doctrinal wilderness.

The doctrine that the US Air Force embraced so confidently as 1965 began can be traced directly to its godfather, General Mitchell, the firebrand prophet of airpower. Although Mitchell's views changed significantly over time, the culmination of his doctrinal thinking is found in his statement before the House Committee on Military Affairs just four days after he resigned from the US Army in 1926. Mitchell claimed that airpower could strike directly the enemy's vital centers of production which were essential to the enemy's war-making capability. In essence, Mitchell advocated the use of airpower to wage economic warfare, destroy the enemy's means of production, and thus destroy the enemy's capability to wage modern warfare.¹

Mitchell's court-martial just months before his resignation from the service was a crushing blow to American airmen. In spite of the obvious dangers to their own military careers, the

Originally published in a slightly different form in *Air University Review* 37, no. 6 (September–October 1986): 2–13.

young airmen who were Mitchell's apostles continued to preach his version of airpower doctrine. During the 1930s, the Air Corps Tactical School (ACTS) at Maxwell Field in Montgomery, Alabama, was the center of airpower doctrine development. The faculty members were the heirs of Mitchell's ideas, many having served with him during the turbulent 1920s. It is not surprising that the concepts developed by the Tactical School faculty were elaborations of Mitchell's seminal ideas. A lecture by Capt (later Lt Gen) Harold L. George best summed up the Tactical School concepts: "Nations are susceptible to defeat by the interruption of [their] economic web. It is possible that the moral collapse brought about by the break-up of this closely knit web would be sufficient; but connected therewith is the industrial fabric which is absolutely essential for modern war."²

The ideas promulgated by the Tactical School faculty were encouraged and then made acceptable by technological developments. While Mitchell's ideas often seemed fantastic in the 1920s, the development of high-speed, long-range heavy bombers in the 1930s gave the pronouncements of the Tactical School considerable credibility. Moreover, these revolutionary ideas spread and took hold because they were broadcast in a school environment in which the students were the most promising officers in the Army Air Corps. Perhaps more important, faculty members of the Tactical School were the best of the best, many of whom went on later to important senior command and staff positions during World War II.³

The Army Air Corps (later the Army Air Forces) entered World War II with a doctrine that emphasized the decisive role of strategic bombardment in modern warfare. The other roles of airpower were not ignored in the doctrine, as the Tactical School "readily acknowledged the usefulness of air forces in support of surface forces."⁴ However, the spotlight was on strategic bombardment because the airmen believed that striking the enemy's vital centers could lead to quick and decisive victory. This belief, inherited by airmen and emphasized over the years, helps explain why the United States entered World War II with the two best heavy bombers in the world (the B-17 and the B-24) but could not field a first-class fighter aircraft until 1943.

Strategic bombing doctrine was put to the acid test against both Germany and Japan. The results have been a subject of considerable controversy since 1945. Skeptics pointed out that victory had been neither quick nor easy and noted that, in spite of heavy bombing strikes of the Axis vital centers, victory had still required the defeat of the deployed Axis armies and navies. Airmen, however, saw the results differently and believed themselves vindicated. They took particular pride in the results of the US Strategic Bombing Survey, an exhaustive study conducted by a blue-ribbon panel that gathered much of its evidence from on-the-scene investigations. As the *Bombing Survey Summary Reports* reveal, the panel concluded that Allied airpower had been decisive in Western Europe and had brought the enemy's economy to virtual collapse. In regard to Japan, the verdict was much the same; the survey panel concluded that the Japanese would have surrendered before the end of 1945 even if atomic bombs had not used.⁵

But the atomic bombs had been used. Their destructive capacity seemed to offer Airmen the ultimate tool for strategic bombardment. Airmen believed atomic weapons, mated with long-range bombers to form atomic airpower, would bring the ideas of Mitchell to complete fruition.

The Korean War challenged the principle of strategic bombing, but the American military establishment considered the struggle in Korea to be an aberration, a war in which the military was hamstrung and frustrated by timid civilian leadership. The only lasting lesson gleaned from that conflict was expressed in the angry call for "No more Koreas!"

In the Korean aftermath, the newly independent Air Force produced its first doctrinal manuals amid attempts by the Eisenhower administration to reduce defense spending. Administration officials believed (encouraged by Airmen) that atomic airpower was a method of preventing or fighting wars on the cheap. As a result, the entire national defense structure relied more and more on nuclear weapons and airpower to deter not only major wars but also more limited assaults on American vital interests. By 1956 Air Force secretary Donald Quarles was professing the idea that if one could deter a general war, one could also deter or win small wars. Further, Quarles made a not-too-subtle threat by declaring, "From now on, potential ag-

gressors must reckon with the air-atomic power which can be brought to bear immediately in whatever strength, and against whatever targets.”⁶

Air Force basic doctrinal manuals published during the 1950s reflected the continuing belief in strategic bombardment as the most decisive use of airpower and as a tool usable across the spectrum of conflict. The refrains of Mitchell and the ACTS were repeated again and again in the context of a nuclear world and were encouraged by the continuing policies of the Eisenhower administration. In 1957 Secretary of Defense Charles Wilson told Congress that “we are depending on atomic weapons for the defense of the nation. Our basic defense policy is based on the use of such atomic weapons as would be militarily feasible and usable in a smaller war.”⁷

The Air Force was the beneficiary of such attitudes, and it received more than the lion’s share of the defense budget during much of the 1950s. The Strategic Air Command became the dominant command within the Air Force. The tactical air forces reflected the trend as they became mini-strategic commands equipped with fighter-bombers designed to deliver nuclear weapons. Even aircrew training missions in the tactical air forces concentrated on nuclear weapon delivery.

In spite of the interest of Pres. John F. Kennedy in unconventional warfare, Air Force doctrine remained almost unchanged between Kennedy’s inauguration in 1961 and the start of Rolling Thunder in 1965. The 1964 version of basic doctrine, with which the Air Force would enter the Vietnam War, paid only lip service to anything more than general or tactical nuclear warfare. Very little had changed since 1961, when Gen Curtis E. LeMay could say, “I think we have been consistent in our concepts since . . . 1935. Our basic doctrine has remained generally unchanged since that time.”⁸

Two fundamental, if unstated, assumptions formed the foundation for that doctrine. The most fundamental assumption was that American wars would be fought to destroy the enemy. The objective of strategic bombing was to destroy the economic and social fabric of a nation in order to destroy the enemy’s ability and will to continue the fight. This most fundamental assumption fit nicely with the traditional American view of war as a crusade waged to destroy a well-defined enemy. The sec-

ond major assumption undergirding Air Force doctrine was that America's enemies would be modern industrialized nations. Strategic bombing was based on the idea of destroying the enemy's ability to produce the wherewithal of modern war. It was economic warfare geared to the destruction of the vital production facilities of an industrialized state. Even the interdiction mission, regarded throughout the development of airpower doctrine as the second most important airpower mission (a poor second, however), assumed that the enemy would be a modern industrialized state. Traditional interdiction efforts featured attacks on rail yards, highway and rail bridges, and other presumed transportation chokepoints typical of industrially sophisticated states.

The decision in 1965 to bomb North Vietnam led directly to a clash between civilian perceptions and objectives in the war and military advice about how best to conduct the war (doctrine). Moreover, neither of the two basic assumptions of Air Force doctrine proved valid in Vietnam. The results were two-fold: first, the initiation of Rolling Thunder, a bombing campaign in North Vietnam far different from that recommended by the military; second, the creation of a crisis of sorts for American airpower doctrine.

For a variety of reasons, the American objective in Vietnam—particularly in the bombing campaign—was not to destroy North Vietnam. The basic American military objective was to “get Hanoi and North Vietnam (DRV) support and direction removed from South Vietnam.”⁹ In 1965 Secretary of Defense Robert S. McNamara defined Gen William Westmoreland's objective in South Vietnam by asking Westmoreland “how many additional American and Allied troops would be required to convince the enemy he would be unable to win.”¹⁰ In regard to objectives in the North, Rolling Thunder was part of an overall program to coerce and entice the North Vietnamese into abandoning their efforts. Senior government officials viewed the bombing campaign as a method to signal resolve to the North Vietnamese while slowly increasing the pressure as carefully controlled and graduated attacks increased in intensity and struck more and more important targets.

The military, meanwhile, had been planning a very different kind of bombing campaign since early 1964. Eventually codified

in the Commander in Chief, Pacific Operations Plan (CINCPAC OPLAN) 37-64, the plan called for a crushing attack on 94 targets, each of which was selected on the basis of three criteria: reducing DRV support for operations in South Vietnam, limiting DRV capability to intervene directly in the South, and destroying the DRV's capability to continue as an "industrially viable state."¹¹

The criteria for selecting targets on the Joint Chiefs of Staff (JCS) 94-target list and the JCS plan for striking those targets indicate clearly that the joint chiefs desired to wage a classic strategic air campaign against North Vietnam and a complementary interdiction campaign. The proposed method of attack was to gain air superiority by attacking the principal enemy airfields; destroying the enemy's petroleum, oil, and lubricant facilities; and then destroying the enemy's industrial web. At the same time, interdiction efforts would destroy those war materials already en route to South Vietnam. In essence, the military planned to take the World War II air campaign in Europe and transplant it 20 years later into North Vietnam.

The conflict between American civilian perceptions and objectives and American military doctrine continued throughout the Rolling Thunder campaign. Airpower doctrine called for the massive application of strategic bombing to destroy the enemy and its war-making capability. The senior government leadership sought not to destroy but to persuade the enemy to cease and desist. Pres. Lyndon Johnson characterized the dilemma as the difference between seduction and rape.¹² Throughout the Rolling Thunder campaign, the military pressed again and again for permission to increase the intensity of the bombing and to strike more important targets. Eventually this permission was granted, but slowly and gradually as Washington kept a tight grip on every facet of the campaign.

The second major assumption of American airpower was also called into question in the Vietnam situation. Vietnam was anything but a modern industrialized state. The North Vietnamese industrial economy was tiny even by Asian standards, producing only about 12 percent of the country's total gross national product. There were but a handful of major industrial targets. When the first targeting studies were done by the JCS, analysts found only eight industrial installations worth listing.

The industry that did exist made only minor contributions to North Vietnam's military capabilities. Most of its military equipment, including all its heavy equipment, was imported.¹³

Rolling Thunder continued through mid-1968. The president kept a tight personal control on the campaign, slowly increasing the bombing pressure and expanding the list of targets that Airmen were allowed to strike. But those targets which the military considered most vital in Hanoi and Haiphong remained off limits, as did important interdiction targets close to the Chinese border. The campaign against approved targets was something less than overwhelming as the president imposed pauses in the campaign to allow the North Vietnamese to seek a negotiated settlement without losing face. In the end, Rolling Thunder did not achieve its objectives. It did not seduce the North Vietnamese to the conference table, and it did not convince them that they could not win. One must also wonder what kind of American resolve it signaled to the North Vietnamese.

In the aftermath of Rolling Thunder and the Vietnam War, recriminations have flown from two directions. Airmen have blamed the failure of the bombing campaign on timid civilian leadership that would not turn airpower loose in 1965 as it was turned loose during the intensive bombing of the Linebacker campaigns in 1972. On the other hand, Airmen have been accused of not understanding the nature of the war, the nature of the enemy, and the restraint required to wage limited war and keep it limited.

Although Airmen resist the thought, a few of them have been known to voice the suspicion that their traditional doctrine was irrelevant in Vietnam. The two fundamental assumptions of airpower doctrine were clearly incorrect in the Vietnam situation. The object of the war was not to destroy the enemy, and the enemy was not an industrialized state. There is also no empirical evidence that, had Rolling Thunder been conducted differently (i.e., if airpower had been turned loose), the outcome would have been materially different. In any case, President Johnson was not about to give in to the wishes of the Airmen in 1965, despite the fact that the same proposals for a short, sharp bombing campaign of great intensity were offered to him over and over again. It seemed Airmen were so mesmerized by

their doctrine that they had little else to offer even though the foundations of that doctrine were not relevant in Vietnam and it quickly became obvious that they would not be allowed to execute their doctrine.

In the aftermath of the war, there is also the lingering suspicion that the war in Vietnam was not an aberration that can be passed off with a simplistic call for “No more Vietnams!” At least in some of the professional military literature, there is the growing realization that such “revolutionary” wars are not just conventional wars writ small. Rather, they are qualitatively different from conventional wars, just as conventional wars are qualitatively different from nuclear wars. Even worse, many experts believe that such revolutionary wars are far more likely to demand American involvement (in some capacity) than are any other kinds of conflict.

The result of the confusion and suspicions about the role of airpower in the war against North Vietnam has been two decades of confusion for Air Force doctrine. Before 1965, right or wrong, Airmen thought that they knew how best to use airpower in war. Air Force doctrinal manuals published since the end of the Vietnam War reveal that, since 1965, Airmen have been unsure of themselves, to say the least.

The first thing one notices about post-Vietnam basic doctrinal manuals is that the Air Force has largely ignored the war in Vietnam. The manuals concentrate almost exclusively on theater-level conventional warfare and are clearly centered on the European case. The attempt to forget Vietnam is not limited to doctrine. Consider, for example, that 13 years after World War II, the Air Force had published an exhaustive seven-volume official history of the war written and edited by respected historians. Thirteen years after the end of the American combat role in Vietnam, the official Air Force history has yet to be written, with the exception of a few isolated volumes on disparate subjects.

The second thing one notices about the basic doctrinal manuals published during the 1970s is how muddled Air Force thinking became about some of the most fundamental tenets of warfare. Even the venerable principles of war were not exempt from tinkering. The time-honored principle of economy of force, for example, was interpreted in economic terms rather than in tra-

ditional terms of mission priorities—a particularly vexing change when one considers that the traditional interpretation of economy of force is singularly important to the effective application of airpower. The unmistakable impression of such gaffes was that the Air Force was not serious about its doctrine and that those who wrote the basic doctrine manuals were ill-equipped to do so. General Mitchell and his heirs at the ACTS would have been appalled.

The third thing one notices about the basic doctrinal manuals written in the 1970s is that they contain very little information useful to Airmen in the field. They appear to be written for use by harried Air Staffers involved in never-ending budget battles within the Pentagon. Although disappointing, this trend in doctrinal “development” was not altogether surprising. The long struggle in Southeast Asia had diverted funding for new weapon systems, making budget monies for modernization programs very urgent needs for all of the armed services after the war. The culmination of the trend was the so-called comic-book basic doctrinal manual published in 1979. This manual was visually appealing but wallowed in generalities, unsubstantiated assertions, and irrelevant quotations. It was a triumph of form over substance, an airpower doctrine manual that contained almost nothing about the nature of war, the art of war, or the employment of airpower.

The year 1979 was the nadir of Air Force doctrine. The basic doctrine manual published in that year clearly reflected neglect, misunderstanding, and general confusion. The years since 1979 have been marked by considerable progress, spurred on by a fortunate confluence of events that were perhaps a reaction to the doctrinal muddle. The encouraging events may have gained impetus from the publication of the first balanced and scholarly military histories and critiques of the war in Southeast Asia as the 1970s drew to a close.¹⁴

A review of the professional journals beginning about 1979 reveals a spate of critical and thought-provoking articles centering on Air Force doctrine. Younger officers began challenging the current dogma, calling into question not only what the doctrine espoused but also how the doctrine was formulated. Not all of the “young Turks” agreed with one another, but they

created in the professional journals, particularly the *Air University Review*, a climate of intellectual ferment.

At Air University, which had once been the center of Air Force doctrine development, both Air War College and Air Command and Staff College began implementing revolutionary changes in their curricula. The theme was to “put war back into the war college” (and the command and staff college). The study of military history, theory, and doctrine, which had virtually disappeared from both schools, suddenly reappeared as subjects of primary focus. In addition, Air University formed a new organization, the Center for Aerospace Doctrine, Research, and Education, which has as its primary mission the development of original thought about the use of airpower and is charged to assist the Air Staff in the development of doctrine.

Meanwhile, the Air Staff began assembling a team of more qualified personnel (comprising, at least in part, graduates of the revamped Air University schools) to direct doctrine development efforts and produce the doctrine manuals. The quality of these personnel has continued to rise to this date. One of the direct results of this effort was the publication of the 1984 version of Air Force basic doctrine. Although the 1984 version of the manual has many serious flaws, it is a quantum improvement over the 1979 version.

The improvement is noticeable and admirable, but the Air Force remains in the doctrinal wilderness. Strangely, however, our experience in the wilderness, particularly since 1979, has had a beneficial side. Amid the confusion, accusations, and suspicions that have surrounded airpower doctrine since 1965, perceptive Airmen have begun to realize that war is not the simplistic affair visualized by the pioneers of airpower doctrine. Wars are not homogenized happenings fought against one kind of enemy with the same kinds of vulnerabilities. We have begun to realize there are no magic answers which airpower can deliver, and, in fact, war is a multifaceted phenomenon fought in three dimensions.

The years in the wilderness have led to intellectual ferment and turmoil. We are asking questions about the very nature of warfare rather than limiting our investigations to airpower alone. We are now arguing about how our doctrine should be written, whether we should have different doctrines for differ-

ent kinds of wars, and how to integrate Air Force doctrine with the doctrines of other services. In short, we are beginning to seek answers to the truly difficult questions, rarely asked 20 years ago. Today, the most pressing need is to continue the ferment and encourage the debate. There are those who would stifle the debate to protect their own bureaucratic positions and political interests. However, those seeking a more effective force realize that the intellectual ferment must be encouraged and the dialectic process must continue. The agenda for the debate remains crowded, and the subject matter continues to be difficult and contentious.

After two decades in the wilderness, do we know where we are? Yes, we do. We are still in the wilderness. But we are beginning to get our bearings so that we can find our way out. Perhaps in the foreseeable future, we will again be as confident as we were before 1965 but without the naïveté of that earlier era.

Notes

1. Robert Frank Futrell, *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force, 1907–1964* (Maxwell AFB, AL: Air University, 1971), 28.

2. Maj Gen Haywood S. Hansell, Jr., *The Air Plan that Defeated Hitler* (Atlanta: Higgins-McArthur/Longino & Porter, 1972), 32–33.

3. Ibid. Hansell lists several such faculty members, including the later Lt Gen Harold Lee George, Maj Gen Robert Olds, Brig Gen Kenneth L. Walker, Maj Gen Claire L. Chennault, Gen Muir S. Fairchild, and, of course, Hansell himself.

4. Ibid., 6.

5. *United States Strategic Bombing Survey Summary Report (European War)* (Washington, DC: Government Printing Office [GPO], 1945), 22. *United States Strategic Bombing Survey Summary Report (Pacific War)* (1946), 26.

6. Futrell, *Ideas, Concepts, Doctrine*, 227.

7. Ibid., 232.

8. Ibid., 405.

9. William Bundy, "Draft Position Paper on Southeast Asia," 29 November 1964, in *The Pentagon Papers*, New York Times edition, ed. Gerald Gold, Allan M. Siegal, and Samuel Abt (New York: Bantam Books, 1971), 373–78.

10. Gen William C. Westmoreland, *A Soldier Reports* (Garden City, NY: Doubleday & Co., 1976), 183.

11. Department of Defense, *United States-Vietnam Relations, 1945–1967*, vol. 4 (Washington, DC: GPO, 1971), chap. 3, 3.

12. Doris Kearns, *Lyndon Johnson and the American Dream* (New York: Harper & Row, 1976), 264–65.

13. Raphael Littauer and Norman Uphoff, eds., *The Air War in Indochina* (Boston: Beacon Press, 1972), 37.

14. Two of the best books to appear at this time were Guenter Lewy's *America in Vietnam* (New York: Oxford University Press) and Dave Richard Palmer's *Summons of the Trumpet* (San Rafael, CA: Presidio Press), both published in 1978.

Technology and the American Way of War

Worshipping a False Idol?

For much of the past century, the American military has been in headlong pursuit of technological solutions to its war-fighting problems. As the pace of scientific progress accelerated in the second half of the twentieth century, ever more sophisticated gadgetry and its presumed battlefield advantages became prime objects of American research, development, and acquisition efforts. This effort to substitute American wizardry for American blood has met with enough success that, to a large degree, technological force multipliers are now the preferred currency of the American military realm. High tech has become the American way of war.

There is no question that pursuit of high-tech weapon systems has produced capabilities undreamed of only a few decades ago. Whether we look at ground, sea, or air forces, the story is the same: weapon systems are faster, more powerful, and more accurate. It is no wonder many among us have come to believe that technology has almost mystical powers to provide panaceas. To at least some degree, we have been seduced by technology's legendary successes and glittering promises. But a note of caution should temper the nearly frantic pursuit of high-tech solutions. Although modern technology is important to success on the battlefield, its impact can be overstated, its risks understated, and its opportunity costs obscured or ignored. In short, although we must not stifle technology, we must bring the science of war into better balance with the art of war.

If we examine the relationship of technology and warfare with a skeptic's calculating eye, we can find several factors which should at least provide a cautionary note to the pursuit of high-tech solutions. An examination of these factors is a worthwhile exercise, for we must assure that any force multiplier has a value greater than 1.0. Anything less is self-defeating.

Originally published in a slightly different form in *Air Force Journal of Logistics* 11, no. 1 (Winter 1987): 21-23.

Squandered Advantages

Technological advantage has often been skillfully exploited to yield decisive results in battle, even when the technology was new and previously untried in combat. The British, for example, were very successful in exploiting their new radar system in conjunction with the overall air-defense plan in the Battle of Britain. However, superior technology does not guarantee effective use of that technology. The history of modern warfare is replete with examples of squandered technological advantage. During World War I, for example, the British developed the tank, which had the potential to break the bloody stalemate on the western front. But the British required nearly two years of experimentation before they learned how to use tanks effectively. This example is particularly enlightening because primitive tanks did not represent a significant leap in technological sophistication. Rather, they were simply a new combination of well-known technologies. It is perhaps even more important that the British squandered their hard-won advantage by forgetting or ignoring the lessons they learned in World War I. Ironically, the Germans, who had all but ignored tanks during the first war, learned their lessons well and excelled in armored employment during the second war.

Later in World War II, the Germans failed to capitalize on their advantages in jet and rocket technologies. Had the Germans concentrated their efforts on the production of jet-powered interceptors, the Allied strategic-bombing offensive might have been in jeopardy. In the same light, had the Germans targeted their V-I and V-2 weapons against embarkation ports in Great Britain, they might have seriously disrupted the logistical effort required to sustain the Allies on the Continent. Instead, the Germans concentrated on jet-powered attack bombers and rockets used as vengeance weapons against British cities.

In a slightly different sense, the United States wasted its overwhelming technological superiority in both Korea and Vietnam. In both wars, military leaders found that some of their most potent weapons could not be used for their intended purposes because of political considerations. The conflict in Vietnam was particularly frustrating because vastly superior American technology was, in the long run, largely irrelevant to the outcome of that forlorn war.

Perishability

Technological advantage can be a decisive factor in battle just as radar provided an important advantage for the British in 1940. But given enough time and resources, technology can be equaled by the enemy, as our bomber crews learned when they attempted to penetrate German airspace later in the war. Technological advances are based on physical laws, which are well known to our most dangerous opponents, particularly in the age of the information and communication explosions. In effect, there are no real technological secrets. Even if our opponents do not have the scientific, economic, and industrial infrastructures to produce equal technology, they can often obtain sophisticated weaponry from allies or supporters. The important point to remember is that technological advantage is relative. If an enemy develops or acquires equivalent technology, the advantage disappears and force multipliers no longer multiply.

Technology can also be countered in one of two ways. The most obvious method is the use of a countering technology. It is particularly frustrating that some countermeasures are simple and inexpensive, as well as effective. For example, chaff—simple strips of tinfoil—was first used to counter radar in World War II. It remains an effective counter to this day. Simple flares are often used effectively to spoof sophisticated heat-seeking weapons. Nowhere is the technology-countering capability more apparent than in the realm of electronic warfare. Electronic devices quickly yield to electronic countermeasures and in turn to electronic counter-countermeasures.

The second method used to counter superior technology is the application of clever strategy and tactics. A mastery of the art of war can offset, if not nullify, technological advantages. The United States learned this lesson most recently in the Vietnam struggle. The United States went to war in Southeast Asia relying on sophisticated weapons that could deliver large amounts of fire and steel on almost any target. During a major portion of the war, the enemy countered by using guerrilla strategies and tactics. They eliminated lucrative targets by working in small units, refusing to stand and fight, and hiding among the civilian population whose allegiance was critical to the American cause. When the enemy departed from these tactics, such as during the

Tet offensive in 1968 or the Easter offensive in 1972, they paid a bloody price and suffered crushing defeats.

Battlefield Performance

The dazzling successes of our sophisticated weapon systems can obscure the fact that technology may not perform as well as expected. Fortunately, our combat experience is infrequent. But this blessing often means that many of the high-tech gadgets upon which we have come to depend are untested in the rigors of combat. In spite of our best efforts, neither simulations, exercises, nor maneuvers can replicate the chaos, complexity, and terror of the modern battlefield. We often find it difficult to anticipate the counteractions of a clever and dedicated enemy. The result is that we are frequently confronted in war by unexpected circumstances which can seriously hinder the effective employment of weapon systems and reduce or nullify technological advantages.

Perhaps the classic airpower example of the problem is found in the American planning for the strategic bombing campaign in World War II. The accuracy predicted for bombers was based on careful experiments conducted before the war. Unfortunately, the calculations of the planners included the hidden assumption that each bomb dropped was individually aimed at the target. In truth, entire bombloads were jettisoned by a single command from the bombardier. Even worse, because of unanticipated difficulties peculiar to the aerial battlefield, entire bomber formations often dropped their bombs on the command of a single lead bombardier. In some cases bombsights were removed from all but the lead and deputy lead aircraft in a bombing formation and replaced with improvised mounts for defensive guns. As a result, in spite of a generous “fudge factor” included by the planners, their calculations were seriously in error—calculations which affected the entire strategic bombing program from bomber procurement to damage expectancy.

Even if it works precisely as expected, technology may not produce a decisive advantage. For all their wonders, technological improvements in weapon systems tend to be evolutionary rather than revolutionary (with a few notable exceptions). In other words, technology tends to operate at the margins of mili-

tary effectiveness. Technology provides soldiers in the field with “better” targeting systems, “more accurate” weapons, and “more powerful” explosives. Certainly these weapons *are* better, more accurate, and more powerful. Just as certainly these improvements are important. But they may not produce a decisive advantage. Even if the technological advantage is large, it still may not be decisive because of the factors discussed earlier.

Unwanted Baggage

Technology has increased military capability immeasurably. However, a price has been paid for every advance in capability. There is no free lunch. It is clear that technological sophistication produces unwanted baggage—undesirable side effects which offset, to some degree, the advantages produced by technology. This baggage must be evaluated when we examine the net worth of a force multiplier. The baggage comes in several varieties.

High cost is the most obvious piece of unwanted baggage. The cost of modern weapon systems is breathtaking by almost any measure. This is not to say they are not worth the price. By almost any measure they are better, more accurate, and more powerful than any similar weapons previously fielded. However, their incredible cost virtually guarantees we will produce relatively few of these weapons. This problem, of course, is at the heart of the quality-versus-quantity issue. Those who favor the latter argue that quantity has a quality of its own and technology cannot forever offset the superior numbers which our opponents may field. The price of high-tech weapons can also be critiqued in terms of opportunity costs, those things we forego to pay for the acquisition of expensive gadgetry. The acquisition of new weapon systems comes, to at least some extent, at the expense of more mundane needs such as spare parts, munition stocks, training sorties, and support equipment.

The cost of sophisticated weapons leads to another major problem. The cost of some of the most sophisticated “smart” weapons dictates that they cannot be expended in training. The Army, for example, finds it difficult to conduct frequent live-fire training for the bulk of its troops with the most expensive anti-tank missiles. The Air Force faces somewhat the same problem with its sophisticated air-to-air missiles. Such predicaments

exacerbate the problems of effective employment and battle-field performance. The development of advanced simulators attacks but does not solve the problem. Some might argue that modern technology has made these weapons so simple and reliable that little training is needed. Those possessing the skepticism born in combat experience know better.

A third piece of unwanted baggage reveals the two-faced nature of some technological developments. On one side of the ledger is rapid field repair based on the concept of removing and replacing black boxes. On the other side is the fact that repair of the black boxes may require delicate equipment available only at central depots located far from the battle area—a situation of questionable merit in high-intensity, rapidly changing combat situations.

Munitions consumption is another example of the two-faced phenomenon. On the one hand, smart weapons can accomplish with one bomb or missile what might require many hundreds of “dumb” weapons. On the other hand, the appeal of some modern weapons is found in their incredible rates of fire. These weapons, used by nearly everyone from ordinary infantrymen to high-flying fighter pilots, consume munitions at an incredible rate, dwarfing anything seen heretofore. They can put a considerable strain on any logistics system and magnify any shortcomings in munitions stocks (some of which may have been created in the first place by cutting corners to procure the basic weapon system). Even more than in the past, the decisive factor in warfare may not be in the quality or quantity of weapons or even in the skill with which they are used. Rather, the key to victory may well be found in the ability to supply adequate consumables to troops in the field. Ironically, warfare’s newest weapons have magnified the importance of one of warfare’s oldest requirements—superior logistics.

Balancing the Scales

The foregoing list of potential and actual problems should cause even the most ardent technocrats to at least pause and reflect on their passion for sophisticated weaponry. To some so-called military reformers, the list might also seem to confirm dark suspicions regarding the superiority of quantity over quality. As one might expect, the most rational reaction to the list lies some-

place between the views of the anxious technocrat and the dour reformer.

It should be clear to almost any serious student of military affairs that, other things being equal, superior technology on the battlefield offers significant advantages. It is also demonstrably true that when other things are not equal (which is almost always the case), superior technology can play a significant role in leveling the odds on the battlefield. However, these truths must be tempered by the thesis of this essay, which is that a militarily significant technological advantage is a fragile, perishable, and elusive commodity.

With all of this said, what is to be done? We face a future that seems to compel an accelerating rush toward more and more sophisticated weapon systems. Ensuring that these weapons do, in fact, increase our military capabilities, in spite of the factors which might militate against such increases, will be a difficult problem. Three approaches to the problem may yield favorable results. The first approach is rather obvious and the second less so. The third approach is quite subtle but perhaps the most important.

First, we must restrain what has become a natural enthusiasm for the leading edge of technology. The skeptic's eye is a useful and revealing tool. We should keep in mind the admonition that if it sounds too good to be true, it assuredly is. We must develop a method that weighs opportunity costs and the risk of failure against the possible advantages of new weapon systems. As we consider those advantages, we must also look long and hard at how they can be effectively exploited on the battlefield and, conversely, how an opponent might counter those advantages. And amid the glitter of high tech's bells, whistles, and flashing lights, we must pay attention to the mundane logistical details that may ultimately determine victory or defeat. In short, we must assure that any presumed force multiplier actually multiplies capabilities by a factor of more than 1.0.

The second approach is somewhat of a mirror image of the first. Although Americans take great pride in a tradition of technological superiority, our principal potential adversary also places considerable reliance on sophisticated technology and faces similar problems as a result. Thus it would seem prudent to spend considerable energy learning how to exploit the internal problems

created by the enemy's technological success. In the past we have viewed the enemy's technology only as a threat and generally ignored the problems for *him* that the enemy's high-tech weapon systems engender. As just one example of possible enemy vulnerabilities, the munition consumption rate of modern weapons probably exacerbates traditional Soviet logistical weaknesses. The exploitation of these weaknesses could lead to effects out of all proportion to the effort expended. With further study, we might identify several technology-inspired vulnerabilities that we can effectively exploit. To do this, however, requires that we develop a mind-set that regards technology as a two-edged sword.

The third approach to the problem is much less obvious. The basic assumption we live with is that the United States possesses the superior technology, which is a proposition of questionable validity. We must not be so seduced by the promises of modern science that we ignore the time-honored study of the art of war. Skillful strategy, clever tactics, and practical doctrine will help us exploit any technological advantage we possess and may save us if our technology fails or if we find ourselves in a technologically inferior position. The ideas of Clausewitz and the other masters of military art are pertinent even in the era of electronic counter-countermeasures. The spectacular advances of military science have not obviated the importance of understanding the art of war.

If anything, the need to understand the art of war is magnified by the revolution in military technology. Unbridled enthusiasm for high-tech solutions tends to be infectious, producing a disease that destroys historical perspective. The high-tech contagion can make us forget that how we use what we have is often more important than what we have. If the American officer corps ignores the art of war and concentrates on finding technological panaceas, it will relinquish the formation of strategy and the development of tactics to those who know little about war and nothing about combat.

Technology is important, but it is not a panacea for our military problems. It must be pursued and exploited but with caution and skepticism. We must use technological advantage skillfully and at the same time be prepared to counter a possible enemy advantage cleverly. We must remember that the science of war complements

rather than replaces the art of war. We must remember that technology is a tool of war, not a way of war.

With all of this said, we return to the question posed in the title of this essay. Is technology a false idol? Probably not. It might be better described as fickle—dispensing its favors to those who regard it skeptically, develop it carefully, and use it wisely.

Part 2

The End of the Cold War

Overview

The end of the Cold War in the early 1990s came quickly, quietly, almost without warning and left only one side standing. Many marveled at the speed with which the Soviet influence evaporated around the world and then were amazed at how rapidly the Soviet Union itself disintegrated. In the wake of the Cold War, it appeared the danger of the kind of war that might threaten the survival of the United States and perhaps all of humanity had, for the foreseeable future, passed. At the same time, the demise of superpower competition and the controlling influence of that competition in the developing world raised the specter of a welter of smaller conflicts. But there was no consensus about possible US involvement in such conflicts. The key unanswered questions were over what issues and under what circumstances US military forces would be sent to fight in the post-Cold War world.

At the same time, victory in the Cold War and the disappearance of the only peer competitor in the military realm led the American body politic first to celebrate and then to demand a peace dividend for their massive investments in the defense establishment since the late 1940s. There were calls for huge cutbacks in military spending and for bringing American forces home to "Fortress America" from their worldwide deployments. The questions quickly became not whether to cut the American military but rather what cuts to make and what kind of forces to keep.

The Cold War had functioned much like a straightjacket. Most obviously, it had constrained the actions of both the United States and the Soviet Union because of their mutual fears of what the other might do and the potential for catastrophic consequences. The superpower nuclear standoff also limited the actions of those aligned with one or the other of the superpowers. Both superpowers kept a tight rein over their allies and hangers-on, particularly after both sides peered into the nuclear abyss during the Cuban missile crisis in 1962.

Meanwhile, as pundits prognosticated about the possibilities of the new world order, reality happened. Freed from the constraints of the Cold War, the world saw a series of small wars in

the 1990s that otherwise would have been most unlikely and which eventually involved the participation of the United States. Only Operation Desert Storm involved land power along with naval power and airpower. Brief wars in Bosnia and Kosovo were primarily air campaigns as were Operations Southern and Northern Watch, which kept a resurgent Iraq in check following its defeat in Desert Storm. At every turn of the budget battles, Airmen emphasized the dominating role of airpower in all of these encounters.

The essays in part 2 reflect the pride of Airmen in the role they were playing in the 1990s, emphasize the demonstrated importance of airpower in the “new world disorder,” and suggest different ways to think about sizing our military forces to meet post-Cold War realities. The two speeches in part 2 suggest ideas for the kinds of research and weapon systems development that might be most appropriate given our revised view of the future. The second of these two speeches directly addresses the importance of airlift. It is worth noting that in the two clearest instances of airpower alone directly achieving our national security objectives (Berlin airlift and Yom Kippur War), it was US airlift, not our fighters and bombers, which made the difference

The American Airpower Doctrine Dilemma

At the start of the twentieth century's final decade, American Airmen must resolve a doctrine development dilemma or face some very unfortunate consequences. The dilemma is, simply stated, how do Airmen develop a well-founded doctrine when the raw ingredients for that doctrine are missing for the most part? If this dilemma is not resolved, American Airmen will be unable to convincingly promulgate their doctrine to American soldiers and sailors as well as to the civilian masters of the American military. Without widespread acceptance, American airpower could be misused and squandered, and the very foundations of the US Air Force could be undermined. Thus, without well-founded and convincing doctrine, the future of American airpower could be very bleak.

Peculiarly American circumstances are bringing the failure to resolve the doctrinal dilemma to the point of crisis in the United States. However, the dilemma and its two fundamental causes are common to many air forces. Therefore, an examination of these common causes may be of wide interest and value.

The most fundamental cause of the doctrine dilemma is that Airmen are prisoners of their own history, and history (experience) is one of the two basic ingredients which form the basis of doctrine. The second cause contributing to the dilemma is that Airmen have not formulated and articulated a contemporary theory of airpower, the second essential ingredient of doctrine. This essay will briefly examine each of these fundamental causes before turning to the nature of the crisis now brewing in the United States and possible solutions to the doctrine development dilemma.

Trapped by the Past

The common denominator among the doctrinal problems facing airmen around the world is that they are prisoners of their own history. Granted, the history of the Royal Air Force (RAF) is very different from that of the USAF, and each, in turn,

Originally published in a slightly different form in *Air Power: Collected Essays on Doctrine*, ed. Group Captain Andrew Vallance, Royal Air Force (London: Her Majesty's Stationery Office, 1990).

differs from the experiences of every other air force. But as different as these histories are, airmen around the world also share a common history from which they cannot escape. The most universal experience which affects airpower doctrine is, oddly enough, lack of experience.

Searching for a Foundation

Doctrine, which we can concisely define as what we believe about the best way to do things, is based primarily upon the analysis and interpretation of experience, that is, upon history. Unfortunately for airmen, the experience of airpower in warfare is limited, particularly when compared with the vast experience base that land and naval forces can call upon to develop and buttress their doctrinal beliefs. In contrast to the centuries of land and naval warfare, airmen can draw upon much less than a single century of experience, and within that short span, the practical experience of airpower in combat is even more limited.

In the early years of this century, airpower had a very limited effect on war, although warfare had an enormous effect on airpower. There is no doubt that in World War I airmen made a significant contribution to military operations conducted by many of the antagonists. Reconnaissance and artillery spotting were probably the most important missions performed by airmen, although ground attack missions eventually became significant. Airmen also engaged in primitive attempts at what we would now call strategic bombardment. These attempts caused great excitement but did little significant damage to the war-sustaining capabilities of either side. Air-to-air combat was then, as it is now, colorful, exciting, even glamorous. But then, as now, the struggle to control the air was seen as an enabling mission, in which success meant that one could more effectively accomplish other missions.

Although important to tactical operations in the Great War, airpower had little real impact on the war itself. It did not fundamentally change the way in which surface forces (land and naval) conducted their operations. One can build a strong case that had airpower not existed, the war would have been fought in much the same manner and with the same results. Thus, it was difficult for post-war airmen to draw well-founded conclu-

sions about the proper place, use, or potential impact of airpower in military operations. Testimony to the confusion can be found in the very different treatment accorded to airpower in various nations and to the acrimonious debate over the future of airpower carried on among soldiers, sailors, and airmen.¹ Airmen were forced to base their arguments for the future of airpower on hope and imagination rather than concrete historical evidence.

On the other hand, World War I had a profound effect on airpower. It forced the rapid development of combat aircraft, which leaped forward in capabilities at an incredible rate. Much was learned, through bloody trial and error, about aerial tactics. And much was learned about the importance of technological advantage when control of the air shifted dramatically because of successive technological breakthroughs by one side or the other.²

The most profound effect the war had upon airpower, however, was to create a vision of airpower in the minds of airmen. Visionary airmen saw beyond the confines of primitive but rapidly advancing World War I technology and envisioned airpower as the dominant force in future wars. Airmen understood the importance of airpower's unique capability, in theory, to concentrate firepower on any point on the earth's surface. This essentially constituted the visions of Douhet, Trenchard, Mitchell, de Seversky, and others.

Thus, at the end of the war airmen had little, other than visions and hopes, upon which to base their doctrine above the tactical level. Between the two world wars, airmen gained considerable experience in a score of minor skirmishes, but usually in curious circumstances from which it was again difficult to draw doctrinal generalizations. The RAF, for example, was used to police the empire, exercising air control over primitive tribesmen, particularly in the Middle East.³ Such experiences were important, but the lessons learned were not easily transferable to major conflicts against a powerful enemy in possession of its own modern airpower.

Airpower, of course, came into its own during World War II, and to a very large degree it shaped how the war was fought. Military leaders quickly realized that control of the air was essential to success on the surface, that important surface targets far beyond the front lines were both vital and vulnerable,

and that the war-sustaining capability of the enemy's industrial base could be crippled even before surface forces fired their first shots in anger. Many senior American airmen remained convinced after the war that, given more time and fewer diversions of effort, the strategic bombing effort against Germany could have resulted in German surrender even without the cross-channel invasion of France. True believers in airpower pointed to the surrender of Japan without invasion as convincing evidence of the decisive nature of airpower, particularly strategic airpower.⁴ Added to this experience was the birth of nuclear weapons and their mating with long-range heavy bombers, which indicated to airmen that the prophets of airpower had been vindicated.

Soldiers and sailors were much less sanguine about the potential decisiveness of airpower. In spite of the claims of airmen, soldiers and sailors rightly noted that much hard fighting, bleeding, and dying were required of them to bring the Axis powers to their knees. Although they fully recognized the importance of airpower, soldiers and sailors tended to regard it as just another tool in the military kit rather than the decisive weapon of modern warfare.

The decades since the end of World War II have included a bevy of smaller (in comparison to the world wars) conflicts in the Middle East, North Africa, Korea, Southeast Asia, Southwest Asia, and the South Atlantic. Airpower was important in each conflict, but again not in the decisive ways envisioned by the prophets of airpower. Such less-than-decisive experiences might have settled the argument over the place of airpower in military operations were it not for the recognition that airmen were often restrained from using airpower to its full potential. Ironically, nuclear weapons, which seemed to fulfill the prophesies of the early airmen, brought with them the unwanted baggage of political restraints imposed for fear of escalation to superpower nuclear confrontation.⁵

Thus ends the airpower experience at war, some eight short decades after it began. The upshot of this experience is that virtually all military men and women agree that airpower is important to success in modern military operations, perhaps even a decisive element. However, just how important and how decisive airpower is or can be remain bitterly contentious issues, as do

issues concerning how airpower should be applied to achieve the best results. This is not altogether surprising considering airpower's paucity of real wartime experience, particularly against enemies who also had first-class airpower available.

Inarticulate Airmen

A second major cause of the airpower doctrinal dilemma is the fact that airmen are a relatively inarticulate lot. Few airmen of note since the early days of airpower prophesy have written extensively in an attempt to develop airpower theory. There are exceptions to the generalization, but a quick scan of the shelves of any good military library reveals precious few serious volumes on airpower history and theory, only a tiny fraction compared with the extensive and ever-expanding body of literature concerning land and naval warfare.⁶

Airpower has had its prophets, but the age of prophesy ended with the beginning of World War II when airmen were forced to produce results rather than just promote a cause. The end of the war virtually begged for a reasoned analysis and a synthesis of prophesy and experience into a revised airpower theory. But none was forthcoming. The trauma of limited conventional war, insurgencies, and state-sponsored terrorism in the nuclear age further heightened the need for revised airpower theory. But none was forthcoming, at least none that made a lasting impression upon the US Air Force. Airpower produced its prophets in the early years of the twentieth century, but in the wake of experience airpower has failed to produce its Clausewitz, or Jomini, or Mahan, or Corbett.

A question of continuing fascination is why airmen (particularly American Airmen) have been so inarticulate in reexamining and promulgating an experienced-based theory of airpower, and subsequently, a meaningful airpower doctrine. This observer believes the answer is twofold: a fascination with technology and the character of the American experience at war.

Technology's Siren Song

It is not at all surprising that technology would be uppermost in the minds of airmen; after all, it is a technological gad-

get that gets the airman into the air. To many airmen, however, technology has become virtually the alpha and omega of airpower success—all else seems to be of secondary importance.

The importance of technology to airpower became obvious during World War I when control of the air often turned on short-lived technological advantage. The Fokker scourge of 1915, occasioned by Anthony Fokker's invention (actually reinvention) of the interrupter gear, was a prime example. After the war, the prophecies of the airpower pioneers would have remained far-fetched science fiction without the advance of technology which made long-range, heavy-bombardment aircraft a reality.

During World War II, of course, technological developments continued to play an increasingly important role in aerial warfare. The development of heavier bombers and long-range fighters, the advent of electronic warfare (particularly radar), and the invention of nuclear weapons were technological developments which seemed to control the destiny of airpower and the future of warfare.

In the post-war era, the "invention of invention" made it seem that nothing was impossible, and technology could always get airmen higher, faster, and farther with more firepower.⁷ With their eyes always trained on the future, eagerly awaiting the next gadget produced by the technologists, it is no wonder that airmen, particularly American Airmen, have paid so little attention to the theory of airpower and to their doctrine. To many airmen, what happens tomorrow is important; what happened yesterday is irrelevant.

The American Experience

While a fascination with technology has contributed to the inarticulateness of airmen in general, there is yet another factor which has been a major contributor to the peculiar American doctrinal malaise: the unique American experience at war.

The American experience at war, at least since the Civil War, has been one of an embarrassment of riches. Blessed with abundant natural resources, a large population base, and an entrepreneurial spirit, the American industrial base grew quickly to world-class proportions prior to World War I and later outstripped all other economies by a wide margin.

As a result of economic and industrial dominance, the US armed forces have been able to drown their opponents in a sea of manpower, firepower, logistics, and technology. With the exception of the earliest days of a conflict when the United States was caught unprepared (an all too frequent occurrence in American military history), Americans since at least 1960 have fought from a position of greatly superior, sometimes overwhelming, strength.

To many Americans, victory was little more than a matter of marshalling superior resources, finding the enemy, and applying those resources. In short, the American way of war often resembled an engineering project. In the air, this was especially true. Airmen marshaled superior resources and superior technology, analyzed targets, and applied firepower—an engineering project in the air.⁸

The Consequences of Inarticulateness

In retrospect, what happened (or more correctly, did not happen) to American airpower doctrine was almost a foregone conclusion. As late as 1962, the USAF chief of staff stated that American airpower doctrine had remained almost unchanged since 1935,⁹ when the heirs of Billy Mitchell were putting the final touches to their strategic bombardment doctrine. American Airmen seemed confident and content with the prophecies of the airpower pioneers as the basis for their doctrine and placed convenient interpretations on their sometimes contradictory experiences.¹⁰

The Vietnam conflict ended the illusions of at least some American Airmen. A failed effort is much more difficult to interpret conveniently.¹¹ The years since the end of the American effort in Southeast Asia have been characterized by consternation, confusion, and a series of pusillanimous basic doctrine manuals that grew ever more remote from the harsh realities of war. Rather than establishing well-founded tenets of airpower, USAF basic doctrine mired itself in definitional arguments and platitudes, eventually producing in 1979 a basic doctrine manual which said virtually nothing about the employment of airpower. Although things have improved significantly since 1979, basic American airpower doctrine remains quite unremarkable.

Creating a Crisis

The doctrine development dilemma and its two underlying causes—limited airpower experience in combat and the failure of airmen to articulate airpower theory—have been present in the American airpower milieu, indeed in many air forces, for quite some time. Unfortunately, for the US Air Force, the chance confluence of at least six disparate factors has escalated the dilemma to near crisis proportions in the United States.

The Factors of Crisis

The first of these disparate factors, at least chronologically, is the disarray and confusion caused by the American experience in Southeast Asia. Long overdue research and analysis are now providing strong evidence that the American military (and particularly airpower advocates) can no longer place exclusive blame for the American failure in Vietnam upon the shoulders of the civilian leadership. Without going into details, suffice it to say that there was plenty of blame to go around. Further, it has finally begun to sink in that the kind of airpower (both in force structure and employment doctrine) appropriate to wage war against Warsaw Pact forces is not necessarily the kind of airpower needed to combat insurgent movements in the Third World.¹²

A second and closely related factor is the widespread realization that the kind of war in which the United States is most likely to become involved (at whatever level) is an insurgent conflict in the Third World.¹³ Much sweat and treasure have been expended by the United States and its allies to provide an effective deterrent to the worst-case scenarios involving nuclear conflict or large-scale conventional conflict. So-called low-intensity conflicts in the Third World are another story, rarely possible to deter with military forces, as witnessed by the large number of such conflicts now extant.

A third factor is generally expressed in terms of cost, but cost is not the most important military implication. Simply stated, combat aircraft have become *very* expensive. Cost escalation is not surprising and perhaps not even excessive when one considers the capabilities of modern combat aircraft and the fact that every new aircraft is pushing forward the leading edge of

technological capability. However, the soaring costs of these aircraft, coupled with rapidly escalating and competing demands for government funding, mean that few will be procured. As a result, modern air forces are just a shadow (in numbers) of those which led the Allied forces to victory in World War II.¹⁴ Granted, the aircraft are almost incomparably more capable. But the point is there are few of them, they cannot be produced rapidly, and attrition can be significant even in “small” wars against “unsophisticated” adversaries.¹⁵ Given that air assets are primary targets for early enemy attacks in a major war, and given the effectiveness of air-defense weaponry possessed even by Third World military forces, how long can American airpower or that of any of the Western powers endure significant attrition and still remain an important factor in the prosecution of a war of significant duration?

A fourth factor is the disarray (some call it a crisis) in the financial condition of the US government. Beset by budget deficits of staggering proportions and lacking the political backbone to either raise taxes or decrease spending, Congress implemented a plan to force automatic reductions in government spending if certain deficit reduction targets are not met. Unfortunately, these automatic reductions impact military spending with, in the view of some, disproportionate severity. Whether disproportionate or not, the upshot is that the halcyon days of sustained military budget growth which characterized the first Reagan administration are over for the foreseeable future. At the same time, some very expensive military projects are competing for funding that is ever more scarce.

Closely related to the budget crisis is a fifth factor, the perceived reduction of the Soviet threat. Whatever the genuineness of his motives, the stunning moves initiated by Mikhail Gorbachev have lessened Soviet-American tensions and given the impression to some that the Cold War is over. The euphoria of the moment has made it all the more difficult to find political support for many air weapon systems, particularly if they are of a strategic nature.

The sixth and final factor relates to the congressionally imposed drive toward jointness within the American military. Frustrated by what they perceived to be rampant service parochialism, competition, and the resultant failure to coordinate

weapon systems, employment doctrines, and strategies, Congress mandated more jointness, including the production of joint doctrines.

A Crisis in Confidence

Unless the doctrine development dilemma is somehow resolved, the lack of solid and convincing doctrine combined with the factors just discussed could readily lead to a debilitating crisis in confidence on at least three levels. To some degree, such a crisis is already building at each level.

First, at the level of Airmen themselves, in spite of their typical bravado there clearly is disagreement, confusion, and consternation. There has been a clear inability since the conflict in Southeast Asia to write meaningful basic airpower doctrine. This is not at all surprising considering the comparative lack of airpower experience in war, the expansion of the American experience into the confusing and confounding world of limited conflict and insurgent warfare, the lack of a unifying airpower theory propounded by experienced air leaders (or even substantial conflicting theories), and the perceived decline in the importance of the Air Force's traditional role of preparing for and thus deterring war with the Soviets. In this state of disarray, Airmen are asked to go to the negotiating table and hammer out joint doctrine with their land- and naval-force counterparts. This is not a situation that lends itself to a high degree of confidence.

At the interservice level, suspicions born of the inability of Airmen to develop and proclaim a convincing basic airpower doctrine can lead to considerable friction and a decline in mutual confidence. The Army has its AirLand Battle doctrine and the Navy has its Maritime Strategy (in reality, a doctrine), while Air Force doctrine is often perceived as either unconvincing or irrelevant—or both. All of this is added to the natural tension between soldiers and Airmen. Soldiers put a premium on direct air support of troops in combat, while Airmen emphasize what they believe to be more lucrative targets for airpower—targets that will affect the outcome of the war, not just an individual battle—which are often found at considerable distance from the fighting troops at the front.¹⁶

At the congressional level, there is growing concern over a number of proposed air weapons. Some congressmen, gripped with euphoria, believe that many weapons are no longer required because the Soviet threat is fading away. Others believe legitimate needs exist but see great difficulty in finding the monies to fund such projects, given budget deficit problems. The situation is exacerbated by the dilemma of producing a well-founded, believable doctrine that convincingly demonstrates the need for many of the weapons the Air Force has proposed for development and procurement.

Finding Solutions

Given the foregoing discussion, what approach must American Airmen take to resolve the doctrine dilemma and ameliorate the developing crisis in confidence? We can seek a possible resolution by first examining approaches to the several disparate parts of the problem and then turning our attention to the requirements that an airpower doctrine must fulfill in order to reverse the trend toward crisis.

The relative lack of airpower experience at war would seem to be an insoluble problem, short of inaugurating new conflicts to flesh out the historical database. However, Airmen can ease the problem through several actions. First, Airmen must come to value the importance of history. It is no accident that so many of the great captains throughout history were avid students of history.

But even taking full advantage of the available historical record may not provide a sufficient basis from which to draw generalizations confidently about airpower. There may, however, be a way to substitute for air experience. Airmen should consider seeking analogies for airpower in other methods of warfare. For example, guerilla tactics are analogous to many offensive air operations (dispersed forces massing temporarily to strike at vulnerable targets in hit-and-run operations); naval blockades are conceptually analogous (in purpose) to strategic bombardment; and many of the classical maneuvers of ground forces are analogous in their purposes to many of the classic missions of airpower. There may be much for Airmen to learn from analogous circumstances, perhaps providing valuable grist for the airpower doctrinal mill.

An appreciation for and study of the history of airpower is a necessary precursor to solving the second part of the problem, that of inarticulate Airmen. Understanding where airpower has been—its successes and its failures—may encourage some of the brightest Airmen to attempt development of a unified theory of airpower. Placing much hope in the emergence of a “Clausewitz with wings on his chest” is probably foolhardy. However, if knowledgeable Airmen can be convinced to write more, perhaps attacking just some small portion of the task; publish in the professional journals; and engage in constructive debate, then perhaps a consensus theory of airpower will emerge.

But writing is hard work, and exposing one’s ideas to critical analysis from all quarters is not for the faint-hearted. Therefore, incentives are required for those who contribute to the debate—or at least disincentives must be eliminated. This means that air forces as institutions must learn to value robust debate and criticism from within and learn to be more open to new ideas. The tempestuous upheavals and temporary embarrassment sometimes caused by such debate and criticism must be tolerated in pursuit of the longer-term and greater goal.

Writing the Doctrine

What are the requirements for a well-founded and convincing doctrine? Just what is it that all of the foregoing discussion must eventually produce? The first requirement, it would seem, is a return to the roots of airpower which analyses and delineates what makes airpower unique. It is the unique (rather than relative) qualities of airpower and the capabilities and limitations those qualities spawn which ultimately justify the independence of air forces and a distinct doctrine for the use of airpower.

The second requirement is to integrate the capabilities and limitations of airpower with the realities of warfare. Airmen quickly lose all credibility when extolling the virtues of airpower if those capabilities are not placed within the context of war and all its vagaries. To establish the context, doctrine writers must study and interpret the history and theory of warfare in general before considering the much more specific case of airpower application. Equally important, Airmen must address the entire spectrum of conflict.

The third requirement of a convincing doctrine is that it cannot be presented as a set of unsupported assertions, an unfortunate characteristic of USAF doctrine in the past. In effect, it must be supported either through the presentation of convincing evidence or irrefutable logic. Preferably, it will rest its case on both evidence and logic.

Notes

1. It is worth reminding readers that in the United States airmen remained shackled to the Army until after World War II. The American debate between airmen and soldiers was heated indeed. Gen William Mitchell, the firebrand spiritual leader of American airmen, became so discouraged that he took the case for airpower directly to the public through the press, an action which led to his court martial. All was not a bed of roses for the RAF either. As an independent service, it was saved by the skin of its teeth from Lloyd George's death sentence after the end of the Great War and still might have strangled for lack of funding had not RAF chief of staff Hugh Trenchard taken on the task of subduing Mohammed Abdullah Hasan, the Mad Mullah of Somaliland, in 1920. For a concise description of this era on both sides of the Atlantic, including the famous first meeting between "Boom" Trenchard and Billy Mitchell, see David Nevin, *Architects of Air Power* (Alexandria, Virginia: Time-Life Books, 1981), 15–79.

2. One indicator of the rapid advances in aircraft technology is the increase in speed of combat aircraft. In 1915, the Bristol Scout was the fastest fighter on the scene with a top speed of just over 160 kilometers (km) per hour. As early as 1917, at least five fighters had top speeds of over 200 km per hour, and two (the SE-5A and the Spad XIII) had top speeds well in excess of 220 km per hour. See Enzo Angelucci, *Rand McNally Encyclopedia of Military Aircraft: 1914–1980* (New York: Military Press, 1983), 37.

3. The RAF's air-control experience between the world wars has received considerable attention in the USAF, including a major research project briefed to very high command levels that envisioned using the concept of air control against very different kinds of adversaries in the nuclear age. See two College for Aerospace Doctrine, Research and Education Papers by Lt Col David J. Dean, *Project Control: Creative Strategic Thinking at Air University* and *Airpower in Small Wars: The British Air Control Experience* (Maxwell AFB, AL: Air University Press, 1985).

4. A number of personal conversations I had with prominent American air leaders from World War II are the basis for this interpretation. For example, the late Maj Gen Haywood S. Hansell, Jr., noted as the premier American planner in the strategic bombing of both Germany and Japan, remained convinced until his death that, if properly conducted, strategic bombing alone would have brought Germany to its knees. Gen Curtis E. LeMay, who commanded the B-29 forces that bombed Japan (and subsequently became the most famous commander in chief of the Strategic Air Command and later

chief of staff of the US Air Force), maintains vigorously that the surrender of Japan with major armies still in the field and without an invasion was proof positive of strategic bombing's decisive capabilities.

5. The fear of escalation was so strong in both the Korean and Vietnam conflicts that any serious thought of actually using airpower to its full potential (including the use of nuclear weapons) died a quick death. The Chinese intervention in Korea shocked American policy makers, making them acutely aware that escalation was indeed possible. Later the same fears of escalation dominated American policy in the Vietnam conflict. A glance through the so-called Pentagon Papers concerning US policy in the Vietnam War reveals an overwhelming concern about the possibilities of escalation and Chinese intervention. See Department of Defense, *United States-Vietnam Relations, 1945-1967* (Washington, DC: Government Printing Office [GPO], 1971). Some of the American military leadership clearly did not fully comprehend or agree with these fears and the resulting constraints on the use of military power in either conflict. Thus General MacArthur was relieved of his command during the Korean conflict, and many Vietnam-era military leaders blamed the debacle in Southeast Asia on timid political leadership.

6. Many senior officers of the RAF form a significant exception, among them Air Marshall Sir John Slessor, Air Vice-Marshall J. E. "Johnnie" Johnson, Air Chief Marshall Sir G. A. "Gus" Walker, Air Vice-Marshall M. J. Armitage, and Air Vice-Marshall Tony Mason. However, these are exceptions which test the rule, and the generalization stands.

7. The concept of the invention of invention has recently been advanced by the military and analyst-historian Martin Van Creveld. He notes that "at some point during the Industrial Revolution . . . a transition took place from a situation in which inventions were . . . exceptional . . . accidental and unexpected, to one in which technological change and the anticipation of technological change became the normal state of affairs." See *Technology and War* (New York: Free Press, 1989), 218.

8. The concept that the American way of war was to simply overwhelm enemies with superior resources was surfaced by historian Russell F. Weigley. Weigley claims the first American military leader to practice what became the American way was Ulysses S. Grant in his campaign against the forces of Robert E. Lee in Northern Virginia in 1864-65. Grant hammered Lee ceaselessly, inflicting losses which Lee and the Confederacy could not replace, and thus took full advantage of the Union's overwhelming superiority in the wherewithal of war. See Weigley, *The American Way of War* (New York: Macmillan, 1973).

9. Gen Curtis E. LeMay, quoted in Air Force Manual (AFMAN) 1-1, *Functions and Basic Doctrine of the United States Air Force*, 14 February 1979.

10. In the welter of controversy over the effectiveness of strategic bombing during World War II, American Airmen pointed to the US Strategic Bombing Survey and its comments about the overall impact of such bombing and to the surrender of Japan without invasion as proof of strategic bombing's worth. After Korea, Airmen (in fact most American military leaders) viewed that police action as an aberration never to be repeated.

11. Although it was difficult to rationalize the failure in Vietnam, American Airmen (as well as soldiers and sailors) tried valiantly. Some claimed there was no failure—the war was won militarily by the United States and lost either by the political leadership or by the South Vietnamese. Others admit there was a military failure, but believe that airpower could have brought the North Vietnamese to their knees if it has been turned loose in 1965 as it was in 1972 (the Linebacker campaigns). Although the issue is still very contentious, American Airmen seem less sanguine today about what airpower could have done had it been turned loose earlier in that forlorn war.

12. Over the past few years, considerable literature has appeared in the United States expressing this theme. Of particular importance is Mark Clodfelter's *The Limits of Air Power* (New York: Free Press, 1989). Written by a USAF officer, it is one of the most important books by a serving American officer in the past decade.

13. Although such conflicts are often officially ignored in open literature, the US government took a giant step toward admitting that these “wars of the third kind” could dominate the future with the publication of the report of the distinguished Commission on Integrated Long-Term Strategy. This blue ribbon commission included the likes of former Secretary of State Henry A. Kissinger, former presidential National Security Advisor Zbigniew Brzezinski, and retired chairman of the Joint Chiefs of Staff Gen John W. Vessey. See *Discriminate Deterrence: Report of the Commission on Integrated Long-Term Strategy* (Washington, DC: GPO, January 1988).

14. In 1990, for example, the USAF had just over 5,000 aircraft whose mission was to put fire and steel on target, that is, combat aircraft. These included combat aircraft assigned to the Air National Guard and Air Force Reserve forces. By way of comparison, if we look at just four of the most famous US aircraft in World War II (P-47, P-51, B-17, and B-24), we find that the combined production of just these four aircraft types totaled over 58,000. Total US military aircraft production from 1941 through 1945 was an astounding 297,866. (Angelucci, *Encyclopedia of Military Aircraft*, 256–261, 361.)

15. Of course, many of the supposedly unsophisticated adversaries are anything but unsophisticated when it comes to air defense, particularly ground-based anti-air assets. Two examples come immediately to mind. The first is the US experience in the Southeast Asia conflict, in which the USAF lost 2,257 aircraft due to combat and operational causes. This number excludes losses of Navy aircraft and Army helicopters. See Carl Berger, *The United States Air Force in Southeast Asia, 1961–1973: An Illustrated Account* (Washington, DC: Office of Air Force History, 1984), 369. The second example is the Soviet campaign in Afghanistan. Unfortunately, no confirmed and documented aircraft-loss figures are available at this writing. However, Soviet losses are suspected of being significant.

16. For a more complete explanation of the traditionally different points of view among soldiers, sailors, and Airmen, see my article “Joint Operations: The World Looks Different from 10,000 Feet” in part 3 of this anthology.

The Airpower Imperative

Hard Truths for an Uncertain World

The Soviets were very good enemies. Although they possessed threatening military power and were troublesome, often brutish, and always anxious to take advantage, they were also, in fact, conservative and usually predictable. They certainly gave the appearance of knowing and understanding the unwritten rules of international power politics. Accordingly, they did not directly threaten an obvious US vital interest after both superpowers peered into the nuclear abyss during the Cuban missile crisis. Indeed, since 1962 the so-called delicate balance of terror was neither very delicate nor (in retrospect) very terrible. In retrospect, there was a comforting degree of certainty in a bipolar world in which both sides had much at stake.

Today, the United States faces a fundamentally different situation. The Soviet Union has turned inward, far more preoccupied with internal economic, social, and political problems than with manipulations abroad. Soviet influence is dwindling throughout the world, crumbling with its failed ideology and collapsing economy. At the same time, the United States faces significant problems that dim the luster of “victory” in the Cold War. The most pressing are the multifaceted economic problems which threaten to undermine the foundation of American power and influence. Combined with the perception of a less threatening Soviet Union, the economic crunch will almost inevitably result in a reduction of the US military establishment—the Iraqi conflict notwithstanding. Overseas bases for US forces may well be an additional casualty. Forward deployment, a pillar of American Cold War military strategy, could become a thing of the past.

Although a mutual superpower policy of retreat from areas of possible confrontation is laudable, problems persist that do not portend well for the future. Without the calming and controlling influence of the superpowers, often ancient and always

Originally published in a slightly different form in *Strategic Review* 19, no. 2 (Spring 1991): 24–31. Reprinted by permission of the United States Strategic Institute.

bitter enmities may be unleashed. Without the restraint enforced by the superpowers, the ambitions of those formerly held in check may be unbridled. In short, a world not dominated by the superpowers may well be a very uncertain, unstable, and dangerous place.

Global Stability and Evolving Threats

US prosperity and security are intimately tied to global political and economic stability. The flow of raw materials, access to foreign markets, and free use of commercial trade routes are critical factors to the American economy. Instability may threaten all three, particularly if the United States is unable to respond effectively.

And so it is that the ongoing public debate concerning the future structure of the American military establishment is crucially important. Politicians faced with public euphoria over victory in the Cold War on the one hand and severe fiscal problems on the other may be stampeded into drastic reductions in military spending. If done hastily, mammoth spending cuts could go far beyond rational force reductions and destroy the American military infrastructure that surely will be needed in the future. The result would handcuff future American foreign policy makers, encourage assaults on American interests, and threaten the future prosperity and security of the nation. The downsizing and restructuring of the American military must be done with care and precision. A declaration of victory in the Cold War does not wipe away threats to American vital interests. Residual threats and new challenges will pose serious problems as the United States and the Soviet Union withdraw into their homeland fortresses.

The Nuclear Threat

As superpower tensions ease, nuclear arsenals will dwindle. But nuclear weapons and their delivery systems will not disappear from the Soviet inventory for at least two reasons. First, with the disintegration of the Warsaw Pact and the crumbling of the Soviet economy, the possession of a significant nuclear force remains one of the few Soviet claims to superpower sta-

tus. A major nuclear capability assures that their voice will be heard and increases the probability that it will be heeded.

The convoluted logic of nuclear deterrence also dictates that nuclear weapons will not disappear. The deterrent value of nuclear weapons resides in the mutual understanding that aggression will result in retaliation, causing unacceptable damage to the aggressor. In this situation, aggressors cannot calculate victory in any rational sense. However, if nuclear arsenals drop to a level at which retaliation would cause less than unacceptable damage, a potential aggressor might believe a tolerable victory is possible. Further, if the millennium arrives and nuclear weapons disappear altogether, the upshot might be only to make the world a stage for full-scale conventional war between the major powers. Such an unlikely return to the prenuclear age has little appeal to those who understand the prolonged bloodbaths of two world wars.

Beyond the superpower equation, there remains the problem of nuclear proliferation. Several of our allies, friends, and potential opponents openly possess nuclear weapons and capable delivery systems; still others are attempting to develop or procure such capabilities. The prospect that certain regimes might achieve nuclear capabilities can only be described as frightening. The potential for nuclear mischief cannot go undeterred.

Thus the hard truth is that a significant nuclear threat will continue, and the United States must retain a credible nuclear deterrent force. The force might well be smaller than the extant force, and its structure might change considerably. But the deterrent must continue to exist.

Persistent and Emerging Nonnuclear Threats

Forty-five years of focusing on the Soviet threat, both nuclear and nonnuclear, has led to a myopic condition that even today sometimes leads us to ignore the considerable threats to American vital interests from other quarters. In the postcontainment world there remain many very capable conventional military establishments serving regimes with interests often in conflict with those of the United States. The situation is made more threatening when such regimes harbor irredentist desires, conjure visions of greater grandeur and power, serve as vehicles of

personal ambition, or are driven by religious fanaticism that nearly defies understanding in the West. The danger is complicated further if such regimes do not understand the unwritten rules of international politics, or they reject the norms of international behavior.

Examples of potential adversaries with strong conventional forces abound. In the Middle East, the decisive defeat of Iraq ended only the most recently revealed threat to US interests. Other threats remain potentially dangerous, and new threats could quickly emerge in the aftermath of a crisis. In Asia, North Korea is armed to the teeth and continues to growl occasionally at its neighbor to the south. In Southeast Asia, Vietnam retains a large military establishment and pursues a meddlesome foreign policy. Other possibilities in other parts of the world come easily to mind.

There are many other significant military forces in the world which appear to be anything but a threat to the United States. But in the wake of events over the past year or two, who can predict our future adversaries and friends? We have all been witness to the speed with which international events can move and how rapidly and extensively the situation can change. Yesterday's evil empire becomes today's cooperative supporter. The converse is certainly possible.

Potential adversaries capable of fighting modern, high-tech warfare are not the limit of the American problem. Those we could oppose who are bereft of major military capabilities may resort to the tactics of the weak fighting the strong—guerrilla and terrorist operations. Further, those governments we support overseas may be faced with insurgencies which, by their very nature, combine the most troublesome aspects of guerrilla and terrorist operations with a sophisticated package of political, economic, and psychological operations—all based within the body politic of the nation under siege.

Unfortunately, conditions in many parts of the world (Latin America, sub-Saharan Africa, and much of Southeast Asia) provide fertile ground for insurgent movements. For a variety of reasons, the US government has supported both insurgent movements (e.g., Nicaragua and Afghanistan) and governments under siege (e.g., El Salvador and South Vietnam). Future American policy may require selective involvement in such conflicts.

The Meaning of the Threats

The hard truth is that the United States must retain a military establishment capable of deterring and/or prosecuting nuclear, conventional, and insurgent conflicts. The situation is made more complex by the fact that there is no longer a clear-cut "worst case" upon which to base the size, structure, and deployment of our military forces. Threats to American vital interests can come from any direction at any time.

Rapid response may be the key to deterring a threat, stopping a threat, or limiting the damage done by threatening forces. The recent struggle with Iraq provides a good example. Even the most rapid response might not have stopped the invasion of Kuwait, but knowing our ability and determination to react quickly might have led to second thoughts on the part of Iraq. In any event, the rapid deployment of forces to Saudi Arabia ended any Iraqi thoughts of marching farther into the oil fields of the Arabian Peninsula.

War plans, however, are traditionally based on warning time. Certain amounts of warning time are assumed, and all planned actions (and, to a significant extent, force structures) are based on the assumed warning time. Unfortunately, warning time is often recognized only in retrospect and by historians. Even if recognized, warning time can be quickly frittered away in the political decision-making process. The result is that for many contingencies, response time can be the critical factor.

Rapid response to far-flung threats will be made much more difficult if our present forward basing is reduced, as seems likely in response to our own economic problems and the diminished Soviet menace. As a result, US forces must be able to respond rapidly on a global basis, perhaps only from bases within the 50 states.

The Dominance of Airpower

In the final decade of the twentieth century, the American military establishment has focused its attention on jointness, in recognition (some believe long overdue) of the fact that modern warfare is three-dimensional. In a real sense, there is no such thing as the land war or the sea war or the air war. All

three are inexorably linked. Properly and cleverly conducted, combat operations in all three environments form natural synergies, the whole being much greater and more effective than the sum of the separate parts. Achieving these synergies is the essence of operational art, the subject of much attention in the professional military during the 1980s. This is not to argue that so-called independent operations (e.g., strategic bombing, deep interdiction, etc.) are not possible, effective, and perhaps even decisive. Rather, it is to say that even independent air operations are conducted in support of a broader strategic or operational-level plan. A case in point is the recently concluded Gulf War, which will be studied for some time as the epitome of joint warfare.

At the same time that jointness has come to permeate military thinking, it is also true that warfare in one of the dimensions has come to dominate the other two. After an 80-year maturation process, airpower now dominates modern warfare (note the term is *airpower*, not *Air Force*—the difference is significant).

The concept of jointness and the dominance of airpower are not contradictory. The dominance of airpower does not mean that surface forces operate only in support roles. By way of analogy, consider the domination of armored forces in many types of land warfare, which did not mean that infantry and artillery would be discarded or relegated only to secondary roles. Rather, it meant new modes of operation, new forms of combat teamwork, new ways of thinking about the operational art, and revised force structures. The analogy holds true for airpower, although some continue to doubt airpower's dominance—and for good reason. Airmen have too often promised more than they could deliver.

The use of airpower in World War I created a powerful vision among airmen, particularly those who would become known as the prophets of airpower—Douhet, Mitchell, Trenchard, and later, de Seversky. The potential for airpower to mass great power over any spot on the globe and to attack any portion of an enemy's power structure drove them to make outlandish claims. They promised quick and cheap victories in stark contrast to the bloody attrition battles of the Great War.¹ Unfortunately, the reach of the prophets exceeded their grasp as their visions far outstripped the available technology. Airmen have paid a heavy

price in credibility for the “too much too soon” promises of the prophets. Victory in war has been neither cheap nor quick. Armies and navies still play vital roles. They have not become obsolete, as predicted by some of the early airpower prophets.

On the other hand, the dominance of airpower has become ever more obvious as airpower has matured. Modern conventional armies have great difficulty operating in the face of strong, hostile airpower controlling the skies above the battlefield. Conversely, armies operate much more efficiently and effectively in conjunction with strong, friendly airpower.² This lesson has not been lost on surface forces, as demonstrated by the US Army’s adoption of AirLand Battle doctrine (and the possession of their own large, rotary-wing air force) and the importance of integrated organic airpower to Marine Corps air-ground task forces, both of which were tested in the crucible of the Gulf War.³

At sea, naval warfare has become naval air warfare. Navies have virtually become naval air forces with the aircraft carrier playing the role of the capital ship of the modern era. Other surface ships support the carrier. Only the submarine navy can argue with the dominance of naval airpower. But even in the silent service, a significant portion of the force, the fleet ballistic missile submarines, is a launching pad for airpower (i.e., ballistic missiles).

Airpower across the Spectrum

Conceptually, airpower occupies the new high ground in military operations; it dominates surface warfare both on land and at sea. Beyond these generalized concepts lie the more specific and dominating applications of airpower in the very different kinds of warfare across the spectrum of conflict.

Strategic Nuclear Warfare. Airpower is the sine qua non of strategic nuclear warfare. The marriage of atomic weapons and long-range airpower in the late 1940s seemed to bring the predictions of Douhet, Mitchell, and the other prophets to fruition. Doubts about the effectiveness of strategic bombing were lost in the mushroom-shaped clouds over Hiroshima, Nagasaki, and Bikini. For more than a decade, American war plans centered on the use of nuclear weapons in wars large and small.⁴

It was not until the late 1950s and early 1960s that a lonely few began to point out that nuclear weapons were of limited usefulness except as a deterrent against their use by others.

Regardless of the practical utility of nuclear weapons, virtually all conceptions of strategic nuclear warfare and its deterrence center on the delivery (or threatened delivery) of the weapons through the use of airpower—either manned aircraft or unmanned missiles. Although other means of delivery can be imagined, few appear practical. The central role of airpower in strategic nuclear warfare has remained, thankfully, untested. However, airpower in conventional warfare has steadily increased its utility and importance.

Conventional Warfare. The unique ability to mass great power over any spot on the globe means that airpower can dominate all three levels of conventional warfare. At the strategic level, airpower can attack directly the sources of an enemy's power, destroying his industrial infrastructure that produces the wherewithal of modern mechanized warfare. At the operational or theater level of warfare, airpower can disrupt, delay, and/or destroy the flow of forces and logistics long before they come into contact with friendly surface forces. Working in close cooperation with surface forces, airpower can wreak havoc on the enemy's campaign plan or provide the dominating element in friendly campaigns. Finally, at the tactical level, close support of surface forces can be a powerful if not dominating factor in the outcome of individual surface battles.

Low-Intensity Conflict. The dominance of airpower in nuclear and conventional warfare is nearly self-evident to the impartial observer. At the so-called low-intensity end of the conflict spectrum, many analysts doubt the efficacy of airpower. Unfortunately, wars of the third kind, as one frustrated observer called them, have become a semantic morass and conceptual enigma. Well-meaning but misguided officials and unofficial commentators have lumped everything ranging from normal international economic competition, peacekeeping operations, terrorism, and insurgencies (protracted revolutionary wars) to small conventional wars under the rubric of low-intensity conflict.

It is beyond the scope of this essay to bring order to the confusion and solve the enigma of low-intensity conflict. But it is

important to note that in the narrow military context, many of the most vexing conceptions of low-intensity conflict center on the problem of combating an enemy force that is using guerrilla tactics. Guerrilla tactics are designed to frustrate superior conventional forces through dispersion, hit-and-run operations, and individual mobility.

In such an environment, the superior firepower of conventional forces is thwarted by the refusal of the guerrilla forces to provide lucrative targets. In the air, such traditional missions as strategic attack and interdiction may be nearly impossible to conduct effectively. However, airpower can still be a dominant factor because it offers conventional forces one of their few absolute advantages over guerrilla forces. Only airpower, in its airlift role, can provide operational and tactical mobility superior to the mobility of the guerrilla. The reconnaissance capabilities of airpower can also provide important advantages. When guerrilla forces do mass to attack isolated conventional forces, airpower has the speed and range to respond with the firepower required to thwart the attack and inflict devastating casualties on the guerrilla forces. Properly used and coordinated with surface forces, airpower can be the key ingredient when confronting an enemy using guerrilla tactics.⁵

Airpower Choices

The two major subdivisions of modern airpower in the American context are land-based (primarily Air Force) and sea-based (Navy carrier) airpower. They are often depicted as archrivals of one another, thanks to the often rancorous budget battles waged in Washington. Indeed, parochial interests and restricted budgets have often pitted Air Force and Navy airpower against one another in heated bureaucratic battle, the so-called revolt of the admirals in 1949 being only the most infamous example. But outside the Beltway, in battle against real enemies, Air Force and Navy airpower can form natural synergies, the capabilities of one compensating for the limitations of the other and the whole being greater than the sum of the individual parts.

Carrier-based airpower has several advantages. Aircraft carriers can establish an imposing presence in troubled areas before the shooting starts and hopefully deter the shooting alto-

gether. The presence of a carrier and its supporting battle group can send a powerful and persuasive message ashore without firing a shot or risking a life. If a carrier is on or near the scene, carrier airpower can provide the fastest possible American military response. Carrier aviation requires no bases ashore in the operating area, a great advantage in many situations. Finally, because they require no facilities ashore in the operating area, carriers can pack up and leave at a moment's notice for whatever reason such movement might be required.⁶

The advantages of land-based airpower are even more numerous. Its inherent advantages in range make it possible to strike directly from the continental United States against targets anywhere on the globe (including those in areas very distant from any ocean) within hours—no steaming time is required to get within range. Furthermore, from such intercontinental distances, the bases used by land-based airpower would be nearly invulnerable to most potential adversaries. The inherent payload advantages of land-based airpower provide more “bang” per sortie on attack missions. Combined advantages in range and payload make land-based airpower the obvious choice for long-range, heavy airlift and high-density aerial refueling operations. Finally, even if vulnerable to enemy attack, the bases used for land-based airpower are very difficult to put permanently out of action.

The preceding discussion does not pretend to be an exhaustive exposition of the relative capabilities of land- and sea-based airpower. However, even from this limited presentation it is not difficult to imagine plausible future scenarios in which both types of airpower are required for success and work synergistically to achieve victory.

Policy Imperatives

The foregoing discussion leads almost inevitably to several conclusions about the imperatives of US policy in an uncertain, probably unstable, and certainly very dangerous future.

- The United States must have the military means to defend its far-flung vital interests around the entire globe. We can no longer concentrate on the obvious worst-case scenarios

that characterized a bipolar world. In the emerging circumstances, threats to American interests can be unleashed in every quarter by a variety of potential adversaries, some with significant military capabilities.

- The United States must have the military capability to deter and/or prosecute hostilities across the entire spectrum of conflict. Residual nuclear threats remain and new ones are emerging. Conventional threats, some formidable, abound. And many conflicts of the third kind—insurgencies and other struggles of the weak pitted against the strong featuring guerrilla tactics—are now ongoing throughout much of the world. Each class of threat across the spectrum is fundamentally different from the others and requires a distinctive force structure, specialized training and equipment, and unique combat employment techniques.
- The foundation of American military capability must be airpower. Airpower dominates warfare across the entire spectrum of conflict. It can provide a quick and powerful response to the most remote contingencies even if the United States no longer deploys its forces forward at overseas locations. This is not to argue that land and naval forces are unimportant. Quite the contrary. Warfare almost always is fought in three dimensions and rarely won in fewer than three dimensions. The argument is only that airpower is now the dominant element.
- The airpower foundation must be appropriately designed and structured. The complementary strengths and weaknesses of land- and sea-based airpower must be weighed against one another and an effective mix of these capabilities designed into the total force structure.
- Air and surface forces must be designed to complement one another both in their operations on the battlefield and in their ability to get to far-flung battlefields. The former requirement mandates increased emphasis on joint education and training as well as the ability to produce operational plans designed with the total campaign or theater perspective as the driving factor. The latter requirement mandates the design of surface forces that are air trans-

portable and the procurement of adequate and appropriate air-transport assets.

The president and Congress will make decisions over the next two to three years that will effectively determine the military force structure of the United States for at least the next two decades. At this writing, it is nearly certain that the American military will emerge from the decision process as a much smaller force. How effective this smaller force will be in supporting national security objectives depends, to a great extent, on the judiciousness of these decisions.

If the decisions are not based on the hard truths of our brave new world, the consequences could be disastrous. The lack of appropriate forces could effectively hamstring future policy makers, lead to the unnecessary expenditure of American blood and treasure in support of policy decisions, or lead to the defeat of our forces and our policies. These consequences simply are not acceptable. They are avoidable if we face up to the hard truths.

Notes

1. Of the airpower prophets, Brig Gen William "Billy" Mitchell was the most prolific writer. In addition to articles in influential periodicals, his three most influential books were *Our Air Force* (New York: E. P. Dutton, 1921); *Winged Defense* (New York: G. P. Putnam's Sons, 1925); and *Skyways* (Philadelphia: J. B. Lippincott, 1930). Gen Giulio Douhet was widely published but is best known for his seminal work *The Command of the Air*, published in Italy in 1921. According to Richard H. Kohn and Joseph P. Harahan in their preface to the 1983 reprint (Washington, DC: Office of Air Force History), translations of Douhet were available to American airmen as early as 1923. Maj Alexander P. de Seversky published extensively in popular magazines but is best known for *Victory through Air Power* (New York: Simon & Schuster, 1942), which in itself was partly based on previous writings in at least eight popular magazines. Gen Sir Hugh "Boom" Trenchard was a "doer" rather than a writer, and his influence comes through the examples he set. Mitchell, for example, admits to Trenchard's great influence on his thinking after he first met Trenchard in May 1917. Perhaps the best single exposition of Trenchard's views is contained in a memorandum he prepared in May 1928, one year before he retired as chief of staff of the RAF. Incidentally, Trenchard's nickname "Boom" had to do with his voice, not his views on bombing.

2. Although many clear-cut instances could be cited from World War II through the most recent conflicts, perhaps the best and best-known instance is the Allied advance across France after the breakout from the Normandy

beachhead in the late summer and fall of 1944. Total Allied dominance of the air ensured that the orderly retreat of the highly disciplined German army became, in many instances, a near rout. The close cooperation between the Ninth Air Force and 12th Army Group, particularly the fast-moving armored columns of Patton's Third Army, was a major reason Patton was able to move so rapidly toward Germany. See *Condensed Analysis of the Ninth Air Force in the European Theater of Operations* (1946; repr., Washington, DC: Office of Air Force History, 1984), 26–43. It is important to note that virtually the only German counterstroke in the West (the Battle of the Bulge) achieved its initial success in weather conditions that hindered Allied air support. One of the keys in finally stopping the German thrust and turning it into a crushing defeat was the arrival of better flying weather and Allied dominance of the skies. For an outstanding analysis of air-ground synergies in more recent campaigns, see Lt Col Price T. Bingham's *Ground Maneuver and Air Interdiction in the Operational Art*, CADRE Paper 89-2 (Maxwell AFB, AL: Air University Press, 1989).

3. The Army is very direct and emphatic about the importance of airpower, noting in Field Manual (FM) 100-5, *Operations*, May 1986, that “the control and use of the air will always affect operations; the effectiveness of all operations in fact can decide the outcome of campaigns and battles,” 4.

4. Following the Korean War and extending throughout the decade, the United States used a major portion of its defense expenditures to create a very large atomic-airpower force structure and, as a result, sacrificed other military capabilities. In January 1957, Secretary of Defense Charles “Engine Charlie” Wilson made US policy very clear in testimony before Congress: “We are depending on atomic weapons for the defense of the nation.” As for small conflicts that did not directly threaten the United States, Wilson went on to say, “Our basic defense policy is based on the use of such atomic weapons . . . in a smaller war, if such a war is forced upon us.” House of Representatives hearings, *DOD Appropriations for 1958*, quoted in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907–1960* (Maxwell AFB, AL: Air University Press, 1989), 459.

5. A wealth of literature is available on the use of airpower in low-intensity conflict. In 1963 the RAND Corporation published the results of an international symposium on the subject, summarized in A. H. Peterson, G. C. Reinhardt, and E. E. Conger, *Symposium on the Role of Airpower in Counterinsurgency and Unconventional Warfare: A Brief Summary of View Points* (Memorandum RM-3867-PR) (Santa Monica, CA: RAND, March 1964). For a more recent interpretation, see Philip Anthony Towle, *Pilots and Rebels: The Use of Aircraft in Unconventional Warfare, 1918–1988* (London: Brassey's, 1989).

6. Although carrier-based aviation has many inherent advantages, its utility may be limited when facing strong land-based aviation with its inherent advantages in range and payload. This would be particularly true in the narrow waters of the world where there is limited maneuver room for carrier battle groups. The danger to the surface forces in such situations can be extreme. Note, for example, the damage done to the British invasion fleet by

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the Argentine Air Force operating at the absolute limits of its range during the Falklands War and the damage done to the USS *Stark* (during tanker escort duty in the Persian Gulf during the Iran-Iraq War) by a single Iraqi aircraft in spite of the sophisticated defensive systems on the US ship.

New Technology for a New Air Force

Hopefully, I can convince you that the history of aerial warfare and the doctrine that has evolved from that experience is not only important to your work, but indeed is central to the direction your work should take. Historians will argue that new technology for a new Air Force, the title of this talk, means little without putting both technology and the Air Force in the proper context and perspective. That, it seems to me, is the job of the historian.

Let me begin by looking at the most recent display of air-power technology in action. Desert Storm was a gratifying demonstration of the technology that you and people like you have developed, particularly over the past 20 years. Much attention has been lavished on the success of such modern wonders as the stealth aircraft and the incredible accuracy of precision-guided munitions, and this attention is altogether fitting and proper given their sterling performance in the heat of battle. But in reality, the aerial victory in Desert Storm was the result of much more than our superior technology. In reality, the aerial victory in the Gulf War was due to the confluence of three separate streams of development—experience, technology, and doctrine. Let me address each of these in turn.

The first stream is experience. Unlike land and sea forces, airmen do not have a rich historical record from which to draw their war-fighting lessons. Military aviation is only about 80 years old, the first bomb being dropped in anger by an Italian aviator in the Libyan Desert in 1911. The early and inconclusive experiences in World War I, the often bitter experience of World War II, the disillusioning experience of the Korean Conflict, and the confusing experience of the Vietnam War were absolutely necessary for American Airmen to learn how to wage aerial warfare across the spectrum of conflict. These experiences provided invaluable insights in how to structure, train, equip, and use airpower. In my opinion, without the seasoning

This address was delivered to the Air Force Systems Command, Vulcan's Forge Conference, 3 December 1991.

of this experience, even the finest and most advanced technology might have yielded only marginal results over Iraq and Kuwait.

The second stream of airpower development is technological. Rather than zero in on particular technologies or particular weapon systems, it is more useful for our purposes to view the technological development of airpower in the broadest perspective. From the very beginning, certain things hindered airmen in their attempts to turn the prophecy of airpower's decisiveness into war-winning reality. Among these hindrances were lack of adequate motive power, lack of lifting capacity, limited range, limited altitude, the need for greater speed and more maneuverability, and the multifaceted difficulties of delivering munitions with precision from aerial platforms. Even Mother Nature seemed to conspire against airmen, for two of the greatest challenges faced by airmen were bad weather and the dark of night.

But over the years, your efforts and the efforts of your predecessors created technologies which stripped away most of these hindrances, peeled away the problems, and left airpower with its prophetic essence—the ability to dominate warfare. It is not much of an exaggeration to say that modern airpower can carry almost any load, almost any distance, under almost any circumstances, and deliver that load with great speed and mind-boggling precision. The prophecies of Douhet, Mitchell, Trenchard, and de Seversky have become today's reality. Airpower can now dominate warfare. Notice I said that airpower *can* now dominate warfare. *Can* is the operative word here. Experience and technology are not enough. Something must bring the wisdom of experience together with available technology to produce airpower's dominance. That something is doctrine, the third stream of airpower's development.

Doctrine has a good many definitions, both official and unofficial. A good informal description is that doctrine represents what we have learned about war in general and aerial warfare specifically. In a conceptual sense, it ties together experience and technology. The result is guidance about the best way to wage war.

Airpower doctrine has gone through a good many phases in its development. Occasionally we were led down the garden path by our doctrine, and we discovered that our doctrine was

based more on myth and wishful thinking than upon research and honest evaluation. At times we have virtually ignored our doctrine—this was particularly true in the confusion that followed in the wake of our involvement in Vietnam. But beginning in the late 1970s, right here at Air University, a renaissance in military thinking and doctrinal development began to take shape. The result was radically reformed curricula at the Air War College and Air Command and Staff College and the establishment of the Air Force's own blue-suit think tank, the Airpower Research Institute. The renaissance came to full flower this year with the completion of a radically reformed Air Force doctrine created here at Air University and the formation of the new School of Advanced Airpower Studies, a graduate-level school devoted only to the study of warfare and the role of airpower in warfare.

It was these three streams of development that came together in Desert Storm—experience across the spectrum of conflict, enabling technology, and a clear conception of how best to apply airpower. The result was a war won before the land forces began to move and a war in which airpower both dominated and was decisive in virtually every sense of that often misused word.

But how does all of that relate to the development of new technology for the new Air Force? I maintain that if you examine our doctrine, you will find clues as to the kinds of technologies we will need in the future. Just as doctrine guides our employment of airpower, it can and should also guide the development of airpower. Let me give you a few examples of often overlooked but critically important technologies, the need for which can be found in our doctrine.

Our doctrine says very clearly that one of the most efficient and effective ways to attack an enemy air force is to catch the enemy on the ground, packed together on an air base. We have many well-known examples of this, including George Kenney's raids on the Japanese in the Southwest Pacific, the 1967 Arab-Israeli War in which the Egyptian Air Force was crippled in the first hour of the struggle, and the shelter-busting campaign in the Gulf War. Again and again the lesson is clear—catch the enemy on the ground and you can destroy him en masse at minimum risk to you. But why is this true, and what does it mean for those who develop our technology?

It is true for two reasons. First, aircraft, unlike almost all other weapon systems, are virtually helpless when not in their operating environment, that is, when they are not aloft. Aircraft on the ground cannot defend themselves and are rather fragile structures. They are vulnerable to almost every conceivable kind of attack—everything from sophisticated air raids to hand grenades thrown by Asians wearing black pajamas.

That last reference to the Vietnam War was very purposeful. In that struggle, more Air Force aircraft were lost to the action of enemy sappers than were lost in air-to-air combat (96 versus 67), and nearly as many were lost to sappers as were lost to the vaunted North Vietnamese surface-to-air missile system (96 versus 110). It is no wonder, then, that we spend so much effort in providing defensive shelters for these vulnerable aircraft. But, as Desert Storm revealed, even the most sophisticated shelters are no match for high-tech precision weaponry.

The second reason why catching the enemy's aircraft on the ground is a good idea is that on the ground is where most aircraft spend most of their time. For a variety of reasons, most combat aircraft spend most of their time on the ground even during intense operations. Refueling, rearming, and repairing combat aircraft take time. Crews need rest or fresh crews need to be provided. Aircraft with limited capabilities will be on the ground at night or when weather prevents operation. In short, for a good number of reasons, aircraft spend most their time on the ground. And on the ground is where we plan to attack an enemy air force if at all possible. But more important to us at this meeting, on the ground is where an enemy will probably plan to attack our aircraft. My suggestion should now be obvious. We need to develop the kinds of technologies that will decrease the threat to our aircraft on the ground. There may be a good many roads to this goal. Perhaps we need better aircraft shelters, although the concept of what we might call fixed fortifications has not yielded satisfactory solutions to military problems since the Middle Ages. Perhaps we should think in terms of designs which would mean far less time on the ground for aircraft—faster refueling and reloading systems, less preventive maintenance, longer mean times between component failures, and so on. Perhaps we should think of aircraft that can be more easily dispersed, hidden, and camouflaged and do

not require long runways for takeoffs and landings. Again, there may be many technological roads that would lead to the same ends.

The vulnerability of aircraft on the ground becomes an even more important issue when we think about the dwindling numbers of airframes that will be available in the future. The vastly increased capabilities of modern aircraft, combined with their enormous cost, dictate that fewer and fewer will be purchased and available for use. Consequently, the loss of every aircraft—especially losses on the ground—is magnified in importance. That leads me to another example of the types of things we should be thinking about for our future—things that come right out of our experience and our doctrine. *Numbers do count.* Our weapon systems do indeed have incredible capabilities, and thus fewer are needed to accomplish any given task than in the past. But numbers still count. There will still be attrition—perhaps even significant attrition. Multiple contingencies may arise which could stretch our resources to the limit. We cannot allow our resources to dwindle to the point that there becomes a question as to what we would dare put them at risk over. I'm struck that having only 15 B-2 bombers would raise such questions. Having fewer than 100 B-1s may have already raised the question.

The major factor in the decreasing number of weapon systems we purchase is their cost. Worse, as the costs rise, we begin to see what might be called a self-fulfilling prophecy. As Air Marshal Ray Funnell, chief of staff of the Royal Australian Air Force, expressed to me on a recent visit, the escalating cost of first-line air weapon systems is pricing our friends out of the market. Without foreign sales, production runs become shorter, and unit costs can be forced even higher. Further, there are also serious international political and policy ramifications to the cost problem. Our friends and allies may be forced into a second-class air force status. This in turn may lead to a higher probability of US intervention to bolster less-than-adequate allied military organizations.

The point of all this is the need to seek ways to produce aerospace weapon systems more economically. In itself this is probably not a difficult task. But combined with the requirement to be on the leading edge of rapidly changing technologies, the task becomes prodigious, but probably not impossible. Have we, in fact, turned our best scientific and engineering talent

loose on the problem of cost control from concept and design right through the manufacturing process? Perhaps we have, but have we given these cost factors the proper priority? I don't know—but I do know we must do something to get a handle on the problem.

The list of problems gleaned from our doctrine at which technologists should be looking is quite large. Let me mention just a few others in quick passing.

Flexibility is a basic tenet of airpower. Airmen don't want aircraft that can perform only one mission. Airmen also don't want aircraft that can perform many missions but because of design compromises, perform none of them in a superior manner. Can technology help us here, perhaps with aircraft that can quickly be transmuted under difficult field conditions?

Simplicity is another fundamental of military theory, first codified by Clausewitz 160 years ago and still valid today. I argue that it is just as important to military technology as it is to military theory. An airpower example quickly comes to mind. It takes years for a pilot to learn to fly and then to master his or her aircraft. Can we simplify the aircraft or the interfaces between the aircraft and pilot to speed up the mastery of pilot over aircraft? The thought strikes me that Bill Gates at the Microsoft Corporation is making millions doing just that sort of thing for computers with his Windows software—simplifying the interface between personal computer users, application software, and computers. If Bill Gates can make it easy for me to use a computer, there is hope of simplifying, streamlining, and condensing the process of pilot mastering an aircraft.

Insurgent warfare, or what one observer called “wars of the third kind,” is a major concern of our doctrine and our national military strategy. Insurgent wars are the most likely conflicts we will face in the future. Typically they are wars in the Third World, in very primitive areas, in impoverished states with almost no military infrastructure. Airpower can be very important in these kinds of struggles and in the economic and social development of these states even without a war of the third kind.

However, if airpower is to be a dominant element in these struggles, we need to be able to provide these nations with combat-quality aircraft which are rugged, require very little support infrastructure, need very little maintenance, and are

so cheap that either impoverished Third World states can afford to buy them or we can afford to give them away in military aid programs.

This talk was not meant to be a catalog of the kinds of technologies we need in our future. Rather, these have just been examples that can be found through the study of our doctrine. If my list had been a tasking, I am sure you would have thrown up your hands at the impossibility of it all. After all, what I have called for is a massive fleet of aircraft that never have to spend time on the ground, can be transfigured from the world's best air-to-air fighter to the world's best heavy bomber, are simple to fly, and are so cheap we can give them away. That is a tall order!

No, that was not my purpose at all. My point has been that those concerned with our future technologies—each one of you—should look to the past and to what we have learned about the application of airpower over the past 80 years. And what we have learned can be found in our doctrine. Doctrine embodies the experience of the past but looks to the future for what should be. And that is what we are concerned with here—what should be.

So we again arrive at the sometimes strange juxtaposition of the future and the past, of doctrine and technology, of historians and scientists. That, I suppose, is how it should be. After all, much of military history is the story of the struggle to use technology successfully, the story of overcoming the enemy's technology, and the story of preparing technology to wage the next war.

Airpower in the New World Order

Speculation, like talk, is cheap. We can speculate about the future, but no one knows the shape of things to come. Yet speculation has been rampant in this era of enormous apparent change. In the realm of international power politics, the questions and speculation have run the gamut from the obvious (e.g., is the demise of the Soviet threat real and permanent, or will it just be replaced by similar threats from the newly independent but potentially powerful states in the Eurasian heartland?), to the revolutionary (e.g., will supranational organizations dominate the future, signaling the demise of the nation-state as the primary actor in international power politics?). These questions and speculations, along with many others, are interesting and provocative. But they are of little help to those charged with providing for the common defense except to indicate that the United States desperately seeks something solid on which to anchor its security policy.

The provocative questions and speculations reemphasize two essential truths with which military planners must wrestle. First, international politics are very volatile. The perceived constancies of the Cold War obscured this truism, but it has resurfaced in our thinking because of the rapidly unfolding and unforeseen events of the last five years. Second, military decisions concerning force structure are long-term decisions. They require years (sometimes decades) to implement and similar time periods to undo once in place.¹ Given that international politics determines the employment of military forces, this long-term/short-term dichotomy presents a true dilemma for national security strategy; that is, how does one make long-term military force-structure planning decisions based only on short-term political guidance?

The anxieties raised by the planning dilemma are even more acute for Airmen, made so, strangely enough, by the success of airpower in the Gulf War. In that struggle, airpower came of age in the sense that technology and technique finally caught up with doctrine and prophecy. The prophecies of the airpower pioneers finally came to fruition. It now seemed that airpower

Originally published in a slightly different form as an Army War College Strategic Studies Institute monograph (Carlisle Barracks, PA: Army War College, May 1993).

could dominate modern mechanized warfare and could be the decisive factor in such armed struggles. But success has led to controversy among Airmen as to the most profitable roles for airpower (an internal roles and missions controversy) and between Airmen and surface warriors about overall US force structure and the concept of jointness.

All these questions, speculations, dilemmas, and controversies make the overall problem of developing national security strategy for the new world order problematic. In terms of airpower, we can simplify the problem by reducing it to three basic questions. First, who or what is the enemy? Second, flowing from the first, what will be the role of airpower in meeting the enemy's challenge to US interests? Third, flowing from the first two questions, what must Airmen do to prepare for that threat? These three questions form the framework for the discussion that follows.

Who or What Is the Enemy?

The "who" question has bedeviled the American military establishment since the fall of the Berlin Wall in 1989. It came to even greater prominence with the dissolution of the Soviet Union. The identity of the threat had been the central and controlling element in US force-structure and force-sizing decisions since at least 1945. It was an easy and seemingly logical approach to the national security problem when we knew—or thought we knew—who threatened and where the threat was greatest.²

But it was also a simplistic approach that, in many respects, led the United States astray on occasion. While the United States focused on the Soviet Union as the primary adversary and Europe as the most important potential battleground during the Cold War, over 100,000 Americans died in several armed conflicts, none of which directly involved the Soviets and none of which were in Europe. In at least one case the identification of the Soviets as primary enemy and the Eurocentric fixation led to the development of forces, capabilities, and strategies ill-suited to a shooting conflict in which the United States became involved (i.e., Vietnam).

The problem with tying long-range defense decisions to a particular enemy is that such a policy ignores the inherent vol-

atility of international politics—a volatility to which the incredible changes since 1989 bear witness. Only the most ardent optimists predicted the imminent collapse of the Soviet Union, and no one imagined that it would disintegrate so rapidly and, to this point, peacefully. Many might have predicted in the late 1980s that the United States would be at war in the Middle East in the early 1990s, but not against Iraq (Iran was the big worry), not in coalition with the Syrians (an erstwhile adversary), and not with the tacit blessing of the former Soviet Union. This demonstrated unpredictability reinforces the notion that defense policies cannot be based on the enemy of the moment. The identification of an enemy provides only short-term guidance for decisions with long-range implications.

Who is the enemy? is the wrong question. A better question, one that leads to more viable policy options over a longer term, concerns *what* threatens. In other words, with what might the US military be forced to deal in the future? This definitional question seems, at first blush, to be even more puzzling than the identity of an adversary. But in practical terms, there is an answer that provides long-term guidance for our military policy and strategy.

In the modern era and particularly in the twentieth century, we have identified and experienced three kinds of warfare so fundamentally different that they generally require different strategies, force structures, weaponry, training, and tactics. They are so different from one another that we cannot approach them with the same mind-set. Each differs from the others in ways ranging from the conceptual to the technical. Each has its own purposes, control mechanisms, centers of gravity, operational methodologies, and measures of effectiveness. In short, the answer to the “what threatens” question is nuclear, conventional, and insurgent warfare.³

The US military will have to deal with these three levels of warfare in the future. Although the Soviet Union has disappeared, its nuclear arsenal has not. A nuclear threat remains, and probably will remain, no matter who owns the weapons. Further, the increased probability of nuclear proliferation may add significantly to the problem. In terms of conventional warfare, a number of nations could raise significant mischief while threatening important US interests. Insurgencies, protracted revolutionary war-

fare in the underdeveloped and developing world, appear to be the most likely, if not most directly threatening, kind of conflict the United States will face in the future.⁴

Although nuclear, conventional, and insurgent conflicts are the three fundamentally different kinds of conflict with which the US military must be prepared to deal, there are countless variations on these three themes. Further, there are numerous important military functions in situations short of war (drug interdiction, humanitarian relief, rescues, raids, peacekeeping, and the like) which will also task the capabilities of the military establishment. But for the most part, these tasks short of war simply make use of the equipment and techniques developed for war.⁵

Approaching the national security problem from the direction of what threatens rather than who threatens provides considerable long-term guidance for military planners. First, and most obviously, it would seem that the United States must have forces capable of dealing with all three kinds of warfare. Some might argue that we will, as a matter of policy, not let ourselves be involved in certain kinds of warfare. Those decisions are, however, not the province of the military. Rather, they are the province of the political leadership reacting to the volatility and vagaries of international politics. The military's job is to be prepared to meet the challenge if called upon.⁶

Second, this approach allows policy makers to develop flexible approaches to force size regardless of the perceived enemy of the moment. Such was the experience of the British in sizing their fleet in the decades prior to World War I. The British two-power standard, developed in 1889, provided a rationale for the size of the fleet and for adjusting fleet size over time, regardless of a perceived enemy. The two-power standard called for a British fleet equal to the next two largest fleets combined regardless of who owned those fleets.⁷ This policy recognized the volatility of international politics and the long-term nature of military decisions. Similarly, approaching the problem today from the point of view of what threatens rather than who threatens would allow the United States to make policy decisions that bridge the gap between short-term political developments and long-term military realities.

What Is the Role of Airpower?

Although our strategic vision of the future is obscured by uncertainty, we can be relatively certain that the US military must be prepared to deter and/or prosecute nuclear, conventional, and insurgent wars in their many variations. Further, and perhaps more likely, the military will be asked to deal with contingencies short of war that rely on the military equipment, forces, and techniques developed for open warfare. Given the relative certainty about this part of our future, what will be the role of airpower?

During its brief 80-year combat history, the role and importance of airpower have been hotly and passionately debated issues. The visions of the early airpower prophets (Douhet, Mitchell, Trenchard, de Seversky) and the claims of their disciples often fell short of the mark in the crucible of war. To many nonairmen, the history of airpower is a trail littered with broken promises. The strategic bombing campaigns in World War II, Korea, and North Vietnam all yielded results that, for a variety of reasons, lacked the decisiveness promised by the airpower prophets. In other air missions, interdiction for example, the reality of results in combat often has not lived up to the sometimes grandiose predictions of latter-day Airmen.

Often missed in the heat of the detailed and technical debates is the simple truth that since 1911 airpower has rapidly and consistently become ever more important and central to success in war. Airpower visionaries were too far ahead of their time. Airmen needed technology and experience to match their prophecies and doctrines. The experience came the hard way in North Africa, Europe, the Pacific, Korea, and Vietnam. The technology came steadily and rapidly, peeling away the problems that had plagued airmen since the beginning of powered flight.⁸

In Desert Storm, airpower finally came of age. The prophecies of the airpower visionaries were, in most respects, more than fulfilled. Technology and experience had finally caught up with airpower doctrine. Airmen demonstrated that they could mass great power any place and attack any facet of the enemy's power structure. More importantly, Airmen demonstrated that they could attack these targets with great precision and do so around the clock. The air campaign blinded and paralyzed the

Iraqi command structure and made it nearly impossible for the Iraqis to support and sustain their deployed forces. Finally, airpower systematically and methodically attacked the hapless Iraqi forces in the field with devastating physical and psychological results. Although the peculiar circumstances and setting of Desert Storm were nearly ideal for the employment of airpower, this notion should not cloud the fact that airpower has become an essential ingredient in almost every form of warfare in almost any setting.⁹

Airpower is the *sine qua non* of nuclear warfare. Although one can deliver nuclear weapons by other means, in practicable terms, any large-scale employment of nuclear weapons will almost certainly continue to rely on aerial means of delivery. The future may see the prevention of nuclear weapons proliferation rival the importance of traditional concepts of nuclear deterrence. In this regard, deterrence might well include preemptive strikes on nuclear production facilities to prevent the development of nuclear arsenals—following the model of the Israeli air raid on Iraqi nuclear facilities in 1981 and the early air attacks, again on Iraqi facilities, during the Gulf War. One would assume that future contingency operations of this sort would also rely on airpower. In many, if not most, cases, airpower would be both the instrument of choice and the only force capable of such missions.

In conventional warfare, airpower has become and will almost certainly remain a dominating factor. Only airpower can attack directly the sources of enemy power, the links between those sources and deployed forces, and the deployed forces themselves. On land, modern conventional armies have great difficulty operating in the face of strong, hostile airpower controlling the skies above and behind the battlefield. Land forces operate much more efficiently and effectively in conjunction with strong, friendly airpower. At sea, airpower has become the centerpiece of naval warfare, and the aircraft carrier is still the acknowledged queen of the fleet.

In insurgent warfare, the impact of airpower is not nearly so self-evident, for several reasons. First, the duality of insurgencies—the equal importance of the military and nonmilitary struggles in classic insurgency strategy—dilutes the impact of all military efforts including airpower. Second, on the military

side of an insurgency, the guerrilla tactics used by insurgents are designed to minimize lucrative targets for the massive firepower that the government forces can bring to bear, including aerial firepower. Third, and most important, the US military in general and Airmen specifically have all but ignored the subject. Compared to other forms of war, few resources and little thinking have been turned to the subject of defeating well-run, classical insurgencies.

Even without the kind of in-depth analysis of counterinsurgent strategies that we might desire and require, the importance of airpower in the military portion of counterinsurgency struggles is significant. Airlift and air reconnaissance provide important advantages for counterinsurgent forces. Further, airpower may be the only choice to provide quick-response firepower when guerrilla forces mass to attack isolated friendly forces. Finally, the contribution of airpower to psychological operations can be very significant.

It seems clear to this observer that airpower will remain the key ingredient in the three fundamentally different kinds of wars with which the military may be forced to deal in the new world order. Of equal importance is the trend toward creation of Fortress America as public opinion and fiscal constraints draw down the forward deployment of US forces. This trend toward withdrawal will magnify the importance of airpower.

The United States cannot, of course, withdraw from the world. Whether or not the United States retains significant forces deployed overseas, the nation will continue to have important, perhaps vital, interests in nearly every corner of the globe. Surely at some time in the future, these interests will be threatened, and military action may be required. In such situations, time is often of the utmost importance, particularly reaction time. Unfortunately, warning time often turns out to be something only historians can identify, or it is wasted in prolonged decision making. In either case, reaction time becomes crucial. Only airpower can bring great power to bear anywhere on the face of the globe in a matter of hours.

This is not meant to denigrate the power-projection capabilities of sea power and the new littoral war strategy of the US Navy. Three things are worth noting in that regard. First, naval power projection centers on airpower—naval airpower. Second,

every crisis will not necessarily be within easy reach of Navy and Marine forces. Third, even if a crisis is located conveniently for the application of naval power, US naval forces cannot be everywhere at once, particularly with the fleet reductions we now expect. It is worth noting that the first significant forces on the scene in Saudi Arabia at the onset of the Gulf War were Air Force fighter aircraft and airlifted Army troops. Both flew directly from the continental United States.

Most of these notions about the importance of airpower in the new world order are reflected in the Air Force concept of Global Reach—Global Power. An important white paper issued by the Secretary of the Air Force articulates this concept and provides an extensive catalog of airpower capabilities that will certainly be of paramount importance in the post-Cold War world if our regionalized national security strategy is to succeed.¹⁰

What Must Airmen Do Now?

The rise of airpower, in all its forms, to a dominating position in most forms of warfare has been one of the most significant military trends of the twentieth century. However, much remains for Airmen to do, and the new USAF basic doctrine addresses those challenges. In chapter three of that doctrinal manual, the concept of *airmindedness* is presented as a challenge to every Airman.¹¹ *Airmindedness*, a term coined by General of the Air Force Henry H. “Hap” Arnold, refers to rethinking traditional concepts of warfare in airpower terms.¹² The *airmindedness* plea seeks to make modern warfare three-dimensional rather than two-dimensional with an airpower annex.

As Airmen face the future, four distinct challenges would seem to fall under the rubric of developing *airmindedness*. The first is to develop new ways of thinking about airpower. The second is to develop new synergies with surface forces. The third is the technological challenge—where to direct research and development efforts. Finally, the fourth and perhaps greatest challenge is to develop a sense of *airmindedness* among nonairmen.

New Visions of Airpower

The first order of business for Airmen is to redevelop their own vision of airpower in light of the newly demonstrated capabilities of airpower and the experience gained over the past 80 years. The Gulf War demonstrated that the vision of the airpower prophets is finally a reality. Technology has conquered most of the factors that had previously hindered the application of airpower. Technology has made possible the prophetic essence of airpower: an enemy is now vulnerable everywhere all the time. Range, lift capacity, speed, navigation, the dark of night—those and most other limiting factors have been dramatically reduced. What does this mean to our vision of airpower and our vision of waging war?

Of special interest is the success of precision-guided munitions. The new generation of air-delivered munitions gives a whole new meaning to the word *precision*. World War II “precision” bombing required fleets of bombers delivering thousands of “dumb” bombs to accomplish what a few well-placed precision-guided munitions could have accomplished had they been available. In a sense, modern guided munitions have redefined the principle of mass for Airmen. What does this mean for our visions of airpower and warfare?

Redeveloping the vision of airpower and its use in war may bring forth important new concepts for the conduct of air campaigns. One such concept was suggested, almost by accident, by the conduct of the air campaign in the Gulf War. Allied planners developed a four-phased air campaign. However, allied airpower was so overwhelming, thanks in large part to round-the-clock operations and the success of precision munitions, that all four phases quickly overlapped and were executed nearly simultaneously. The effect on the Iraqi capability to conduct operations was devastating.

Simultaneous or parallel operations may signal a whole new way to think about the structure of air campaigns. In the past, Airmen have thought about the classic missions of airpower (counterair, strategic bombing, interdiction, battlefield air interdiction, close air support, etc.) as operations often independent of one another. In other words, Airmen have thought about the elements of an air campaign in horizontal mission slices. The

mission-slice or horizontal mind-set was most evident in the fiercely independent nature of the strategic bombing campaigns in World War II, the either/or controversy between the “oil plan” (purely strategic) and the “transportation plan” (interdiction) for bombing Europe in 1944, and in the Operation Strangle interdiction bombing operations in both Italy in World War II and later in Korea. Except for the counterair mission, which was essential to all the other missions, Airmen often regarded each mission only in its own light—as a horizontal mission slice, rather than a slice of the much larger integrated air campaign.

Thinking about airpower in horizontal mission slices was logical when the most pressing problem of Airmen was to mass sufficient resources to accomplish the mission. The worst mistake Airmen could make was to dilute the available resources across too many targets or mission areas. Now with precision munitions redefining mass and round-the-clock delivery of those weapons a practicable reality, it may be time to think about air campaigns integrated vertically. Vertical integration—the simultaneous, coordinated, and integrated execution of strategic, interdiction, and other air missions—could build synergies that would make air campaigns far more effective than they have ever been in the past.

One cannot leave the subject of new airpower visions without discussing the future of space operations. The most important need in this area is to integrate fully space capabilities and plans with traditional air and surface operations. Space operations are so different and thus so specialized technically that it has been very difficult to develop understanding between those directly involved with space programs and those involved with air and surface warfare. Further, the extraordinary blanket of secrecy that has surrounded most space-based programs has made full understanding all but impossible. The task then must be to break down the barriers and expand the operational synergies.

Vertical integration of air campaigns and expanded space-operations synergies are only two examples of what might develop as Airmen redefine their vision of airpower and develop a greater sense of airmindedness. The important point is that Airmen must think through the ramifications of airpower’s newfound maturity. Just what does it now mean when an

enemy is vulnerable everywhere all the time? The answer to this question may well shape the future of warfare.

New Visions of Joint Operations

Beyond developing a new sense of airmindedness in the modern era is the question of bringing the mature capabilities of airpower to bear in joint operations. What new opportunities for working in cooperation with surface forces arise from the newly proven capabilities of airpower? The answer to this question will not likely emerge fully until both Airmen and non-airmen develop an appropriate sense of airmindedness. However, at least one concept emerges from the airpower capabilities demonstrated in Desert Storm, particularly from the performance of precision munitions and the ability to deliver those munitions around the clock.

One of the major problems encountered in inserting airborne forces behind enemy lines has been that these light forces do not have the heavy firepower required to survive in the heart of hostile territory. It would seem now that with control of the air, airpower can provide the heavy firepower airborne troops require and provide it around the clock with accuracy equaling or exceeding that of heavy surface weapons. Perhaps for the first time, airborne forces will be able to fight on equal terms with heavy enemy forces deep behind enemy front lines.

Such a synergistic mating of air and ground forces could yield two results that could change the face of air-land operations. First, it could create a theater of operations with no real front lines. No matter how strong the enemy's deployed ground forces, they would be forced to fight at the times and places of our choosing. The ability to insert, support, and operate forces at points of our choosing expands the notion of making the enemy vulnerable everywhere all the time. Combined with other portions of the air campaign, such airborne operations could actually make almost any forward deployment of enemy forces a disadvantage. Attempting to hold territory in such a situation could be a disastrous strategic mistake for the enemy.

The second possible result of this synergistic mating of air and ground forces is more difficult, but worthy of investigation. The ability to insert and support airborne troops leads to the

possibility of seizing important targets rather than destroying them from the air. In most cases, the military result would be the same. But in some cases, the postwar political result could be vastly improved.¹³ After victory on the battlefield, it could be politically advantageous simply to switch electric power back on rather than rebuild power plants or simply to reopen key bridges, factories, and airfields rather than rebuild them.

Both air and surface forces must also learn to build synergistic maneuver schemes. For example, coupling sweeping surface maneuvers with air interdiction can place an enemy on the horns of a terrible dilemma. If the enemy leaves concealed and fortified positions to meet the ground maneuver units, airpower can wreak havoc on those maneuvering elements, creating the kind of "highway of death" witnessed near the end of Desert Storm. If the enemy elects to remain hidden and fortified in fear of destruction from the air, the surface maneuver will progress unopposed with equally disastrous results for the enemy. Clearly, there is much work to be done in the area of joint maneuver operations.

The final priority for thinking about joint operations in the era of mature airpower is in the arena of insurgent warfare. So called low-intensity conflict has become a quagmire of misperceptions and misinterpretations. The military and self-anointed civilian experts have managed, at one time or another, to dump into this mire everything from basic types of warfare (i.e., insurgencies) to tactics (e.g., terrorism, guerrilla operations). As a result, insurgency, one of the three fundamental kinds of warfare, has received relatively little attention. The problem is perhaps typified by the equation of insurgency and counterinsurgency with special operations in the minds of many. This observer is certain that the special operators who played such an important role in Desert Storm would dispute that equation.

The truth is the entire US military has done little thinking about insurgent and counterinsurgent warfare. Many Airmen have been particularly reluctant to address these complex subjects because they assume airpower will not play an important role. This attitude begs the question of how one knows airpower will play a minor role when we have done so little analysis and have given so little thought to the subject. This attitude also ignores how important airpower is to any surface operation and

how useful airpower has been in these kinds of struggles in the past. Clearly, Airmen must work with surface warriors to develop effective counterinsurgent strategies. Further, and equally important, both air and surface forces must work with nonmilitary elements to develop comprehensive counterinsurgent strategies.

The Technological Challenge

To an extent exceeding any other kind of armed power, airpower depends upon superior technology to achieve its ends. It is, after all, a technological gadget that gets mankind into the air. The problems that have plagued Airmen over the years had technological solutions. This is not to denigrate the importance of superior doctrines, clear-headed strategies, and clever tactics. Rather, it is to highlight the critical importance of research and development programs to the future of airpower. The technological challenge is crucial.

The downsizing of US military forces and the shrinking budget monies available for research and development will magnify the importance of decisions about technological development. Put in terms of the military reformers of the 1980s, quality will have an even more important role in offsetting the declining quantity of US weapon systems. The key question is, Where should Airmen put their research and development efforts? The answers, it seems, lie in two areas: ongoing programs that might be more clearly thought of as acquisition programs (although research and development continue), and programs that are more clearly in the research stage.

If the drawdown of US forces overseas continues, long-range aircraft of two types will become even more important to the ability of the United States to project power quickly. As amply demonstrated in Desert Storm, long-range transport aircraft are the key to the rapid deployment of forces when response time is a critical factor. At the same time, the ability to put fire and steel on target very quickly will increase the importance of the long-range heavy bomber. Both of these concerns are reflected in current Air Force programs to develop and procure the C-17 transport and the B-2 stealth bomber.

A third airpower priority program, currently progressing toward the acquisition phase, reflects a basic truth of airpower:

although airpower can now do many things and can be the dominating influence in war, nothing works in or from the air without control of the air. The first priority is always control of the air. Thus the Air Force continues its quest for state-of-the-art air superiority weaponry, as most recently expressed in the development of the F-22 fighter.

The C-17, B-2, and F-22 programs are, of course, ongoing—perhaps more in the acquisition mode than the research and development mode. So the question remains, Where should Airmen put new research and development dollars to work in the future? Three areas would appear to offer the greatest benefit in terms of increasing the effectiveness of airpower: all-weather systems, targeting systems, and intelligence systems.

Although technology has stripped away most of the problems that have plagued Airmen since the Wright brothers took to the air, weather remains a problem, particularly the ability to deliver munitions with great precision in heavy weather. This is a nagging problem that deserves top priority if Airmen are to achieve the full potential of airpower. Airmen also need precision targeting systems that are more useful in certain difficult ground environments. Although the concept of making triple-canopy jungle transparent seems far-fetched at present, so did precision munitions just a few years ago.

Finally, we come to the subject of intelligence, and the problems are both technological and organizational. Military leaders always desire more and better intelligence, and many of the answers to these desires may be technological (e.g., better sensors, artificial intelligence, computer analysis). Military leaders also need more responsive intelligence, that is, intelligence synchronized with operations. Late intelligence is worthless. Shortening the intelligence processing cycle may have some technological solutions (e.g., systems to deliver target intelligence directly to the cockpits of enroute aircraft) and also some organizational solutions (e.g., the organization and management of the diverse intelligence-gathering organizations). Whatever the solutions, the truism that “airpower is targeting and targeting is intelligence” continues to carry great importance.

Airmindedness and Nonairmen

The most difficult problem Airmen must solve is how to develop a sense of airmindedness among their brethren who serve in the surface forces. There are enormous cultural obstacles to overcome as well as service pride and parochialism. Surface warriors understand the importance of airpower in relation to surface operations. The task for Airmen is to develop in their brethren the airminded view that the importance of airpower goes far beyond those traditional missions and may, in fact, change the way we think about warfare itself. The world does indeed look different from 10,000 feet.¹⁴

Surface warfare has historically been bound in a two-dimensional world. Operations were and remain sequential in nature—typically, first, defeat the fielded enemy army; second, push the enemy back until, third, the enemy's centers of gravity are threatened (prompting surrender), or fourth, the enemy's centers of gravity are destroyed (forcing collapse). Modern airpower changes all that by making the enemy vulnerable everywhere all the time. No longer are sequential operations required, and the sequential mind-set may actually not only hinder the application of airpower, but also limit the development of synergistic air and surface operational concepts.

To many surface warriors, however, the demonstrated potential of airpower and calls for a sense of airmindedness are little more than old wine in new bottles. The “far too much, far too soon” promises of the early prophets of airpower and their disciples and the perceived trail of broken promises and unfulfilled expectations form a powerful barrier to a sense of airmindedness. The stunning success of airpower in Desert Storm may have convinced some doubters. However, many remain unpersuaded, noting that the environment in which the Desert Storm operations took place was almost ideal for the application of airpower and that the Iraqis never really challenged the coalition for control of the air.

Developing a sense of airmindedness among nonairmen may be the biggest, most difficult, and most important challenge for Airmen. To do so, Airmen will have to overcome much tradition, many ill feelings, mutual distrust, cultural roadblocks, and

strong parochialism. But success is vital if the US military is ever to fully realize the potential of three-dimensional warfare.

Conclusion

What is the future of airpower in the new world order? In short, it appears to be robust. There is no evidence to suggest that the 80-year trend of increasing airpower importance in military operations will abate. There is considerable belief in some quarters that the newfound maturity of airpower as an instrument of warfare will accelerate the trend.

Some in the military may regard this prospect with considerable anguish. Indeed, they may regard the rise of airpower as a zero-sum game. But the increased and increasing importance of airpower does not signal a decline in importance for surface forces. Rather, it opens new possibilities for the most effective use of armed force and projects new roles for air and surface forces. At the same time it demands the rethinking of force structures, command and control arrangements, and operational concepts. Most importantly, the maturation of airpower demands that the US military develop a three-dimensional paradigm of warfare.

On a broader scale, although there is much uncertainty and speculation about the future, there remain certain constants. First, the millennium has not arrived. Second, the US military must prepare to deter or prosecute the three fundamentally different forms of warfare. To ignore this requirement is to repeat the mistakes of the past and put the future in peril.

Notes

1. This is most apparent in three areas: weapon-system development and procurement, leadership development and education, and training. Modern weapon systems often take a decade or more to progress from research to full operational capability. Even discounting research and development, modern high-tech weaponry often cannot be produced rapidly even in an emergency. Educating military officers in the complexities and vagaries of modern war is a time-consuming task. Seasoning those officers for effective performance in combat is even more time consuming. As for training, consider that it takes two years to train a combat pilot to minimum combat proficiency. One should also note that even the lowly infantryman now uses weapons of such sophistication that extensive training is an absolute requirement.

2. The best-known attempts over the past few years to wrestle with the problem of an ambiguous enemy driving US military policy are the "base force" concept developed by the DOD and a competing vision developed by Rep. Les Aspin, chairman of the House Armed Services Committee. For details of the base force concept, see the *National Security Strategy of the United States* (Washington, DC: White House, August 1991) and the *National Military Strategy of the United States* (Washington, DC: Government Printing Office [GPO], January 1992). The Aspin proposal is discussed in some depth in "An Approach to Sizing American Conventional Forces for the Post-Soviet Era," by Representative Aspin (unpublished paper, released to the press on 24 January 1992).

3. To illustrate the fundamental nature of the differences between nuclear, conventional, and insurgent warfare, it is instructive to build a matrix. Place the three types of war on one axis and several of the basic parameters of warfare on the other axis (purpose, operational methodologies, centers of gravity, measures of merit, and methods of control are particularly instructive parameters). Defining the various intersections on the matrix reveals: (1) we know virtually nothing about nuclear warfare save its enormous destructive potential, and it is these unknowns that make nuclear warfare so fundamentally different, and (2) insurgent warfare essentially takes the time-honored basics of conventional warfare and stands them on their collective ears.

4. These concepts are expressed in both the *National Security Strategy* and the *National Military Strategy* (see n. 2 above). Interestingly, they are also referenced, with particular emphasis on so-called low-intensity conflict, before the fall of the Berlin Wall in *Discriminate Deterrence*, a report developed by the Commission on Integrated Long-Term Strategy (Washington, DC: GPO, January 1988).

5. These functions short of war are presented in the new USAF basic doctrine as standard tasks for airpower. Air Force Manual (AFMAN) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, March 1992, vol. 1, 3 and vol. 2, 51-62.

6. Even if not directly involved in such conflicts, the military may be called upon to assist in terms of training, provision of equipment, advisors, and so forth.

7. The British two-power standard originated in the 1889 Naval Defence Act, when the principal pretenders to the supremacy of the Royal Navy were the navies of France and Russia. Later, of course, Germany's rising naval power became a concern. Concerning Germany, the first sea lord told the cabinet in 1902, "It is an error to suppose that the two power standard . . . has ever had reference only to France and Russia. It has always referred to the two strongest naval powers at any given moment." Quoted in Paul Kennedy, *Strategy and Diplomacy, 1870-1945* (London: Fontana, 1984), 139.

8. For the reader interested in tracing the development and growing importance of airpower, a number of general and specialized histories are available. Among the former are Herbert Molloy Mason, Jr., *The United States Air Force: A Turbulent History* (New York: Mason/Charter, 1976); and James L. Stokesbury, *A Short History of Air Power* (New York: William Morrow & Company, 1986). Among the specialized histories, consult Lee Kennett, *A History of Strategic*

Bombing (New York: Charles Scribner's Sons, 1982); Richard P. Hallion, *Strike from the Sky: The History of Battlefield Air Attack, 1911–1945* (Washington, DC: Smithsonian Institution Press, 1989); and Benjamin Franklin Cooling, ed., *Case Studies in the Development of Close Air Support* (Washington, DC: Office of Air Force History, 1990). Another excellent reference focusing on the post-World War II era is M. J. Armitage and R. A. Mason, *Air Power in the Nuclear Age* (Urbana, IL: University of Illinois Press, 1983).

9. Two of the more complete and authoritative published works on air-power in the Gulf War are Richard P. Hallion, *Storm over Iraq: Airpower and the Gulf War* (Washington, DC: Smithsonian Institution Press, 1992); and Gary Waters, *Gulf Lesson One—The Value of Air Power* (Canberra, Australia: Air Power Studies Centre, 1992). The most complete treatment is found in the five-volume *Gulf War Air Power Survey*, sponsored by the Secretary of the Air Force (Washington, DC: Department of the Air Force, 1993).

10. US Air Force, *Global Reach—Global Power: The Air Force and US National Security*, White Paper (Washington, DC: Department of the Air Force, 1990).

11. AFMAN 1-1, *Basic Aerospace Doctrine*, vol. 1, 15–16 and vol. 2, 209–18.

12. See Henry H. Arnold, "Third Report of the Commanding General of the Army Air Forces to the Secretary of War," 12 November 1945, 70.

13. Coalition air forces received considerable criticism (in hindsight) for destroying Iraqi electrical power facilities and other such targets. The destruction of these targets, in the view of critics, had little to do with the Iraqi defeat and caused thousands of civilian deaths after the war because vital civilian services were not available. One of the most vocal critics was William Arkin of the Greenpeace organization, who made headline news in his 8 January 1992 media briefing in which he expanded upon his view of these subjects. For excerpts see *Inside the Air Force*, 17 January 1992, 16–20.

14. For an expanded discussion of the cultural differences between soldiers, sailors, and Airmen, see my essay "Joint Operations: The World Looks Different from 10,000 Feet" in part 3 of this anthology.

Recasting the Flawed Downsizing Debate

A New Approach for the New World Order

Everyone has an opinion about the proper size and structure of the US military in the new world order. No one, however, has been able to build a consensus among the key decision makers or the public at large. The maneuvering opened when, after the Berlin Wall came down, the military proposed a 25 percent force reduction and a new base force organizational scheme.¹ The plan received generally high marks as both workable and practical. In the wake of the subsequent collapse of the Soviet Union itself, Rep. Les Aspin and others have branded the proposed reduction as too timid and out of touch with the new world order.

Representative Aspin bases his vision for the future military on operations equivalent to Desert Storm, Just Cause, and Provide Comfort. Each of these equivalents is an interpretation of the size and structure of forces that led to quick success in, respectively, the Gulf War, the Panama Invasion, and the Kurdish relief effort following the Gulf War.² Although a novel concept, Aspin's vision has also received considerable criticism.

Other participants in the national debate have more radical force reductions in mind. This is particularly true of those who envision the so-called peace dividend as a panacea for the multitude of social and economic ills plaguing the nation.

The core issue in the debate is the disappearance of our long-standing principal adversary, the Soviet Union. As a result, the military has been under pressure to identify other threats and produce theoretical scenarios which would justify future force structures. This approach is doomed to failure in the current political environment by those who will brand all potential threats and scenarios as either too pessimistic or outlandish, self-serving fantasy.

The truth is, the simplistic identification of a principal enemy—the foundation of Cold War military policy—simply does not work

Originally published in a slightly different form in *Parameters: Journal of the US Army War College* 23, no. 1 (Spring 1993): 39–48.

in the new world order. It is a systemically flawed procedure based on assumptions that consistently proved wanting even during the Cold War. Further, the vain search for an enemy has so dominated the defense debate that important issues which should affect the debate have been all but ignored.

What follows is an explication of the flaws in the traditional method in defense decision making, a proposal for a more rational approach, and a discussion of hidden issues which have run aground in the shallows of the current debate.

Flaws in the Old Order

What is wrong with identifying the enemy, the traditional first step in the defense decision process? The answer is two-fold. The first flaw is that such an approach seeks short-term guidance to solve a long-term problem. International power politics are volatile. Yesterday's adversary becomes tomorrow's ally and vice versa. On the other hand, building a competent and effective military organization is a long-term process often extending over decades. Modern armies, navies, and air forces are extraordinarily complex organizations that require considerable time to fashion into effective fighting forces.

Consider, for example, that it requires two years to train a pilot to *minimum* combat proficiency in modern, high-tech aircraft. Minimum combat proficiency does not easily translate to victory and generally results in very high casualty rates. Consider the lowly infantryman who, unlike his counterpart in earlier wars, now must master and use some of the most sophisticated equipment imaginable—satellite-based positioning systems and night-vision systems, for example. The days in which we could simply put a carbine in an infantryman's hands, give him some target practice, and send him off to war have long since passed.

Consider the amount of time it takes to build modern weapon systems. Even discounting research, development, and procurement time lags (sometimes stretching over a decade), sophisticated aircraft, ships, and tanks simply require a great deal of time to produce. With the decline in our industrial base, even in an emergency we could not produce these weapon systems with the speed and numbers we might have earlier associated with industrial mobilization.

Finally, consider the time required to educate and season military leaders—both commissioned and noncommissioned officers. War is as much a mental struggle as a physical contest. Educating military officers in the complexities of modern warfare is a time-consuming task. Seasoning those officers to lead forces in battle effectively and confidently or plan complex military campaigns requires even more time. If this corps of officers does not already exist when the fighting starts, there will be precious little time to produce these leaders.

All of these factors—training, education, procurement, and seasoning—compound the time problem. They explain why it took more than a decade to build from the “hollow force” of the mid-1970s to the robust force the United States fielded in Desert Storm.

On the other side of the equation is the enemy we identify. Predicting who will be tomorrow’s adversary or where and when the civilian leadership will commit military force is a risky business. We were not very successful making these predictions even during the Cold War, when we were confident we had accurately identified the enemy.

Consider the following examples. As little as six months prior to the outbreak of hostilities in 1950, no one in a position of authority, including the secretary of state, seems to have considered that we might be drawn quickly into a war against North Korea.³ In 1958 few imagined that within a decade over half a million Americans would be fighting the North Vietnamese and Vietcong. Who could have imagined in the late 1980s that we would shortly be involved in a major shooting war against Iraq, whom we had supported in its war against Iran, and join a coalition with Syria, a long-time political adversary?

Many of these examples took place during the height of the Cold War, when we had a clearly defined enemy (the Soviet Union) and had assumed from the beginning that the critical flash point was in Europe. We should remember that beyond the two “hot” wars the United States fought during the Cold War (Korea and Vietnam), we also used or threatened to use force in the Straits of Formosa, Lebanon (twice), Grenada, Panama, and Libya, to name but a few examples. Further, we nearly came to blows with our British and French allies over their invasion

at Suez in 1956. None of these situations directly involved the Soviets and none were in Europe. So much for predictions.

The second flaw in the old order for defense decision making is that identifying the enemy promotes worst-case planning based on faulty assumptions. Such was the case during the Cold War. With the Soviets identified as the enemy, the United States built a military establishment to deter or defeat the worst possible case—a nuclear confrontation or an invasion of Western Europe. That was a natural and logical policy. However, implicit in the policy was the general assumption that if prepared for the worst case, we were automatically prepared for lesser cases.⁴ The war in Vietnam demonstrated that our military must also be prepared for *different* cases, not just lesser cases. Although possessing far superior technology and firepower, we were woefully unprepared for the kind of war waged in Vietnam.

Predicting the long-term adversaries of the United States is a difficult, if not impossible, proposition. Moreover, it is a dangerous exercise in that it may leave us unprepared for the kind of conflict actually encountered. The United States needs a longer-term strategy that considers both the unpredictability of international politics and the full range of threats we might face. The key to this strategy is *what* the United States will face rather than *who*.

Defining the Threat

Even in the face of a very uncertain future, we can say with great confidence that the United States military must be prepared to deal with three fundamentally different kinds of warfare.⁵ Each requires its own strategy, force structure, operational methods, equipment, and training. The generalized (and clearly oversimplified) descriptions of these kinds of warfare that follow illustrate their fundamental differences.

Conventional Warfare

Americans are most familiar with conventional warfare. In this century, the Gulf War, the various Arab-Israeli wars, the Korean War, and both world wars were good examples of conventional warfare. What did these very different conflicts have

in common? Operationally, they emphasized large unit operations and a heavy reliance on firepower. Maneuver was based on the mechanized mobility of large units. As with all conventional wars, strategies revolved around perceived centers of gravity of the antagonists.⁶ Both sides in each struggle deployed and maneuvered their forces to defend their own centers of gravity and to attack those of the enemy. Each of these struggles continued the trend present for at least the past two centuries in the western world: strategy, operations, tactics, and technology designed to bring an enemy's centers of gravity under attack faster and more effectively. The military objective in conventional warfare is to bring the struggle to a quick and decisive conclusion.

Insurgent Warfare

Insurgencies are wars of the weak against the strong—those out of power against those in power. They are revolutionary civil wars generally fought for total political control of the state in question. Although there are many insurgent strategies, they all have much in common, and they all turn conventional strategies on their collective ears.⁷

Insurgencies use a sophisticated mix of political, economic, psychological, and military operations to drain support away from the government and build support for the insurgents. The military portion of the mix often plays only a supporting role, and therein lie both a dilemma and an advantage. The insurgent needs to win *either* the nonmilitary or the military struggle to achieve total victory. The government must win *both* the military and nonmilitary portions of the struggle.

Time is a key weapon for the insurgent. Rather than providing quick victory, insurgencies are protracted affairs. Every day that the insurgency survives heaps more discredit upon the government. The very survival of an insurgency provides the impression that the government is not in control of its own destiny.

On the military front, guerrilla tactics are the norm for the insurgent because the insurgent generally cannot compete directly with the military forces of the government in power. Guerrilla tactics dictate that insurgent military maneuvers must be

based on the mobility of the individual soldier rather than the mechanized mobility of large formations.

The most important difference between insurgent and conventional warfare is that the centers of gravity for both sides are the same—the population of the nation under siege. Insurgents cannot survive without significant support from the people nor can the government. This fact brings into question the basic military strategy of attacking the enemy's center of gravity by putting fire and steel on a target.

Nuclear Warfare

Though the threat of superpower nuclear confrontation has significantly subsided, nuclear weapons will not cease to exist, and thus their threatening nature will continue. Many have postulated that the spread of nuclear weapons to new potential antagonists will only heighten the threat.

Nuclear warfare is fundamentally different from other types of war on at least two counts. The first is the potential destruction that could result from the detonation of even a single nuclear weapon. As a result, the declared policy of the United States for nearly 50 years has put the deterrence of nuclear warfare as the first national security priority.⁸

The second fundamental difference between nuclear warfare and all other forms of conflict is ignorance. There has never been a nuclear war, at least not as we now think of nuclear war. We have no empirical evidence as to what might happen once the first nuclear detonation takes place. Can escalation be controlled? What would constitute victory? What would bring the enemy to his knees? Why would one use such weapons, given the potential risks? For these and a thousand other questions ranging from the grand strategic to the tactical, we have no evidence and no answers, only opinions.

Even more troubling is the notion that traditional concepts of deterrence may not apply to some new members of the nuclear club. The Soviet Union was a very good enemy in its day. Deterrence concepts seemed to work. Will they work against nations who may have much less to lose or may be motivated by religious, ethnic, or nationalistic fervor only dimly understood in the West?

Using the Defined Threats

Armed with a definition (rather than identification) of the three fundamental threats with which our military forces may be forced to deal, we can begin to estimate the size and kinds of forces we will need. The volatility of international power politics dictates that the most rational approach is to look at each of the problems we may face (conventional, nuclear, and insurgency) and the forces extant in the world that could pose a problem *no matter who possesses those forces*. The key is what, not who, may cause the problem in an uncertain future.

This approach is not new. Before World War I, the British sized their fleet, which they considered crucial to the maintenance and defense of their global empire, using a similar process. The British policy was to maintain a fleet equal in size to the two next largest fleets combined.⁹ One can argue whether this was a prudent decision. But it was an approach that recognized political volatility. The British policy also recognized that military decisions, particularly those involving navies, are decisions for the long term. Finally, the two-power standard provided a logical rationale for adjusting the size of the Royal Navy over time, based on something more than temporary budgeting problems or passing political whims.

A similar example can be found in the construction of the Washington Naval Treaties negotiated during the 1920s. In those instances, the great naval powers established size ratios for their respective navies without reference to specific enemies.¹⁰ Again, whether ultimately successful in their purpose or not, those ratios provided a rationale for force size without regard to current enmities. The point is, of course, that rational decisions for the long term have been and can be made without regard to clearly perceived specific threats. That process, however, still leaves the question of the decisions themselves. What guidelines should the United States use to develop a modern version of the British two-power standard? Some guidance can be found in the issues not yet influencing the public debate.

The Hidden Issues

The shallowness of the debate and its misguided focus on threat identification have prevented discussion of several cru-

cial issues that bear on the problem. These hidden issues fall into four broad categories: time, structure, quality, and consequences.

Time

Time is the most precious of all commodities. Once squandered, it cannot be reclaimed. This is particularly significant to defense policy for at least two reasons. The first has to do with the peculiar nature of American democracy. Americans have traditionally viewed war as an aberration in human affairs. As a result, there has often been a reluctance to respond to growing threats. A prime example of this phenomenon took place in 1941 when the world was already in flames. The Germans had overrun western and central Europe. The Soviets reeled under the Blitzkrieg. Axis troops rummaged around North Africa and threatened to make the Mediterranean Sea their private lake. Passage through the North Atlantic was hotly contested. In the Pacific, Japan continued its endless war in China and made threatening noises toward the entire Pacific region. Even in the face of these obvious threats, the United States House of Representatives managed to pass a renewal of the Selective Service Act by only a one-vote margin. Just over two months later, the Japanese struck Pearl Harbor.

With the demise of the Soviet threat, there is the distinct possibility of slipping back into the kind of myopia that gripped much of the nation before World War II. It would be foolhardy to base our military preparedness on the assumption that future threats will present themselves unambiguously and that they will conveniently provide a reluctant democracy with enough time to build sufficient forces. Strategic warning is often a mirage—lost in the background noise of world affairs, ignored for a variety of reasons, or frittered away in the often laborious decision-making processes of the US government. Response time is the crucial element, and the ability to respond in time can be heavily influenced by the size and structure of standing armed forces.

The problem of recognizing a building threat and mobilizing the political will to meet that threat is magnified by the time-related problems discussed earlier. Effective military forces can-

not be designed, built, procured, trained, and educated quickly. A standing force made too small, a shrunken defense-industrial base, a reluctance to recognize an emerging threat, and a prolonged decision to react could combine to give an aggressive adversary an insurmountable lead in military capability. The results could be catastrophic. Time, in all its ramifications, must remain a central element in the defense decision-making process.

Force Structure

How the United States constructs the future force is at least equal in importance to the size of the future force, but there is precious little discussion of structure in the current debate. At least two major factors should influence force-structure decisions. First, any decision must consider the three fundamentally different kinds of warfare that will likely confront us in the future. The strategies, tactics, weapons, training, and organization appropriate for one type of warfare are not necessarily appropriate for the other two. The sweeping maneuvers of heavy armored forces would be of little use against insurgents using hit-and-run guerrilla tactics in jungle areas. Nuclear-tipped intercontinental ballistic missiles would have limited impact on the conduct of conventional or counterinsurgent operations.

The second factor influencing force structure is geography. The United States is essentially an island nation with few threats to its territorial integrity. But the United States has far-flung national interests reaching into virtually every corner of the world. No one can predict which of those interests might become so important in future that, when threatened, they would warrant the use of military force.

At the same time, it now appears the mood of the American body politic requires retrenchment to Fortress America or something close to it. If that comes to pass, future employment of American arms will be in far-off places, which would require massive and rapid deployment efforts. An expeditionary armed force—one not reliant on forward prepositioning of troops and equipment—must be highly mobile and quickly transportable and have large amounts of high-speed, long-range air and sea lift. Further, it should be able to put fire and steel on targets

quickly and over extreme distances to discourage, slow down, or possibly defeat an adversary or to prepare the battlefield for other forces being deployed.

Future force structure is crucially important lest the United States be caught with the wrong force at the wrong time and be unable to get to the right place. Close attention to the kinds of warfare we will face and where we will face them is essential to produce an effective force structure regardless of size.

Force Quality

Adversaries on both sides of the questions concerning the future of the American military probably can agree on one point. Whatever the size of the future force and whatever its structure, it must be the best—the most effective force person-for-person and weapon-for-weapon in existence. Even with all sides in agreement, however, the quality issue (or nonissue, if you prefer) has major implications for both the size and structure of the future force. For example, a quality force requires extensive infrastructure (including associated manning and funding) for intense and realistic training and professional education of its commissioned and non-commissioned leaders. A quality force also requires a robust research and development program to produce superior technology for that force. The proper size of the future force is determined by much more than just soldiers in the field, rubber on the ramp, and keels in the water. The infrastructure of a quality force must be a major consideration in the defense debate.

The Consequences of Error

The final hidden issue in the defense debate concerns the consequences of error. The consequences of building a future military that is too large have been well vetted. Those consequences are important—money and manpower wasted that could have been better spent on other pressing national needs. But erring on the low side also leads to serious consequences.

The first and most obvious consequence of a too small, too ill-equipped, or too ill-structured force is that it will tie the hands of policy makers. They will find it increasingly difficult to deter threats to our national interests. They will be unable to defeat

those who transgress. Indeed, such a predicament will likely encourage transgressions.

The second possible consequence is victory at a high price. In this scenario, US leaders commit forces to the battlefield even though they are too small, ill-equipped, and ill-structured. Many Americans die unnecessarily, paying the price for errors on the low side, yet US forces manage to carry on and muddle through to eventual victory. This has been the story of American arms for much of the history of this nation. Such was the case in the Civil War, the two world wars, and the Korean conflict. The ghosts of Pearl Harbor, Bataan, Corregidor, Kasserine, and Task Force Smith bear witness to the folly of the traditional US approach to defense policy.

The third possible consequence of erring on the low side is a replay of the second but with an even more tragic outcome. Again Americans die unnecessarily, but this time in vain—we lose. Some would argue this is what happened in Vietnam. The United States went to war in Southeast Asia with a military unprepared for the kind of war ongoing and then compounded the error with poor decision making at every level. In the future, the consequences for the United States could be much more severe than those stemming from our misadventure in Southeast Asia.

The point of this argument is that errors on the low side lead to consequences that are at least as unacceptable as errors made building and maintaining a military establishment that is too large. This problem needs to be set firmly in the minds of our policy makers and well articulated in the defense debate.

What Now?

So what now? Clearly, the current defense debate must be recast. The new debate framework must take into account the volatility of international politics and juxtapose that reality with the long-term consequences of defense policy decisions. Continuing to focus on the identification of an enemy as the basis for defense policy, that is, seeking short-term solutions to a long-term problem, will likely result in a future strategy-capability mismatch,

The hidden issues must also come to the fore as primary modifiers to what otherwise might seem a straightforward, almost mathematical, calculation. War and peace, victory and defeat are not engineering problems that can be solved with calculator and computer. Nor can force size and structure decisions be calculated using Desert Storm, Just Cause, Provide Comfort, or any other equivalents. If one could construct such balanced equations, the task of providing for the common defense would be simple indeed. Nor should the reader conclude that the hidden issues discussed here are the only salient variables. This article discusses only those issues which have been largely ignored in the current debate. The number of issues that will and should bear on the problem is large indeed.

Of equal importance to recasting the framework of the debate are the participants in the debate. To this point, the informed debate has been among military professionals, politicians, and occasional columnists. We have not co-opted the public into the process. This is a crucial error. The need for national consensus is paramount when there are so many important competing demands for government resources. Further, the new administration does not have a clear political mandate and needs broad consensus on issues of such magnitude. If we fail to fashion a national consensus, our plans for the future American military will almost certainly founder under pressure from competing domestic agendas.

Notes

1. See the *National Security Strategy of the United States* (Washington, DC: White House, August 1991), particularly p. 31; and the *National Military Strategy of the United States* (Washington, DC: Government Printing Office, January 1992), 17–25. For a critique of the base force concept, see Rep. Les Aspin, “National Security in the 1990s: Defining a New Basis for US Military Forces” (presentation, Atlantic Council of the United States, 6 January 1992). For a brief analysis of the base force concept, see Kevin Lewis, “US Force Structure Post-Gulf, Post-Cold War” (seminar, Defense and Arms Control Studies Program, Center for International Studies, Massachusetts Institute of Technology, 8 October 1991).

2. Rep. Les Aspin, “An Approach to Sizing American Conventional Forces for the Post-Soviet Era” (unpublished paper released to the press, 24 January 1992). Also see Aspin, “National Security in the 1990s.”

3. In a speech to the National Press Club on 12 January 1950, Secretary of State Dean Acheson described the defensive perimeter of the United States and excluded the Korean peninsula. Robert Frank Futrell, *The United States Air Force in Korea, 1950–1953*, revised ed. (Washington, DC: Office of Air Force History, 1983), 18.

4. This concept approached its zenith in the 1950s. In 1956, Air Force secretary Donald Quarles publicly stated, “It seems logical if we have the strength required for global war we could handle any threat of lesser magnitude.” Secretary of Defense Charles “Engine Charlie” Wilson turned opinion into policy when he told Congress in 1957, “We are depending on atomic weapons for the defense of the nation. Our basic defense policy is based on the use of such atomic weapons as would be militarily feasible and usable in a smaller war, if such a war is forced upon us.” Quoted in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907–1964* (Maxwell AFB, AL: Air University, 1971), 227, 232.

5. The reader should not think that warfare has only three variations. Although there appear to be, at this point in history, three fundamentally different kinds of warfare, there are many variations on these three themes. Nor should the reader confuse tactics (e.g., guerrilla operations, terrorist operations) that are used in many different kinds of wars with the kinds of wars themselves.

6. The term *center of gravity* was perhaps used first by the Prussian military theoretician Carl von Clausewitz, who describes it in his magnum opus *On War* as “the hub of all power and movement, on which everything depends. That is the point against which all our energies should be directed” (595–96). Clausewitz continues, “The first task, then, in planning for a war is to identify the enemy’s centers of gravity. . . . The second task is to ensure that the forces to be used against that point are concentrated for a main offensive” (619). *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976).

7. Insurgency is, for most Americans, the most misunderstood form of warfare, and thus I have included a slightly expanded description in the text of the article. For further reference, see Douglas Pike, *PAVN: People’s Army of Vietnam* (Novato, CA: Presidio Press, 1986); Truong Nhu Tang, *A Viet Cong Memoir* (San Diego: Harcourt Brace Jovanovich, 1985); David J. Dean, ed., *Low-Intensity Conflict and Modern Technology* (Maxwell AFB, AL: Air University Press, 1986); Robert B. Asprey, *War in the Shadows: The Guerrilla in History* (Garden City, NY: Doubleday, 1975); Mao Tse-tung, *Selected Military Writings of Mao Tse-tung* (Peking: Foreign Language Press, 1963); Robert Thompson, *No Exit from Vietnam* (New York: David McKay Co., 1970); and Edward E. Rice, *Wars of the Third Kind: Conflict in Underdeveloped Countries* (Berkeley: University of California Press, 1988).

8. The importance of nuclear deterrence in overall US security strategy is unequivocal. “Even in a new era deterring nuclear attack remains the number one defense priority of the United States.” *National Security Strategy of the United States* (Washington, DC: White House, August 1991), 25.

9. The British two-power standard originated in the 1889 Naval Defence Act, when the principal pretenders to the supremacy of the Royal Navy were

the navies of France and Russia. Later, of course, Germany's rising naval power became a concern. Concerning Germany, the first sea lord told the cabinet in 1902, "It is an error to suppose that the two power standard . . . has ever had reference only to France and Russia. It has always referred to the two strongest naval powers at any given moment." Quoted in Paul Kennedy, *Strategy and Diplomacy, 1870–1945* (London: Fontana, 1984), 139.

10. For concise discussions of the naval treaties concluded during the interwar period, see E. B. Potter, ed., *Sea Power: A Naval History* (Annapolis, MD: Naval Institute Press, 1985), 233–34; Samuel Eliot Morison, *The Two-Ocean War: A Short History of the United States Navy in the Second World War* (Boston: Little, Brown & Co., 1963), 3–13.

Global Reach and the Future of American Airpower

In June 1990, Air Force secretary Donald Rice published a new white paper about the Air Force entitled *Global Reach—Global Power*. Over the past three years, it has been an extraordinarily successful and exceedingly important public relations document. It was successful because in one simple, four-word phrase, Secretary Rice captured the essence of modern airpower. Those four words defined not only what airpower can do in the modern era, but also, by implication, the impact of airpower on modern mechanized warfare.

It was important because in a concise, sound-bite phrase, he characterized the dominant element of global power politics in the new world order and did so in a manner easily understood by our political leadership, our legislators who control the national purse strings, and the American body politic. *Global Reach—Global Power* was also important because it did all of those same things for American Airmen, who needed something to hang on to as they faced the uncertainties of the post-Cold War world.

Because of its impact, the *Global Reach—Global Power* white paper must take its place alongside Alexander de Seversky's *Victory through Air Power*, and former Secretary Rice must take his place beside de Seversky as a man who understood airpower *and* how to express that understanding effectively.

It is altogether fitting, then, that the first Vulcan's Forge Conference in 1991 addressed the technological aspects of global power and that this Vulcan's Forge Conference is addressing the technological aspects of global reach. Global reach is the all-too-often ignored aspect of airpower. Global reach isn't sexy. Global reach looks at the more mundane side of military power—logistics, lift capability, what you might call the shaft of the military spear. It is much more enticing to look at global power with its emphasis on weapons, employment strategy, things that go boom in the night—the point of the military spear.

This address was delivered to Air Force Systems Command, Vulcan's Forge Conference, 5 October 1993.

Yet any reasonable prediction of an admittedly uncertain future puts a premium on issues concerning the ability to deploy our military power on a global scale, that is, global reach. In truth, however, it is not just the momentous political changes of the past few years that bring global reach to the forefront. With the exception of a potential strategic nuclear attack on the United States, it has long been self-evident that unless Canada or Mexico were hostile, any fighting done by the American military would be on far-flung battlefields overseas. Thus global reach is central to the American military establishment, even though we often seem to deny that level of importance.

We have paid a heavy price in the past for failing to fully recognize the importance of world-wide deployment capability. It is instructive to note that at the beginning of almost every foreign adventure by the American military, we faced severe shortages in lift capacity, deployment know-how, and the skills to make rapid, smooth, and effective deployments a reality. My point is that the subject you are addressing at this conference is not just of passing, idle interest. Rather, it lies at the core of concerns the American military must face.

The concerns about our ability to reach globally are more urgent and perplexing now than they have been in the past. The reasons for this are several. First, we have no idea where we might have to deploy. During the Cold War, we believed in and planned for major deployments to Europe and Northeast Asia. Northeast Asia still seems a good bet, but major deployments to Western Europe seem far-fetched. Now the potential places where we might become militarily involved seem endless. Recent deployments of forces to Panama, the Persian Gulf, Somalia, Bosnia, and Haiti bear this out.

Second, our deployments tend to be "come as you are parties" with time often the crucial factor. We often will have no substantial allies that can hold the line while we take months or years to prepare as we did in World War II. Even though one can point to Desert Shield and Desert Storm as the exception that tests this rule, it is clear that the quick early reaction of American fighter aircraft and airborne troops deploying from the States within hours was crucially important to the containment of Saddam Hussein's ambitions.

Third, and somewhat corollary to the “come as you are” rule, is what we have learned about warning time. Traditionally, all of our operational plans have been based on projected amounts of warning time we could use to get ready and deploy. What we have learned is that warning time is often a fiction, lost in the confused signals of diplomacy and intelligence or squandered in the political decision-making process. The general result is that warning time is something historians tell you that you had. Response time, not warning time, is what has been and will continue to be important.

Finally, deployment issues seem more crucial today because of what will become the problem of sustainment once deployed. We all recognize that not all wars will be quick, decisive, six-week affairs such as we had in the Gulf. But few of us seem to recognize that future struggles will likely be much longer and put much greater strains on our ability to sustain substantial forces in far corners of the globe. The reasons are twofold. First, others have learned from the experience of the Gulf War and understand the folly of fighting our kind of war. Saddam played to our strengths and did so in an environment well suited to maximize our strengths. Future opponents will undoubtedly be much less accommodating, adopting different operational and tactical styles designed to minimize the impact of superior American firepower. That was the secret of our opponents in Vietnam—adopting operational and tactical schemes that negated our strengths.

The second reason that future wars will be longer and less decisive than the Gulf conflict has to do with the downsizing of American forces. As the force shrinks, it will be more and more difficult to deploy the kind of overwhelming strength that we had in the Gulf. In effect, we are leveling the playing field with our potential adversaries, making it a more sporting proposition to wage war against us. As I think on this phenomenon, I am struck that Congress has been asking the wrong question about the proper size of the military in the new world order. They have been asking How much is enough?, when the proper question, if we want future struggle to be as painless as the Gulf War, is How much is far too much—that is, far too much for any potential adversary to handle?

The point of the above discussion is to emphasize the importance of your undertaking at Vulcan's Forge. The application of technology to the perplexing problems of deployment and sustainment—global reach—may yield innovative solutions crucial to our future success.

How should we approach the problem? Traditionally when we think about deployment and sustainment, our attention quickly turns to problems of lift and the procurement of systems that can haul more cargo and people faster and farther. But as we look to an austere and severely fiscally constrained future, it may be much more profitable to look at the other half of the equation—reducing the amount that must be lifted. We have already made significant progress in this area. For example, precision-guided munitions are so much more effective than so-called dumb bombs that the total number of bombs we must haul into a theater of operations should be reduced considerably.

I would like to suggest two other areas which are often overlooked and could yield startling results in terms of reducing lift requirements. Both areas are related. The first is what is commonly called the tooth-to-tail ratio, and it has to do with people. This first came to my attention in 1966 in Tuy Hoa in South Vietnam when I realized that in the 31st Tactical Fighter Wing, we had 80 people flying combat missions and 3,320 people supporting them. The most complicated things in our inventory to deploy and sustain are people. Clearly we must have people to support our weapon systems, but each of those people must be supported by other people. We must provide them with food, shelter, pure water, fuel, pay, and promotions, and the list goes on and on. The problem feeds on itself, and we wind up with people supporting the people who support the people who support the weapon systems. We wind up with 3,320 people supporting 80 pilots.

The problem can be attacked at two levels. The first, obviously, is to develop weapon systems that require fewer direct-support personnel. A less obvious approach has to do with technological solutions to the indirect-support problem. Let me illustrate using the experience I mentioned earlier in Vietnam. At Tuy Hoa, we had a fully manned personnel office and a fully manned finance office, as did every other Air Force base in Southeast Asia. A better solution might involve only a few deployed technicians from finance, personnel, and so forth working with satellite-based communica-

tions gear linked directly to the appropriate centers stateside. This sort of reach-back support could be applicable to many support areas and could take a large bite out of the number of personnel we must deploy.

A second area in which we might make significant inroads centers on overseas bases themselves. In many ways, they are the long pole in the deployment tent. The first problem is the most obvious: they may not exist. We may have to build them in remote, primitive areas requiring the deployment of enormous amounts of equipment, materiel, and personnel. Can technology help us? Can we find better, cheaper, easier, and faster ways to build air bases that require us to deploy less equipment, materiel, and manpower?

Air bases are also vulnerable to the enemy. They must be defended and repaired. We cannot afford to have our aircraft destroyed on the ground or grounded by damaged runways, destroyed fuel facilities, and so forth. Base defense, whether it is against enemy aircraft or enemy sappers, is a manpower- and equipment-intensive proposition. Can technology help us in this area? Can we develop better, more efficient, more effective ways to defend our air bases that let us deploy fewer people and less equipment?

I have tried to express to you the importance of this Vulcan's Forge Conference. Global reach has little sex appeal and is all too often overlooked, yet it is crucial to our future military success. I have suggested two specific areas in which technology might be applied to solve our deployment problem. With this said, it is obvious that you have much important work to do in your short stay at Maxwell and that I should not be taking any more of your time.

Part 3

The Nature and Impact of Airpower

Overview

During the 1980s and 1990s many Airmen recognized that the rapidly approaching 100th anniversary of the Wright brothers' first powered flight should be an occasion for some retrospective assessment. The technological progress during those 100 years had been spectacular and well documented, but it needed to be put into perspective. Further, Airmen needed to take the thread of technological development along with the threads of experience and theory and weave together a tapestry depicting what airpower had become and what overall impact it had, not just on warfare but on society as a whole.

There were several other reasons for such retrospection. First, Airmen had been in the habit of promising more than they could deliver, a habit that distorted the perceptions of airpower by many nonairmen. Second, by the end of the twentieth century, airpower had become so ubiquitous that it was often taken for granted. US ground forces, for example, often just assumed American air superiority in military operations. Third, airpower had become so important to the success of most military operations that everyone wanted to control it, including those who had little, if any, real understanding of airpower. Finally, as airpower matured and its capabilities developed, it became America's weapon of first choice, reaching out to chasten transgressors in the hope that manpower-intensive surface forces would not be required. All of these factors made retrospection an important goal as the 100th anniversary of the Wrights' achievement approached.

The essays in part 3, written between 1988 and 2002, attempt to weave together the threads of technology, experience, and theory and explain more clearly how airpower is fundamentally different from other forms of military power, why Airmen have vastly different worldviews than those of their earthbound comrades, and what impact (far beyond military operations) airpower has had on the United States. The final article in part 3 was written for the journal of the Argentine Air War College and is a fast and furious recap of the previous 100 years of powered flight viewed through the three lenses of technology, experience, and theory. In short, it provides a compact summation for this entire section.

Joint Operations

The World Looks Different from 10,000 Feet

Buzzwords are an occupational hazard in the military. But the latest buzzword—jointness—is more than just the newest fashion soon to be of interest only to military lexicographers. Rather, jointness signifies the realization that in modern warfare there are no such things as discrete air, land, and sea wars. The notion of jointness represents the historical truth that neither airpower nor land power nor sea power wins wars by itself. The widespread adoption of joint themes and attitudes provides hope that we realize that how we employ our force structure is at least as important as the force structure itself. It also provides hope (faint as it may be) that we realize that service parochialism is both anachronistic and dangerous.

We must temper our euphoria, however. Even if the millennium arrives and service parochialism disappears, there will remain significant barriers to true jointness in our military operations. These problems stem from fundamentally different worldviews held by soldiers, sailors, and airmen, creating honest differences over how warfare should be conducted. Rather than parochial differences, these divergent views are natural phenomena.

True jointness—in spirit and in fact—can come about only after we understand our different worldviews and their consequences. With that understanding, it may be possible to build effective joint doctrines—a joint “theory of victory” that amalgamates different worldviews and applies them appropriately to various kinds of armed conflicts.¹ Attempting to devise joint doctrine before soldiers, sailors, and airmen understand themselves and each other may be an exercise in futility.

It is particularly important that airmen understand the sources and nature of their own worldview and how it contrasts with those held by soldiers and sailors. Airpower, the most recent ad-

Originally published in a slightly different form in *Airpower Journal* 2, no. 3 (Fall 1988): 4–16.

dition to military arsenals, is almost always poorly understood (even by airmen) because it is so new, and it has the least amount of evidence to buttress its claim to validity. As a result, airmen tend to be at a disadvantage in any joint doctrinal arena.

The world does look different from 10,000 feet, but is the perspective from on high better or simply different?

Worldviews Defined

The nature of a military force determines its doctrinal worldview. The discussion that follows is certainly oversimplified but remains instructive.²

A Soldier's View

Armies are confined and constrained by the harsh realities of geography that limit their speed and maneuverability. Moreover, in war their central problem is often immediate because the enemy is right in front of them. As a result, the soldier's worldview is sharply constrained, often limited to the immediate problem. Two examples illustrate the point. It is now clear that the commanders of the cross-channel invasion of Western Europe in June 1944 were more worried about the initial lodgment on the shores of France than about the subsequent breakout from that lodgment and offensive drive toward Germany. Although the Normandy beaches offered favorable conditions for the amphibious assault and subsequent force buildup, the hedgerow country behind the beaches was just about the worst imaginable terrain for subsequent breakout operations—a fact illustrated in the bloody, yard-by-yard struggle that ensued from the landings on 6 June until the breakout at Saint-Lô on 25 July. In short, planners and commanders of the Overlord operation (a group dominated by ground soldiers) were worried more about the immediate landing problem than about the problems of subsequent operations.³

A second example is much more recent and involves US Army doctrine. In the mid and late 1970s, Army operations doctrine was based on the concept of “winning the first battle,” a focus centered on the immediate problem facing ground commanders in the field.⁴ The doctrine clearly had the unstated purpose of

meeting the Warsaw Pact threat in Western Europe and assumed that early defeats would persuade the Pact to reevaluate aggressive intentions.

Although the mid-1970s version of Army doctrine reflected the traditional soldier's worldview, more recent Army doctrine is much less constrained. Hailed as a revolution in Army thinking, so-called AirLand Battle doctrine emphasizes "looking deep" behind enemy lines and attacking Soviet follow-on forces before they can influence events on the front lines.⁵ Although much less constrained than previous Army doctrine, the AirLand Battle concept still focuses on the immediate and near-term time frames and the proximate geography of the campaign area.

A Sailor's View

The sailor's worldview is much less constrained than that of the soldier, a phenomenon originating in the nature of the environment in which naval forces operate. Naval forces are constrained only by the shorelines of the great oceans, a constraint now somewhat mitigated by the range of naval airpower. Rather than contending with mountains, rivers, forests, and a myriad of other terrain features, naval forces have an almost unrestricted ability to maneuver on a featureless battlefield that covers most of the planet's surface. Moreover, the problems naval forces face are often less immediate; that is, the enemy's navy is rarely in the immediate vicinity opposing every movement. Historically, a major naval problem has been to seek out and find the enemy fleet so it could be engaged in battle, a luxury rarely enjoyed by ground forces.⁶

The global reach and concerns of naval forces provide seamen with a very broad worldview. In conflict, sailors think less about battle (except when directly engaged) and more about the war as a whole. This viewpoint is reinforced by the nature of naval forces. Sailors are the stewards of extremely expensive war-fighting assets—so expensive they can be regarded only as national assets rather than just weapons or weapon systems. Capital ships represent enormous investments and require a great deal of time to produce. At the same time, they can be lost in a matter of seconds. The consequences of this situation were

well summed up in Winston Churchill's statement about Adm John R. Jellicoe at the battle of Jutland in World War I. Churchill observed that when Jellicoe took the British battle fleet to sea on 31 May 1916 to meet the German high-seas fleet, he could have lost the war in a single afternoon.⁷

Although the naval worldview is less constrained than that of ground forces, it remains limited because naval forces are constrained. The world's shorelines define limits beyond which ships simply cannot sail. Unlike the broad oceans, narrow waters and sea-lane choke points also constrain naval forces. Thus it is that the great naval powers have sought control of vital choke points such as the Strait of Malacca, Gibraltar, the Dardanelles, and more recently the Strait of Hormuz. Further, there has always been a question of the extent to which naval power can influence the course of a continental war, particularly one fought in the central portions of the Eurasian landmass. Although the advent of naval airpower has mitigated this question to some degree, it remains unanswered, as evidenced by the ongoing debate over the US Navy's so-called maritime strategy.

An Airman's View

Airmen do not face the same geographic limitations as those encountered by either soldiers or sailors. The worldview of airmen has been limited only by the capabilities of their equipment and has expanded over time as capabilities have expanded. Additionally, in the global expanse in which airpower operates, enemy forces are often even more distant than enemy forces on the high seas. On the other hand, the closing speeds that opposing air forces achieve can make the airman's problem nearly as immediate as the soldier's problem.

The result of this situation is a global but time-sensitive worldview. This perception, in turn, has traditionally led airmen to think not only in terms of war rather than in terms of specific battles (similar to the sailor) but also in terms of immediate effects (similar to the soldier). Thus we find much of the developmental work in airpower doctrine during the 1930s concentrating on the use of airpower to win wars quickly by striking hard at what airmen called the enemy's vital centers, targets that land and sea forces could not strike directly.⁸

Airmen also use assets that fall in the middle ground between the national assets used by naval forces and lesser assets used by ground forces. Aircraft (even relatively primitive aircraft) are very expensive and thus scarce resources compared to tanks, artillery pieces, and rifles. However, aircraft pale in comparison to a navy's capital ships.

Although aircraft are more time consuming to produce than are the tools of a soldier's trade, it takes far more time to produce a ship of the line. Further, although airpower has proven invaluable in direct support of surface forces in battle, the advent of nuclear weapons makes airpower capable of winning or losing a war in an afternoon (at least as we envision nuclear war).

Center-of-Gravity Conflicts

Differing worldviews naturally lead to differences of opinion between soldiers, sailors, and airmen over an enemy's center of gravity. The center of gravity is a Clausewitzian notion of the critical element or elements of a nation's war-making power upon which everything else depends.⁹ One could refer to it as the key to victory. Airpower pioneers such as Gen Billy Mitchell used the term *vital centers*.¹⁰ In the modern, informal vernacular, the center of gravity might be called the "golden screw" that holds everything together for the enemy.

Joint operations and joint doctrine founder on the differing views of an enemy's center of gravity. How wars are waged and campaigns conducted depend ultimately on one's view of this critical element, for the ultimate aim of strategy is to attack the enemy's center of gravity and thus destroy his capability to wage war.

Soldiers tend to take a very traditional view that the enemy's army itself is the center of gravity. Soldiers hold the view, sometimes referred to as the Continental school of thought, that lasting victory can be achieved only by defeating and destroying the enemy's armed forces, occupying his territory, and controlling his population. In short, the immediate problem for the soldier—the enemy army—is also the ultimate problem and the source of the enemy's ability to resist.

Sailors tend to look beyond the deployed forces of the enemy. Although control of the seas requires the neutralization of the

enemy's fleet, this action is an intermediate objective rather than the ultimate objective. Control of the high seas and narrow choke points allows naval forces to disrupt an enemy's foreign trade, cripple his economy, blockade his ports, and thus destroy the economic basis of his power to wage war. Further, control of the seas allows one to project power ashore and thus control events there. In short, the naval worldview regards warfare more in terms of an economic struggle while realizing that hard combat at sea and ashore may be required to bring the enemy to heel.

Airmen, at least in the United States and Great Britain, have taken the broadest and most abstract view of warfare. Airmen have traditionally regarded deployed armies and navies as manifestations of an enemy's strength rather than the source of strength. To traditional airmen, the real source of enemy strength is found in the enemy's industrial capability to produce the wherewithal of modern warfare. If this industrial capacity is destroyed, according to airmen, the enemy's ability to resist militarily will collapse. Unlike armies, which must fight their way through enemy armies to the source of the adversary's power, and navies, which attack the enemy's economic power indirectly with slow pressure, airpower can attack the critical element quickly and directly. Or so the airmen postulate. One pioneer philosopher of airpower, the Italian Giulio Douhet, even speculated that armies and navies would become passé.¹¹

Both soldiers and sailors have a considerable historical basis for their theories of victory. Airpower, however, has a short and checkered history, and thus airmen have less empirical evidence upon which to base their doctrinal beliefs. Worse, the history of airpower, particularly in the United States, is rife with unfulfilled promises made by airmen who saw the potential of airpower but were unable to fulfill that potential. Thus, it is worth discussing just how the airpower theory of victory evolved in this country.

The Development of Airpower Doctrine

Airpower is a product of the machine age. As men first learned to fly in heavier-than-air powered craft, war was rapidly becoming mechanized. World War I revealed the extent to which indus-

trial capacity is essential to military capability. Tanks, battle-ships, submarines, trucks, and airplanes could not be produced by cottage industry nor could the billions of artillery shells and bullets used by the massive armies on both sides from 1914 to 1918. In many respects, World War I illustrated that war had become a battle of factories, a contest of industrial production.

Airmen will admit (if pressed hard enough) that airpower did not play a decisive role in World War I. The war had more effect on airpower, given the rapid changes in aircraft and their use during the conflict, than airpower had on the war. However, even with the relatively primitive aircraft available during that war, airmen realized that the view from aloft was qualitatively different from the view on the ground.

From high above the earth's surface, it was clear that with the proper equipment airpower could be used strategically (and independently) to strike the enemy's sources of production, targets later codified by Billy Mitchell as the enemy's vital centers. It was also clear that airpower could strike at the enemy's supplies and replacements on their way to the front lines long before they could influence the course of battle on the ground. The deeper behind enemy lines these interdiction strikes were made, the better, for targets were more concentrated, and the effect at the front was all the more comprehensive.

In essence, the view from 10,000 feet revealed far more options for airmen than were available to soldiers. Although the army was limited by terrain and the enemy force deployed to its front, airpower could strike almost anywhere, limited only by the available technology and often inadequate air defenses. But options had to be chosen carefully because aircraft and trained crews were scarce resources compared to the kinds of equipment and skills used by surface forces.

At the heart of the conflict between soldiers and airmen is the matter of options and the priorities assigned to those options. Soldiers focus on the immediate problem—the enemy army. They fear that air assets will be wasted on targets that have little impact on this problem. Further, soldiers worry that even if the airmen are correct about the enemy's center of gravity, quick enemy success on the ground will present airmen with a fait accompli. Airmen believe that precious air assets can more profitably be used to strike deep behind the enemy army at the source

of its power. In essence, airmen fear that diverting valuable air assets to the army's immediate problem of winning a battle will squander airpower's ability to strike more valuable targets that could win the war.

These sorts of almost irreconcilable differences were at the heart of the argument for an independent air force. They remain the foundation for the central tenet of US airpower doctrine (first expressed in the 1943 version of Army Field Manual [FM] 100-20, *Command and Employment of Air Power*, the so-called Magna Carta of American airpower) that airpower must be centrally controlled by an airman.

Is the View Better from 10,000 Feet?

Soldiers, sailors, and airmen each believe they have an accurate view of the world and thus adhere strongly to the war-fighting doctrines that eventuate from those views. Airmen, as mentioned earlier, have the least amount of empirical evidence to buttress their case. Whereas soldiers and sailors can point to an enormous store of experience over the centuries, airmen must content themselves with somewhat conflicting evidence limited to the twentieth century. It is clear, for example, that in World War II, strategic bombardment of German and Japanese vital centers was a decisive factor in the Allied victory. It is also true that even though airmen would like to take the credit for the triumph, much hard fighting on land and at sea was required for Allied forces to prevail in both theaters. On the other hand, it is nearly impossible for soldiers and sailors to deny the importance of strategic bombing and air interdiction efforts in defeating Germany and Japan.¹²

Following World War II, airpower's true believers maintained that airpower had not been the decisive weapon because of inadequate equipment and diversions of air effort away from strategic attacks in order to support ground and naval operations. Moreover, the advent of nuclear weapons and intercontinental bombers to deliver them promised to fulfill the prophecies of the pioneer airpower advocates.¹³ However, the political realities of war in the nuclear era (so-called limited war) and warfare in third-world countries that have almost no strategic targets have now tempered the claims for airpower's decisiveness.

What has emerged from our experience is the lesson that, although very different, the view from 10,000 feet is not necessarily any better than the view from ground level or sea level. Much depends upon the circumstances of the conflict at hand. It is also clear that in almost every case, land, sea, and air forces can act synergistically—in fact, must act synergistically—to achieve victory. The evidence that service parochialism is anachronistic and dangerous keeps mounting, giving rise to the long overdue emphasis on jointness. Unfortunately, the basic barriers to jointness—divergent worldviews—remain. How then do we achieve jointness in spirit and in fact?

Achieving Jointness

Almost any impartial observer will admit that the US military has not done well in achieving jointness. True, there is a significant record of successes in certain joint operations. But it would not be inaccurate to say that these successes have been achieved in spite of differing worldviews rather than because of an integration or convergence of worldviews. The parochial battles between the services have been both legion and legendary, ranging from Billy Mitchell's fight with the Army in the 1920s, through the so-called revolt of the admirals in the late 1940s and the convoluted command arrangements in Southeast Asia in the 1960s and 1970s, to the continuing budget battles and competing strategies of the 1980s. Within the last decade, agreements at the highest service levels to work closely on certain issues have been hailed as significant breakthroughs toward jointness but in reality offer embarrassing evidence of past shortcomings.

The most recent wrinkle is the drive to produce joint doctrine, a movement that is long overdue and at the same time sadly premature. It is overdue for reasons made obvious in this article. It is premature because there is little evidence that even those on joint staffs fully understand and appreciate the different worldviews held by the various services, much less their consequences. It is particularly premature for the Air Force because our own doctrine is in such a muddle there is some doubt we can adequately articulate and defend the basic tenets of airpower.¹⁴

Successful jointness and joint doctrine will come about only when soldiers, sailors, and airmen understand and appreciate the sources and implications of their own views and the views of their counterparts. Only after such understanding is achieved is there any real hope of synthesizing these views into rational joint theories of victory, theories that will differ depending upon the circumstances of the conflict in question.

The need to achieve this understanding places a double burden upon anyone who aspires to senior staff and leadership positions in the military. Not only must the individual learn all there is to learn about the art of warfare as waged in the air or on the ground or at sea, but also the individual must endeavor to get inside the heads of his brothers-in-arms from the other services. How can this be done?

One obvious solution is to continue ongoing programs of exchange in duty assignments and professional military education exchanges at sister service schools. Although profitable, these programs affect only a few fortunate officers.

A second option is to tailor the curricula at the services' professional military education institutions to attack the problem. This option has three implications. First, subjects dealing with the art of warfare would receive greater emphasis, a change that would deemphasize other subject matter unless the limited available time is increased. Second, within the revised curricula more attention must be given to the combat history and doctrine of the sister services and to how the services can and must act in concert. Third, school faculties must have a greater representation from sister services to construct and present revised curricula.

Although professional military education seems to be a convenient and bureaucratically tidy solution to the problem, it is an incomplete solution. In the final analysis, the responsibility of military professionals to understand their profession is a personal matter. There are only two ways to learn about warfare. One is to experience war firsthand. Fortunately, the American military has not had to face such experiences too frequently. Moreover, personal experience is just that—personal—and thus almost always narrow, limited, biased, and without analysis.¹⁵ The second way to learn about war is through vicarious experience, that is, the study of military history. It is no accident that

many of the “great captains” of military history were also avid students of the subject.

With these proposals in mind, it appears prudent for the services to devise programs to facilitate and encourage the personal study of military history among their officer corps. Such programs might include well-thought-out recommended reading lists, graduated by depth and breadth of analysis, building one upon another to provide over a period of years a comprehensive study of military history; easy access to all recommended readings through specially stocked collections at installation libraries; a shift in installation-level off-duty courses of study toward degree-granting programs in fields dealing with national security and military affairs; and a system of rewards for officers who study fundamentals of their profession. This last point, appropriate rewards, may be the most important because motivation will be a problem.

The Hidden Payoffs

The most obvious benefit of programs emphasizing the art of war rather than service-peculiar subjects is broader understanding that will increase our ability to produce viable joint doctrine, improve our ability to operate successfully in the joint arena, and help to eliminate service parochialism. With luck, we might even produce another great captain. But there are also hidden payoffs.

Officers who study military history will find there is little new under the sun, at least conceptually, and may well find in the musty corners of the past useful insights about contemporary military problems. Perceptive students will also find that their brothers-in-arms from other services face most of the same kinds of problems both in peace and in war.

Perhaps most important, the student of military history will find that there is little variation in warfare, whether on land, at sea, or in the air. For example, many classical naval maneuvers have their conceptual counterparts in the classical maneuvers of ground forces and the basic missions of airpower.¹⁶ It will be disturbing and enlightening to airmen when their studies demonstrate that the only unique characteristic of airpower is elevation above the earth's surface—all other characteristics

(speed, range, flexibility, etc.) are different only in a relative sense. Finally, it will become obvious to the student of military history that soldiers, sailors, and airmen have much to learn from each other.

Notes

1. Credit for defining doctrine as a “theory of victory” goes to Larry E. Cable in *Conflict of Myths: The Development of American Counterinsurgency Doctrine and the Vietnam War* (New York: New York University Press, 1986).

2. For a more complete exposition on differing worldviews, see John M. Collins, *Grand Strategy* (Annapolis, MD: Naval Institute Press, 1973).

3. Russell Weigley makes this point with considerable vigor: “By concentrating almost all their planning effort on the assault and the immediately following buildup, the planners neglected a maze of troubles awaiting behind the French shore. The greatest trials of OVERLORD . . . were to appear when the invaders plunged inland . . . in the region of Normandy called the Bocage.” Russell F. Weigley, *Eisenhower’s Lieutenants* (Bloomington: Indiana University Press, 1981), 35.

4. US Army FM 100-5, *Operations*, 1 July 1976.

5. Ibid., 20 August 1982. In particular, see chapter 7. Also see the 5 May 1986 edition of the same manual, particularly chapter 2.

6. The best layman’s guide to naval views and strategy remains Bernard Brodie’s *A Guide to Naval Strategy* (New York: Praeger, 1965).

7. Quoted in Geoffrey Bennett, *The Battle of Jutland* (London: David & Charles, Ltd., 1980), 41–42.

8. For a somewhat expanded and documented discussion of the development of airpower doctrine, see my CADRE Paper, *Rolling Thunder 1965: Anatomy of a Failure* (Maxwell AFB, AL: Air University Press, October 1986), 14–27.

9. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 595–96.

10. See especially his testimony before Congress shortly after his court-martial and resignation. This testimony is quoted in part in Robert Frank Futrell, *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force, 1907–1964* (Maxwell AFB, AL: Air University, 1971), 28.

11. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, DC: Office of Air Force History, 1983), 1–33.

12. The best evidence of strategic bombing results is found in *The United States Strategic Bombing Survey: Summary Reports (European War) (Pacific War)* (30 September 1945, 1 July 1946; reprint, Maxwell AFB, AL: Air University Press, 1987).

13. In 1957, for example, Secretary of Defense Charles Wilson told Congress, “There is very little money in the budget . . . for the procurement of so-called conventional weapons . . . because we are depending on atomic weapons for the defense of the nation.” Quoted in Futrell, *Ideas, Concepts, Doctrine*, 232.

14. For an expanded discussion of the Air Force doctrine problem, see my article "Two Decades in the Air Power Wilderness," *Air University Review* 37, no. 6 (September–October 1986): 2–13.

15. Frederick the Great believed that experience was of little value to the military leader unless the experience was examined and analyzed: "A mule who has carried a pack for ten campaigns under Prince Eugene will be no better a tactician for it." Jay Luvaas, ed. and trans., *Frederick the Great on the Art of War* (New York: Free Press, 1966), 47.

16. A superior short essay with illustrations on the classical maneuvers of ground warfare can be found in David G. Chandler's *Atlas of Military Strategy* (New York: Free Press, 1980), 12–13. When one compares these maneuvers with descriptions of the tactics used in naval fleet actions (e.g., Nelson at Trafalgar) and the descriptions of the missions of tactical airpower (e.g., close support, interdiction, etc.), the conceptual similarities are striking.

We Are an Aerospace Nation

For at least a decade, naval partisans have persistently declared the United States to be a “maritime nation.” They have portrayed the country as a virtual island, dependent on sea lines of communication for prosperity and security and in need of a 600-ship Navy based on 15 aircraft carriers. The United States requires such a fleet, they have argued, to defend its shores, protect trade routes, and project power abroad.

Without question, the navalists are correct but only in the sense that the country is bordered on two sides by the world’s great oceans and does depend on the sea-lanes. There is no argument against the proposition that sea power is vital.

First and foremost, however, the United States is an aerospace nation. Aerospace power has become the dominant element in global military affairs, and aerospace forces provide the foundation of US military power. The aerospace industry is a pillar of the US economy. Air transport and space communications bring Americans together as a nation and integrate the United States into the world order.

The great oceans and continents are overarched by air and space. These reaches, free of natural boundaries and obstructions, dominate all that lies below. Such has been the case from the beginning of powered flight. However, aerospace forces required nine decades of tumultuous development to evolve into the world’s dominant military instrument. On the commercial side, matters moved more rapidly; the aerospace industry has grown to immense proportions and provides one of the few bright spots in US international trade.

In the beginning, aircraft were incidental weapons, envisioned only as tools of improved observation. Other advantages appeared soon. Virtually all of what would become the classic missions of airpower were pioneered in World War I, but airmen and their primitive flying machines had little effect on the course of that war. Even had aircraft not existed, both sides probably would have prosecuted the war in much the same way and arrived at the same result.

Originally published in a slightly different form in *Air Force Magazine* 73, no. 11 (November 1990): 32–36. Reprinted by permission from *Air Force Magazine*, published by the Air Force Association.

Visions of the Prophets

The Great War, however, created powerful visions of what airmen could accomplish if the proper technologies became available. Prophets of airpower—Hugh Trenchard, Giulio Douhet, Billy Mitchell, and Alexander de Seversky—realized the true meaning of the aerial revolution. Aviation made it possible to amass great power quickly over any spot on the earth's surface and to attack any portion of an enemy's strength. For the first time, a military force could strike directly at the enemy's vital centers without first defeating his armies and navies. After the carnage at Verdun, Ypres, and the Somme, the prospect of quick, cheap, and decisive victories from the air was seductive.

The prophets of airpower promised too much, too soon. In many respects, airmen ever since have paid a heavy price for these excessive and premature promises. In World War II, airpower played major roles in many Allied victories, but the victories were neither quick nor cheap.

Military airpower had its infancy in World War I. It went through a confused and questioning adolescence during World War II. How should airpower be controlled? Which missions had the most important claims on manpower and materiel? What were the enemy's vital centers, and precisely how should they be attacked? How should air defenses be defeated?

In the course of the war, most of the questions were resolved, and the effects of airpower became ever greater and more decisive. One could argue that the maturation of airpower culminated with the surrender of Japan, which was brought on in no small part by the destructive effect of conventional aerial bombardment and, at the end, the atomic bombardment of Hiroshima and Nagasaki.

Airpower had come of age with the advent of atomic weapons and long-range airpower—atomic airpower, as this combination was called in postwar years. Airpower enthusiasts (including a number of former doubters) believed that the airpower prophets were about to be vindicated. America's atomic airpower, they maintained, surely would yield quick, cheap, and decisive victories and would be useful even in fighting local conflicts. This belief persisted into the 1950s. As late as Janu-

ary 1957, Defense Secretary Charles Wilson was explaining to Congress that Washington's "basic defense policy is based on the use of . . . atomic weapons . . . in a smaller war, if such a war is forced upon us."¹

The Impotence of Power

The prophets of airpower had not foreseen that the power of modern nuclear weapons would make them essentially unusable except as a deterrent. Nor had they imagined the resulting emergence of an era of "limited" warfare in which there would be no decisive battles, no overwhelming aerial onslaught, and no quick and cheap victories. If airpower was in its adolescence in World War II, Korea and Vietnam provided the equivalent of college and graduate degrees. Airmen began to comprehend the varieties, vagaries, and political imperatives of warfare across the spectrum of conflict.

In the soul-searching that followed defeat in Southeast Asia, Airmen in large numbers began to understand that they needed to undertake serious study of war rather than passively accept the words of the prophets as revealed wisdom. To this end, the Air War College in the late 1970s launched a major overhaul of its curricula, a move followed shortly by the complementary overhaul of curricula at the Air Command and Staff College. The watchwords "Put more war in the War College" reflected a desire to eliminate the emphasis on management and cost efficiency imposed in the era of Defense Secretary Robert S. McNamara.

Serious study of war revealed some new realities of the modern battlefield. It became clear that modern mechanized armies could not operate effectively in the face of strong air attack. It was also clear that armies operated much more effectively when assisted by friendly airpower. In addition, it was only too apparent that surface naval forces could not survive under hostile skies and that, in direct response to this bitter fact, modern navies had become naval air forces. The aircraft carrier had become the capital ship of the new age; other surface ships were relegated to little more than support roles. Hostile aircraft posed major threats even to submarines.

In some important respects, the narrow waters of the southwest Pacific, Persian Gulf, Mediterranean Sea, Baltic Sea, Carib-

bean Sea, and elsewhere no longer could be viewed as exclusively maritime theaters of conflict. Rather, it was clear that land-based airpower, with range and payload superior to naval airpower, could dominate such theaters. Faced with the need to provide rapid, worldwide responses to hostile threats, Washington policy makers often looked to long-range airpower as the only viable option.

Technological Explosion

During this period, science made great strides toward solving problems that had inhibited airpower, frustrated Airmen, and left the vision unfulfilled. Such problems included, but were not limited to, darkness, storms and other unpredictable weather, inaccurate targeting, and strong air defenses. Modern aircraft are capable of flying almost anywhere, at almost any time, and under almost any conditions. They can deliver smart weapons with great precision. They can survive in hostile environments as never before, using the marvels of electronic countermeasures, terrain-following radar, stealth technologies, and surface-to-air missile (SAM)-busting antiradiation missiles. Often they can simply avoid air defenses by launching standoff weapons from afar.

Airpower has become the keystone of military power. Land and naval forces cannot operate effectively in the absence of air superiority by friendly forces. With control of the skies, Airmen can deliver devastating blows to enemy land and naval forces in orchestrated joint campaigns. Further, they can strike any portion of the enemy's power structure in independent operations. In short, land and naval forces, except in the most unusual circumstances, cannot operate without airpower, but airpower can function effectively—perhaps even decisively—without support from land and naval forces.

Airpower redefined and reemphasized the traditional importance of the high ground in military affairs. The advent of *aerospace* power is reemphasizing that importance. Even in their infancy, American capabilities in space are crucially important to military operations, even though these capabilities are tightly controlled and strictly limited by policy and treaty. Space systems provide fast, worldwide communications and navigational

aids. They have revolutionized military intelligence. The nation relies on space systems—so-called national technical means—to verify treaty compliance. Space systems have become invaluable tools in such tasks as predicting the weather, a crucial factor in military operations. In short, space systems are now tools on which American military forces routinely depend.

Even so, the fact that aerospace power today stands as the keystone of national defense does not, by itself, establish that the United States is an aerospace nation. The United States is not a garrison state, and its character, prosperity, and success hinge on factors that go well beyond its armed forces.

Staggering Economic Impact

The most critical of these factors is American economic power. In a few decades, the airplane has wrought staggering changes in the US economy. The most obvious change is the growth of the aerospace industry itself. Sixty years ago, when steel and auto manufacturing dominated the economy, aircraft manufacturing was essentially a cottage industry dominated by enthusiasts with little business sense and even less capital. Americans traveled by train and by ship. The railroads furiously competed for passengers with lavishly appointed “name” trains on fast schedules; shipping companies did the same, offering fast, luxurious ocean liners. Even so recently as 30 years ago, air travel was a relative novelty. Civilian jet aircraft were a new phenomenon, and the airways were dominated by prop-driven Douglas DC-somethings. Airmail required a more costly stamp.

Today Americans, particularly those traveling on business, travel by air. In 1987 the large American-flag airlines carried nearly half a billion passengers more than 500 billion miles. The aerospace industry is a strong part of the economy. Aerospace manufacturers directly employ more than 750,000 men and women and indirectly employ many times that number through suppliers and subcontractors. In 1989 the 21 largest aerospace equipment manufacturers reported total sales of more than \$140 billion.

Perhaps the industry’s most important contribution to the economy has been its impact on the balance of foreign trade. While most US export industries have declined, American aero-

space manufacturers enjoy thriving overseas markets. In 1989 the United States sold \$40 billion worth of civilian aircraft and engines to foreign customers. American aircraft manufacturers produced a trade *surplus* of \$28 billion, the largest positive US trade in any product category. That figure does not include sales of US military aircraft. The vaunted positive impact on foreign trade of US agricultural products—an \$18 billion annual surplus—pales in comparison.

Meanwhile, the American shipbuilding industry has all but disappeared. Only 14 American shipbuilders remain in business, kept on life support by Navy contracts. The steel industry has rusted away, and the automobile industry is staggering under the blows of foreign competition.

As of March 1990, US shipyards were building one-tenth of 1 percent of commercial ships on order worldwide, ranking well behind Japan and South Korea and even behind Yugoslavia and Spain. In the last four years, US shipyards received only one commercial contract for new ships.

While long-unused rail terminals are being converted into shopping malls and bus terminals are being razed to make room for office buildings, gate space at crowded hub airports has become one of the domestic economy's most precious commodities. Traditional sea lines of communication remain critical to bulk cargo shipping, but they have become irrelevant to passenger traffic and nearly irrelevant to the transport of high-value, low-bulk cargo, such as computers and electronic goods.

Such cargo has fueled the growth of the airfreight industry. In 1987 large, certificated American-flag carriers hauled more than 5 million tons of cargo and 1.5 million tons of mail. Premium-priced, overnight-delivery airfreight services to both domestic and overseas locations have experienced phenomenal growth. Even the conservative US Postal Service has been forced to enter this market or face a permanent loss of significant revenue.

What impact will the "space" part of aerospace have on the US economy? The evidence is that space already has had a pervasive impact on the economy and on the fabric of life in the United States. Telephone calls, particularly to overseas destinations, are often completed by bouncing signals off satellites. Americans can hardly watch television without taking advantage of spacecraft. Television's so-called superstations broadcast nationwide

via satellite to local cable television systems and backyard dish antennas. The advent of national daily newspapers stems, in large part, from the ability to transmit words and pictures via satellite to local markets for printing and distribution. Instantaneous, worldwide communication, made practical by satellites, has helped to integrate the global economy by facilitating trade, electronic fund transfers, and global trading in stocks, bonds, and other financial instruments.

Tracking Storm Systems

Satellites play a key role in weather forecasting, particularly in spotting and tracking dangerous weather systems. Satellites have also helped map the globe, find sources of pollution, and find new supplies of natural resources.

What comes next? The US military is in for considerable change, almost certainly including a significant reduction in size. US political leaders must be aware that airpower dominates modern warfare. They must also consider that, because the Soviet Union has faded as the locus of US strategic planning, military threats could appear suddenly, almost anywhere—a fact most recently demonstrated by Iraq. Speedy reaction may be the most critical element in controlling such dangers, and airpower almost always provides the most rapid response. Though land-based airpower and its sea-based variant often are cast as rivals in Washington budget battles, in the heat of real battle they are complementary.

Future space policy is a subject of controversy. The importance of space capabilities in US military operations and the civil economy makes it imperative that the United States continue an aggressive space program. Because space assets are so important, the United States must be able to defend its critical space instruments and its access to and use of space. All signs are that, in the twenty-first century, freedom of space will be at least as important as freedom of the seas has been throughout our history.

The US political and military leadership faces daunting problems. Its decisions are sure to shape the nation for decades to come. These decisions must be based on the world as it is and will be, not on the world as it was and never will be again. The

United States has been many things—a great agricultural nation, a great industrial power, a continental power, a post-industrial nation, and, yes, a maritime nation. It continues to be many of these, but if it is to continue as a great power in control of its own destiny, it must remain, above all, an aerospace nation.

Note

1. Quoted in Robert Frank Futrell's *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907–1960*, vol. 1 (Maxwell AFB, AL: Air University Press, 1989), 459.

Desert Storm as a Symbol

Implications of the Air War in the Desert

Victory in the Gulf War brought with it both euphoria and controversy. Almost nothing could dampen the euphoria which followed such a successful short war that produced remarkably few casualties. The controversy has been mostly good-natured, centering on the question, Who won the war? Success has a thousand fathers, and proud Airmen, soldiers, sailors, and marines are quick to trumpet their contributions to the victory.

In truth, everyone is correct. It was a great victory for joint warfare. The strangling naval blockade, the devastating air campaign, the integration of space assets into all operations, the lightning-fast ground maneuvers, the threatened seaborne invasion—these and many other operations define the essence of joint warfare. The spirited controversy between the services is good fun, even if it sheds little useful light on the event.

There is, however, a serious side to what might otherwise be harmless macho posturing by Airmen, soldiers, sailors, and marines. Operation Desert Storm symbolized a fundamental shift in the traditional method of waging mechanized warfare. The stunning performance of coalition airpower symbolized both the maturity of airpower and its dominant position in late twentieth-century warfare. Most important, however, victory in the Gulf War symbolized the need to reevaluate and reform traditional ways of thinking about the art and science of war.

The Real and Symbolic Victory

The story of what happened in the air during Desert Storm is well known. Beginning in mid-January 1991, coalition airpower (note that the term is *airpower*, not *air force*) seized control of the air over both Kuwait and Iraq within hours and within a matter of

Originally published in a slightly different form in *Airpower Journal* 6, no. 3 (Fall 1992): 4–13.

days achieved total air supremacy. In nearly simultaneous actions, airpower “blinded” the Iraqi leadership, making command and control of Iraqi forces in the field exceedingly difficult. Meanwhile, strategic targets—including Iraqi nuclear facilities—were attacked and either destroyed or heavily damaged. The campaign quickly moved on to physically isolate Iraqi surface forces deployed in and around Kuwait (a classic interdiction campaign) and then to attack field forces directly from the air. Although Desert Storm was conceived as a four-phased campaign, all phases overlapped to the point that they were nearly simultaneous.

The result, of course, was that when the ground offensive began in mid-February, it met minimal resistance and quickly swept forward from Saudi Arabia all the way to the Euphrates River, accepting the surrender of tens of thousands of hungry, demoralized Iraqi soldiers. The magnitude of the aerial victory in the overall campaign was revealed by the almost unbelievably low casualty rate suffered by coalition surface forces.

In previous wars, the impact of airpower had always been a bone of contention, an article of unresolved and unresolvable debate. In the Gulf War, the impact of airpower (again note the generic term) was clearly overwhelming and decisive. The clarity of the aerial victory also provided a symbolic beacon of sorts. It symbolized the maturity of airpower, the domination of airpower, and the need for a new paradigm of warfare.

Symbol of Maturity

The most obvious symbolic meaning of the Desert Storm experience is that airpower has matured as an instrument of war. At long last, airpower lived up to its potential and fulfilled the promises made by the early prophets of airpower. Much credit has been given to the sophisticated technology employed by Airmen in the Gulf War. However, the maturation of airpower is a much more complicated story that goes far beyond technological gadgets. The maturity of airpower resulted from the confluence of three streams of development over the past 80 years: experience, technology, and doctrine.

Airpower’s early prophets—Giulio Douhet, Gen William “Billy” Mitchell, and others—predicted during their heydays in the 1920s that airpower would revolutionize the nature of war.

Some even predicted that surface forces would become obsolete. But their visions were simplistic, unseasoned by extensive experience in warfare generally and in aerial warfare specifically. World War I had seen the only large-scale employment of airpower in a major conflict, and the results were mixed. In all likelihood, World War I would have been fought in much the same way and with the same general results had airpower not existed.¹ The importance of airpower was revealed only with further experience in the wars that followed.

Experience—sometimes bitter and disappointing, sometimes dramatic and decisive—was also the key element in tempering and honing the blade of airpower. The global experience of World War II and its somewhat mixed results in terms of airpower, the disappointing experience of the Korean War, and the confusing experience of the war in Southeast Asia all provided the know-how to structure, train, equip, and employ airpower effectively across the entire spectrum of conflict.²

The extravagant promises of the airpower prophets also seemed hollow because their visionary reach exceeded their technological grasp. Either the prophets were unaware of the many problems that would confront airmen, or they too easily assumed them away. In the beginning, the list of problems which hindered airpower was almost endless—inadequate power plants, poor aerodynamics, limited range and lifting capacity, inadequate speed, inaccurate delivery systems, and so forth. The list goes on and on. Even nature conspired to hinder the airmen. Poor weather and the dark of night were two of the most difficult and universal problems with which airmen had to contend.

Sometimes slowly, sometimes with mind-boggling speed, but always with predictable persistence, technology overcame the limitations, peeled away many of the problems, and left airpower with its prophetic, revolutionary essence. Today it is not much of an exaggeration to say that airpower can carry any load, anywhere, under any conditions, and deliver that load with great speed and incredible precision. Although airpower has not fully realized this long-sought goal, it is getting closer and closer.

But experience and technology by themselves are not enough to create the dominating influence of present-day airpower.

Equally essential is doctrine. Conceptually doctrine ties together the lessons of experience and the technology of the present into an effective operating scheme. It establishes what Airmen believe about the best way to wage aerial warfare, given what they have learned and what they can do. The development of doctrine is the third stream of development in the maturation of airpower.

The airpower prophets were enthralled by the idea that airpower could destroy an enemy's ability to resist by destroying his means of producing the wherewithal of mechanized war. The doctrine of strategic bombing, which had its roots in World War I and was fervently articulated in the 1920s and 1930s, envisioned attacks on an enemy's industrial capabilities that would lead to quick collapse. As demonstrated in World War II, bombing an enemy into submission was not quite so simple or so easy. The advent of nuclear weapons, however, seemed to provide airmen the tools they needed to fulfill the prophets' dreams.³

The nuclear era brought with it the seeds of its own demise. Fear of nuclear calamity led the United States to fight only limited wars for limited objectives with limited means. The Korean War was a major disappointment for Airmen, but so strong were their beliefs that they chose to view it as little more than an aberration. As a result, strategic bombing continued to drive US airpower doctrine through the 1950s. Not until the Vietnam conflict did it become clear that nuclear weapons would rarely, if ever, be used except in extremis. Further, both Korea and Vietnam highlighted the indecisive nature of strategic industrial bombing in a war against a nonindustrialized country (a kind of war the airpower prophets had not imagined) as well as the crucial role of nonstrategic airpower missions in such wars.

In the wake of the Vietnam conflict, some Airmen began thinking of airpower in a much broader and more sophisticated manner. Rather than emphasizing certain missions (e.g., strategic bombing), in the early 1980s some US Airmen began looking at the operational level of war and air campaigns designed to create synergies from the careful orchestration of all airpower missions. The notion of a comprehensive air campaign, which came to full flower in the Gulf War, reflected the maturity of US airpower doctrine.

Symbol of Domination

One can also view Desert Storm as a symbol of the dominant role that airpower has assumed in modern mechanized warfare. Clearly, it dominated every facet of the war in the Gulf. However, the dominant nature of airpower is not a surprising “bolt from the blue.” Rather, it is the culmination of a long-term trend. Throughout its 80-year history, military airpower has become a more important factor in warfare with each passing year.

The trend was obvious even in the early experience of World War I. Envisioned before 1914 only as reconnaissance platforms, aircraft not only became invaluable in that role but performed many other roles as well. In World War II, control of the skies became the first priority in planning virtually every operation, whether on land or at sea. In North Africa as well as Northwest Europe, land forces had great difficulty operating under hostile skies and operated much more effectively with friendly air control and assistance.

Airpower was perhaps even more important to amphibious operations. Note, for example, that control of the air was a prerequisite for Operation Sea Lion (the planned German assault on Great Britain) and Operation Overlord (the Allied invasion of Northwest Europe in 1944). In the former case, Germany never achieved air superiority over Britain—thanks to Churchill’s “few” to whom so much was owed—and Sea Lion was canceled. In the latter case, total Allied air supremacy over the invasion beaches of Normandy played a significant role in the success of Overlord.

At sea the growing importance of airpower was even more pronounced. Prior to World War II, most naval leaders envisioned naval airpower as an extension of the eyes and ears of the fleet, rather than its principal striking arm. By the end of the war, it was clear that the face-to-face gun battles between contending fleets were a thing of the past and that naval aviation was the primary offensive striking arm of the Navy. Worth noting is the fact that in 1941 the US Navy had eight aircraft carriers with 521 aircraft aboard. At the end of the war, the Navy had 99 aircraft carriers with 4,000 aircraft aboard.⁴

As was evident with land forces, sea surface forces operating without sufficient air cover were at constant risk. The sinking of the British warships *Repulse* and *Prince of Wales* by Japanese

airpower off the coast of Malaya and the sinking of the Japanese superbattleship *Yamato* by US airpower late in the war are just two well-known examples. Gen George C. Kenney's use of land-based airpower to establish control of the narrow waters of the Southwest Pacific theater of operations is another example, but on a much larger scale.⁵

The importance of airpower is not just a contention of the USAF. Rather, it is a reality underscored by the US Army, Navy, and Marine Corps. The Army has its own air force (mostly helicopters), rivaling the USAF in the number of airframes it possesses. At sea, the Navy's aircraft carriers are clearly the centerpiece of a fleet largely organized into carrier battle groups—with all due respect to submariners, who take a slightly different view. In the Marine Corps, closely integrated air-ground operations are standard operating procedure. Airpower now dominates warfare.

Symbol of Need for a New Paradigm

As pointed out previously, the maturation of airpower is not the result of the sudden introduction of some new gadget. It is the result of the accumulation of experience, the development of technology, and the refinement of doctrine over the past 80 years. The same holds true for the dominating nature of airpower. It is the culmination of an 80-year trend. In a sense, the culmination of these two trends—symbolized by the aerial victory in Desert Storm—has crept up on Airmen, soldiers, sailors, and marines alike and caught them off guard. The result is the urgent need to develop a new paradigm—a new way of thinking about modern mechanized warfare.

For literally thousands of years, military establishments have operated within a two-dimensional context. The early twentieth century saw war expand into the third dimension but only as a simple extension of the traditional two-dimensional model. This was appropriate in the early days, insofar as the capabilities of airmen were limited by primitive technology, lack of experience, and questionable doctrine.

However, even as airpower matures, the traditional view of airpower persists. Airpower has been—and generally still is—viewed by nonairmen as an adjunct to surface forces, an in-

strument used to lend support to warriors tied to the surface of our planet (nuclear warfare excepted). Even conventional strategic bombing was considered by all but airpower zealots as merely a means to reduce the enemy's ability to resist in the field. The two-dimensional model has persisted so long that a good many Airmen, particularly those involved with so-called tactical airpower, believe that airpower's role is to support surface operations.

But times have changed. The need to develop a new paradigm that makes the best use of airpower's newfound maturity and domination is obvious. The new model should not just address long-standing questions of who supports whom—the main weight of effort—and who controls what. Rather, the new model must return to the fundamentals and reevaluate the art of warfare itself in the airpower age. An example will illustrate the point.

The two-dimensional model of warfare has a sequential orientation. It assumes that an enemy's military forces will be deployed to defend his centers of gravity. Thus the two-dimensional model of warfare postulates that (1) fielded armies and navies must be defeated and driven back, to the extent that (2) an enemy's center(s) of gravity become vulnerable. Seizing, controlling, and holding territory become of paramount importance in this model of warfare. Further, progress is simple to evaluate—one uses a map and watches the orderly advance (or retreat) of the front lines.

A three-dimensional model of warfare is based on a unique capability that defines the essence of airpower. That capability is the quick concentration of great power over any spot on the surface of the globe. The result is that an enemy is vulnerable every place all the time. Conceptually, every tangible facet of an enemy's power structure can be attacked with equal facility at any time. Consequently, one no longer requires sequential orientation. Operations against the enemy—whether at the front lines, at some deep-seated center of gravity, or at some place in between—can be parallel in nature, perhaps carried on simultaneously.

Controlling territory becomes much less important in a three-dimensional model. Forces deployed to hold territory can, in fact, be a disadvantage in some circumstances. The Iraqi case provides a classic example in which airpower reduced the Iraqi

army in the field to a bedraggled, demoralized, undersupplied, and hungry mob that wanted to do little more than surrender. As a result of all this, in the three-dimensional model, maps no longer serve as adequate or accurate tools for measuring the progress of a war.

The air campaign in Desert Storm illustrated the advantages of parallel operations in a three-dimensional model of war. The result was a thundering aerial onslaught that put enormous pressure on strategic, operational, and tactical targets all at once and continuously, offering the enemy no chance to recoup.

Previous wars in the airpower age foreshadowed, in limited ways, the parallel air campaign in the Gulf War. In World War II, for example, the strategic bombardment of Germany progressed even while Allied forces built up in Great Britain for the invasion of the Continent. In the Pacific, the bombardment of Japan began in earnest even as Allied forces were moving through the island chains toward the Japanese homeland.

For the most part, however, the strategy used in World War II was sequential in nature. The Battle of the Atlantic had to be won before forces could be massed in Great Britain. Adequate forces had to be massed in Great Britain before the invasion could take place. The Normandy beachhead had to be established and port facilities secured before Allied forces could break out across France and so forth. In the Pacific, the story was much the same.

The capabilities of modern airpower and a war-fighting model that is truly three-dimensional may obviate the need for sequential strategies in many situations. If an enemy is vulnerable everywhere all the time, theater commanders can choose and then orchestrate the combination of simultaneous or near-simultaneous actions that will create the greatest impact upon that enemy's ability to resist. The result should be a rapidly unfolding campaign in which there are no front lines, in which holding territory is often irrelevant (and may be a detriment), and in which air, land, and sea forces are used to their greatest advantage against the most appropriate and important enemy vulnerabilities anywhere at any time.

In such a three-dimensional campaign model, forces on the offensive have enormous advantages over those on the defensive. Successful defense would require one to be strong everywhere all the time—a near impossibility. In this model, the

question of who is supporting whom can become irrelevant or can be a constantly changing relationship, depending upon the enemy's actions and reactions.

But the key is airpower. Airpower makes such warfare possible to begin with, and airpower will make it possible to execute in practice. The absolute criteria are control of the air and overwhelming amounts of airpower to take advantage of that control. In the Gulf War, the coalition achieved total air supremacy. Whether or not such total control of the air is required remains a question that can be resolved only with further study.

The Challenge for Airmen

It seems to me that Airmen must address three basic agenda items if they are to fully develop the new three-dimensional paradigm. First, they must address the implications of such a model of warfare. Some are obvious. Clearly, Airmen must be able to operate 24 hours a day, in all weather, at a high tempo. They must be able to respond quickly and accurately to a campaign situation that will change rapidly. These requirements, in turn, can have serious implications for weapons-system design, force structures, manning levels, logistic patterns, intelligence requirements, and command and control structures. As thinking about the new paradigm unfolds, Airmen will certainly have to address a good many more requirements and implications.

Second, Airmen must overcome the fears and resistance that will surely come from their compatriots in arms who serve in the surface forces. Is the future of surface forces dim? Certainly not. On the contrary, the three-dimensional model of warfare will open new vistas for the use of surface forces of all kinds. At this early stage in its development, the three-dimensional model of warfare appears to be the epitome of joint operations.

The third agenda item is both a method for accomplishing the first two and a requirement in itself. Airmen must educate themselves and others. We must force ourselves to challenge assumptions and to rethink long-standing beliefs. Airmen must commune with one another, feed off each other's ideas, and develop the new model of warfare to the fullest. Airmen must write in their journals and debate the ideas and their implications. Airmen should initiate conferences to stimulate the free

flow of ideas. But this process must not be limited to Airmen. Our colleagues in the surface forces must enter the dialog, challenge Airmen and their ideas, and present alternative arguments. The full development of the new paradigm of warfare requires a vigorous dialectic process.

Operation Desert Storm, although not large by historical standards, was one of those symbolic events that few people are fortunate to witness. It symbolized both a fundamental shift in the way many wars will be conducted and the need for a new way of thinking about military operations. Viewed from the Iraqi perspective, Desert Storm symbolized the terrible penalty for adhering to the old model. It is time to change, and Airmen must lead the way.

Notes

1. See Lee Kennett, *The First Air War, 1914–1918* (New York: Free Press, 1991). In particular, see chapter 13, especially pages 220–29. There is no question that airpower performed many important roles. But in truth, the total air effort and its severely limited capabilities were simply dwarfed by the enormous struggle on the ground.

2. There are a good many survey histories of US airpower over this extended period. Three of the more informative are James L. Stokesbury's *A Short History of Air Power* (New York: William Morrow & Company, 1986); Herbert Molloy Mason, Jr.'s *The United States Air Force: A Turbulent History* (New York: Mason/Charter, 1976); and Robert Frank Futrell's monumental *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force*, vol. 1, 1907–1960, and vol. 2, 1961–1984 (Maxwell AFB, AL: Air University Press, 1989).

3. See the following: Stokesbury's *A Short History of Air Power*; Mason's *The United States Air Force*; Futrell's *Ideas, Concepts, Doctrine*; R. J. Overy's *The Air War, 1939–1945* (New York: Stein and Day, 1980); Michael S. Sherry's *The Rise of American Air Power: The Creation of Armageddon* (New Haven, CT: Yale University Press, 1987); David R. Mets's *Master of Airpower: General Carl A. Spaatz* (Novato, CA: Presidio Press, 1988); and James Parton's *"Air Force Spoken Here": General Ira Eaker and the Command of the Air* (Bethesda, MD: Adler and Adler, 1986).

4. An excellent, brief, well-documented, and recent treatment of the evolution of US naval power is George W. Baer's "U.S. Naval Strategy, 1890–1945," *Naval War College Review* 44, no. 1 (Winter 1991): 6–33.

5. General Kenney, who was Gen Douglas MacArthur's chief Airman in the Southwest Pacific theater in World War II, used land-based airpower in very creative ways. He essentially denied the narrow waters of the Southwest Pacific theater to the Japanese navy, thus neutralizing an enormous Japanese advantage and allowing MacArthur to take important offensive actions far earlier

than had been expected. Kenney's first-person account of the struggle is a classic in airpower literature. See George C. Kenney, *General Kenney Reports: A Personal History of the Pacific War* (1949; reprint, Washington, DC: Office of Air Force History, 1987).

The Essence of Aerospace Power

A New Perspective from a Century of Experience

The post–Cold War era started well enough with a successful foray into Panama followed by a brilliant victory (with considerable help from our coalition friends) in the Gulf War. Ironically, the US military became the ultimate victim of its own success on the battlefield when those in positions of power and influence challenged the need for such a powerful military when there were no “peer competitors” to be found. Cuts in force structure began just before Desert Storm and picked up momentum in its aftermath. Major downsizing in the Air Force led to major reorganization, and within about three years, from 1989 to 1992, the operational heart of the Air Force for the previous 45 years had been ripped apart and its rapidly shrinking pieces put back together in smaller and very unfamiliar patterns. As the 1990s continued, a bewildering array of operational requirements (some of them continuing with no end in sight) stretched our much smaller force to the limit. The fact that many of these operations probably would not have been necessary during the Cold War was a bitter irony that did not go unnoticed. For Airmen caught up in the escalating operating tempo, victory in the Cold War seemed to confirm the old adage that no good deed goes unpunished.

Amid all the angst and confusion, the Air Force attempted to redefine itself. But rather than enlighten ourselves, our sister services, our civilian masters, and the public at large about the Air Force and aerospace power in the new world order, our well-intentioned efforts added more confusion to an already chaotic situation. In a sense we tried too hard, too often, and in too many ways. First came the 1990 white paper spelling out the overarching Air Force vision of Global Reach—Global Power followed in 1996 by the Global Engagement vision statement. Most recently (June 2000), Global Vigilance, Reach, and Power bowed

A condensed version of this article was published in *Aerospace Power Journal* 15, no. 2 (Summer 2001): 23–31.

in as the third Air Force vision of itself in just one decade.¹ We added more to the muddle by promulgating a set of Air Force core competencies, which we claimed were “basic areas of expertise that the Air Force brings to any activity.”² To our chagrin, we quickly had to modify the newly minted core competencies to include items we apparently forgot were basic areas of Air Force expertise. With all of this frenetic activity, multiple visions, and resulting confusion, it is not surprising that the Air Force appears to be suffering an identity crisis as we plunge into the new century.

It is time to step back from the hubbub of contemporary affairs and take the longer view. We now have the luxury of looking back on and learning from a century of airpower experience and about four decades of space power experience. Although only a brief moment in time when compared to the experience base of soldiers and sailors, the last century offers invaluable perspective for Airmen. We have seen airpower—and to a lesser degree space power—used in many different ways, for many different purposes, under many different conditions, and with many different degrees of success. It is reasonable to believe that with such perspective we should be able to answer some of the most basic questions about aerospace power with considerably more confidence than did our predecessors. We should be able to overcome the myopia of the moment and our identity crisis by distilling from our century of experience what can best be called the *essence* of aerospace power.

The following pages contain an examination of the *essence* in some detail, including its absolute requirements and very real limitations. Perhaps most importantly, this essay explains how the *essence* provides the psychological and operational rationale for an independent Air Force and how aerospace power spawned the most significant revolution in military affairs in the twentieth century. The essay turns its attention to the conceptual difficulties surrounding the space portion of aerospace power and space issues that have yet to be adequately addressed. Finally, the essay will cast a glance at the future, particularly the reality and the dilemma facing Airmen as they fly into the third millennium.

Discovering the Essence of Aerospace Power

The first order of business is to define the principal term of reference: *aerospace power*. To simplify things, this essay will consider only the military dimension and thus define aerospace power as the ability to use platforms operating in or passing through air and/or space for military purposes. The platforms referred to in this definition would obviously include aircraft, spacecraft, satellites, ballistic missiles, and cruise missiles. The definition would also include the supporting and enabling infrastructures of these platforms. There are some gray areas, such as terminally guided artillery rounds that one can argue are less conventional artillery rounds and more “platforms passing through air and/or space.” However, such gray-area systems are anomalies that can be usefully set aside because, whether included or excluded from the aerospace power mix, they do little definitional harm.

The second order of business is to identify the unique quality or qualities that set aerospace power apart from other forms of military power. In other words, what makes aerospace power unique? For years Airmen have erroneously argued that the unique qualities of aerospace power include such things as speed, range, flexibility, and lethality. Although aerospace power often possesses impressive *relative* advantages in many of these admirable and valuable qualities, they are not unique. Virtually all military forces possess some degree of speed, range, flexibility, and so forth.

The quality unique to aerospace power is so obvious we often overlook it—airpower operates elevated above the earth’s surface. Although obvious, this is not a trivial observation because elevation is far more than just a new way to seek the high ground and results in much more than just a new perspective. Operating in the third dimension frees Airmen from impediments to movement created by geography, topography, flora, and fauna. The third dimension opens an almost limitless operational expanse in which Airmen can approach their goal from any direction and any altitude. The third dimension presents less general friction and resistance to movement by orders

of magnitude. As a result, aerospace power accrues enormous relative advantages in speed, range, flexibility, and so forth.

The relative advantages spawned by operating in the third dimension produce a unique capability that has changed the face of warfare in the last century. This unique capability forms the *essence* of airpower, a concept that can be expressed in just one brief declaratory sentence.

The Essence of Aerospace Power

Only aerospace power can apply great power quickly to any tangible target on the planet.

Parsing the Essence

Hidden in this apparently straightforward and disarmingly simple statement are all the elements that make aerospace power profoundly different from land and sea power. We must unpack the statement to understand its importance and to appreciate its ramifications. First, the reader should note that *aerospace power* rather than *the Air Force* appears in the statement above. The *essence* of aerospace power has little to do with who owns the power. It remains the same whether one speaks of the Air Force, aviation elements of the other services, or the airpower possessed by allies and adversaries. Differences in ownership are reflected by the word *can* in the statement. Not every air force or aviation organization has the “full-service” force structure that *can* take full advantage of the *essence*.

The term *quickly* defines one of the cardinal advantages Airmen have relative to surface forces. The speed at which modern aerospace forces can travel to any point on the globe is several orders of magnitude greater than that of the fastest surface forces. In the aerospace age, no place on earth is more than a few hours’ distance from any other place. Airmen have stripped away the time and space advantages afforded by traditional defensive barriers such as the great oceans. By the beginning of the second half of the twentieth century, airpower gave every

military threat a very real sense of immediacy, and war became very much a “come as you are” affair, a situation that intensified with the dawn of space capabilities. In the age of aerospace power, although bordered by friendly neighbors and protected by the great oceans, even the United States has been forced to maintain large standing military forces in peacetime, reversing a revered and carefully observed policy dating back to the aftermath of the Revolutionary War.

Perhaps the most important and certainly the most misinterpreted word in the *essence* is *power*. In a traditional military context, explosive ordnance quickly comes to mind when one thinks of applying great power. Certainly this was the common perception at the height of Cold War tensions when opposing air and missile fleets were on constant alert armed with nuclear weapons. The nuclear world notwithstanding, the popular vision of airpower centers on powerful images of bombs dropping, whether they are from B-17s in World War II or B-2s in Allied Force. In truth, however, the power that aerospace power can apply can be very different from that in these traditional Draconian visions.

In the post-Cold War world, the power most often delivered by Airmen has been in the form of humanitarian aid—food for the starving, medical supplies for the sick and injured, heavy equipment to deal with the destruction of floods and earthquakes. We have seen this humanitarian power delivered time and again in places such as Nicaragua, Mexico, Peru, Somalia, Rwanda, Turkey, Bosnia, and literally hundreds of other venues. This kind of air-delivered power was designed to save lives rather than take them and to make friends rather than defeat enemies.

In different circumstances the power delivered by air can be people—many different kinds of people for many different reasons. They could be soldiers and their equipment airlifted to the latest crisis in some far corner of the world. Modern expeditionary forces rely on airlift to get to the scene of the action quickly, ready to fight. They could be technical experts essential to the success of an important foreign aid program. They could be diplomats trying to avoid war by defusing a crisis. Shuttle diplomacy is a child of the air, if not the space, age.

Alternatively, the power can be information. Knowledge is the purest form of power and is the reason that overhead surveillance, reconnaissance, and intelligence-gathering efforts are

so important in both war and peace. The information delivered from above might take the form of propaganda calculated to strengthen a friendly regime, discredit an enemy regime, or directly attack the morale of an adversary's frontline troops. In less hostile circumstances, the information might consist of humanitarian warnings about impending natural disasters or news about disaster-relief efforts.

Finally, as we parse the *essence* statement, we confront the term *target*. In the traditional military sense of the word, the target can be anything of military value to an adversary. For example, the targets might be the sources of the adversary's military power—munitions factories, industrial plants, and the like. Early airpower theorists were enamored by the idea of attacking the sources of enemy power, the conceptual foundation of strategic bombing. Or the targets might be the lines of communication—interdiction targets—through which military power flows from its sources to its fielded forces. Most obviously, targets can be the enemy's fielded forces. In this regard, it is worth noting that airpower can take direct offensive actions against an adversary's air forces and surface forces. Surface forces, conversely, can defend themselves against air attack, but only in very unusual circumstances can they take direct offensive actions against air forces.³ Generally speaking, surface forces can take direct offensive actions only against like forces.

In a less traditional sense, the target can be hunger, disease, ignorance, lawlessness, or any of a hundred other vexing problems that plague so many people throughout so much of the world. This point has special meaning for Airmen because the Berlin airlift was the first major strategic campaign waged by the newly independent US Air Force, and its target was hunger. Such nontraditional targets have been most prevalent in the post-Cold War world.

Parsing the *essence* reveals that the options for using airpower are virtually unlimited. Notwithstanding the requirements limitations discussed in the following paragraphs, it is not unfair to say that modern Airmen can deliver precisely any kind of payload for any purpose anywhere in the world in a matter of hours. These extraordinary capabilities provide unparalleled flexibility. In truth,

the Airman's traditional axiom that "flexibility is the key to airpower" should be reversed—airpower is the key to flexibility.

The Absolute Requirements

Stunning technological progress during the twentieth century made the *essence* of airpower a physical reality. However, there are three fundamental requirements that must be fulfilled before the physical reality can be a practical and useful reality. Left unfulfilled, any one of these three fundamental requirements is a showstopper.

The first requirement is the most obvious: appropriate kinds and numbers of air assets must be available. To fully exploit airpower's unlimited options, a nation must have assets that can quickly mass great power anywhere, that are appropriate for every type of load and target, and that can deliver the load with great precision. However, not every nation needs to fully exploit the *essence*. A global power may perceive a critical need worldwide. Regional powers may perceive a critical need within only their own regions. As a result, the appropriate kinds of air assets will likely be significantly different. A regional power, for example, might not even consider a force structure with long-range heavy bombers, a large number of tankers, and intercontinental ballistic missiles. Conversely, a global power might put these same kinds of assets at the top of its priority list. It is important to understand that the required air assets go far beyond airframes and munitions. Almost any nation can procure modern, sophisticated aircraft and munitions on the open market. The global arms bazaar makes them readily available. However, hardware is not airpower. Even though airpower is a child of technology, the infrastructure that educates, trains, disciplines, motivates, and cares for airmen and their equipment separates first-rate air forces from high-tech flying clubs.

The second fundamental requirement is access to timely and accurate intelligence. Airpower historian Phillip Meilinger once claimed that "in essence Air Power is targeting, targeting is intelligence, and intelligence is analyzing the effects of air operations."⁴ Meilinger may have engaged in a bit of hyperbole on this point but not much. The target intelligence required is not just about technical and tactical matters such as location, con-

struction, defenses, and so forth. Of equal importance are the strategic- and operational-level requirements to understand if, why, and to what extent operations against potential targets will contribute to the overall military effort and, ultimately, to political objectives. In a sense, strategic- and operational-level intelligence informs decisions about *what* airpower should do. Tactical-level intelligence informs decisions about *how* airpower should do it.

One of the key intelligence requirements is the ability to accurately assess the results of operations. Assessing actual target damage has been a problem for airmen since the earliest days of military airpower.⁵ Even with modern sensor capabilities, bomb damage assessment remains a problem to this day.⁶ The situation is further complicated by the need to assess not just simple bomb damage, but also the effects of that damage in terms of the overall military effort and political objectives.⁷ Measuring first-order effects of aerospace operations remains a difficult and complex task. The ability to measure second- and third-order effects remains problematic.

The third fundamental requirement is the political will to fully exploit the *essence* of aerospace power. In the eyes of many Airmen, political will has been their Achilles' heel. During the Cold War, the fear of escalation to a possible nuclear confrontation restrained the use of aerospace power. In Korea, lucrative targets in Manchuria were off limits, and air strikes against enemy industrial centers of China and the Soviet Union were out of the question. In Vietnam, escalation fears not only made strikes against China and the Soviet Union out of the question, but also seriously restricted operations against North Vietnam. After the Cold War, fear of inflicting undue civilian casualties and the need to maintain fragile coalitions continued to restrict the full exploitation of the vertical dimension. In Desert Storm, for example, the destruction of the Al Firdos bunker in Baghdad with the loss of many civilian lives resulted in tight restrictions on bombing any targets in the Iraqi capital. During Allied Force, the need to maintain a united front provided every NATO member the ability to virtually veto strikes on Serbian targets, thus seriously restricting the NATO aerial assault.

Disabilities, Vulnerabilities, and Limitations

The unparalleled capability of aerospace power does not mean there are no limits to its utility. As is true with every other form of military power, there are some things that Airmen either cannot do or cannot do well. It is also true that aerospace forces have some important vulnerabilities. Finally, there are several important limiting factors with which Airmen must deal.

The most obvious thing that aerospace power cannot do is physically seize and hold territory. Under certain circumstances, airpower alone may be able to force opposing forces to vacate territory or prevent opposing forces from entering territory. To do so, however, one must envision a situation of total air superiority if not absolute air supremacy, a ground environment in which opposing forces would find concealment difficult, and an opposing force composed of “regular” forces, perhaps mechanized, with extended lines of supply. The advent of operations such as Southern Watch and Northern Watch has led to some discussion of “air occupation” as a viable concept. Both of these operations have met at least one of their major objectives—the enforcement of no-fly zones—but this is a far cry from occupation of anything but the airspace over Iraq. Even the British air-control experience of the 1920s and 1930s, often cited with regard to air occupation, required the coordinated use of ground forces (often armored-car columns) along with airpower to police portions of the Empire.⁸

The most significant vulnerability of aerospace power occurs whenever aircraft leave their operating environment. On the ground, aircraft are helpless—fragile, unarmored, and unable to defend themselves. Unfortunately, combat aircraft, even in high-tempo wartime operations, spend most of their time on the ground. Their vulnerability is such that in a combat zone almost heroic measures must be taken to protect them in hardened shelters or, at a minimum, in revetments. The most telling testimony to the vulnerability of aircraft on the ground is found in the Vietnam War. During that struggle, Vietcong and North Vietnamese sappers and mortar teams destroyed 43 percent more USAF aircraft on the ground than were lost in air-to-air combat, and they destroyed nearly as many USAF

aircraft on the ground as were lost to the vaunted North Vietnamese surface-to-air missile system.⁹

The limitations of aerospace power are several. Three of the most important are directly related to one another. Most important is the obvious fact that modern airpower is very expensive. The incredible capabilities of modern air and space craft come with a considerable price tag. The cost of modern combat aircraft is measured in the tens of millions of dollars each, and for some aircraft (e.g., the B-2 bomber) in the hundreds of millions of dollars each. The weapons these aircraft employ are also often expensive, particularly in the era of precision-guided standoff munitions.¹⁰ Second, the combination of complexity and cost results in smaller and smaller aircraft inventories. Although modern aircraft are much more capable than their predecessors, their numbers are much more limited, and numbers do count—particularly for a global power wrestling with parallel requirements in the far corners of the globe. An aircraft can be only one place at a time doing one thing at a time. Further, smaller inventories magnify the importance of attrition.¹¹ Third, prudence dictates that expensive and relatively scarce airframes and crews should be put at risk and expensive weapons should be expended only against lucrative targets. As a result, high-tech precision aerial weapon systems can be at a serious disadvantage when facing adversaries employing strategies and tactics that emphasize dispersion rather than concentration of forces (e.g., insurgent strategies/guerrilla tactics).

The Rationale for an Independent Air Force

Notwithstanding requirements and limitations, aerospace power's nearly unlimited options and unparalleled flexibility provide the fundamental and compelling rationale for an independent air force. Several of the world's great air forces, including the US Air Force, gained their independence from surface forces in large measure because of the perceived importance of so-called independent missions—most prominently, strategic attack. Independent missions, particularly after the advent of nuclear weapons (which some believed gave Airmen a means to win wars without the aid of land or naval forces), provided a convenient bureaucratic rationale for an independent US Air

Force in 1947. However, with more than a half century of additional experience and perspective, it is now obvious that the fundamental rationale for an independent aerospace force is psychological and operational, not bureaucratic. The key to understanding this basic truth lies in the implicit assumption that the unlimited options and unparalleled flexibility of aerospace power should be fully exploited within the parameters of the situation at hand. To do any less would raise the strong possibility of ignoring options that could turn defeat into victory or make victory more decisive and less costly.

An aerospace organization “joined at the hip” and subservient to a surface force would be much less likely than an independent force to fully and appropriately exploit the unlimited options of aerospace power. The reason for this is found in the very different worldviews or mind-sets of soldiers, sailors, marines, and Airmen.¹² Ground forces, for example, are traditionally most concerned about the immediate problem they confront, an understandable mind-set since most often it is the enemy at relatively close range doing the shooting and killing. This mind-set has manifested itself in many ways and in many places over the years. During World War II, for example, the ground officers who dominated D-day invasion planning were much more concerned with the immediate problem of securing the initial lodgment on the shores of France than they were about the subsequent breakout into the heart of France. The beaches of Normandy offered favorable conditions for the amphibious assault, but the hedgerow country behind the beaches was some of the worst imaginable terrain for subsequent operations—a fact illustrated in the bloody, yard-by-yard struggle through the hedgerows that lasted for nearly two months.¹³ Another example is found in US Army doctrine during the mid-1970s that concentrated on “winning the first battle.” It was the immediate problem, the first battle, which was of most importance.¹⁴ Only in the late 1970s and early 1980s with the advent of AirLand Battle doctrine did the Army look up, so to speak, and acknowledge that what happens far beyond the battlefield is often of great importance. But even with a newfound appreciation for the “deep battle,” the perceptions of ground force commanders are constrained by lateral confines that tend to channel their attention and interest. Ground commands must exist and operate “cheek by jowl”

across an entire theater of operations. Clear divisions of command responsibility are required to prevent fratricide or counter-productive operations along command boundaries. The upshot is that ground commanders from the corps level down have strictly defined areas of responsibility (AOR) which generally extend considerably to the rear (reflecting rear-area security concerns) and considerably forward (reflecting the newfound importance of the deep battle). Laterally, however, ground commands are tightly constrained by the parallel AORs of their neighboring commands. This results in the so-called bowling alley effect, long but relatively narrow AORs that channel attention and interest and thereby constrain perceptions.

The view held by Airmen, because of the nature of aerospace power, is the antithesis of that held by or imposed on ground forces. The AOR of an Airman—from the most junior pilot to the most senior air commander—is the entire theater of operations. There are no physical boundaries in any direction that constrain air operations. Airmen realize that they can spread their operations across the entire theater or concentrate their operations—perhaps at one end of the theater in the morning and at the opposite end of the theater in the afternoon. Airmen also realize that, depending upon the adversary and the situation, the most important enemy targets—those whose destruction may lead to ultimate victory with the least cost—may not always be the most immediate, most obvious, or closest targets.

Compared to the ground forces, sailors have a much broader and less constrained worldview. But even this broader view is significantly constrained by physical and psychological realities. In terms of physical realities there are, after all, some places where one cannot sail a ship; thus the naval worldview tends to focus on the high seas and the littorals. Physical characteristics peculiar to shipborne aircraft also impose limits on their capabilities.¹⁵ Psychologically, because naval fighting ships are very expensive and difficult to replace, their protection rightfully has a very high priority, including a high priority in the tasking of naval aircraft. This defensive priority inevitably translates into reduced offensive utilization. During Desert Storm, for example, 38 percent of all “shooter” sorties flown from US Navy aircraft carriers were defensive counterair or defensive combat air patrol sorties. During the same period, only 12 percent of all shooter sor-

ties flown by the USAF were defensive sorties.¹⁶ These physical and psychological realities significantly constrain the perceptions and limit the options of sailors with regard to the use of aerospace power.

As the evidence indicates, if organized as part of a surface force and subject to the culture, customs, and mind-set of the parent surface force, airmen will be much less likely to fully and appropriately exploit the unlimited employment options available to them. The reason that a full-service air force should be independent and coequal with surface forces is not some mystical “independent” mission. Nor is the rationale for an independent air force based on notions of a stand-alone, war-winning capability. Rather, the most fundamental and compelling argument for an independent air force is the imperative to fully exploit the *essence* of aerospace power. Exactly the same arguments lead to the inevitable conclusion that, within a theater of operations, an Airman should centrally control aerospace forces.

The Real Revolution in Military Affairs

By the middle of the twentieth century, the technological progress of airpower had revolutionized military affairs in the most profound ways imaginable. By the end of World War II, air superiority was already the first and overwhelming requirement for any military or naval operation. Surface forces had quickly and often tragically learned how difficult it was to operate in the face of strong, hostile airpower and how much more effectively they could operate with the help of strong, friendly airpower. At sea, aircraft carriers had supplanted battleships as capital ships, and naval aircraft were the fighting elements of fleet engagements, with the opposing ships rarely within sight of each other. After the war, the advent of missile technology provided new missions for submarines, both in launching missiles and destroying enemy submarines attempting to launch missiles. The development of cruise missile technology provided many surface ships with precision airpower and the ability to apply naval firepower over previously undreamed of distances.

With the advent of aircraft and missiles with intercontinental range in the 1950s, the *essence* of airpower was complete. With it came almost total vulnerability—everyone was subject to at-

tack from the air everywhere all the time. There was no place to run, and there were few places to hide. Every soldier on the front lines, every ship at sea, every bridge and tunnel on every line of communication, every factory, every city—virtually everything, everywhere was vulnerable to attack from the air at any time. As a result aerospace power gave nuclear weapons much of their importance. The only practical means of delivering nuclear weapons in significant numbers was by aircraft or missiles. The immediacy of the airborne nuclear threat across the globe had profound effects on international relations. The strange Kabuki drama of nuclear deterrence took center stage in the Cold War as two hostile armed camps endeavored to maneuver for advantage without upsetting the so-called delicate balance of terror.

All of these developments taken together constituted a true revolution in military affairs and foreign policy, a revolution centered on aerospace power. The revolution happened quickly—just over three decades from the first time an airman dropped a bomb from an airplane in anger to the advent of atomic airpower. Today, the revolution continues as technology makes aerial weapon systems ever more potent. As a result, for better or for worse, airpower has become the military instrument of choice for the United States and many of our allies when dealing with hostile military situations around the world.

The Space Power Conundrum

I have used the term *aerospace* throughout this essay. Although *aerospace* is politically correct at the time of this writing, in the 1990s there was vacillation at the highest command levels concerning the medium in which the Air Force operates. Three successive chiefs of staff went from using the time-honored appellation *aerospace* to *air and space* (which, it was said, would someday become *space and air*) and then back again to *aero-space*. Such inconstancy highlights the difficulty Airmen face when considering mature airpower capabilities, the promise of space power, and the nexus between air and space power.

Space and space power are subjects of obvious and growing importance, yet our consideration of them is hobbled by a dearth of conceptual thinking about space and military operational matters. Scientific wizards rather than operational warriors

dominated the military space community for much of its history. As a result, military space power is still looking for its great theorist. A modern-day, space-power version of Mahan or Mitchell has yet to make his or her presence felt. The problem became so painfully obvious in the later 1990s that Gen Howell M. Estes III, then commander in chief of US Space Command, commissioned a civilian academic to develop a space-power theory “as the opening statement in what I hope will be a meaningful debate about space power theory.”¹⁷ Unfortunately, the project fell on hard times, and the results have not provided the spark that General Estes sought.

Despite the paucity of general theory, there is no question that space operations have become vitally important to US military operations. Command, control, communications, intelligence, weather, reconnaissance, surveillance, global positioning, and mapping are just the most obvious areas in which space plays a major role. But even with the obvious and growing importance of space operations, how are we to think about space power? Without some overarching theoretical framework, space and space operations are only a collection of capabilities, albeit very important capabilities. There are three sets of fundamental issues that must be vetted if we are to understand space power with the kind of clarity with which we understand airpower and if we are to understand their nexus.

The first set of issues concerns what we have learned about space power. Does the *essence* actually apply to space power as has been assumed throughout this essay? Can space power apply great power quickly to any tangible target on the planet? Many would argue for a negative answer to this question because of political restraints on weaponizing space. Others would argue for a positive answer based on technical, if not political, feasibility. In either case, the question concerning the applicability of the *essence* remains assumed but undemonstrated. Or is there a space-power version of the *essence*? After more than 40 years of experience with space operations, can we make a concise generalization that defines space operations and at the same time differentiates them from all other military operations, including airpower?

A second group of issues concerns the future of space power. What kinds of military operations are likely to migrate to space

and why? Will space become another “battlespace,” or is it likely that military operations in space will remain focused on nonlethal activities in support of combat elsewhere? What are the advantages and disadvantages of each alternative? What circumstances are likely to affect the choices between these alternative futures for space operations?

The third set of issues has to do with the relationship between space power and airpower. The defining characteristic of airpower is an operational regime elevated above the earth’s surface. Conceptually, space power would seem to be just more of the same at a higher elevation, a concept tacitly endorsed by the Air Force in its current (as of this writing) basic doctrine.¹⁸ The term *aerospace*, coined in the late 1950s, echoes this same theme, as do official pronouncements such as “although there are physical differences between the atmosphere and space, there is no absolute boundary between them. The same basic military activities can be performed in each, albeit with different platforms and methods.”¹⁹ But can the vast differences between operations in the atmosphere and operations in space be ignored so easily in our conceptual thinking? Should they be brushed aside so readily? Is space just more altitude, or is the notion of a seamless aerospace environment a convenient fiction stemming from interservice rivalries and budget competition?

It is difficult to analyze these and many more issues dealing with space without a general, overarching theory of space power. The task is made even more difficult by several other factors such as the very limited experience base in space operations, the very tight security classification concerning much of what goes on in space, the thoroughly subdivided responsibility for space operations,²⁰ and, of course, interservice rivalries. Thus we have a conundrum—a jigsaw puzzle that will picture how space power fits or doesn’t fit with airpower, if we can put the puzzle together in a manner that addresses the three groups of issues noted above. Until that happens, the pieces of the puzzle will remain unconnected, and space power will remain a contentious issue.

Explaining Aerospace Power and the Dilemma Airmen Face

In many respects, Airmen explain aerospace power using two broad themes that seem almost frozen in time at about the middle of the last century—updated technologically but not conceptually. The first and most common theme is some version of “higher, faster, farther” that emphasizes the relative advantages of operating above the earth’s surface. The new Air Force slogan No One Comes Close is the latest incarnation of the relative-advantage theme. The second theme centers on lists of the wonderful things that aerospace power can do. Some of the listings are quite detailed as in the *Global Reach—Global Power* white paper issued in 1990. Others, such as the USAF core competencies, are much more abbreviated. Neither of these themes captures what is unique about aerospace power.

The *essence* of aerospace power, on the other hand, takes a much broader and more fundamental view founded on the unique capability of aerospace power. It concentrates on concepts, possibilities, and virtually unlimited options rather than comparisons and lists. It is instructed by the absolute requirements that make it work, and it is tempered by vulnerabilities and limitations. A thorough understanding of the *essence* reveals the intellectual imperatives for independent air forces and for the centralized control of aerospace forces within a theater of combat operations. Finally, a thorough understanding of the *essence* makes it clear that aerospace power is the key to the flexibility that will be required in the new world disorder.

Aerospace power would seem to have a very bright future. But there are dark clouds on the horizon. Just as there is an *essence*, there is also a twofold reality that produces a dilemma Airmen must face. In a sense, Airmen are choking on their own success. The reality is that, because aerospace power has become so valuable to so many in so many different ways, the demand for it is virtually unlimited. As noted earlier, the reality is also that aerospace resources are very limited and becoming even more limited. In sum, there is a classic supply-and-demand mismatch which produces a classic dilemma. How can Airmen exploit unlimited options while satisfying unlimited demands with increasingly limited resources? How Airmen deal with this

dilemma across the entire spectrum of conflict will determine much about the future of aerospace power.

Notes

1. USAF, *Global Reach—Global Power: The Air Force and US National Security*, White Paper (Washington, DC: Department of the Air Force, 1990); USAF, *Global Engagement: A Vision for the Twenty-first Century Air Force* (Washington, DC: Department of the Air Force, 1996); USAF Chief of Staff, *Global Vigilance, Reach, and Power: America's Air Force Vision 2020* (Washington, DC: Department of the Air Force, 2000).

2. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, September 1997, 27.

3. There are several well-known examples of such unusual circumstances. Examples of ground forces directly attacking air forces are found in the Vietnam War when Vietcong sappers successfully attacked a number of US air bases in South Vietnam, destroying aircraft and materiel, killing American personnel, and disrupting operations. An example of naval surface forces directly attacking an air force is found in the struggle for Guadalcanal in the Southwest Pacific theater during World War II. Japanese surface warships made nighttime raids on Henderson Field on Guadalcanal, which was within the range of heavy guns on Japanese ships sitting just off shore.

4. Col Phillip S. Meilinger, *10 Propositions Regarding Air Power* (Washington, DC: Air Force History and Museums Program, 1995), 20.

5. There are countless instances of gross bomb-damage-assessment (BDA) errors. A classic example comes from the war in Vietnam and the effort to determine the number of North Vietnamese trucks destroyed on the Ho Chi Minh Trail as they infiltrated personnel, equipment, and supplies into South Vietnam. In April 1971, an Air Staff message to commanders in Southeast Asia noted, "Seventh Air Force is really concerned about the validity of the BDA reported by the AC-130 gunships in their truck killing operation. They stated all aircraft BDA for this hunting season indicates over 20,000 trucks destroyed or damaged to date, and if intelligence figures are correct, North Vietnam should be out of rolling stock. The trucks continue to roll however." Quoted in Donald J. Mrozek, *Air Power and the Ground War in Vietnam* (Maxwell AFB, AL: Air University Press, 1988), 131.

6. Two relatively recent examples illustrate the point. During the Gulf War, the Joint Chiefs of Staff (JCS)/US Central Command (CENTCOM), the Defense Intelligence Agency (DIA), and the Central Intelligence Agency (CIA) each came up with widely different estimates of the percentage of Iraqi tanks, armored personnel carriers, and artillery destroyed by coalition air strikes. For example, on 23 February 1991, JCS/CENTCOM claimed 39 percent of Iraqi tanks had been destroyed. The DIA said only 16 percent had been destroyed, while the CIA claimed only 12 percent of the Iraqi tanks had been destroyed. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 2, *Operations and Options: Effects and Effectiveness* (Washington, DC: Government Printing Office

[GPO], 1993), pt. 2, 211, table 13. For an even more recent example, refer to the controversy between *Newsweek* magazine and NATO concerning the number of Serbian tanks, armored personnel carriers, and artillery pieces destroyed during Operation Allied Force. For example, *Newsweek* claimed only 14 Serbian tanks had been destroyed while NATO claimed 93. John Barry and Evan Thomas, "The Kosovo Cover-up," *Newsweek*, 14 May 2000, 23–26; and Stephen P. Aubin, "Newsweek and the 14 Tanks," *Air Force Magazine* 83, no. 7 (July 2000): 59–61.

7. This point is driven home by Gordon and Trainor when commenting on the widely differing estimates of damage done to Iraqi tanks, armored personnel carriers, and artillery (see note 6). In essence, they argue, the bar had been set too high. The goal had been to destroy 50 percent of the overall Iraqi armor and artillery which theoretically was required to make the Iraqis combat-ineffective. No one's estimates came near the 50 percent level, yet "the air attacks made it impossible for the Iraqis to mount an effective defense. Airpower crippled the Iraqi war machine." Initially setting the bar too high in the Iraqi case seriously hindered the ability to estimate Iraqi capabilities prior to the start of the ground operations against Iraq. Michael R. Gordon and Gen Bernard E. Trainor, *The Generals' War* (Boston: Little, Brown & Co., 1995), 331, 474.

8. For an excellent discussion of air occupation, see Marc K. Dippold, "Air Occupation," *Airpower Journal* 11, no. 4 (Winter 1997): 69–84.

9. Sappers and mortar teams destroyed 96 aircraft in attacks on USAF bases. Only 67 USAF aircraft were lost in air-to-air combat, while surface-to-air missiles downed 110 USAF aircraft. Walter Kross, *Military Reform: The High-Tech Debate in Tactical Air Forces* (Washington, DC: National Defense University Press, 1985), 98. Antiaircraft artillery was the biggest threat to US aircraft, particularly radar-guided guns ranging from 57 mm to 100 mm. Lon O. Nordeen, Jr., *Air Warfare in the Missile Age* (Washington, DC: Smithsonian Institution Press, 1985), 13.

10. The issue is not exactly how much aircraft cost or how much more they cost today than in the past. Such determinations can be made in several different ways using different sets of assumptions. Nor does the question concern the capabilities of the aircraft. There is no question that modern aircraft are much more capable than their predecessors. But there is also no question that, by virtually any standard of measurement, modern aircraft cost considerably more than their predecessors. For a discussion of the different dimensions and difficulties of comparing aircraft and weapon costs, see Kross, *Military Reform*, 24–57.

11. The decline in aircraft inventories over the past 40 years has been startling. Snapshots taken at 20-year intervals of bombers and fighters in the active inventory reveal the following:

	1960	1980	2000
Bombers	2,193	412	179
Fighters	3,922	2,804	1,594

See *Air Force Magazine* (almanac issue), May 1975, 137; May 1980, 162; and May 2000, 66.

12. For further explanation, see my article "Joint Operations: The World Looks Different from 10,000 Feet" in part 3 of this anthology.

13. Russell Weigley makes this point: "By concentrating almost all their planning effort on the assault and the immediately following buildup, the planners neglected a maze of troubles awaiting behind the French shore. The greatest trials of OVERLORD . . . were to appear when the invaders plunged inland . . . in the region of Normandy called the Bocage." Russell F. Weigley, *Eisenhower's Lieutenants* (Bloomington: Indiana University Press, 1981), 35.

14. US Army FM 100-5, *Operations*, 1 July 1976.

15. For example, because carrier aircraft must take off from and land on relatively small ship decks and be able to "go below" for maintenance and so forth, their potential size is sharply limited, which puts limits on such capabilities as payload capacity, unrefueled range, and so forth.

16. Keaney and Cohen, *Gulf War Airpower Survey*, vol. 5, *A Statistical Compendium and Chronology*, 232, table 64.

17. Quoted in Jim Oberg, *Space Power Theory* (Washington, DC: GPO, 1999), x.

18. AFDD 1, *Air Force Basic Doctrine*, 21-22.

19. Air Force Manual (AFMAN) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, March 1992, vol. 1, 5.

20. In addition to the Army, Navy, and Air Force, other government agencies involved in space operations which are pertinent to this discussion include the National Imagery and Mapping Agency, the CIA, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the National Reconnaissance Office, and the National Security Agency. Tamar A. Mehuron, "Space Almanac 2000," *Air Force Magazine* 83, no. 8 (August 2000): 40.

100 Years of Airpower

Three Great Lessons and One Continuing Dilemma

Airmen will soon mark the completion of the first century of airpower. It was on 17 December 1903 that Orville and Wilbur Wright flew for the first time—the first controlled and sustained flight in a heavier-than-air, power-driven aircraft. The Wrights flew four times on that fateful day; the historic first flight lasted a total of only 12 seconds. Their fourth ascent lasted 59 seconds and covered approximately 260 meters. It was from these humble beginnings on wind-swept Kill Devil Hill near Kitty Hawk, North Carolina, that modern airpower grew. In less than 100 years, what the Wrights spawned arguably has come to dominate modern warfare and in some cases (e.g., Bosnia, Kosovo, and Afghanistan) has become the weapon of choice for those nations with significant airpower resources.

The pending anniversary of the Wright brothers' achievement is an appropriate time for all airmen to look back and see where we have been, evaluate where we are, and ensure that we understand the problems we face. It is my intent to do just that. This examination will look at airpower through the organizing framework of three different lenses focused on three of the most important themes in airpower's development. The focus of the first lens will be the most obvious: the development of airpower technology. Airpower is a child of technology, and the advances in airpower technology came with startling speed during the twentieth century. The second lens will focus on the experience of actually using military airpower throughout the twentieth century. This lens brings into focus a picture of airpower's ever-increasing importance in modern armed conflict. The final lens will focus on the development of airpower theory. In earlier decades, airpower theory provided grandiose visions of what airpower could do and how it should be used. But in more recent decades, existing

Originally published in a slightly different form in *Revista de la Escuela Superior de Guerra Aérea de la Fuerza Aérea Argentina* (Journal of the Argentine Air War College), Third Quarter 2002. Republishing granted by *Revista de la Escuela Superior de Guerra Aérea de la Fuerza Aérea Argentina*.

theory seems confused and out of touch with new realities, while efforts to develop new airpower theory appear moribund. Looking at airpower through the three lenses of technology, experience, and theory will ultimately focus our attention on where airpower is today and the problems airmen face.

Looking through the Technology Lens

The Wright brothers' technological breakthrough in 1903 unleashed a torrent of aeronautical developments. The pace of change was often breathtaking, particularly after the beginning of World War I, and has yet to abate. Although difficult to prove, it is very likely that the pace at which airpower developed technologically is unprecedented, and thus the speed at which airpower rose from little more than a military curiosity to an often dominating position has been stunning. In the early days, of course, everything seemed to conspire against the notion that airpower would someday be a dominating military force. Early aircraft were underpowered and primitively designed. They were slow by modern standards, lacked lift, and thus had very meager payload capacities. Systems for navigation and payload delivery were primitive by any measure. Even Mother Nature conspired against airmen—flying in the dark of night and in bad weather was problematic. The pace at which technological development overcame these problems can best be illustrated by taking a snapshot of airpower at the beginning of World War I in 1914 and comparing it with the picture of airpower just 30 years later in 1944.

In terms of motive power, the most common aerial power plant in use during the early years of World War I was the rotary engine, an odd design in which the entire engine block rotated around a fixed crankshaft. Although dependable and smooth running, the rotary had several significant drawbacks, the most important of which was the extreme torque generated by the whirling engine block. Torque limited the size of the engine that could be placed in the aircraft to one that could produce, at best, 200 horsepower. Beyond that size, torque made the aircraft virtually impossible to fly. By 1944 airmen had long since abandoned rotary engines for modern, high-powered, air-cooled radial and water-cooled inline and V-configured engines.

For example, radial engines with several rows of cylinders that produced 3,000 or more horsepower were in common use in large aircraft such as the B-29 bomber. More importantly, by 1944 the first turbojet aircraft entered service, opening a path to what seemed virtually unlimited power for aircraft.

More motive power meant more speed. In 1914 most aircraft had top speeds of considerably less than 100 miles per hour. By 1944 propeller-driven aircraft were approaching the sound barrier. More power and speed meant more lifting capacity—the B-29 bomber had a payload of 20,000 pounds. New streamlined designs and innovative construction techniques immeasurably improved speed and lifting capacity. The wood frameworks, canvas coverings, and wire rigging that comprised most World War I vintage aircraft gave way to strong, lightweight aluminum-alloy monocoque (stressed skin) construction. The additional power, speed, and streamlined construction vastly increased the range of aircraft even before the advent of air refueling during the Cold War. The World War II B-29 bomber, for example, had an unrefueled range of 3,200 miles.

Speed, range, and lifting capacity are of little use if the aircraft cannot find its way to the target and deliver its payload with precision. During World War I, pilots relied on little more than a simple compass and maps. By 1944 aircraft were already navigating using radio beams; in fact, the electronic “battle of the beams” had a significant impact on both the German and Allied long-range bombing efforts. Once near the target, World War II bombardiers could drop their bombs on a radio beam cue, use the famous Norden bombsight if the target was visible, or, later in the war, view the target at night and in bad weather on radar.

While the technological progress was impressive in the three decades from 1914 to 1944, the progress since has been even more spectacular. Ever more powerful and efficient jet engine designs now provide incredible (but classified) speeds, including supersonic cruise capability for the F-22 fighter now in development. More speed and power combined with advanced design technologies provide impressive lift capabilities, such as the 172,000-pound payload of the C-17 transport aircraft. Further, the range of most aircraft is, for all practical purposes, unlimited because of air refueling capabilities. As impressive

as these developments have been, perhaps the most significant post-World War II developments have been in design, construction, navigation, and weapons delivery. Radical design and exotic construction materials have yielded aircraft with extremely low radar signatures. The advantages of such “stealthy” aircraft in almost any combat situation are more than obvious and were well demonstrated in the skies over Iraq, Bosnia, and Kosovo during the final decade of the last century. Navigation in the space age is, for the most part, space based using orbiting satellites to precisely locate any object in the air or on the ground. The same sort of pinpoint accuracy is now commonplace with precision-guided munitions using several different guidance systems.

The First Great Lesson

Looking back on the first century of airpower, we see technological progress eliminating, one by one, the obstacles that so badly hindered early airmen. It is not much of an exaggeration to say that modern airpower can go anywhere quickly, go anytime, carry any load, and deliver that load precisely. Said somewhat differently, the first great lesson of airpower is what I call the *essence* of airpower: *only airpower can apply great power quickly to any tangible target on the planet*. This *essence* is the very heart of what airpower has become. It expresses the unique capability that sets airpower apart from all forms of surface power. The importance of this unique capability becomes much clearer when we parse the *essence*.

The *great power* that airpower can deliver can be in many forms. Military airmen are most likely to think of explosive ordnance—bombs on a target. But airpower can also deliver people (troops, aid workers, etc.), humanitarian supplies (food, medicine, etc.), heavy equipment, information, even diplomats on “shuttle diplomacy” missions. How *quickly* airpower can deliver its great power is measured today in hours and minutes to any place on the planet from any place on the planet. For military airmen, *quickly* means that there is little time to prepare to meet distant threats—all threats have a sense of immediacy no matter how distant they may be. The ability to deliver great power to *any target* is supremely important, for it

means a target both in the traditional military sense and in a very different sense, such as hunger, disease, ignorance, or the threat of war. In traditional military terms, *any target* means that everyone is vulnerable everywhere all the time. It means that in war, airpower can strike at (1) the sources of an enemy's power, (2) the links between the enemy's sources of power and fielded forces, (3) the fielded forces themselves, or (4) all three types of targets simultaneously.

When we closely examine the *essence* of airpower as we have done, we find that it is another way of saying that the options for using airpower in peace and war are virtually unlimited. Airmen have long said that flexibility is the key to airpower. In reality, the reverse is closer to the truth: airpower is the key to flexibility. These unlimited options form the most compelling reason for an independent air force. Unfettered by geography or topography, only an airman's global worldview can fully capitalize on the unlimited options and opportunities that airpower presents.¹

The Dark Side

However, there is a dark side to the technology story, an unfortunate yet obvious truth: technologically sophisticated airpower is expensive. The cost of fielding modern, first-class airpower has rapidly increased by almost any means of measurement.² The nearly unavoidable consequence is that modern, high-technology air forces tend to be much smaller than their predecessors even though they may be much more capable. The importance of this immutable fact will become clearer later in this essay.

Looking through the Experience Lens

The first large-scale military experience using airpower was, of course, in World War I. Virtually all of what airmen now know as the classic missions or functions of airpower (counter-air, reconnaissance, close air support, interdiction, strategic bombing, etc.) were tried during the Great War. Only reconnaissance and counterair were of great importance. Reconnaissance, including mapping enemy trench lines and artillery spotting, probably had the greatest overall impact on the war. Because reconnaissance was important, denying that capability to the

enemy was important, which made the counterair mission important. However, in the overall scheme of things, the Great War had more impact on airpower than airpower had on the Great War. The most obvious impacts on airpower were rapid technological advancements spurred by the urgent need for better, faster, more powerful aircraft by all combatants.

By the beginning of World War II, airpower had already become a dominating element in modern warfare. Air superiority was an absolute requirement for virtually any military operation. Attack aviation proved its importance in the earliest of the European campaigns as it was woven together with fast-moving armored columns in the German blitzkrieg concept that quickly rolled across Poland, the Low Countries, France, and deep into the Soviet Union. At sea, modern sea power quickly became centered on naval airpower, and the aircraft carrier became the new capital ship of modern navies. Of all the classic missions or functions of airpower, only strategic attack received mixed reviews. Ironically, prior to World War II many airmen believed that strategic bombing would be the major airpower contribution to victory in modern warfare, perhaps even replacing traditional combat by surface forces. In the event, however, the results were less clear-cut, and the overall contribution of strategic attack to victory by the Allied powers is still vigorously debated to this day.

The final acts of strategic bombing at Hiroshima and Nagasaki ushered in the atomic age and the era of nuclear deterrence and potential nuclear warfare. Throughout that era, the impact of airpower (to include ground- and sea-launched missiles with nuclear warheads) has been dramatic. Although there were (and are) other ways to deliver nuclear warheads, both nuclear deterrence and nuclear war planning relied on rapid aerial delivery of nuclear payloads deep into the heart of an adversary's homeland. Without airpower it is difficult to envision a nuclear strike against an adversary (either first strike or retaliatory strike) that would be so potent and widespread as to force capitulation or impose destruction so heavy that the enemy would cease to exist as a viable society. In short, in both nuclear warfare planning and nuclear deterrence, airpower has been *the* dominating element.

The nuclear era brought with it the era of limited conventional war. As demonstrated in the Korean War, limited conventional war can look a great deal like World War II. In the Korean case

the struggle was even fought with many weapons remaining from World War II. As in World War II, airpower was a dominating element. Again all of the missions or functions of airpower were important, and again strategic bombing had mixed results. In Korea, however, the reason for the mixed results was more obvious. There were very few truly strategic targets in North Korea. Most of the enemy's military wherewithal originated elsewhere (primarily China and the Soviet Union), and targets in those countries were politically off limits to US bombing efforts.

The nuclear era also heralded the rise of modern insurgency warfare, particularly protracted revolutionary warfare. In counter-insurgency struggles, airpower had great success in supporting roles. During the Malaysian Emergency (1948–60), the British used Royal Air Force and Royal Australian Air Force airpower in many roles, but it was airlift that turned out to be essential to their success. Without airlift support, success may have eluded the British in that protracted struggle. Conversely, the French attempt to reclaim their former colonies in Indo-China was unsuccessful, due in no small part to the meager airpower resources available to them. American efforts in Vietnam were also ultimately unsuccessful. However, there is no question that American airpower was very important to military operations in South Vietnam, particularly in close air support, airlift, and reconnaissance roles. During much of the struggle, surface travel was so hazardous that South Vietnam was held together as a nation-state by air lines of communication. The effects of strategic and interdiction attacks against North Vietnam remain a hotly debated issue among military historians but are not directly germane to this essay.³

In the early 1990s coalition airmen demonstrated the new and improved capabilities of airpower with devastating effects on the Iraqi military during the Gulf War. Second-generation precision-guided munitions destroyed targets with such accuracy that collateral damage was amazingly small. Equally important, modern airpower owned the sky both during the day and at night. As a result, for the first time airpower totally dominated every aspect of a war. Moreover, airpower's success in the Gulf War so shaped Western perceptions that airpower became the military instrument of choice for NATO operations in the

mid to late 1990s—Bosnia and Kosovo—as well as the US-led operations against the Taliban regime in Afghanistan.

The Second Great Lesson

As we look back over a century of airpower experience, we see that airpower became the dominating factor in nuclear war planning and nuclear deterrence. Airpower has several times proven to be a dominating factor in conventional war and, with round-the-clock precision capabilities, can be *the* dominating factor in many instances. In terms of insurgency and counter-insurgency warfare, airpower has clearly proven to be an important supporting factor. Finally, in many instances, airpower has clearly become the military instrument of choice for those nations that have the choice, that is, nations that have a capable, modern air force.

These developments make obvious the second great airpower lesson—what I call the *reality* of airpower: airpower has become so valuable to so many in so many different kinds of warfare that *the demand for airpower is virtually unlimited*. But there is another part of the *reality*, the darker side alluded to earlier in this essay. As noted earlier, the cost of modern airpower can be staggering, and as a result the number of aerial weapon systems available has dwindled over time. For example, from 1960 to 2000 the number of heavy bombers in the US Air Force declined 92 percent from 2,193 to 179. During the same period, the number of fighters declined over 59 percent from 3,922 to 1,594.⁴ This same trend can be found in nearly every major air force. There is no question, of course, that modern aerial weapon systems are far more capable and effective than their less sophisticated predecessors. But regardless of their capabilities, numbers are important because an aircraft can be in only one place at a time doing one thing at a time. There is no evidence to indicate that this trend will end in the foreseeable future. Thus we must add to the *reality* of airpower the fact that *airpower resources are very limited and becoming more limited*. When we combine the unlimited demand and ever more limited supply of airpower, it is quickly obvious that airmen in many air forces suffer from significant supply-and-demand mismatches, and there will be more such mismatches in the future.

The Dilemma of Airpower

At this point in the discussion, we need to combine the first two great lessons of airpower—what we have called the *essence* and the *reality* of airpower. When combined, they reveal the great and continuing *dilemma* with which airmen must cope: *how do airmen exploit airpower's unlimited options and satisfy the unlimited demands for airpower with increasingly scarce airpower resources?*

The *dilemma* of airpower lies at the heart of most disputes among airmen themselves and between airmen and nonairmen about how airpower should be structured and employed. In the most basic terms, the dilemma poses the question, What is the best way to use airpower? Airpower theory has always attempted to answer this question, and thus we turn our attention to the focus of the third lens in this inquiry.

Looking through the Theory Lens

The earliest of the airpower theorists were heavily influenced by the incredible carnage of World War I. Conditioned by their desire to avoid the bloody trench warfare that characterized the western front for over three years, the most influential of these theorists all came to the same general conclusion about the best use of airpower—avoid the frontal assaults into the face of the enemy's powerful artillery and deadly machine guns and, instead, strike deep at the sources of the enemy's power. The Italian Giulio Douhet advocated direct attacks on the enemy's population, terrorizing the people with high-explosive, poison-gas, and incendiary bombs. The idea was to destroy the population's will to continue with the war effort, which would result in demands upon the government to end the conflict on any terms.⁵ The American firebrand Billy Mitchell called for attacks on an adversary's "vital centers," industries and functions that made modern warfare possible.⁶ Great Britain's Hugh Trenchard also talked about bombing "centres which are essential for the continuance of the enemy's resistance."⁷

In the mid-1930s, the faculty members of the US Army Air Corps Tactical School (ACTS) elaborated on the ideas of Mitchell and codified an operational doctrine calling for the bombard-

ment of critical points of an enemy's "industrial web."⁸ According to this concept, striking critical industries or the ties between those industries would cause complex industrial systems to collapse, much as a spider's web would disintegrate if key junctions in the silk structure were torn apart. The ACTS theorists postulated that the collapse of the enemy's industrial system would cause great hardships and thus would destroy the people's will to resist. Even if the people's will remained, collapse of the industrial web would destroy the adversary's ability to continue hostilities. It was with the industrial-web theory that American airmen entered World War II.

The early theorists who believed that strategic bombing was the best (most productive and/or most decisive) use of airpower in war made several very important, although generally unstated, assumptions. The first was that an adversary would be a modern, industrialized state and thus would have the industrial targets envisioned by the theorists (Douhet relied less on this assumption since many, if not most, of his attacks would be against the enemy population). The second assumption was that the adversary would fight a modern, mechanized war, thus making the industrial base a doubly important target. Not only were the fruits of the industrial base central to civilian society, but also they were essential to the enemy's war effort. The third assumption was that such conflicts would be total wars fought for unlimited objectives—in a sense, wars of national survival. This third assumption provided the moral justification for killing and wounding many civilians while destroying the enemy's industrial web. The three assumptions underlying many of the early theorists' ideas were not unreasonable at the time. They would have been accurate in World War I and were certainly appropriate in World War II. They seemed even more pertinent as the nuclear age dawned. But the assumptions of the early airpower theorists were not valid in Korea, Vietnam, civil wars in China and Greece, and dozens of other military confrontations on the periphery of great-power interests.

The end of the Cold War left existing airpower theory in disarray. The nuclear end of strategic-bombing theory seemed to fade away as the Soviet Union collapsed. Nonnuclear strategic-bombing theory seemed irrelevant because the three underlying assumptions, which dated all the way back to the 1920s

and 1930s, were not necessarily true in the kinds of conflicts faced as the end of the century approached. In the 1990s, Col John Warden, USAF, surfaced ideas centered on the concept of looking at an enemy as a system or, more accurately, a complex system of systems. Although his ideas received much notoriety and considerable acceptance in some quarters, some analysts claimed that Warden's ideas amounted to little more than the ACTS industrial-web theory with new technology added.⁹

During much of the period from the Vietnam War to the present, there was an undercurrent of thought about the best use of airpower that concentrated on airpower acting in direct support of ground forces. This undercurrent gained considerable attention in the late 1970s and early 1980s in the USAF when its Tactical Air Command worked closely with the US Army in developing an Army doctrine called AirLand Battle. But AirLand Battle doctrine was never adopted by the USAF as official doctrine. In many circles, it remains just as controversial as John Warden's ideas about viewing the enemy as a system.

The Third Great Lesson

As airmen enter the twenty-first century, *theory has not resolved the dilemma of airpower*. There are at least two very good reasons why the theorists have been unsuccessful. First, most (if not all) of the theorists made simplistic assumptions. They assumed one kind of war (modern, mechanized warfare) waged against one kind of enemy (a modern, industrialized state). Further, each of the purveyors of theory provided a very prescriptive solution to the dilemma—a one-size-fits-all solution. Either they favored some form of “going deep” to destroy vital targets, or they favored direct support of ground troops in battle as the best or most profitable use of airpower. Thus the bottom line is, as my friend and colleague Hal Winton noted in his excellent 1992 article, “there simply does not exist any body of codified, systematic thought that can purport to be called a comprehensive theory of air power.”¹⁰

Resolving the Dilemma

After a century of theorizing without yet resolving the dilemma of airpower, it is clear that airmen need to take a differ-

ent approach, one that does not make simplistic assumptions or provide prescriptive solutions. The first step in a different and more effective approach is to understand there is no solution that fits every situation because every war has its unique characteristics. But beyond that truism, some kinds of warfare are fundamentally different from one another. In the twentieth century we faced at least three fundamentally different kinds of warfare. Modern, mechanized warfare—so called conventional warfare—dominated much of our attention in the last century, the most obvious examples being World War II, Korea, the Arab-Israeli wars, and Desert Storm. Each of these conventional wars was different, but the same basic ideas about how to wage these wars, achieve victory, and avoid defeat applied in each case. But such was not the case with protracted revolutionary warfare—two significant examples being the Malayan Emergency and the war in Vietnam. Based on the ideas of Mao Tse-tung and his many disciples around the world, protracted revolutionary warfare turned virtually all of the conventions of conventional warfare upside down. Protracted revolutionary war is a classic strategy of those without the wherewithal to wage conventional warfare, the strategy of the “have-nots” against the “haves,” the strategy of those out of power against those in power. Finally, the third fundamentally different kind of war we faced in the twentieth century was nuclear war. What makes nuclear war so different is that in spite of the potential for unparalleled catastrophe in such a conflict, we know virtually nothing about it; there has never been a nuclear war, and thus there is no empirical evidence upon which we can rely.¹¹ These three fundamentally different kinds of war make it painfully obvious that a one-size-fits-all theory of airpower is a delusion.

With the foregoing in mind, it becomes clear that the dilemma of airpower can be resolved only on a case-by-case basis, and thus the *true purpose of airpower theory is to maximize the advantages of the essence of airpower for the situation at hand*. If modern airmen are going to fulfill this purpose and avoid the kinds of dogmatic prescriptions so typical of earlier theorists, they must develop and use an analytical framework that asks appropriate questions about the situation at hand. Based on the answers, they must use pertinent historical experience and analogies juxtaposed with current capabilities and objectives

in order to provide broad guidance.¹² This is easily said but much more difficult to do because it requires a mind-set that can best be described as Clausewitzian, a mind-set that can be problematic for airmen.

The Prussian military philosopher Carl von Clausewitz sought to explore the fundamental essence of war and to appreciate its vagaries. He came to understand that much in war depends upon what he called fog, friction, and chance—factors that separate real war from war on paper. Clausewitz understood that in war there are no permanent answers to problems posed by the enemy because the enemy thinks and reacts. To deal with the vagaries of real war and the unexpected moves of a clever adversary, the mind of a successful leader must be agile and at the same time attuned to subtleties and nuances. This is particularly true for air leaders who, while dealing with the traditional problems of fog, friction, chance, and a thinking enemy, are also dealing with the unparalleled flexibility of modern airpower and the obligation to maximize the advantages of that flexibility.

Unfortunately, much of the early training most airmen undergo instills in them thinking patterns and attitudes far from the Clausewitzian ideal. Flying military aircraft is a dangerous business even in peacetime. Small mistakes can quickly result in serious accidents and dead airmen. Learning to fly “by the book” is essential for survival. There are very definite right and wrong ways of doing things in that dangerous environment. Procedures tend to be black or white, rarely a shade of gray. In the face of such training early in an airman’s career, developing a Clausewitzian mind-set that is agile and at the same time attuned to subtleties and nuances can be problematic.¹³

All of this begs the question of how an air force can develop airmen with a Clausewitzian mind-set. The answer would seem to rest in the quality and tenor of an air force’s professional military education. By quality, I mean the rigor of the curriculum and the qualifications of the faculty. By tenor, I mean a curriculum focused on developing officers’ abilities to think critically, that is, thinking characterized by careful analysis and reasoned judgment, which is the centerpiece of the Clausewitzian mind-set.

Conclusion

For many airmen, the issues raised here may be very unsettling. We would all like to have a simple answer to the complex questions that surround the best use of airpower. But there are no simple answers, and there is no one-size-fits-all notion of airpower employment. It would make our lives much simpler if we could just pull out a checklist and quickly determine the correct course of action when a contingency arises. But armed conflict is much too complex for such an approach. Rather, airmen must wrestle with and reconcile two very complex phenomena. On the one hand is a military contingency fraught with danger and passion, confused by fog and friction, and subject to the whims of chance. On the other hand is airpower, the most flexible military force in history, which can be used in an almost infinite number of ways. The question airmen must answer is, Which of the nearly infinite possibilities for the use of airpower is best in the unique and only partially understood contingency at hand? All of this would be simple if there were only one kind of military contingency or if airpower could be used in only one way. But such is not the case. Every contingency is unique, every contingency is imperfectly understood, and airpower is almost infinitely flexible.

Whether or not airmen are capable of making the best choices may depend on the professional military education they had years earlier. If that educational experience focused on developing the airman's critical thinking abilities, the airmen will be much more likely to have the Clausewitzian mind-set required to deal with such complex problems. If not, airmen may rue the day they discover that maximizing the advantages of the *essence* of airpower for the situation at hand is a daunting task.

Notes

1. For a discussion of the airman's worldview and a comparison with the worldviews of surface warriors, see my article "Joint Operations: The World Looks Different from 10,000 Feet" in part 3 of this anthology.

2. For an excellent in-depth discussion of the different dimensions and difficulties in comparing the costs of aircraft and weapons, see Walter Kross, *Military Reform: The High-Tech Debate in Tactical Air Forces* (Washington, DC: National Defense University Press, 1985), 24–57.

3. It is ironic that most of the literature concerning airpower in the Vietnam War concentrates on the strategic and interdiction bombing of North Vietnam. Most of the air effort in Vietnam was in South Vietnam in direct support of allied ground forces. Eighty-three percent of all fixed-wing attack sorties flown in the war and 90 percent of all the bombs dropped during the war were in South Vietnam. See Wayne Thompson, *To Hanoi and Back: The US Air Force and North Vietnam, 1966–1973* (Washington, DC: Smithsonian Institution Press, 2000), 301.

4. *Air Force Magazine* (almanac issue), May 1975, 137; and May 2000, 66.

5. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, DC: Office of Air Force History, 1983), 20, 61.

6. Mitchell's views on airpower changed over time. Perhaps the best statement of his mature and considered views on the best use of airpower is found in his testimony before Congress on 5 February 1926. Robert Frank Futrell, *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force, 1907–1964* (Maxwell AFB, AL: Air University, 1971), 28.

7. Phillip S. Meilinger, "Trenchard, Slessor, and Royal Air Force Doctrine before World War II," in *The Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, AL: Air University Press, 1997), 52.

8. This idea is best described in an ACTS lecture delivered by Capt (later Lt Gen) Harold George, found in Haywood S. Hansell, Jr., *The Air Plan That Defeated Hitler* (Atlanta: Higgins-McArthur/Longino & Porter, 1972), 32–33.

9. Scott D. West built a strong case for this point of view in "Warden and the Air Corps Tactical School: Déjà Vu?" (thesis, School of Advanced Airpower Studies, Maxwell AFB, AL, 1998).

10. Harold R. Winton, "A Black Hole in the Wild Blue Yonder: The Need for a Comprehensive Theory of Air Power," *Air Power History* 39, no. 4 (Winter 1992): 32–42.

11. Although two nuclear weapons were used by the United States at the end of World War II, that war was by no means a nuclear war as we have come to think of such conflicts.

12. The most obvious questions concern the nature of the war, the nature of the enemy, the political objectives, the military objectives, forces available, rules of engagements, and other questions of a similar nature.

13. For a more thorough discussion of this subject, see my article "The Three Pillars of Professional Competence: Imperatives for Airpower Leaders" in part 4 of this anthology.

Part 4

Educating Airmen

Overview

In the long run, the education of Airmen, particularly the education of those who will lead, is far more important to the ultimate success of airpower than the technological gadgetry that so fascinates us. Without appropriate education, leaders will find it very difficult to make the informed and considered judgments required to procure the appropriate technology and use it effectively against adversaries who have proven in the past to be very smart, very cunning, and very motivated.

In the long run, education for those who lead is far more important than experience. Experience can be a marvelous teacher if one reflects upon it, but the time and temperament for contemplative reflection on one's experiences are often not available. Further, personal experience is always limited and often quite narrow. As noted in one of the essays in part 4, "experience is limited to those things . . . actually done, things and events actually seen, and people actually known or observed."

The two essays and speech in part 4 speak to the importance of education in developing competent leaders; organizing, training, and equipping the Air Force; and fighting successfully against wily adversaries. The essays also speak of the often anti-intellectual predispositions of many Airmen, the well-known tendency for Airmen to worship at technology's altar, and the difficulties still faced and the progress that has been made in educating officers at Air University over the years. Finally, part 4 addresses the nature and importance of critical thinking to successful Air Force leadership.

Educating Air Force Officers

Observations after 20 Years at Air University

Former Air Force chief of staff Gen Michael Dugan once commented to me that the Air Force is producing a generation of illiterate truck drivers. He worried that officers who aspire to senior leadership positions know a great deal about airplanes and precious little about airpower. They can skillfully talk with their hands about air tactics but are ill prepared to think with their heads about air strategy.

Hyperbole? Perhaps a bit, but there is more ground truth in General Dugan's statement than any of us would like to admit. For 20 years I have watched the crème de la crème of the Air Force officer corps come to Air University's Air Command and Staff College (ACSC) and Air War College (AWC). For the most part, these officers have been appallingly ignorant of the bed-rock foundation of airpower thinking, virtually oblivious to airpower theory and its development, and without any appreciation of airpower history and its meaning.¹ These officers are products of an Air Force system that does not reward personal professional development, promotes irrelevant academic education, and thus places an insupportable burden on the formal professional military education (PME) system.

Before getting into the meat of this argument, it is worthwhile to consider why all of this is important, why General Dugan was so concerned, and why I share that concern. We should begin with the proposition that the next generation of Air Force leaders should be more capable than the current generation. If they are not, we will have failed in one of our most important duties: preparing those who will follow in our footsteps. We will have failed to pass along the accumulated wisdom of the past and our own contributions to that wisdom. Every generation of Air Force leadership should be better than its predecessors.

In my judgment, the recipe that produces superior military leaders has three key ingredients: training, experience, and edu-

Originally published in a slightly different form in *Airpower Journal* 11, no. 2 (Summer 1997): 37–44.

cation. The need for training and experience is obvious. Training provides the mental and physical skills and disciplines required to succeed in the face of great danger, uncertainty, and confusion. Experience develops maturity of judgment by testing and tempering both body and soul and providing exposure to leadership role models both good and bad. But what about professional education? Why is it such a key element?

In a sense, education is concentrated experience that can broaden an individual's experience base. Our personal experience is always narrow, limited to those things we have actually done, places we have actually been, and people we have actually known. Professional education allows us to vicariously take part in the experiences of others in different times and far-off places. Understanding what Billy Mitchell went through trying to sell airpower to a hidebound Army, or how Ira Eaker coped with the disastrous losses of the Schweinfurt-Regensburg raids, or why Tooey Spaatz argued so vehemently with Dwight Eisenhower about the pre-D-day use of heavy bombers—these and a thousand other subjects professional education should address—can create context, perspective, and insight for our narrow personal experience.

Education provides the luxury of dissecting and analyzing experience without the exigencies of the event—and it is the analysis of experience that is critically important. As the Prussian soldier-philosopher-king Frederick the Great noted over 200 years ago, it is the ability to analyze and learn from experience that separates those who will be great leaders from those who will be “occupied with trifling matters and rusted by gross ignorance.”² Reasoned analysis fosters the ability to think broadly, deeply, and critically. It nurtures the drive to analyze honestly, fairly, and thoroughly. It demands logical yet creative synthesis.

Education for our officer corps comes in three varieties. First, there are informal, career-long, personal professional-development efforts, such as reading journals and books and attending conferences—the kinds of personal-development activities that lie at the heart of all traditional professions. Second is formal academic education. An undergraduate degree has long been a prerequisite for receiving an Air Force officer's commission, and graduate-level education is nearly a necessity

for promotion to and above field-grade levels. Finally, there is formal PME, which for Air Force field-grade officers is centered at Air University's ACSC and AWC.³ The remainder of this analysis will examine these three educational modes.

Air Force efforts to promote informal, personal, career-long professional development have been very limited and largely ineffective. There are no carrots, no special rewards or recognition, for officers who independently pursue professional knowledge. Officer evaluation forms provide no block to check and no rating standard for officers who have read a good professional book. Promotion recommendation forms provide no recognition, nor does the Air Force give any special consideration to officers who have taken it upon themselves to study the art of war. It would be nice if we needed no carrots. In an ideal Air Force, officers would work hard to increase their knowledge simply because it is the professional thing to do. Unfortunately, downsized forces without downsized responsibilities, increased operating tempos in the new world order, and other such temporal tyrannies require officers to weigh the costs and benefits of every competing demand for their time. Without any tangible carrots, personal professional development can easily drop off the priority screen.

The lack of carrots may explain the demise of Project Warrior, which was, in part, an innovative attempt to encourage Airmen to study airpower theory and history. The program widely distributed a remarkable library of airpower-related books, including reprints of classic texts such as Giulio Douhet's *The Command of the Air* and George C. Kenney's *General Kenney Reports*, as well as original works developed specifically for Project Warrior. The program began in the early 1980s with considerable fanfare and the support of then chief of staff Gen Lew Allen. It ended ignominiously in the early 1990s, suffering from lack of interest, lack of results, and, ultimately, lack of money.

Although there are no tangible carrots for informal professional-development efforts, the Air Force provides many rewards for those who obtain graduate degrees in formal academic education programs. The most important of these carrots is that the Air Force records graduate degrees on personnel records where they can be an important (some would argue crucial) consideration for

promotion boards. With such an incentive, it is no wonder that about 50 percent of all active duty officers possess a graduate-level degree.⁴ Many, if not most, of those degrees have come through civilian university programs recruited by local education offices to provide a variety of graduate programs on nearly every Air Force installation around the world.

But what kinds of degrees? The most recent data available to me indicates that of the 322 on-base master's degree-granting programs at 133 Air Force locations, exactly two—let me repeat that—exactly two of those programs directly concern the art of war (one program in national security studies and one in military history). Another group of 19 programs have tangential relationships to the art of war (degrees in international relations and international policy). By far the most common degree programs offered on Air Force bases are business related (business administration, human resources management, etc.).⁵ Thus the Air Force is in the paradoxical position of putting a high value on graduate-level education that is largely irrelevant to its *raison d'être*. The Air Force seems unable or unwilling to distinguish the value of a graduate degree in business from the value of a graduate degree in national security studies or military history. This is not to denigrate business administration degrees but to point out that some fields of study are more germane to the art of war. Perhaps we need to remind ourselves that our business is not business. Our business is war.

With no carrots for personal professional development and with academic education that is likely to be irrelevant, it is no wonder that students arrive at ACSC and AWC in a condition reminding General Dugan of illiterate truck drivers. By accident or by design, we have come to rely almost entirely on the formal PME system to teach the fundamentals of the art of aerial warfare. This is a very sad situation because even in ideal circumstances, there is no way that two 10-month visits to Air University can adequately replace career-long, personal professional development and relevant academic education. Unfortunately, circumstances at ACSC and AWC are not ideal. From the earliest days of Air University, ACSC and AWC have been beset by major interrelated problems. Among the most vexing of these problems are lack of consensus about curricula and rapid turnover of senior leadership.

Over the entire history of Air University, there has never been a broad, let alone lasting, consensus about the proper curricula for ACSC and AWC. Guidance and advice from the most senior command levels, congressional committees, boards of visitors, and special panels have often been nebulous, conflicting, or both. Lack of lasting consensus led ACSC and AWC to implement nine major shifts in curricular emphasis—on average a major shift every five years—from the time of their founding through the mid-1990s. Even more interesting, the shifts at ACSC and AWC did not mesh with each other, either in terms of timing or areas of emphasis. Such uncoordinated changes suggest curricula more influenced by current whim than by a well-thought-out educational doctrine.⁶ Frequent injection of “hot topics” (some would call them fads) into already crowded and rapidly changing curricula further complicates the situation.⁷

Although curricula have changed often, there have been identifiable trends. In broad terms, ACSC and AWC have divided their curricula (the proportions have varied) between those subjects most closely related to airpower employment (theory, doctrine, strategy, history, etc.) and those subjects more closely related to the management of a peacetime Air Force (planning, programming, budgeting, personnel management, etc.). Both areas are worthy of study, and each could profitably fill a rigorous, year-long curriculum. Taken together, however, the split curricula give credence to the most oft-mentioned criticism of both schools (i.e., curricula a mile wide and an inch deep). There simply is not enough time to explore both areas in depth.

I have long championed war-fighting curricula for a very straightforward reason. Civilian schools can and do teach management, government operations, and the like. Only military schools can specialize in the art of war and, more specifically, in the art of aerial warfare. My guess is that the American taxpayers did not found our PME institutions in order to mirror academic programs at civilian universities. The public has a right to expect our PME schools to produce experts on warfare, not peacetime bureaucrats in uniform.

Some would argue that curricula focused on war fighting are well and good for those students whose specialties deal directly with operations (flyers, missileers, intelligence officers, mainte-

nance officers, etc.) but are of little constructive consequence to officers toiling in support functions (personnel, finance, contracting, procurement, etc.). Nothing could be further from the truth. It is time we recognize that one of the principal differences between a first- and second-class military force is the quality of the supporting infrastructure—how well we train, educate, motivate, pay, feed, and house the force. Those who will lead the infrastructure supporting our Air Force in the future must understand the connection between what they do and the ultimate mission of the Air Force. They must understand that much of what they do ultimately affects combat capability. Further, they must understand that circumstances might require their supporting function to operate in a difficult combat environment.

A classic example of the kind of disconnects that can develop between support and combat operations was illustrated in a study done more than a decade ago at the Airpower Research Institute. The study revealed that the automated and computerized military pay system, so efficient in a stateside environment, had at that time left the Air Force without the ability to handle even routine pay matters in hostile environments. With all good intentions and obvious ignorance of the real world of military operations, the system designers had focused on peacetime efficiency rather than wartime effectiveness. The result of the study was a multimillion-dollar effort to correct the situation.⁸ The point is that there must be a solid connection between the point and the shaft of the spear. Understanding aerial warfare is not just a necessity for the operators. Those who support airpower must also understand what it is they are supporting, what is required of them, and under what circumstances they must perform. PME curricula focused on war fighting are essential for the entire force, not just for the operators.

Turbulence, confusion, and lack of consensus in curricula have been accompanied by—or perhaps caused by—leadership turbulence in both ACSC and AWC. In the half century since their founding, ACSC has had 34 commandants and AWC 25. The average tenure for ACSC commandants has been only 18 months; at AWC, commandant tenure has been just slightly longer, averaging 24 months. My contacts in civilian academia tell me that it typically requires five years to diagnose what needs to be done, design and put programs in place, and then evaluate

and fine-tune these programs. Even if one assumes that the hierarchical and highly disciplined nature of the military environment could drastically shorten the civilian five-year rule, the tenure of a typical commandant at ACSC and AWC still would seem insufficient to complete the curriculum change cycle.

The fact that virtually none of the commandants have had any experience in academia other than being a student exacerbates the short-tenure problem. I reviewed the backgrounds of all 21 ACSC and AWC commandants who served during my 20 years at Air University and found only one with any real leadership experience in an academic environment. It strikes me as odd that although the Air Force would never put a nonflyer in command of a fighter or bomber squadron, it routinely places neophytes in command of the schools upon which it totally depends to educate its future senior leaders.

None of this is to say that these short-duration commandants have been ineffective. Quite the contrary, some of them have been responsible for considerable progress over the past 20 years, progress made all the more remarkable considering the tenure and experience handicaps under which they operated. Of particular importance have been efforts to significantly improve faculty academic qualifications and a gradual movement toward curricula focused on warfare at both colleges. Both of these trends are, in my opinion, very encouraging and important to the continued success of American airpower.

Progress during the past two decades has not always been smooth, and not all of the commandants have been enlightened. For example, over the years, two school commandants told me that highly qualified faculty members were unimportant because students teach themselves. Another wondered why his students needed to understand military and airpower history "since they had lived it for 15 years." Such troglodytic opinions from senior officers would seem to lend credence to what many have said over the years (i.e., the Air Force has an anti-intellectual bent). As far back as 1947, Col Noel Parrish noted in an *Air University Quarterly Review* article that "air activities have most often attracted men of active rather than literary leanings. . . . The Air Force has never boasted a high percentage of scholars."⁹

Perhaps Colonel Parrish was right. Perhaps the basic problem in educating Air Force officers is cultural. Airmen are “doers,” men and women of action rather than introspection. Flyers glory in the romantic tradition of scarves blowing in the prop wash, valiant knights of the air going forth to confront the enemy in mortal combat. Nonflyers tend to be technicians, consumed by the arcane complexities of their specialties. Both flyers and non-flyers worship more often at the altar of superior technology than at the shrine of superior strategy.

Activist and technocratic traditions often, but not always, served us well during times of plenty, when we operated from a position of great strength and relied on the superiority of our resources to overwhelm our enemies. Will such traditions serve us well during the lean times, when every sortie is critically important and we can ill afford to squander our rapidly dwindling resources? If you have “wall to wall” airpower, superior ideas about how to use it seem somehow less important. Out-thinking the enemy becomes a necessity when you can no longer drown your adversary in a sea of military plenty.¹⁰

The dilemma is that we need to reshape our culture without destroying traditions that have served us well in the past. Somehow we must make it culturally acceptable and professionally imperative to be air warriors well schooled in the theory, doctrine, and history of aerial warfare. Warriors must understand airpower as well as airplanes. We need to develop synergies between scarves in the prop wash and books in the classroom. Reshaping our culture without destroying our traditions is the key to making the next generation of Air Force leadership better than this generation.

How do we effect such a monumental cultural shift? In this observer’s opinion, it must begin at the top, at the most senior levels of command. It must start with attitudes and policies that go beyond simply encouraging intellectual development. Being well schooled in the art of war must become a necessity, an absolute requirement for leadership positions at field-grade level and above. Personal professional, intellectual development must become a requirement for every officer.

What specific actions might we take? Consider the following possibilities:

1. Promote relevant graduate academic education. Instruct local education offices to recruit for their bases at least one graduate-level program directly related to the art of war.
2. Reemphasize career-long, personal professional development:
 - Reconstruct the nonresident versions of PME into a continuous, career-long professional development system designed to provide a time-phased baseline of knowledge that all officers need. Incorporate a rigorous, structured professional reading program into the system.
 - Document individual professional development on officer performance reports.
 - Document how successfully supervisors and commanders encourage professional development on their officer performance reports.
 - Require remarks attesting to professional development progress on promotion recommendation forms.
3. Upgrade PME:
 - Develop and implement a formal Air Force PME doctrine that, at a minimum, addresses curriculum guidelines and faculty quality.
 - Use the reconstructed nonresident PME program as the basis for in-residence PME entrance requirements.
 - Upgrade in-residence PME curricula to take advantage of standard minimum in-residence PME entrance expertise.
 - Extend and stabilize the duty tours of ACSC and AWC commandants and other senior PME leaders.

Some of these actions would meet with great resistance. For example, if these suggestions were implemented, there would be no nonresident equivalent to in-residence PME. Those not selected to attend ACSC and AWC in residence would argue that such a system would be unfair. I would counterargue that the equivalency of resident and nonresident programs has always been a convenient fiction.¹¹ Further, I would argue that fairness

is irrelevant. The Air Force is not and must not become an egalitarian organization. Rather, it is and should be a meritocracy.

On the positive side of the equation, these actions would create a reasonable, sustainable, and organized approach to career-long, personal professional development. They would ensure that efforts to become a smarter warrior would enhance one's career prospects, and they would provide top-down motivation for personal professional development. Such actions would also do wonders for the formal PME system. For example, a much higher baseline of knowledge among incoming students would allow our PME schools to tailor their curricula and teaching techniques to attain much higher levels of academic achievement.

Even if General Dugan is only partially correct about a generation of illiterate truck drivers, we must take strong, positive actions if we expect the next generation of Air Force leaders to be better than this generation. We cannot afford to tolerate an anti-intellectual culture among Airmen. Our future leaders will have to be very smart and very well educated to fully exploit the almost limitless options airpower provides and to deal with the almost limitless demands on our dwindling airpower assets. Our future leaders will have to be both very smart and mentally disciplined to deal effectively with the uncertainties and demands Airmen will face in the "new world disorder." Our future leaders must understand airpower—not just airplanes. They must be able to think critically, analyze thoroughly, and synthesize logically.

It will be no mean feat to produce the kinds of leaders we will need in the future. They will require stellar training and broad experience. Most importantly, they will require superior personal professional development, relevant academic education, and outstanding professional military education.

Notes

1. It is fair to ask what I mean by "for the most part." My best estimates, based on years of observation, conversation, and teaching, are that 80 to 90 percent of the officers entering ACSC and 50 to 60 percent of the officers entering AWC are essentially ignorant of the intellectual foundations of their profession.

2. As an illustration that experience alone is not enough, Frederick said, "A mule who has carried a pack for ten campaigns . . . will be no better a

tactician for it.” Jay Luvaas, ed. and trans., *Frederick the Great on the Art of War* (New York: Free Press, 1966), 47.

3. Squadron Officer School (SOS) is also considered to be PME, but the professional education of company-grade officers uses very different techniques to achieve the unique outcomes it seeks. Therefore, I will not focus on SOS in this article.

4. As of 30 September 1995, 49.5 percent of all active-duty line officers possessed a master’s degree, and another 1.43 percent possessed a doctoral degree. *Air Force Magazine* (almanac issue), May 1996, 40.

5. Air Force Pamphlet (AFP) 213-2, *Educational Opportunities on Air Force Bases*, 1 April 1987. Purportedly, there is an updated version of this manual, but it was unavailable to me. I strongly suspect that although the absolute numbers may change in an updated version of this pamphlet, the relative proportions would remain quite stable.

6. Lt Col Harvey J. Crawford et al., “CADRE Officer Professional Military Education Study” (College for Aerospace Doctrine, Research and Education [CADRE], Airpower Research Institute, Maxwell AFB, AL, June 1988). This study remains unpublished, but several copies exist, including two copies in my possession. To my knowledge, it remains the only comprehensive study ever done on Air Force PME, and certainly the only study based almost entirely on primary-source documentation.

7. One of the most recent examples of what I consider to be a fad is the insertion into ACSC and AWC curricula of an inordinate amount of instruction concerning the “quality” movement—the latest in a long line of civilian management techniques adopted by the military in spite of their often dubious relevance. Other examples of this genre stretching back to the early 1960s include Zero Defects, PRIDE, Zero Based Budgeting, and Management by Objectives.

8. Lt Col Bill D. Brogdon, *Support the Troops! Paying Our People in Hostile Forward Areas*, Report no. AU-ARI-88-5 (Maxwell AFB, AL: Air University Press, December 1988).

9. Col Noel F. Parrish, “New Responsibilities of Air Force Officers,” *Air University Quarterly Review* 1 (Spring 1947): 29–42.

10. One can always find exceptions that test the rule. For example, the activist-technocratic tradition did not serve us particularly well in Vietnam, where, for a variety of contentious reasons, we were unable to turn overwhelming materiel superiority into final victory. Conversely, in the Southwest Pacific during World War II, General Kenney demonstrated that American Airmen can outsmart and defeat their adversaries even when operating on a logistical “shoestring.”

11. If one argues that nonresident PME programs are the equivalent of resident programs, then one must ask why we should have the much more expensive resident programs. At this juncture, I do not believe that anyone seriously thinks resident and nonresident programs are of equal educational value. Face-to-face interaction and idea exchange with skilled faculty, distinguished guest speakers, and student peers are central to higher levels of learning and thus crucial to quality, graduate-level education. They cannot, at this point, be duplicated in a nonresident format. However, the march of

technology, particularly concerning our ability to interconnect in real time, may mean that in the future, resident programs will have few if any advantages over nonresident programs.

The Three Pillars of Professional Competence

Imperatives for Airpower Leaders

I give special thanks to two colleagues at the School of Advanced Air and Space Studies: Col Stephen Chiabotti, PhD, commandant, and Harold R. Winton, PhD, professor of military history and theory. They provided extremely helpful advice and wise counsel during the preparation of this paper.

Of the millions of photographs produced during World War II, one of the most famous is that of Gen Dwight D. Eisenhower, the supreme Allied commander in Europe, standing in an open field on 5 June 1944. He is talking face-to-face with some of the young paratroopers who will soon board transport aircraft and depart for their D-day drop zones behind the Normandy beaches. The picture makes some remarkable statements on at least two levels. On one level, Ike's body language as he gestures with his right hand in animated conversation gives the impression he is relaxed and confident. He has done everything possible as the supreme commander to assemble and prepare the Allied forces for a successful invasion of Nazi-occupied Northwest Europe. It is obvious from the picture that he wants to be with his troops who are about to go in harm's way. His need to encourage them, reassure them, and show them his confidence in their success readily emerges from the black-and-white image. On another level, the eyes of the young paratroopers speak volumes from the silent photograph. There is obvious excitement over Ike's presence. They seem to share Ike's confidence; they do not appear at all apprehensive about the dangers they will soon face. The presence of the trusted leader mixing it up with his men is electric, yet at the same time calming.

The photograph of Eisenhower with his troops remains, after nearly 60 years, a visual testimony to the power and importance

Originally published in a slightly different form in *Air Power Leadership: Theory and Practice*, ed. Peter W. Gray and Sebastian Cox, Defence Studies, Royal Air Force (London: The Stationery Office, 2002). British Crown Copyright/Ministry of Defence. Reproduced with permission of the Controller of Her Majesty's Stationery Office.

of good leadership. Since the dawn of organized warfare, there have been few, if any, commodities more prized by military forces. The great captains—and many of their able lieutenants—are rightfully given enormous credit for battlefield success throughout the pages of history. Strangely, in spite of leadership's ancient and obvious importance, the process of producing great leaders remains, for the most part, a mystery. In part that mystery remains because there is no single template or model that would fit all or even most of the great captains. Officers with much the same training, education, and experience often have radically different levels of success as military leaders. Examinations of personal backgrounds, leadership styles, and personality traits also do little to reveal a magic formula for the development of outstanding military leaders. Who, for example, could be more dissimilar than Robert E. Lee, the prototypical patrician southern gentleman, and Ulysses S. Grant, the hardscrabble, hard-drinking, tough-talking everyman? What leadership styles could have been more dissimilar than those of the overbearing and self-promoting George S. Patton and the self-effacing "soldier's soldier" Omar Bradley? Among airmen, it is difficult to find two more dissimilar senior leaders in World War II than the reserved and studious "Stuff" Dowding, who led "the few" of Fighter Command to victory in the Battle of Britain, and Curtis E. LeMay, the outspoken, cigar-chomping commander of the bomber force that reduced Japan to rubble. In spite of these dissimilarities in background, style, and demeanor, all were great military leaders.

As dissimilar as the six men mentioned above might have been, they shared a quality with virtually every other successful military leader throughout recorded history—exceptional competence in the profession of arms. Professional competence is crucial to military leaders for two fundamental reasons. First, a superior will not allow a subordinate to lead without confidence in the subordinate's professional competence. During the Vietnam War, for example, Pres. Lyndon Johnson kept very tight and personal control over the air attacks against North Vietnam (Rolling Thunder), in effect refusing to let his generals lead the air war. He saw bombs as political tools for negotiating a settlement in the war. He did not trust his military advisors, who, it seemed to him, saw the war only as a military problem: "And the generals. Oh, they'd love the war, too. It's hard to be a

military hero without a war. Heroes need battles and bombs and bullets in order to be heroic. That's why I am suspicious of the military. They're always so narrow in their appraisal of everything. They see everything in military terms."¹

Conversely, a leader's professional competence means that subordinates can follow with confidence, knowing that their efforts and perhaps their lives will not be wasted. However, a subordinate's perception that his or her leader lacks professional competence can have devastating results, as demonstrated graphically during the war in Vietnam. As that struggle continued into the late 1960s and early 1970s, the quality of Army leadership at the company and platoon levels declined as a result of recruiting problems caused by the war, ill-advised personnel rotation policies, and the resulting hasty promotions of still-green men. As the quality of leadership declined, incidents of insubordination, mutiny, and "fragging" rose dramatically.² Journalist Stanley Karnow relates a story of one lieutenant whose incompetence so antagonized his men that "the first time, they booby-trapped his hooch with a smoke grenade, yellow smoke, which was a warning. But he didn't take any heed. Then they tried another, red smoke, which said the next one was going to be a hand grenade or a white phosphorous grenade. He obviously didn't believe it. The last one was a hand grenade, and he was eliminated and replaced."³

It is worth noting that then-chairman of the Joint Chiefs of Staff Gen John M. Shalikashvili, speaking in 1995 at the Virginia Military Institute, commented that professional competence is one of the most important and difficult-to-attain qualities of a great military leader:

As we look back on Marshall and on Patton and on MacArthur and all of the others, we realize that the skills and qualities and knowledge that made them great generals took decades of training, of experience and of evolution. For all of the differences between these leaders there is one thing that they had in common. Their careers were marked by a progression of difficult assignments and intense study. Always they were a snapshot of a masterpiece still in progress, still in motion. From the beginning of their careers to the end, each of them was continually applying new brushstrokes to their knowledge and to their skills.⁴

This paper will focus on defining professional competence for an Airman and segmenting its development into three areas of endeavor, the three pillars of professional competence: training, experience, and education. Our concern will rest primarily with building the professional competence of those most likely to become senior airpower leaders. However, we must begin the discussion with a few thoughts about the nature of professional competence and why attaining it is problematic for Airmen.

Professional Competence

What does the term *professional competence* mean, particularly in the airpower context? It is reasonably intuitive that what constitutes professional competence varies in proportion to responsibility and authority. At the lower levels of rank, the mastery of appropriate skills and the development of requisite judgment to operate a combat aircraft safely and effectively may constitute appropriate professional competence. However, the demands of competence quickly expand far beyond such rudimentary requirements and continue to expand with responsibility and authority. At senior levels, professional competence would seem to require both a broad and deep knowledge base about airpower (vice aircraft) along with the ability to analyze and evaluate complex and often conflicting ideas. Further, senior leaders must be able to synthesize appropriate approaches to unique problems.

There are at least two factors that make the development of professional competence problematic for Airmen. The first is that professional competence for Airmen needs to be based on what might best be described as a Clausewitzian mind-set. The Prussian military philosopher and interpreter of Napoleon Carl von Clausewitz sought to explore the fundamental essence of war and appreciate its vagaries. He came to understand that much in war depends upon what he called fog, friction, and chance, the factors that separate real war from war on paper. Clausewitz understood that in war there are no permanent answers to problems posed by the enemy because the enemy is a thinking and reacting being. In short, Clausewitz understood that war is not a glorified engineering project. Therefore, in order to deal with the vagaries of real war and the unexpected

moves of a clever adversary, the mind of a successful military leader must be agile and at the same time attuned to subtleties and nuances.⁵

The Clausewitzian mind-set, with its emphasis on creativity and flexibility, is especially important for senior-level airpower leaders. The essence of airpower, that quality which sets it apart from all other forms of military power, is the ability to apply great power quickly to any tangible target on the planet. Airmen are not constrained by geography, topography, or the kinds of power needed. (Far beyond explosive ordnance, which comes to mind first, the “great power” airpower can deliver may consist of humanitarian aid, diplomatic shuttles, or almost anything one can imagine, depending upon the needs of the situation.) In other words, the options for using airpower are virtually unlimited. Modern airpower provides unparalleled flexibility that can be fully exploited only by airpower leaders with the agile and nuanced Clausewitzian mind-set.⁶

The Clausewitzian approach stands in stark contrast to that of another interpreter of Napoleon, Antoine Henri Jomini. Rather than seeking the fundamental essence of war, he “attempted to reduce it to scientific principles. . . . Jomini argued that war could be abstracted into a small number of rules that could be applied in all situations.”⁷ Unfortunately, much of the early training most Airmen undergo instills in them the type of thinking patterns and attitudes that nurture a Jominian mind-set. Flying military aircraft is a dangerous business even in peacetime. Even small mistakes can quickly result in serious accidents and dead Airmen. Thus learning to fly “by the book” is essential for survival. There are very definite right and wrong ways of doing things in that dangerous environment. Procedures tend to be black or white, rarely a shade of gray. An even more demanding emphasis on following the approved checklist without variation is found in those areas dealing with nuclear weapons. The Strategic Air Command (SAC), the heart of the US nuclear deterrent force until it was deactivated in 1992, was justly famous for its voluminous checklists for doing just about everything. It was equally famous for its greatly feared operational readiness inspections (ORI), which were designed to ensure checklist compliance in great detail. Failure to pass an ORI could quickly bring to an end the careers of the senior

leaders at a SAC bomber or missile wing. In such an environment, there is little motivation to break the mold and think outside the box. The acme of professionalism in the nuclear environment is compliance, not creativity. In such an atmosphere the mind-set becomes very Jominian, focused only on the approved way of doing things.⁸

A second reason that professional competence is problematic for Airmen is professional stovepiping, that is, the extreme amount of specialization, particularly in the operational combat specialties. Ever-increasing technological complexity in modern weapon systems (and supporting systems) requires more and more time and training to master. The resulting specialization is not unique, but Airmen seem to raise the problem to a higher level. Airmen identify themselves and their worth by what they do and the piece of equipment with which they do it. USAF officers identify themselves, for example, not just as pilots but as pilots of a certain kind of aircraft. It is more than coincidence that the official USAF biographies of senior officers with an aeronautical rating list all kinds and models of aircraft the officer has flown, often with the number of flying hours in each aircraft.⁹ In a sense, the USAF "has become divided into tribes . . . reliant on sophisticated specialized competencies . . . absent an overarching institutional mindset."¹⁰ Needless to say, it has been very difficult to develop the kind of broad professional competence required for aipower leadership at the senior level.

The Three Pillars

For Airmen there are three principal pillars that support the development of professional competence: professional training, personal experience, and classroom education. We shall explore each of these three pillars in turn.

Training

For Airmen, training is a two-edged sword. On the one hand, it establishes a young officer's basic competence in the operation and employment of a weapon system. On the other hand, as noted above, it can also establish a checklist-dominated, Jominian mind-set that may be difficult to overcome in later

years. Further, training is the first step into a weapon system's "stovepipe." Of course not all training is directly related to a specific weapon system. In the broader sense, training provides mental and physical skills and disciplines required to survive and prevail in the face of great danger, uncertainty, and confusion. But even in this broader sense, training focuses on the right and wrong ways to do things, on correct and incorrect answers. Subtlety and nuance are seldom in the purview of training.

Training presents an interesting conundrum in that it must be accomplished, but at the same time, it lays the foundation for long-term problems. However, training is not the principal focus of this discussion. Most pure training occurs relatively early in an Airman's career, while the thrust of this paper concerns professional competence at senior leadership levels. The purpose of this short discussion of training has been only to note its essential but dichotomous and contradictory impact on the professional competence of Airmen.

Experience

Common sense would tell us that experience is the ultimate teacher and thus the ultimate provider of professional competence. Experience tests and tempers mind and body and is thus crucial to the development of mature judgment. Experience provides exposure to leadership role models, both successful and unsuccessful, in a variety of situations. Not surprisingly, the USAF has spent much time and effort over the years attempting to provide officers with the kinds of career patterns (experience) that would most likely build professional competence. Rated and missile officers have career paths that, in ideal circumstances, include line duties at the squadron level, staff positions at various levels, and assignments leading to command billets in increasingly large organizations. There were times when, because of a surplus of officers with an aeronautical rating, many flyers could receive career-broadening assignments into nonrated career fields—a program known as the rated supplement. The USAF rated-officer shortage over the past decade crippled the ability to put flying officers into any jobs other than those that require an aeronautical rating. The most beneficial order and timing of different kinds of assignments was

always a matter of conjecture, with no obvious clear path to success in reaching senior ranks.¹¹

No matter how well-organized and managed, experience has at least two major shortfalls as a teacher and provider of professional competence. The first and most obvious shortfall is that every Airman's experience base, no matter how well his or her career is planned and managed, is quite narrow in the grand scheme of things. Experience is limited to those things an individual has actually done, things and events actually seen, and people actually known or observed. Experience is a "first person singular" affair, or it is not real experience. Unfortunately, the relentless advance of time places quite narrow margins on the number and variety of first-person experiences available to an individual. Other barriers, such as the difficulty noted in the previous paragraph of rated personnel gaining experience in nonrated career fields, raise further experiential problems.

The second major shortfall of experience as the ultimate teacher and provider of professional competence is the lack of time and often the lack of personal inclination to reflect on personal experiences. The constant hubbub of daily activities, the tyranny of overwhelming administrivia, the demands of protocol, and other aggravations and vicissitudes of modern military life conspire against Airmen who might otherwise adopt a deeply contemplative attitude toward their own experiences. Even the venerable end-of-tour report, the writing of which was at one time a common practice, seems to have disappeared with some possible exceptions at the most senior levels. Although originally designed to report to higher authority, the end-of-tour report also served (unintentionally, perhaps) to force reflection on one's experiences.

Experience without reflection is not very valuable in the process of developing professional competence. The Prussian soldier-king Frederick the Great was perhaps the most articulate proponent of reflection on and contemplation of one's experience. Frederick asked, "What is the point of seeing if one only crams facts into his memory? . . . What good is experience if it is not directed by reflection?" To drive the point home, he noted that "a mule who has carried a pack for ten campaigns . . . will be no better a tactician for it, and it must be confessed, to the disgrace of humanity, that many men grow old in an otherwise

respectable profession without making any greater progress than this mule. . . . They are never perplexed and will never know the causes of their triumphs and defeats.”¹²

The question of how to build a broad and broadening experience base for future airpower leaders is a significant concern of the USAF's Developing Aerospace Leaders (DAL) program, initiated in the late 1990s by then-USAF chief of staff Gen Michael E. Ryan. The project, now headed by Maj Gen Charles Link, USAF, retired, proposes a very complex and systematic building-block approach to developing the experience base of officers. The proposed system is based on the identification of over 40 specialties (e.g., fighter pilot, aircraft maintenance) grouped into 10 core occupations (e.g., combat operations, logistics), all of which are overlaid with universal competencies such as integrity, loyalty, and so forth. The DAL program envisions an officer progressing in a closely organized manner from the narrow confines of specialties, to broader competence in a core occupation, and then to familiarity with a well-defined set of related core occupations, all in preparation for the generalist requirements of flag officers.¹³

In the past, the ideas about the kinds and timing of experience deemed most useful in grooming individuals for senior leadership in the USAF were heavily influenced by the often-contradictory opinions of serving senior leaders. The DAL systematized approach brings logic and order to the experience pillar of leadership development. However, the complex structure and process proposed by the DAL raises concerns that such a system may be overengineered, overly complex, and too rigid to deal with rapidly changing situations and the explosive progress of technological development. Beyond those generalized concerns, the DAL proposal does not appear to proselytize for Frederick's mandate. At this writing, there appears to be no time or motivation provided for officers to reflect on their experiences and analyze what those experiences really mean. Worse, there appears to be not even the suggestion that officers should do so. As the DAL proposal matures through implementation, experience will indicate whether or not these concerns are well founded.

Education

Education is the crucial third pillar in the development of professional competence. Although education is important in its own right (as will be noted later), it is unique in that it can help to offset the shortfalls of experience discussed in the paragraphs above. In a sense, education is concentrated and distilled experience that can broaden an individual's necessarily narrow base of personal experience. Education allows the student to take part vicariously in the experiences of others who lived in far different times and in far-off places. It also can provide the student with the understanding that many of those past experiences have modern, sometimes very current, analogues. For example, Gen William "Billy" Mitchell's often-bitter struggle to sell airpower to a hide-bound Army in the 1920s has a contemporary reincarnation every year during modern Pentagon budget battles. Gen Carl "Tooe" Spaatz's vehement arguments with General Eisenhower about the pre-D-day diversion of heavy bombers from their strategic targets had modern facsimiles in Operation Desert Storm and Operation Allied Force air operations centers. Education, the third pillar of professional competence, can indeed create context, perspective, and insight far beyond that available from narrow personal experience.¹⁴

Although it may seem anathema to some who read this essay, education about an event can be in many ways superior to personal experience in the event. Education can and should present the "God's eye view," looking at the event dispassionately from many viewpoints. Detached from the exigencies of the event, education provides the luxury of time and calm for the student to dissect and analyze an experience. And as Frederick noted over 200 years ago, it is the analysis of experience that is critically important to the development of great military leaders. The ability to analyze and learn from experience is what separates those who will be great leaders from those who will be "occupied with trifling matters and rusted by gross ignorance."¹⁵

What functions then, beyond compensating for the shortfalls of experience, should education perform in order to build professional competence? Although education can fulfill many functions, the most important for developing senior airpower

leaders is the ability and inclination to think critically about airpower and warfare. Critical thinking—that is, thinking characterized by careful analysis and reasoned judgment—is the *sine qua non* of the Clausewitzian mind-set which, as noted earlier, is so crucial to the professional competency of senior airpower leaders. The pertinent question becomes how to develop the ability and inclination to think critically in the airpower context. This is a question with which we have wrestled at the School of Advanced Airpower Studies (SAAS) since 1990.¹⁶ Our solution to the problem, although it is an evolving solution, is in three parts, and its brief presentation here may be helpful to others engaged in similar efforts.

We begin with a course on thinking, logic, and decision making. We add to that an intense study of military theory and a critical examination of the evolution of airpower theory.¹⁷ To this mix we add a demanding course dealing with issues surrounding the strategic use of airpower in the nuclear age with a special focus on coercion theory, nuclear deterrence, and nuclear strategies.¹⁸ Overlaid on the study of theory is a separate course that forces students to think about the relationships between military and airpower theory, the relationships with classical airpower theory, the realities of the nuclear age, and finally the development of asymmetric counters to the rise of airpower and nuclear weapons. All of this is conducted in a graduate colloquium environment in which reasoned debate and the exchange of ideas are paramount. The writing load is heavy and the reading load is heavier. Students are confronted (many for the first time in their lives) with a true graduate-level academic program in which there are no “school solutions” and in which how one argues and supports a viewpoint is at least as important as the viewpoint itself. These courses are the opening salvos in a yearlong assault on the Jominian mind-set developed by most students through years of military training and checklist-driven operations.

The second part of the SAAS solution is to evaluate the theories of airpower against the reality of the airpower experience. Our study of airpower history is both deep and broad. It includes both land- and naval-based aviation and looks at the use of aviation across the international scene. For many of our students, this part of the curriculum is a rude awakening to

the realization that even historical studies present well-argued and well-supported alternative views of what happened and why. Again overlaid on the study of history is a separate course that asks the students to consider the dynamic relationships among airpower theory, technology, and experience—and to consider what those relationships may mean for the future of airpower and warfare.

In a sense, after completion of the first two parts of the SAAS curriculum, the students have been exposed to a thesis (airpower theory) and an antithesis (the reality of the airpower experience)—two legs of the Hegelian construct. As one would expect, the third part of the SAAS approach requires the students to synthesize airpower theory and experience into a personal theory of airpower, which they must successfully defend before a faculty board. With few exceptions, this final experience destroys what might be left of the Jominian mind-set with which the students arrived 11 months earlier. Those who succeed in this final endeavor have learned much about airpower theory and history. More importantly they have produced a reasoned synthesis of the two, the articulation of which informs the question of how modern airpower might best be applied across the spectrum of conflict. Most importantly, they have taken giant strides toward an agile and nuanced Clausewitzian mind-set and thus toward the exceptional professional competence required of great leaders.

Professional Competence in the Larger Context

Professional competence is clearly the *sine qua non* of effective leadership. Without it, defeat, even disaster, ensues. Without it, superiors will not allow a subordinate to lead. Without it, subordinates will not long follow. In the United States, lack of professional competence at the senior levels of command is most closely associated with the Civil War and the unfortunate practice of appointing political allies as senior officers even though they were without any military experience. During that same bloody conflict, there were also those who became the leaders of certain volunteer units through the curious practice

of election by men in the ranks. As one might imagine, many of these were total amateurs without any military training, experience, or education. Many had considerable charisma, were committed to their cause, and fought with courage. In short they had many of the attributes we associate with great leaders. But they were professionally incompetent as military leaders. The frightful bloodiness of the Civil War was due in no small part to some of these amateurs who squandered the lives of their men.

In more recent times, it has become clear that the degree of a leader's professional competence can be situationally dependent. A leader can be well trained and experienced but thrown into a situation that he or she doesn't understand and with which he or she cannot cope effectively. One must sympathize, for example, with Gen William Westmoreland in Vietnam. His training and experience and that of the army he commanded were designed to fight against Soviet armored thrusts into Western Europe across the inter-German border. Unfortunately, he found himself and his army entangled in a very different war, fighting a very different enemy, in a very different place. In this situation, he lacked the appropriate professional competence.¹⁹ Westmoreland had virtually all the other qualities that are associated with great leaders—integrity, courage, confidence, decisiveness, initiative, bearing, and so on. His rugged good looks would have been appropriate on a recruiting poster. But without the appropriate professional competence, the American effort was unsuccessful in spite of vastly superior technology and the expenditure of tens of thousands of American lives. All of this offers further evidence that relevant professional competence is the *sine qua non* of effective leadership.

Although professional competence is a necessary condition for effective leadership, there is quite broad agreement that it is not by itself sufficient. Other factors—what might be termed enabling traits—come into play. However, because many of these traits are personality dependent, they are often difficult to describe and generally do not have universality among effective leaders; that is, one can find effective military leaders who do not have one or another of these enabling traits. Further, there does not seem to be broad agreement as to what these enabling traits are; there are many differing lists in various publications concerning military

leadership. One USAF publication, for example, lists six “traits which are vital to Air Force leaders”: integrity, loyalty, commitment, energy, decisiveness, and selflessness.²⁰ A well-known US Marine Corps publication, however, goes much further and gets much more specific by listing fourteen “leadership traits”: integrity, knowledge, courage, decisiveness, dependability, initiative, tact, judgment, loyalty, unselfishness, endurance, bearing, enthusiasm, and justice.²¹

It is interesting to ponder how an aspiring leader can acquire these traits. Certainly some traits can be taught—judgment, decisiveness, dependability, tact, and bearing are obvious examples. Some traits can be developed, such as energy and endurance. But what about integrity, courage, loyalty, commitment, and selflessness—those qualities that reflect directly on an individual’s character? In all likelihood many would argue that these are the most important qualities a leader can possess in the long run. Unfortunately, it is difficult to imagine how one would effectively teach such traits as courage or loyalty in the classroom. Although such traits are difficult to teach, they can be learned, and probably learned most effectively at an early age, as Wellington might have said, on the playing fields of Eton.

Some Concluding Thoughts

If exceptional competence in the profession of arms is an absolute requirement for effective airpower leadership, then it may behoove those who worry about such things to concentrate their efforts on improving the means and methods of producing such competence in those who would be air leaders. In this vein, it is clear that those responsible for developing air leaders must wrestle with a group of vexing questions, including, but not limited to, the five questions that follow:

1. How can Airmen develop the Clausewitzian mind-set required to fully exploit airpower’s unlimited employment options, when so much of their checklist-dominated professional training has conditioned them to think otherwise?

2. What experience base is most effective in building broad and deep professional competence?
3. What kind of career-management system would best ensure that potential senior air leaders receive the most effective experience base?
4. What actions or policies would encourage developing leaders to reflect on and evaluate their experiences?
5. How should professional education be organized and delivered to best enrich and augment personal experience and at the same time develop the ability of future senior leaders to think critically about airpower and warfare?

Professional competence is necessary but not sufficient to produce an effective leader. Many an officer with exceptional competence in the profession of arms has failed to become a great leader for lack of some intangible factor, trait, quality, or whatever one calls these amorphous ingredients. It appears that no one knows precisely what these ingredients are, although there are many strongly held opinions. Nor does anyone know the synergistic recipe that uses some or all of these ingredients along with a large quantity of professional competence to produce—in some instances—an effective senior air leader. With all of these unknowns and perhaps unknowables, the question that most obviously arises is, Can there be any real control over the process? Short of controlling the process, another important question would ask, Can one add any sort of “yeast” to the recipe that will increase the chances of producing effective senior air leaders?

If the answers to these questions are negative, then we must question the common practice of emphasizing the study of these unknowns and unknowables under the guise of “teaching leadership.” If the answers to these questions are in the affirmative, then we must take control of the mysterious process or at least ensure that we use the yeast required to increase the chances of success.

Notes

1. Quoted in Doris Kearns, *Lyndon Johnson and the American Dream* (New York: Harper & Row, 1976), 252–65.

2. Guenter Lewy, *America in Vietnam* (New York: Oxford University Press, 1978), 153–61.

3. Stanley Karnow, *Vietnam: A History* (New York: Viking Press, 1983), 632.

4. John M. Shalikashvili, “The Three Pillars of Leadership,” *Defense Issues* 10, no. 42 (1995): 1–4. According to Shalikashvili, the other two pillars of leadership are personal character and love and care for soldiers.

5. For a brilliant exposition on Clausewitzian and Jominian approaches and their impact on Airmen, see Col Thomas A. Fabyanic, USAF, retired, “War, Doctrine, and the Air War College: Some Relationships and Implications for the US Air Force,” *Air University Review* 37 (January–February 1986): 2–29.

6. For a much more in-depth discussion of the essence of airpower, see my article “The Essence of Aerospace Power: What Leaders Need to Know” in this volume.

7. Fabyanic, “War, Doctrine, and the Air War College,” 6.

8. I served in SAC for over 13 years in both field units and at SAC Headquarters, serving as launch crew commander for nuclear-armed intercontinental ballistic missiles and in various support specialties.

9. For examples readily available to the public, go to the official USAF website, which contains a library of official biographies of most general officers, both serving and retired (<http://www.af.mil/library/biographies/>).

10. Maj Gen Chuck Link, retired director of the USAF Developing Airpower Leaders project (presentation, Bolling AFB Officer Forum, 18 December 2000).

11. During the mid-1970s, I served a tour of duty at Headquarters, SAQ as a career development officer for missile launch officers. Others in the organization provided the same service for pilots, navigators, and so forth. Our job was to provide practical guidance concerning assignments that would build professional competence and enhance promotion opportunities for officers up through the rank of lieutenant colonel.

12. Jay Luvaas, ed. and trans., *Frederick the Great on the Art of War* (New York: Free Press, 1966), 47.

13. Link, presentation, 18 December 2000.

14. For a more thorough exposition of the importance of military education and the condition of military education in the USAF, see my article “Educating Air Force Officers: Observations after 20 Years at Air University” in this volume.

15. Luvaas, ed. and trans., *Frederick the Great*, 47.

16. At the time this article was originally published, the school was known as SAAS. It is now the School of Advanced Air and Space Studies (SAASS).

17. In the most recent course offering on military theory, students examined in detail the writings of Sun Tzu, Thucydides, Clausewitz, Jomini, Fuller, Liddell Hart, Tukhachevskii, Mahan, Corbett, Mao, Kitson, and Trinquier. In the most recent course offering on the evolution of airpower theory, Douhet,

Trenchard, Mitchell, Slessor, the German approach, naval air theory, the Air Corps Tactical School (ACTS), de Seversky, Boyd, and Warden were all explored in depth.

18. Among subjects examined in detail during the most recent course offering were realist theory, deterrence theory, compellence, coercion, punishment, risk, denial, nuclear deterrence, and nuclear strategies.

19. It is a bit unfair to single out General Westmoreland for this shortcoming. In fact, the same shortcoming afflicted a large number of senior US military leaders in that war for good reasons. Classic protracted revolutionary warfare strategy, particularly as practiced by the Vietnamese, turns conventional wisdom about conventional warfare on its head. For a superior discussion of the Vietnamese version of protracted revolutionary warfare strategy, see Douglas Pike, *PAVN: People's Army of Vietnam* (Novato, CA: Presidio Press, 1986), 209–48.

20. Air Force Pamphlet (AFP) 35-49, *Air Force Leadership*, 1 September 1985. Interestingly, in the successor pamphlet AFP 36-2127, *Air Force Leadership*, published in 1995, vital traits disappear and “core values” appear: integrity, service before self, and excellence.

21. Fleet Marine Force Manual (FMFM) 1-0, *Leading Marines*, 3 January 1995, 103.

Critical Thinking and Leadership

To Class XVI, since you have given me the chance, I want to talk with you about the School of Advanced Air and Space Studies (SAASS), about critical thinking, and about your responsibilities as a SAASS graduate, and I hope to do all of that in 10 minutes or less.

SAASS has been a great success story, the greatest success story I have seen in my 30 years at Air University. It seems to me that our success over the years has been built on three pillars, all of equal importance.

The most obvious pillar of our success has been great students, and Class XVI has carried on that tradition in its own unique style. Quality students are a key to any school's success. For those who might not know, each year approximately the top 20 percent of those officers selected for promotion to major are selected to attend an intermediate service school, such as Air Command and Staff College. Less than 7 percent of those who graduate from an intermediate service school are selected for SAASS. My point is that we are blessed with outstanding students.

The second pillar of our success is a great faculty. From the beginning of SAASS, we focused on attracting and developing a faculty with the highest academic credentials and a passion for teaching. The added bonus is that not only are the faculty credentialed at the PhD level, many of them also have years of significant operational experience.

The third pillar of our success is a very tightly focused curriculum that is relentlessly uncompromising in the demands it makes of our students. Our curriculum is a grinding 50-week, book-a-day journey of discovery that includes 10 major course papers, a full-blown thesis, comprehensive examinations, and a major field trip. *Relentless* only begins to describe the curriculum.

When you combine great students, superior faculty, and an uncompromising curriculum, it is no wonder that the results have been of great importance to the Air Force and to the nation. And what are these results? There are many, but I am convinced that the most important result is that SAASS pro-

This graduation address was delivered to Class XVI, School of Advanced Air and Space Studies, Maxwell AFB, AL, 13 June 2007.

duces graduates who are critical thinkers who put their newly developed skills to good use in positions of great and increasing importance to solve very difficult problems facing the Air Force and the nation.

Unfortunately, *critical thinking* is a widely misunderstood term. It is, in a nutshell, the disciplined process of analyzing, synthesizing, and evaluating information generated from observation, experience, reflection, and reasoning. Critical thinking also includes critical inquiry, that is, investigating problems, asking tough questions, posing new answers that challenge the status quo, questioning traditional beliefs, and challenging received dogmas and doctrines.

Any air and space power historian can easily demonstrate that critical thinking has been crucial to the rapid development of American airpower and space power and to their incredibly rapid maturity as instruments of military power coequal to the much more venerable land and sea forces. Not only was critical thinking a key to the development of air and space power as we know it today, it will be critical to the continued importance of airpower, space power, and the new world of cyberpower in the era that lies ahead. Most important to SAASS graduates, critical thinking is the realm of the military strategist, and SAASS was originally chartered to produce graduates who could become the brilliant airpower, space power, and now cyberpower strategists our nation will so desperately need in the years to come.

Military history is replete with those who did not or could not practice effective critical thinking and wound up in history's dustbin of ignominy. Think of the French strategists who, in the 1930s, nearly bankrupted their republic by building elaborate static fortifications along their German border. They built their Maginot Line just as their German adversaries were developing the mobile ground and air forces that would, in 1940, drive around and fly over those outmoded fortifications as the German Blitzkrieg raced into the Netherlands, Belgium, and France.

Closer to us in both time and space, think of the Strategic Air Command (SAC) strategists in Omaha who confidently sent their heavy bombers on exactly the same course over the surface-to-air missiles guarding Hanoi for the third straight night during the Linebacker II campaign in December 1972. As an old SAC Cold Warrior, that reference really hurts, but I am sure the crews

of the six B-52s lost on that bloody night over North Vietnam would say the reference is well deserved. My list could go on and on, but my point is simple: critical inquiry and critical thinking are the essential tools of the strategist and are the keys to military success. Unfortunately, critical inquiry and critical thinking are also commodities too often in short supply.

Frankly, I cannot imagine any commodities more important to American survival and prosperity in the decades that lie ahead than critical inquiry and critical thinking. We face new adversaries waging kinds of warfare we have difficulty understanding, and they wage these struggles for reasons we find difficult to fathom. Meanwhile, most of the old challenges and dangers remain with us, perhaps dormant for the moment, but still lurking, still waiting for signs of weakness. This is a witch's brew of deadly dangers with which you must cope using your skills of critical inquiry and critical thinking.

I must warn you, however, that using your hard-won critical-thinking skills will not make you very popular in some circles. Critical thinking frightens those devoted to orthodoxy and those comfortable with mediocrity. Critical thinking scares the pants off the sycophants, the toadies, the vested interests, and the dogmatic bureaucrats—both in and out of uniform. Their opposition is something with which you will have to cope throughout the rest of your career.

I give you this warning because, as a strategist, you may be reporting to those who fear critical thinking. Your job is to tell the truth to power. All is for naught if you fail to do so, which means you must do so with skill and cunning. In other words, you must have a strategy to deliver your strategy. With some, the direct approach works well. With others, you may need to take Liddell Hart's advice and use an indirect approach. But in either case with either method, all is lost if you do not tell the truth to power. I am confident that you will and that you will do it well.

Let me finish by making what sounds like a very ominous prediction about Class XVI. I can almost guarantee that at some time in the not-too-distant future, some member of this class—perhaps even several members of this class—will be in positions of great responsibility and great influence during a time of grave national crisis. The fate of the nation may well be at stake.

Oddly enough, I find that prospect rather comforting, because I can think of no group of military officers that is better prepared to handle such a crisis and bring it to a successful conclusion. The future is in your hands, and that makes me sleep well at night.

Acronyms and Abbreviations

ACSC	Air Command and Staff College
ACTS	Air Corps Tactical School
AFB	Air Force base
AFDD	Air Force Doctrine Document
AFMAN	Air Force Manual
AFP	Air Force Pamphlet
AOR	area of responsibility
AWC	Air War College
BDA	bomb damage assessment
CADRE	Center (now College) for Aerospace Doctrine, Research and Education
CENTCOM	Central Command
CIA	Central Intelligence Agency
CINCPAC	commander in chief, Pacific
DAL	Developing Aerospace Leaders
DIA	Defense Intelligence Agency
DOD	Department of Defense
DRV	Democratic Republic of Vietnam
FM	Field Manual
FMFM	Fleet Marine Force Manual
GPO	Government Printing Office
JCS	Joint Chiefs of Staff
km	kilometers
OPLAN	operations plan
ORI	operational readiness inspection
PME	professional military education
RAF	Royal Air Force
SAAS	School of Advanced Airpower Studies
SAASS	School of Advanced Air and Space Studies
SAC	Strategic Air Command
SAM	surface-to-air missile
SOS	Squadron Officer School
USAF	US Air Force

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Recapitalizing the Air Force Intellect
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