
**THE ROLE OF AIR POWER GOING INTO THE 21ST
CENTURY**

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INTRODUCTION

Air power took a quantum leap in credibility and perceived importance after the opening days of Operation Desert Storm in 1991. The convergence of high technology with intensive training and determined strategy that was attested by the allied coalition's successful air campaign against Saddam Hussein's Iraq bespoke a breakthrough in the strategic effectiveness of the air weapon after a promising start in World War II and more than three years of misuse in the Rolling Thunder bombing campaign against North Vietnam from 1965 to 1968. Indeed, the speedy attainment of allied air control over Iraq and what that allowed allied air and space assets to accomplish afterwards by way of enabling the prompt achievement of the coalition's military objectives on the ground marked, in the view of many, the final coming of age of air power.

There was no denying the effect that initial air operations had in shaping the subsequent course of the war. The opening coalition attacks against Iraq's command and control facilities and integrated air defenses proved uniformly successful, with some 800 combat sorties

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launched in the blackness of night in radio silence against Iraq's most militarily critical targets and only one coalition aircraft lost—a U.S. Navy F/A-18, presumably to a lucky infrared missile shot from an Iraqi MiG-25. Over the next three days, the air campaign struck at the entire spectrum of Iraq's strategic and operational-level assets, gaining unchallenged control of the air and the freedom to operate with impunity against Iraq's airfields, fielded ground forces, and other targets of military interest.

In the aftermath of the war, the predominant tendency, not just among airmen, was to credit coalition air power with the bulk of responsibility for having produced such a lopsided win. Senator Sam Nunn, initially a doubter about the wisdom of the Bush Administration's going to war for the liberation of Kuwait, hailed the result as attesting to the advent of a "new era of warfare."² Three years later, Eliot Cohen of the Johns Hopkins University's School of Advanced International Studies observed that "although ground action necessarily consummated the final victory for coalition forces, air power had made the final assault as effortless as a wartime operation can be."³ Cohen, who earlier had led the U.S. Air Force's Gulf War Air Power Survey, went on to note that air power had all but taken on a mystique in the public mind as a result of its success in the Persian Gulf.

Since then, a high-stakes controversy has emerged in major capitals around the world centering on how best to apportion operational roles and budget shares among the services at a time of uncertain challenges and near-unprecedented fiscal constraints. Naturally, given the predominant role played by the allied air campaign in Desert Storm and the far-reaching claims made on behalf of air power as a result of its performance, the roles and resources controversy has gravitated toward air power as the principal lightning rod for debate. At its core, this debate has come to concern the extent to which the developed nations can now rely on air-delivered precision

²Patrick E. Tyler, "U.S. Says Early Air Attack Caught Iraq Off Guard," *New York Times*, January 18, 1991.

³Eliot Cohen, "The Mystique of U.S. Air Power," *Foreign Affairs*, January/February 1994, p. 111.

standoff attack weapons in lieu of ground forces to achieve battlefield objectives and minimize the incidence of friendly casualties.

Against that background, this chapter seeks to offer a perspective on the nature and meaning of the qualitative improvements that have taken place in air power since the mid-1980s, with a view toward offering a measured portrait of air power's newly acquired strengths and continued limitations. The chapter concentrates on air power's capability in the context of large-scale theater war, as opposed to smaller-scale operations or irregular conflicts, such as urban combat, that may not involve organized or mechanized forces on the enemy side.⁴ Its goal is to provide a basis for better understanding what has increasingly become a central issue in defense planning, namely, the implications of recent and impending improvements in capabilities to acquire, process, and transmit information about an enemy's forces and to attack those forces with precision air-delivered weapons.

Three bounding rules need stipulating at the outset to clarify what is meant here by air power, which is really a shorthand way of saying air and space power. First, air power does not refer merely to combat aircraft (the glamorous "shooters" that performed so unexpectedly well in Desert Storm) or to the combined hardware assets of an air arm, even though these may seem at times to be the predominant images of it held by both laymen and professionals alike. Rather, in its totality, air power is a complex amalgam of hardware equities and less tangible but equally important ingredients bearing on its effectiveness, such as employment doctrine, concepts of operations, training, tactics, proficiency, leadership, adaptability, and practical experience. These and related "soft" factors vary enormously among air arms around the world operating superficially similar kinds, and often even identical types, of equipment. Yet more often than not, they are given little heed in what typically passes for "air capability" analysis. Only through their combined effects, however, can one ultimately determine the extent to which raw hardware will succeed in producing desired combat results.

⁴For a treatment of air power's role in the latter instances, see Alan Vick, David T. Orletsky, Abraham Shulsky, and John Stillion, *Preparing the U.S. Air Force for Military Operations Other Than War*, Santa Monica, California, RAND, MR-842-AF, 1997.

Second, air power is functionally inseparable from battlespace information and intelligence. Thanks to the dramatic growth in the lethality and combat effectiveness of air power since the late 1980s, it has become both correct and fashionable to speak increasingly not of numbers of sorties per target killed, but rather of number of kills per combat sortie. Yet air power involves more than merely attacking and destroying enemy targets. It also involves knowing what to hit and where to find it. It is now almost a cliché that air power can kill anything it can see, identify, and engage. It is less widely appreciated that it can kill *only* what it can see, identify, and engage. Air power and intelligence are thus opposite sides of the same coin. If the latter fails, the former is likely to fail also. For that reason, accurate, timely, and comprehensive information about an enemy and his military assets is not only a crucial enabler for allowing air power to produce pivotal results in joint warfare; it is an indispensable precondition for ensuring such results. This means that tomorrow's air campaign planners will have an ever more powerful need for accurate and reliable real-time intelligence as a precondition for making good on their most far-reaching promises.

Third, air power, properly understood, knows no color of uniform. It embraces not only Air Force aircraft, munitions, sensors, and other capabilities, but also naval aviation and the attack helicopters and battlefield missiles of land forces. In this regard, it is worth highlighting that the first allied weapon impact in Operation Desert Storm was not a laser-guided bomb delivered by an F-117 stealth fighter, but a Hellfire missile launched against an Iraqi forward air defense warning site by a U.S. Army AH-64 Apache attack helicopter. As was well borne out by that example, air power entails a creative harnessing of *all* combat and combat support elements, including space and information warfare adjuncts, that exploit the medium of air and space to visit fire and steel on enemy targets. Recognition and acceptance of the fact that air warfare is an activity in which all services have important roles to play is a necessary first step toward a proper understanding and assimilation of air power's changing role in joint warfare.

No attempt will be made in this chapter to explore *all* components of air power, such as mobility and air involvement in military operations other than war. Instead, the emphasis will be on air power's ability to deliver effective fires in joint warfare against organized and

mechanized enemy forces, since it is what *that* ability now offers theater commanders by way of overall combat leverage compared to land forces that involves the highest stakes and has provoked the greatest controversy in defense debates worldwide. One cannot draw overarching conclusions about air power that apply uniformly for all occasions; moreover, its contribution to joint operations can, in fact, range from decisive to irrelevant depending on the particular circumstances facing a theater commander. Nevertheless, the chapter will argue that current and emerging conventional air employment options can now achieve strategic effects in major theater wars directly by offering joint force commanders the promise of engaging and destroying or neutralizing enemy ground forces from standoff ranges with virtual impunity. This reduces threats to friendly troops who might otherwise have to engage undegraded enemy ground forces directly and thus risk sustaining high casualties. That transformation in combat capability is the essence of air power's recent coming of age.

THE LEGACY OF DESERT STORM

Viewed with the broadened perspective that naturally comes with the passage of time, the conduct of the 1991 Persian Gulf war has now come to be seen by most observers as having been considerably less than a towering strategy success. Many of the loftier goals articulated by its leaders before the war, from General Colin Powell's bold assertion with respect to the Iraqi army that "first we're going to cut it off, and then we're going to kill it" to CENTCOM's declared objective of destroying Iraq's capability for manufacturing weapons of mass destruction, did not come to pass. Beyond that, a legitimate and still-active debate has arisen over the perspicacity of the decision to terminate the ground war so abruptly at the 100-hr mark, at just the moment when allied air and ground operations were beginning to make the most of what military professionals call the exploitation phase of war. Analysts will no doubt argue for years to come over what difference it might have made with respect to the longer-term outcome had the coalition kept pressing the combined air and ground offensive for even another 24 to 48 hours.

Yet as a more narrow exercise in the application of air power, Operation Desert Storm was anything but inconclusive. On the con-

trary, the ability of allied air assets to establish air dominance so quickly over a well-endowed opponent who knew a fight was coming and then to draw down his army to a point where coalition ground forces could consummate a virtually bloodless win in a mere 100-hr campaign represented an achievement that is guaranteed to keep Desert Storm prominently listed in the roster of air power success stories. Indeed, its success in keeping allied ground force casualties so remarkably low suggests that the time may have come for considering a fundamentally new approach to the relationship between air- and surface-delivered fires in modern warfare now made possible by the combination of real-time surveillance and precision attack capability that was exercised to such telling effect by air power against Iraqi ground forces. One aspect of this transformation concerns what the resulting synergy does to enable the defeat of an enemy army through *functional* effects rather than through a more classic drawdown in detail by way of attrition. Just as the earlier SEAD campaign was able to neutralize Iraqi radar-guided SAMs not by physically destroying them but by intimidating their operators from turning on their radars, so the precision attacks made possible by Joint STARS and other systems put potentially hostile armies on notice that they can no longer expect a night sanctuary or any place to hide. At the same time, they served notice that any attempt to move will equally ensure a swift and lethal attack.

Interestingly, some of the most insightful comments on the heightened importance of air power in joint warfare made possible by new technologies and concepts of operations have come from Russian defense professionals, who were close observers of Desert Storm because of their role as the main supplier of Iraq's military equipment and doctrine. One of the best characterizations anywhere was put forward not long after the war ended by retired Russian Army Major General I. Vorobyev: "For the first time in history, we observed a case in which a very large grouping of ground troops (more than a million men) suddenly found itself unable to do its business." Vorobyev added that Desert Storm underscored "the decisive role of fire-power"—he may as well have said air power—in destroying the enemy. This has never been demonstrated so clearly in any operation in the past. The fire phase became a prolonged strike, as a result of

which Iraq's defenses were so shattered that there was no need to execute an assault to break through fortified positions."⁵

A similar perspective was offered by Soviet army Major General Vladimir Slipchenko, a since-retired professor of strategy at the General Staff Academy. Shortly after the war ended, Slipchenko said: "The Gulf war supports the fact that air strikes can, by themselves, form the basis for victory [notice, not victory but the *basis* for victory]. In Operation Desert Storm, air power was responsible for victory because air superiority altered the complexion of the war from the very outset."⁶ Amplifying on this point, Colonel General Anatoly Malyukov, chief of the Russian Air Force's headquarters staff, hit the nail on the head when he remarked: "There was no classical AirLand Battle in Desert Storm. Why? The point is that this war . . . was obviously conceived from the outset as an air war to wear out the opponent by means of air strikes, disorganize his command systems, destroy his air defenses, and weaken the ground forces' striking power. And these objectives were achieved. Broadly speaking, this is the first time we have seen a war in which aviation took care almost entirely of all the main tasks."⁷

There has been a continuing push from some quarters to make technology the hero of Desert Storm and to conclude that it was technological magic that accounted for such a lopsided win by the coalition. Yet that conclusion almost surely is going to prove to be hollow once the historians have the final word. True enough, the coalition's pronounced technological edge over Iraq made an important difference in shaping the course and outcome of the war, and a few allied "silver bullets" had an impact far disproportionate to their numbers in ensuring the relative effortlessness of Desert Storm. These included the F-117, the HARM missile, the APR-47 threat sensor aboard the F-4G, laser-guided bombs, and Joint STARS, among other platforms, munitions, and systems. Without them, the war would have proven far more costly for the allies.

⁵Major General I. Vorobyev, "Are Tactics Disappearing?" *Krasnaia zvezda*, August 14, 1991.

⁶Major General Vladimir Slipchenko, "What Will There Be Without Icons?" *Voennno-istoricheskii zhurnal*, No. 6, 1991, p. 70.

⁷Interview with Lieutenant General A. Malyukov, "The Gulf War: Initial Conclusions—Air Power Predetermined the Outcome," *Krasnaia zvezda*, March 14, 1991.

However, this observation requires an important qualification. Two points expressed by the late U.S. Secretary of Defense Les Aspin while he was still chairman of the House Armed Services Committee warrant special mention in this regard: “One, the equipment worked and was vindicated against its critics. Two, we know how to orchestrate its use in a way that makes the sum bigger than all the parts.”⁸ The second point in Aspin’s statement was no less important than the first. Although by all accounts, the F-117 was indispensable in achieving tactical surprise and minimizing the coalition’s losses to enemy ground fire, to cite only one case in point, the real force-multiplication leverage that swung the final outcome in Desert Storm came from the way the coalition’s diverse assets were brought together in synergistic combination by allied planners.

To sum up, high technology was a significant but not determining factor in the coalition’s success in Desert Storm. Superior training, motivation, proficiency, leadership, tactical cleverness, and boldness in execution were no less important in producing the final outcome. One need only consider the immensely difficult balancing act of getting 400 coalition fighters airborne and marshaled at night in radio silence, refueled often several times, and working under tight timelines without a missed tanker connection, let alone a midair collision or other catastrophic accident, to appreciate how aircrew skill and the ability to adapt under stress were critically important to the air campaign’s outcome. Without these and other intangibles, all the technology in the world would have been for naught.

THE CHANGED ESSENCE OF AIR POWER

As the relatively swift success of Operation Desert Storm amply bore out, the decade preceding it saw a wide-ranging growth in the efficacy and lethality of the air weapon. Those improvements, mostly evolutionary but some entailing true breakthroughs in performance, accounted for much of the seeming ease of the allied joint force victory against Iraq. The effective role played by air power stemmed from a combination of technology advance, increased intensity and

⁸Representative Les Aspin, “Desert One to Desert Storm: Making Ready for Victory,” address to the Center for Strategic and International Studies, Washington, D.C., June 20, 1991, p. 5.

realism of training, and a steadily mounting leadership focus on the operational level of war.

As a result of these three developments, air power has now arrived at a point where it has become truly strategic in its potential effects. That was not the case before the advent of stealth, highly accurate target engagement capability, and substantially improved battlefield information availability. Earlier air campaigns were of limited effectiveness at the operational and strategic levels because it simply took too many aircraft and too high a loss rate to achieve too few results. Today, in contrast, air power can make its presence felt quickly and can impose effects on an enemy from the outset of combat that can have a governing influence on the subsequent course and outcome of a joint campaign.

To begin with, there is no longer a need to amass force as there was even in the recent past. Such advances as low observability to enemy radars and the ability to destroy or neutralize both fixed and moving targets with a single munition have obviated the need for the sort of cumbersome formations of strike and support aircraft that were typically required in Vietnam. The large force packages that the U.S. Air Force and U.S. Navy routinely employed during the air war over North Vietnam offered the only way of ensuring that enough aircraft would make it to their assigned targets to deliver the number of bombs needed to achieve the desired result. Today, improved battlespace awareness, heightened aircraft survivability, and increased weapons accuracy have made possible the *effects* of massing without having to mass. Thanks to this, air power can now produce effects that were previously unattainable. The only question remaining, unlike in earlier eras of strategic bombing, is *when*, not whether, those effects will be registered.

Indeed, the ability to achieve the effects of mass without having to mass is a big part of the essence of air power's new leverage. This means that the day of the classic "gorilla" force package of strike and supporting aircraft has now largely passed, at least in those phases of a conflict following the initial neutralization of an enemy's integrated air defenses. Now that accuracy improvements have opened up the possibility, at least in principle, that nearly every weapon release can be mission-effective, knowing how and where best to commit air power can reduce the number of needed sorties for a given task.

In light of this confluence of developments, retired RAF Air Vice Marshal Tony Mason has proposed that air power may yet succeed in meeting the goal of its early visionaries and obviate altogether any need for surface engagements in many circumstances. However, Mason suggests that a more seemly goal of air power modernization should be to produce situations “which can subsequently be exploited by ground forces in greatly reduced numbers, with greatly reduced casualties, and greatly reduced costs.”⁹ By building on the results gained by surprise and producing the sort of paralysis by intimidation that was inflicted on Iraq’s IADS and army units by the allied air campaign in Desert Storm, air power can neutralize an opponent’s ability to pursue his objectives by means of force or reduce it to a point where the opponent cannot resist a counteroffensive by friendly surface forces. Already, this newly-acquired leverage of air power has unburdened ground commanders of any need to undertake a frontal assault in direct contact with enemy forces until the costs of such an assault can be made tolerable.

To note an important qualification here, air power has by no means become a universally applicable tool providing an answer to every conceivable security challenge that might arise. On the contrary, the spectrum of possible circumstances that could test a joint force commander is so diverse that one can never say for sure that any single force element will always dominate across the board. As one U.S. Army officer observed in this respect not long after Desert Storm, the wide array of possible future contingencies suggests that “no one can safely predict which of the services will be the centerpiece of the next conflict.” That, he went on to say, pointed toward the need for “a balanced force and robust unified commands, fully capable of tailoring and employing the forces needed.”¹⁰

Air Vice Marshal Mason has graphically demonstrated this point via the device of a notional air power pendulum which swings from the clear-cut case of Desert Storm, where targets were accessible and

⁹Air Vice Marshal Tony Mason, RAF (Ret.), “The Future of Air Power,” address to the Royal Netherlands Air Force, Netherlands Defense College, April 19, 1996, p. 4.

¹⁰Lieutenant Colonel Joseph J. Collins, USA, “Desert Storm and the Lessons of Learning,” *Parameters*, Autumn 1992, pp. 87–88.

significant, the desert topography open and unrestricted, the weather generally favorable, bases readily available, and political support both at home and abroad, unquestioned to the more challenging Bosnian scenario, in which targets were mobile and generally of low value, the topography wooded and mountainous, the weather often forbidding, and political support far more fragile. As for other cases of air power application, Mason found the Six Day War of 1967, the Yom Kippur War of 1973, and the Beka'a Valley operation of 1982 far closer to the Desert Storm model in terms of air power's effectiveness and dominance, whereas Somalia and other recent peace-keeping operations aggregated much closer to the Bosnian case.¹¹ In the latter instances, air power proved of more limited value in dealing with the course of events on the ground, even though Operation Deliberate Force did, in the end, help coerce the Bosnian Serbs to put down their arms and accede to a truce.

To note another limiting factor, one must never forget that the operational setting of the 1991 Gulf war was almost uniquely congenial to the effective employment of air power. The going will not always be that easy in future showdowns in which air power might be challenged, as attested by the very different case of Korea. There is where the Gulf war analogy breaks down quickly and where airmen and soldiers have a powerful need for mutual respect because of their mutual dependency. Although air power will almost surely be a key ingredient of success in any war that might erupt there, no such war would be fought with the comparative luxury of fewer than 300 friendly combat fatalities, as was the case in Desert Storm. To begin with, North Korea would presumably be fighting for its survival and might well employ, or attempt to employ, weapons of mass destruction. On top of that, with more than 500,000 armed combatants on both sides poised for immediate action along the demilitarized zone, any such war would necessarily entail close ground combat from the very start.

True enough, air power would quickly establish combined-forces ownership of the skies over North Korea following any outbreak of a full-fledged war on the peninsula. It also would help to reduce the

¹¹Air Vice Marshal Tony Mason, RAF (Ret.), *Air Power: A Centennial Appraisal*, London, Brassey's, 1994, p. xiii.

incidence of friendly combat fatalities by blunting an armored attack, drawing down enemy theater missiles and artillery, and gaining situational control by forcing the enemy to remain underground. It could further engage in systematic “bunker plinking,” although many of North Korea’s underground facilities are sufficiently secure from air attack that it would require allied ground forces to go in and dig them out. But without question, air power would not be able to halt a North Korean armored and mechanized infantry invasion alone. It would not just beat up on enemy ground troops for forty days as it did in Desert Storm while the other side did nothing. On the contrary, there would be plenty of fight for *all* allied force elements in any such war.

Finally, strategic air attack cannot be expected to break an enemy’s will or bring down a political regime. Yet those need no longer be the goals of air power when “strategic attack” can now strike directly at an enemy’s instruments of military power and, in effect, deny him the ability to do anything of operational consequence, irrespective of his will. The increased effectiveness of air power against those instruments means that a joint force commander may no longer need to crush an enemy in every case, but merely to disrupt his capacity for collective action in the pursuit of declared goals. There may also be no need in all cases to obliterate a target or target system, but merely to render it ineffective by destroying its ability to function.

With all due acknowledgment of air power’s continued limitations, what benefits does the air weapon now offer its ultimate consumer, the joint force commander in chief, whose use for it will be directly proportional to its ability to answer his bottom-line operational needs? The first, and by far most important, payoff of air power’s transformation in capability since the mid-1980s entails increasing the situational awareness of friendly forces while denying it to the enemy. Air- and space-based intelligence, surveillance, and reconnaissance (ISR) capabilities now offer greatly improved knowledge of a battlespace situation for all command echelons in a joint operation. They cannot, at least yet, address the legitimate concern voiced by such land combatants as retired U.S. Marine Lieutenant General Paul Van Riper over finding and identifying a notional “enemy company in the basement of [a] built-up area” or “the 12 terrorists mixed

with that crowd in the village market.”¹² However, they are more than adequate for supporting informed and confident force committal decisions by a joint force commander against large enemy armored formations on the move in the open. For all its continued limitations, such an information advantage entails a major breakthrough in targeting capability and one which, in conjunction with precision attack systems, has made for a uniquely powerful force multiplier.

There is nothing, of course, new about this in and of itself. In a sense, “information warfare” has been practiced by belligerents ever since the days of sticks and stones. The difference today, however, is that commanders and planners are now at the threshold of understanding its importance and mastering it. Indeed, the broad area of sensor fusion is arguably more pivotal than any other single area of technology development, because it is the sine qua non for extracting the fullest value from the new imposition options that are now becoming available. Thanks to the enhanced awareness picture it now promises, this synergistic fusion of information and precision attack capability will strengthen the hands of warfighters up and down the chain of command, from the highest level to individual shooters working within tactical confines.

A second payoff area worth emphasizing is the broadened ability of air power to do things it could not do before, as well as to accomplish more with less for a joint force commander. On the first count, it has shown the ability to maintain air dominance over the heart of an enemy’s territory, enforce no-fly and no-drive zones, and engage enemy armies effectively from relatively safe standoff ranges. On the second count, increased information availability and directability has enabled reduced cycle time, yet another force multiplier which creates a larger apparent force from smaller numbers by permitting a higher operations tempo. Relatedly, the current generation of combat aircraft embodies significant improvements in reliability, maintainability, and sustainability, making possible greater leverage from fewer numbers. Such enhancements now allow both greater

¹²*Clashes of Visions: Sizing and Shaping Our Forces in a Fiscally Constrained Environment*, a CSIS-VII Symposium, October 29, 1997, Washington, D.C., Center for Strategic and International Studies, 1998, p. 38.

concentration of force and a reduction in the amount of time it takes to perform an operational task.

A third major payoff afforded by recent improvements in air power is situation control from the outset of combat, such that the first blow can decide the subsequent course and outcome of a war. Air power now permits the attainment of strategic goals through simultaneity rather than through the classic sequence of methodical plodding from tactical through operational-level to strategic goals at an exorbitant cost in lives, forces, and national treasure. Yet its principal objectives are no longer the familiar ones of leadership, infrastructure, economic potential, and so on invoked by past “strategic bombardment” proponents. Instead, they embrace key assets that make up an enemy’s fielded forces and capacity for organized action. Before long, the initial attack may even be surreptitious—for example, into computer systems, to pave the way for fire and steel to follow.

Finally, the maturation of air power has enabled the maintenance of constant pressure on an enemy from a safe distance, increased kills per sortie, selective targeting with near-zero unintended damage, substantially reduced reaction time, and, at least potentially, the complete shutdown of an enemy’s ability to control his forces.¹³ These and other payoffs in no way add up to all-purpose substitutes for ground forces. However, they now permit joint force commanders to rely on air power to conduct deep battle for the greater extent of a joint campaign, foreshadowing an end to any need for friendly armies to plan on conducting early close-maneuver combat as a standard practice. As Desert Storm showed, the ability of independently applied air power to own the air and shape the battlefield eliminated any urgent need for the coalition’s commanders to commit allied ground troops to battle. The only factor driving a need to wrap things up quickly was the certainty of approaching summer heat, which would have made operations for *all* forces much more difficult.

¹³For further development of these points, see Lieutenant General George K. Muellner, USAF, “Technologies for Air Power in the 21st Century,” paper presented at a conference on “Air Power and Space—Future Perspectives” sponsored by the Royal Air Force, London, England, September 12–13, 1996.

In previous years, the dialectic between maneuver and fire cast indirect firepower—whether from air or ground weapons—mostly in a supporting role because it could offer the ground commander little more. That, however, has changed dramatically over the past decade and continues to do so to the benefit of air warfare capabilities. As Barry Watts of Northrop Grumman Corporation has observed, “foreseeable improvements in wide-area surveillance, the ability to act upon the information provided by such surveillance in seconds or minutes, and the range and lethality of indirect, precision fires raise the possibility of air-land combat becoming increasingly dominated by them. Indeed, increased dominance of outcomes by indirect fires from the air was precisely the hallmark of the Desert Storm air campaign, although airmen seldom formulated the point this way.”¹⁴

Relatedly, RAND’s David Ochmanek has noted how in traditional combined-arms thinking, the “indirect” fire provided by air power to ground commanders was valued principally as a means to prevent enemy forces from maneuvering and to induce shock on a battlefield, upon which only close, or “direct,” fire of the sort provided by armored and infantry forces was deemed accurate enough to defeat enemy ground troops decisively. Today, in contrast, technology advance has enabled fielded air and space systems to locate and identify enemy ground units from great distances with high confidence and to bring them under direct fire from standoff ranges with levels of lethality approaching or exceeding those of earlier close-fire systems. The effect, Ochmanek argues, has been to change every aspect of the direct fire mission, “mostly to the detriment of the tank.” Now that air and space power can identify and engage enemy troops from long range, he concludes, the need for friendly ground forces to maneuver and fight at close range has been greatly diminished, “at least under some conditions. The advantage is that battles, campaigns, and wars may be fought more quickly and with far less risk of casualties.”¹⁵

¹⁴Barry D. Watts, “Ignoring Reality: Problems of Theory and Evidence in Security Studies,” *Security Studies*, Winter 1997/98, p. 166.

¹⁵David Ochmanek, “Time to Restructure U.S. Defense Forces,” *Issues in Science and Technology*, Winter 1996–97, pp. 39–40.

All in all, possibly the single greatest effect of the maturation of air power has been its demonstrated capacity to save lives—enemy lives through the use of precision to minimize noncombatant fatalities, and friendly lives by the substitution of technology for manpower and the creation of battlefield conditions in which land elements, once unleashed, can do their jobs without significant resistance because of the degraded capabilities of enemy forces. No less important, modern technology skillfully applied in conjunction with a clear concept of operations offers today's air and space forces a means of gaining their goals through cleverness rather than brute force, in a manner reminiscent of top-scoring Luftwaffe ace Eric Hartmann's frequent injunction that the good combat pilot flies with his head, not his muscles.

A STRUGGLE BETWEEN NEW AND OLD

If air power has registered such gains in capability over the past decade compared to what it was able to contribute to joint warfare in earlier years, then why has it become so beleaguered in today's defense debate? In shedding light on this question, it may be helpful to approach the ongoing confrontation between air and surface warfare functions as the first stirrings of a nascent paradigm shift in defense planning. In essence, a paradigm is a recognized and accepted frame of reference which, in the portrayal of science historian Thomas Kuhn, "for a time provides model problems and solutions to a community of practitioners."¹⁶ Kuhn was speaking of revolutionary changes in scientific outlooks, such as that perhaps most famously exemplified by the gradual transition from the concept of an earth-centered cosmos to that of a solar-centered milieu. Yet the intellectual and professional dynamics that he identified in that process describe almost perfectly what has been happening in the relationship between the air and surface warfare communities in most developed nations since Desert Storm. At bottom, that relationship has entailed an increasingly open and heated dispute over fundamentals in a struggle between one long-accepted frame of reference and another that purports to be better.

¹⁶Thomas S. Kuhn, *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1962, p. viii.

By implication, Kuhn tells us much about the selective images of combat held by the various services in his characterization of how scientists of different upbringing perceive a common phenomenon: “On the road to professional specialization, a few physical scientists encounter only the basic principles of quantum mechanics. Others study in detail the paradigm applications of these principles to chemistry, still others to the physics of the solid state, and so on. What quantum mechanics means to each of them depends on what courses he has had, what texts he has read, and which journals he studies.”¹⁷ With the necessary changes for context, the same can be said with respect to the various protagonists in the current defense debate, not only between airmen and land warriors, but also, in some cases, among airmen themselves. It tends to bear out the now-famous proposition first propounded in the early 1960s by the dean of Harvard’s School of Public Policy, Don Price, that where you stand depends on where you sit. It further explains why the gradual acceptance of new paradigm categories over time is typically accompanied by resistance, often to the point of intransigence, on the part of the old school.

In military doctrine no less than in the natural sciences, as Kuhn has shown, the triumph of new ideas must invariably contend along the way with “lifelong resistance, particularly from those whose productive careers have committed them to an older tradition.” Kuhn explains how “the source of resistance is the assurance that the older paradigm will ultimately solve all its problems. . . . Inevitably, at times of revolution, that assurance seems stubborn and pigheaded, as indeed it sometimes becomes. But it is also something more.”¹⁸ Up to a point, at least, it is a natural and healthy phenomenon which helps ensure that the old paradigm “will not be too easily surrendered” and that any ultimate shift in outlook will be both valid and warranted.¹⁹ Pending the completion of such a shift, the embattled and obsolescing paradigm also remains a necessary key to cognitive consistency and to the ability of its holders to operate effectively within the existing framework.

¹⁷Ibid., p. 50.

¹⁸Ibid., pp. 151–152.

¹⁹Ibid., p. 65.

The problem in the case at hand here, however, is that the would-be “new paradigm” of joint force employment is anything but self-evidently an air and space power paradigm. True enough, some air power proponents since Desert Storm have argued as though an imminent shift to an aerospace-dominated strategy is all but a foregone conclusion, save only for those benighted obstructionists in the surface warfare world who seem so consistently unable to see the light. Yet the surface warfare world has made a no less determined counterclaim to being the vanguard of the military-technological revolution. Land warriors are now professing no less vigorously than airmen that it is *they* who are the keepers of any “new paradigm” of joint warfare.

A major part of the basis for this counterclaim by the land warfare community is that recent improvements in information fusion and precision target attack have enhanced the combat capability of *all* services and force elements. By way of example, former U.S. Air Force chief of staff General Larry Welch has noted that irrespective of the medium, the essence of the emerging change in force capability includes high lethality on the first mission, near-complete freedom of operations from the outset of combat, round-the clock operations enabling a constant high pace while giving the enemy no sanctuary, and the dominance of combat operations by information.²⁰ However much these attributes may represent what air and space power do uniquely best in joint warfare, they are not exclusive attributes of air and space power by any means.

Accordingly, if the promise of air and space power is to be realized, merely the strength of a compelling idea will not be enough to bring it about. As Thomas Keaney and Eliot Cohen pointed out in their summary report of the U.S. Air Force’s Gulf War Air Power Survey, “the ingredients of a transformation of war may well have been visible in the Gulf war, but if a revolution is to occur, someone will have to make it.”²¹ That being so, the first challenge for those air power proponents who purport to be the keepers of the new paradigm is to

²⁰General Larry D. Welch, USAF (Ret.), “Dominating the Battlefield (Battlespace),” briefing charts, no date given.

²¹Thomas A. Keaney and Eliot A. Cohen, *Revolution in Warfare? Air Power in the Persian Gulf*, Annapolis, Maryland, Naval Institute Press, 1995, p. 212.

engage their counterparts in other combat arms in candid awareness of what air power *can not* do and with candid respect for the intellectual and historical origins of the differing views held by their fellow professionals in the surface forces. Equally important, it behooves airmen to acknowledge what their surface-warrior brethren continue to offer the joint force commander by way of needed combat capability, even in the face of the quantum improvements that have recently occurred in the instruments of air warfare.

More to the point, airmen must argue convincingly to those of the putative “old school” that there not only is a better way through air and space power, but one that promises to underwrite the mission needs of surface warriors no less than those who fly. Toward that end, they could benefit enormously by heeding the observation of Harvard political scientist Richard Neustadt years ago that the essence of influence lies in persuading those of different opinions that one’s own version of what needs to be done by them “is what their own appraisal of their own responsibilities requires them to do in their own interests.”²² U.S. Air Force General John Jumper was plainly acting in the spirit of that injunction when he commented that “in the end, all airmen want to do is make the ground guy’s job easier. We’re trying to save some lives here, and we truly think that in this era, as in Desert Storm, if we can get in, and while the ground force is building up . . . we think that by the time that decisive ground engagement is necessary, we may not have to do it, or if we have to do it, it may look very much like the 100-hr campaign they had on the ground in Desert Storm.”²³ Although skeptics in green might be forgiven, at least for a time, for doubting the underlying sincerity of such a statement, it nonetheless represents the tone that needs pressing the hardest by airmen in their dealings with surface warfare professionals on the roles and missions front.

Second, airmen must own up to the fact that achieving and maintaining air superiority is only a part of the air power story, a necessary but insufficient condition for air power to lay convincing

²²Richard E. Neustadt, *Presidential Power*, New York, John Wiley and Sons, 1963, p. 49.

²³Lieutenant General John Jumper, USAF, “Air Power Initiatives and Operations: Presentation for the European Air Attache Conference,” annotated briefing, no date given.

claim to having become the predominant force. Because airmen have dwelled so vocally and for so long on the themes of air superiority and “strategic bombing,” successive generations of army leaders, in a major misperception of air force motives, have come to view their air force counterparts as focused almost exclusively on wanting to go out and defeat an enemy’s air force and then to continue deep to bomb his heartland, in effect fighting their own private war and, in the process, hoarding sorties for their own ends rather than providing needed support to ground commanders.

Part and parcel of any such acknowledgment that air superiority is only a buy-in condition for air power to exercise its combat function that matters most in joint warfare, namely, attacking an enemy’s war-waging capacity, must be for airmen to repudiate, once and for all, Douhet’s signature axiom that “to have command of the air is to have victory.”²⁴ That statement was false when it was first made in 1921, and it is no less false today. Although control of the air is an indispensable precondition for joint-force victory on the ground, air power must also be able to perform the job on the ground faster, better, and less costly in terms of friendly casualties than ground forces if its proponents are to justify their claim to its being the force of first choice. What has lately come to be called “air dominance” will always be important to the success of joint force campaigns. However, it is not now and never was air power’s principal stock in trade.

Third, and relatedly, the new capability and promise of air power require that airmen unburden themselves of past teachings with respect to the utility of urban-industrial bombing to undermine an enemy’s will to fight. Not only have the core arguments of those teachings been shown to be baseless in fact, technology and new force employment options now permit a conception of air warfare that is genuinely “strategic,” yet focused more directly on an enemy’s instruments of military power. The improved and still-improving ability of air power to produce combat results on the ground both rapidly and decisively has invalidated many of the often-voiced doubts prompted by a reading of classical air power theory. This implies a need for air planners to change their measures of effective-

²⁴Giulio Douhet, *Command of the Air*, Washington, D.C., Office of Air Force History, 1983, p. 25.

ness by shifting their attention to air power's newly acquired capability against an enemy's fielded forces if they are to ensure that air power theory remains relevant to the needs of joint force commanders.

More to the point, it is time for airmen to bid farewell to the now-outmoded arguments espoused by Douhet and subsequent air power advocates on behalf of urban-industrial bombardment and, instead, to play up the *new* things that modern air and space power can now do. Point one in this respect is to acknowledge that air power can now quickly destroy or neutralize enemy armies and surface navies anywhere. Airmen have not articulated this case very clearly or effectively. Toward that end, Air Vice Marshal Mason has suggested a need to review critically the image of strategic bombardment put forward by the early theorists of air power because of the extent to which it has become discredited over the years as a result of its stress on the targeting of innocents. The equating of strategic attack with urban destruction, Mason points out, not only gave it invidious associations with the firebombing of Dresden and Tokyo in World War II but, worse yet, "inhibited a wider realization of air power's complete potential."²⁵

Fourth, and directly derivative from the above, air power practitioners need to develop a theory of air power application in land warfare on a scale of the classic theories of "strategic bombardment," yet one that focuses more directly on the prerequisites for attacking and destroying an enemy's fielded army. In contrast to the highly sophisticated planning assumptions that underlay the coalition's SEAD campaign in Desert Storm, there was nothing comparable to inform allied planning for air operations against the Iraqi army. The latter were guided by little more than classic attrition warfare thinking.

Similarly, CENTCOM had a theory for attacking Iraq's "strategic" infrastructure that was imbedded at the center of Colonel John Warden's Instant Thunder attack plan. Unfortunately, that theory did not deliver on its promise. Nevertheless, the Instant Thunder approach at least was built on an organizing concept of a sort that CENTCOM lacked for that part of the air war that fortuitously worked

²⁵Mason, "The Future of Air Power," p. 3.

so well in the end, namely, those portions of the air campaign that were targeted against Iraq's ground forces. Had it possessed such a concept, allied air operations might have given the joint force commander, General H. Norman Schwarzkopf, both greater going-in confidence and greater economy of force in the neutralization of Iraq's army. Instead, as Williamson Murray has pointed out, planning for air attacks against Iraqi ground forces followed a reductionist approach in which the planners "simply racked up targets—so many tanks, so many artillery pieces, so many ammunition dumps, etcetera—and then worked their way down from the top of the list. Nowhere in the planning documents . . . was there an effort to use air power in an operational sense, as a lever to gain larger strategic effects by attacking certain portions of the enemy's ground structure, to cripple the whole."²⁶ As a result, notes Price Bingham, "it was more by accident than design that the coalition's air interdiction made the Iraqis unwilling to risk large-scale movement."²⁷

Fifth, if air power proponents are to have any influence in helping to bring about a transformation in joint force employment strategy that makes the most of what recent improvements in aerospace technology have to offer, they will need, as a first order of business, to stop talking in terms of "dominant air and space power," a proclivity that has needlessly put the other services on the defensive in the budget wars. Instead, they should focus on how aerospace power can contribute toward making the job of ground forces easier. Toward that end, there surely must be more imaginative ways of thinking about the changing relationship between air and land power than simply in reductionist "either-or" terms. For instance, indirect fire support from the air, if well-directed, lethal, and timely, can enable ground commanders to do things differently, as well as to do different things with their forces. Among other options one might imagine, it can hold a forward line until ground troops arrive on scene to secure it. It also can deter or disrupt and delay large-scale invasions even if friendly ground forces have not yet deployed to a threatened theater in fighting strength.

²⁶Williamson Murray, "Ignoring the Sins of the Past," *The National Interest*, Summer 1995, pp. 100–101.

²⁷Price T. Bingham, *The Battle of Al Khaffi and the Future of Surveillance Precision Strike*, Arlington, Virginia, Aerospace Educational Foundation, 1997, p. 14.

EFFECTING A NEW WAY OF WAR

Mindful of the emerging competition over roles and resources that was foreshadowed by air power's surprisingly effective performance in Desert Storm, Air Vice Marshal Mason warned in 1994 of "a danger that sensible and necessary debates about air power may be threatened by a reemergence of zealotry on the one hand and obtuseness on the other as resources are reduced, threats diminished, and role responsibilities blurred."²⁸ To a dismaying extent, that is exactly what has occurred in the years since. In a thoughtful contribution to the post-Gulf war defense debate, Mason called for a stern exorcism of the sort of air power excessiveness that was reflected in the exaggerated claims of Giulio Douhet, which not only had needlessly polarized discussion of strategy alternatives among the services for decades, but were wrong both in overestimating the ability of aerial bombardment to break the will of an opponent and in denigrating the continued need for ground and naval forces alongside strategic air power.

As for those latter-day air power proponents who would exploit the success of the Gulf air campaign to rekindle the flame first lit by the early air power advocates, Mason retorted that insofar as air power could be said to have predetermined the outcome of Desert Storm, it was "a result of strategic, operational, and tactical simultaneous synergism, not from any reincarnation of Douhet." As an antidote to further controversy over false issues, he suggested that it was past time "to place air power into the continuum of military history, to emphasize not just its unique characteristics, but the features it shares, to a greater or lesser degree, with other forms of warfare." Mason added that the preeminence of air power "will stand or fall not by promises and abstract theories, but, like any other kind of military power, by its relevance to, and ability to secure, political objectives at a cost acceptable to the government of the day."²⁹ He later noted, more succinctly, that airmen will succeed in establishing any air and space millennium that may be in the offing *only* when

²⁸Mason, *Air Power: A Centennial Appraisal*, p. xvi.

²⁹*Ibid.*, pp. 273–274.

decisionmakers, legislators, and taxpayers can be persuaded that what airmen have to offer is “the most attractive show in town.”³⁰

Recent developments in the combat capability of air power have made possible a new way of war entailing entirely new concepts of operations. Thanks to precision, stealth, and expanded information availability, airmen are now paradoxically able to apply air power as first envisioned by the early advocates, but not in a way that they could even remotely have foreseen. Three years after the Gulf war ended, the Joint Force Air Component Commander, General Charles Horner, put it this way: “I’ve come to the conclusion that war has profoundly changed. I think that air power is equal to land and sea power. I don’t think it’s superior. . . . Each war must be determined on the circumstances involved in that war—the environment, the aims, the political goals, the nature of the enemy forces, and the nature of the friendly forces. But there are those who still believe that air power is subservient, particularly to land, and also to sea power. That is absolutely wrong.”³¹

In pursuing improvements through the new options held out by information technology and precision firepower, decisionmakers must take care to avoid lapsing into complacency. The promise of new technology indeed offers a windfall byproduct in enhanced deterrence, since potential enemies will naturally be loath to challenge such proven capability if the resulting disparities in combat prowess are well known and understood, as clearly they were by most on-lookers in the early aftermath of Desert Storm. Yet this same technology edge can spur a race by have-nots to develop asymmetrical countermeasures. Retired Indian army Brigadier V. K. Nair set the tone in this respect by describing what determined Third World countries might do on the cheap to negate the superior technology shown by the coalition in Desert Storm.³² Near-term options along

³⁰Air Vice Marshal Tony Mason, RAF (Ret.), “Air Power in Transition,” presentation at a conference on “Canada’s Air Power in the New Millennium” sponsored by the Canadian Forces Air Command, Winnipeg, Manitoba, Canada, July 30, 1997.

³¹General Charles A. Horner, USAF, “New Era Warfare,” in Alan B. Stephens, ed., *The War in the Air: 1914–1994*, Canberra, Australia, RAAF Air Power Studies Center, 1994, p. 332.

³²V. K. Nair, *War in the Gulf: Lessons for the Third World*, New Delhi, Lancer International, 1991.

these lines could include dedicated attacks against high-value soft targets such as Joint STARS, AWACS, and tanker aircraft.³³ Attacks on airlifters moving war materiel into an embattled theater and special operations or theater missile strikes against forward-area terminals and other allied bases could make for additional options. And, of course, there is the ever-present possibility of a desperation resort to a counterdeterrent based on nuclear and other weapons of mass destruction.

In all, however effective and promising they may appear to be today, the new capabilities of air and space power that were so impressively foreshadowed during the 1991 Gulf war portend no “end of history” with respect to the enduring dialectic between offense and defense. One of the most demanding imperatives facing allied force development across the board in the coming years will be to ensure that today’s one-sided predominance over potential troublemakers remains in effect for the indefinite future. That will require not resting on the laurels of the gains achieved to date, but continuing to invest as necessary to stay ahead of potential countermeasures that might even the odds.

Beyond that, one must remain careful not to become so mesmerized by the apparent leverage of newly emerging military technology as to lose sight of the fact that future wars will not invariably offer easy going for the wielders of such technology. As Colin Gray has warned, “decisive maneuver, the decisive laydown of firepower against carefully selected targets (hopefully, the assets that comprise the enemy’s center of gravity), the achievement of surprise, and so forth—assuredly can achieve the all but ‘free lunch’ effect. Nonetheless, historical evidence, as well as common sense, suggests that competent foes, large and small, typically require a lot of beating. . . . Silver bullets and even magic swords may well exist, but they should not comprise the leading edge critical to a general theory of success in war.”³⁴ If defense planners are to succeed in institutionalizing any revolution

³³Following a seminar at the Zhukovskii Air Force Academy in Moscow in 1992, a Russian Air Force general assured me that had he been running the Iraqi Air Force, allied AWACS, Joint STARS, tankers, and airlift aircraft would have been at serious risk—to high-speed ramming attacks, if necessary, to achieve the desired political effect.

³⁴Colin S. Gray, “All That Glitters, , , : Revolutions in Military Affairs (RMA) and the Perils of Very High Concepts,” unpublished manuscript, August 1996, p. 26.

in air and space technology that may now lie within their grasp, they will be aided greatly by remembering General George S. Patton's warning about how easily people can fool themselves into believing that wars can be won by some wonderful invention rather than by hard fighting and superior leadership.

Nothing in this chapter has been intended to suggest that air power can win wars without ground or naval involvement, possibly even significant involvement. Nor has the chapter sought to suggest that air power will, in each and every situation, inevitably be more important than land or sea power. On this point, most airmen have gone out of their way not to overgeneralize from Desert Storm. Said General Horner in this respect: "I think we showed in this circumstance, not in every circumstance, that an air campaign can be used to achieve military goals with a minimum loss of life on both sides."³⁵

That said, one can argue with growing confidence that the air power assets of all services now have the potential to carry the bulk of responsibility for beating down an enemy's fielded forces of all kinds, thus enabling other force elements to achieve their goals with a minimum of pain, effort, and cost. More than that, one can argue that air power in its broadest sense, including such vital adjuncts as surveillance and reconnaissance in addition to combat platforms, munitions, and the mobility assets needed to deploy them, has fundamentally altered the way major wars will be fought over the next two decades through its ability to carry out functions traditionally performed at greater cost and risk by other force elements. Most notable among these are its demonstrated capacity to neutralize an enemy's army with a minimum of casualties on both sides and its ability to establish the preconditions for achieving strategic goals from the very outset of fighting.

Thanks to these new capabilities, air and space power, coupled with information power, now offers the promise of being the swing factor in an ever-widening variety of circumstances. As the great enabler, it has every chance of becoming even more capable and effective if the possibilities now before it are properly cultivated. That suggests that

³⁵Barry Shlacter, "A U.S. General Assesses the War After One Year," *Fort Worth Star-Telegram*, February 17, 1992.

the primary role of land power in future circumstances involving large-scale enemy aggression with massed armor and infantry may now be increasingly to *secure* a win rather than to achieve it.

Just to be clear on an important point, this in no way vitiates the recurrent insistence of land combatants that only ground forces can administer the final blow should an enemy refuse to knuckle under in the face of withering air attacks against his combat capability.³⁶ Nor does it challenge the equally valid point made by surface warriors that the object of future land warfare should be to make close-in killing “a coup de grace rather than a bloody battle of attrition.”³⁷ The question of questions, however, concerns what measures now make the most sense for doing the hard work needed to position those ground troops so they can deliver the coup de grace, should one be required, both rapidly and with minimal risk to their own survival.

In this respect, there is growing ground for maintaining that a sweeping change has begun to take place in the classic relationship between air and surface forces when it comes to defeating attacks by enemy armored and mechanized units. In and of itself, that nascent change may or may not add up to a full-fledged “revolution in military affairs.” Without question, however, it attests to a quantum improvement in the strategic effectiveness of air power in *all* services when compared to the leverage of more traditional ground force elements in modern war. That, perhaps more than anything, is the essence of the transformation that has taken place in the capability of the air weapon since Vietnam.

³⁶See, for example, the comment by since-retired Army Lieutenant General Jay Garner to this effect in Capaccio, *Defense Week*, November 18, 1996, p. 15.

³⁷Brigadier General Robert H. Scales, Jr., USA, *Certain Victory: The U.S. Army in the Gulf War*, Washington D.C. and London, Brassey's, 1994, p. 367.