

No other technological advance has altered the nature of warfare or the way we fight it as much as the airplane. It changed fundamentally the way we think about fighting by creating a viable way to access the third dimension.

Challenges

21st Century Logistics

Understanding Airpower

Clearing the Air: Airpower Theory and Contemporary Airpower

Twenty-First Century Logistics Challenges presents one article in this edition: “Clearing the Air: Airpower Theory and Contemporary Airpower.” This article was included in this edition of the Journal to provide an educational resource for Air Force logisticians and to improve their understanding of airpower and its uses.

In the article, Colonel Raymond P. O’Mara notes that in just one century, airpower has proven to be a tremendously valuable tool for decisionmakers. Early airpower theorists recognized that airpower was different than other forms of power and that, if used correctly, could decisively affect a conflict. The access it provides makes it a faster, more flexible, and more precise than any other form of military power. Airpower has redefined persistence and ability to mass through technological advances, further increasing airpower’s strengths.

Airpower’s greatest strength is its flexibility in application. Air forces can perform missions from strike to humanitarian relief, rapidly and precisely. The forces themselves are flexible

across the spectrum, able to shift from sanction enforcement to strike and back, using the same aircraft and aircrew. Airpower makes the best use of the human ability to adapt to a situation. Economically, these facts make air forces a tremendous value. Airpower provides the best return for every dollar spent across the defense spectrum. However, airpower is not a substitute for all other forms of power. It is best used in combination with the other tools available to decisionmakers in order to meet policy objectives. Each form of military power has strengths based upon its command of its physical medium. We are most effective when we employ each branch of our force to its strengths, with each supporting as necessary.

He concludes, airmen need to control airpower. Only airmen can truly understand the strengths and, equally important, the limitations of airpower. The danger of the limitations is that, if not minimized, they can severely reduce the advantages of airpower’s strengths. Airmen must be able to understand this, and express it to our decisionmakers.

Clearing the Air: Airpower Theory and Contemporary Airpower

Colonel Raymond P. O'Mara, USAF

Introduction

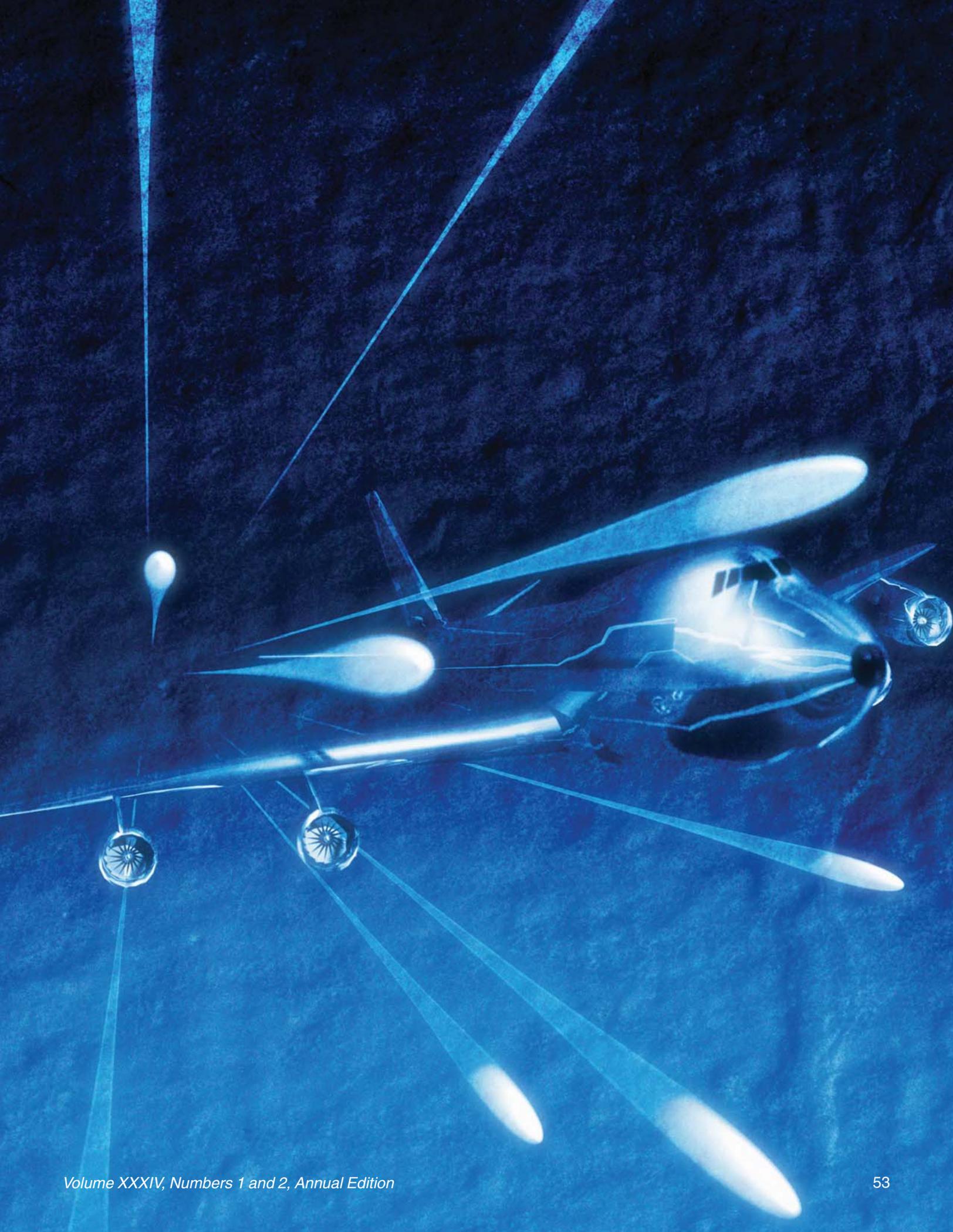
The United States finds itself engaged in a global conflict unlike any other it has ever faced, either in scope or length. The long-term commitment of military forces demands serious consideration of its structure. Efforts to transform America's military are underway, but we need to examine the very basis of our thinking with regard to its use. As we alter the shape and capabilities of our Armed Forces, we depend more on interoperability and synergy to get the mission accomplished. We must make sure that our Armed Forces are used in a fashion that will leverage their strengths to the maximum extent possible. To do that, we must reevaluate each arm of the military and the theory that underpins its use. Airpower, the newest form of military power, is no exception to this requirement.

No other technological advance has altered the nature of warfare or the way we fight it as much as the airplane. It changed fundamentally the way we think about fighting by creating a viable way to access the third dimension. Likewise, from conventional bombs to precision weapons, nuclear weapons to ballistic missiles and satellites, a wide variety of technologies have been developed to exploit this new dimension of warfare that, combined with the aircraft itself, gives rise to a new form of military force—airpower. In the current resource-constrained environment, it is critical now more than ever that we understand the true

nature and capability of airpower. It is only through this understanding that we can optimize the tools at our disposal in order to employ military power to fulfill the political goals of our country.

The advent of the aircraft also spawned a new field of military theory, one aimed at explaining best how to use the third dimension. With the possible exception of nuclear deterrence theory, airpower theory has been the most contentious form of military thought yet developed. Because the first airpower theorists, and many that followed, used their ideas to justify the establishment of a separate air service (thus taking missions and resources from both land and sea forces), debates of airpower's value and role have always been clouded by bureaucratic infighting. Accusations of zealotry on the part of airpower advocates and unthinking obstructionism on the side of skeptics have made it difficult to discuss the true nature of airpower's capability and potential. Incredibly, even today, some are calling into question the need for an independent Air Force.¹

In order to capture airpower's true capability and potential, it is necessary to strip away arguments both for and against a separate air service. We must examine airpower theories in their most basic form and assess their current value by examining the record of their application in warfare. By establishing what portions of established airpower theories have stood the test of time, we can use these results to create a true picture of airpower, define what makes it unique, and then determine how best to use it in the current context and beyond.



Power and Airpower

Airpower is different from ground or sea power. Originally viewed as just another way to attack enemy forces on the ground, the airplane evolved beyond a form of mobile artillery the first time enemy aircraft fought each other in air-to-air combat. The fact that aircraft could perform multiple missions such as reconnaissance, strike, and air defense, and do so in ways that could not be accomplished by other weapon systems, demanded that we think about airpower differently than the way we think about ground or sea power.

But what is airpower? What makes it unique from the other forms of military power? Before we answer those questions, we must first define *power*.

Power is that which allows one entity to influence another entity or situation. With another *entity*, influence is the ability to change a decisionmaker's mind to choose a path desired by the one exerting the influence. That change may be either positive or negative. A positive change is that which influences an entity *to do* something. A negative change occurs when an entity is influenced *to stop doing* something. With regard to a *situation*, influence is the ability to change the conditions of that situation in a desired direction. The manner in which power is applied, not necessarily the type of power applied, will determine the direction of the desired change, either positive or negative. Power also encompasses the ability *to prevent* another entity from exerting influence upon you.

From the above definition, we can reason that airpower is the ability to apply influence through the use of the third dimension. Dr Phillip Meilinger noted that in addition to air vehicles and the ability to fly,

...most observers go on to note that airpower...encompasses the personnel, organization, and infrastructure that are essential for the air vehicles to function. On a broader scale, it includes not only military forces but also the aviation industry, including airline companies and aircraft and engine manufacturers.²

Thus, airpower is the sum total of the ability to apply influence through air, space, and everything that supports that ability.

The Development of Airpower Thought

Airpower has been an integral part of modern warfare since World War I. Today, it is no longer a mysterious new force, and while arguments may still rage as to whether airpower can be *the* decisive factor in winning a war, it is not possible to state with any credence that airpower is not *a* decisive factor in warfare. We need only look to Operation Allied Force over Kosovo, "the third largest strategic application of airpower by the United States since World War II, exceeded only by the Vietnam War and Operation Desert Storm in scale and intensity,"³ as an example of this decisiveness. The success of airpower as the sole military instrument in the North Atlantic Treaty Organization (NATO) victory

...despite the multiple drawbacks of a reluctant administration, a divided Congress, an indifferent public, a potentially fractious alliance, a determined opponent, and —not least—the absence of a credible NATO strategy surely testified that the air instrument has come a long way in recent years in its *relative* combat leverage compared to that of other force elements in Joint warfare.⁴

This rise as a decisive military force occurred in less than a century in the face of rapid technological change.

Traditionally, new technologies are developed into weapon systems, and then integrated into fighting forces, and doctrine is ideally then developed before use in combat. The rapid rate of technological advance in the aerospace realm left little time for this process. Airpower theory, like aviation technology, developed very rapidly. By comparison, technological advances in land and sea power came at a much slower rate. This pace allowed ground and sea power theory and doctrine to develop in a more measured fashion, and new technologies were assimilated more smoothly. The pace also allowed traditionally conservative practitioners of the warfighting craft to become used to the technological advances and adapt to their use. Advances such as the submarine and gunpowder, which was a proven concept by 1776, took hundreds of years before they became integrated into theory and doctrine, although it may be argued that armored warfare proceeded on the same rapid timeline followed by air warfare. However, the relative advance in air technology was far greater than that of armored vehicles over the same period of time.

Debates about the effectiveness of airpower and the best way to employ it have been clouded from the beginning. Any advocacy for the use of airpower was seen as a bureaucratic move to take missions (and the accompanying funding) from another Service, and was frequently characterized as outlandish claims that airpower alone could *do it all*. The airpower advocate was automatically branded an *airpower zealot*. While Billy Mitchell, the charismatic airpower theorist and strong advocate of an independent air Service, certainly advocated an air force that was less expensive than naval ships for coastal defense in the 1930s, nobody has since argued seriously that airpower can replace land and sea power or win wars on its own. It is time to retire the strawman that any advocacy for the use of airpower is an assertion that airpower can completely replace land or sea power. Airpower, just as land and sea power, when used correctly with other appropriate military elements of power, can be a highly effective—even decisive—tool. To use airpower correctly, however, we must first understand what airpower can do.

To establish a clear picture of airpower and its potential as a military element of power, we can turn to the ideas of the past and see how airpower thought has evolved, identifying the ideas and concepts that have been proven through its application. With this done, we can then assess airpower's suitability as an instrument of power in the present context, and shape our thinking for its application in the future. By removing the separate Service argument, we can see what early theorists understood and saw as potential for this new capability. There have been many notable airpower theorists, but five in particular laid the foundation of airpower theory as it exists today: Giulio Douhet, William C. Sherman, William "Billy" Mitchell, John C. Slessor, and John Warden. Sherman and Slessor are much less well known than Douhet, Mitchell, and Warden, but this quintet had the most significant impact on airpower thought in the last century.

Airpower: The Theorists

Airpower theorists focused on three major topics: command of the air, targeting with airpower, and airpower missions. Every theorist we will examine addressed these topics, mixing personal experience, original thought, and the unique context in which

they lived in an attempt to define the unique and appropriate use of airpower.

Giulio Douhet

Giulio Douhet was the first airpower theorist. Born in Italy in 1869 and commissioned as an officer in the Italian artillery in 1882, he began thinking about airplanes in 1909 and had formed the core of his airpower thought by the middle of World War I.⁵ His landmark treatise on airpower, *The Command of the Air*, was first published in 1921. Douhet recognized that airplanes had the potential to significantly change the way wars would be fought in the future. Perhaps the most significant airpower theorist of all, many of his original ideas have either formed the basis for or have been included in most subsequent airpower theories. Criticism of his theory is abundant, but the fact remains, as Phillip Meilinger has noted, that “most of his successors, knowingly or not, merely wrote commentaries on his ideas and predictions.”⁶

Main Theoretical Ideas

Douhet realized that the airplane could have a revolutionary effect on warfare. He believed that the airplane’s inherent speed and ability to reach any point within an enemy country meant that an attacking air force could bypass enemy fielded forces and provide a shortcut to victory.⁷ It was possible (in his mind) to bring the fight directly to the enemy civilian populace and destroy their will to continue fighting, thus avoiding the drawn-out attrition at the battle front that characterized World War I. Douhet envisioned masses of heavily armed, combat-survivable bombers armed with explosive, incendiary, and poison-gas bombs directly attacking the enemy’s civilian population and infrastructure. The principal key to the success of these attacks was something that he called *command of the air*.

Command of the Air

Douhet believed that, because they could now be overflown by attacking air forces, ground and sea forces had become much less significant. Every square inch of an enemy’s territory was exposed to aerial attack, and since they could not defend against such attacks, the disposition of ground and naval forces was irrelevant to the outcome of the war. Logically, to Douhet, “if one no longer needed to control the ground, then the forces used to control it diminished in significance.”⁸

In order to take advantage of airpower’s ability to overfly ground forces and attack the enemy, it was necessary to secure the ability to operate at will in the third dimension. This was to be achieved by attaining command of the air, which Douhet defined as:

To be in a position to wield offensive power so great it defies human imagination. It means to be able to cut an enemy’s army and navy off from their bases of operation and nullify their chances of winning the war. It means complete protection of one’s own country, the efficient operation of one’s army and navy, and peace of mind to live and work in safety. In short, it means to be in a position *to win*. *To be defeated* in the air, on the other hand, is finally to be defeated and to be at the mercy of the enemy, with no chance at all of defending oneself, compelled to accept whatever terms he sees fit to dictate.⁹

In short, to Douhet, “to have command of the air is to have *victory* (italics in original).”¹⁰

Douhet ultimately believed that if a country lost command of the air, it was possible that it might surrender without further fighting. “The side that lost control of its own airspace would realize what was in store and surrender rather than face devastation.”¹¹ To ensure survival, it was fundamental that a country maintain command of the air to prevent an enemy from subjecting it to aerial attack. To that end, he advocated for the acquisition of only those forces that could maintain command of the air and wrest it from the enemy—air forces. This belief laid at the heart of his rationale for an independent air force.

The method of attaining command of the air is a distinguishing characteristic of Douhet’s theory. For him, it was necessary to reduce the enemy air force “to a negligible number incapable of developing any aerial action of real importance in the war as a whole.”¹² Douhet believed that it was more effective to destroy enemy air forces by attacking them while they were still on the ground, rather than by engaging them in the air. He posited “destroying an enemy’s airplanes by seeking them out in the air is, while not entirely useless, the least effective method. A much better way is to destroy his airports, supply bases, and centers of production.”¹³

This idea of destroying “the eggs and the nests”¹⁴ was driven by Douhet’s belief in the offensive capability of the aircraft. He believed that firepower, rather than speed, was the critical capability an aircraft must possess, although he made it very clear that the inherent speed of aircraft was a great advantage over surface-bound forces. In his view, a slower, heavily armed aircraft could withstand the attack of pursuit aircraft and carry out its mission, therefore, destroying aircraft while they were still on the ground was the most effective way to destroy the enemy’s air force.¹⁵

During the Arab-Israeli Six Day War in 1967, the Israelis conducted a Douhet-inspired air campaign to gain command of the air over the Middle East. At the outset of the war, they executed a “preemptive attack designed to destroy the Egyptian Air Force and its airfields.”¹⁶ During this attack, and the ensuing ones over the next two days on the rest of the Arab air forces, the Israelis destroyed 416 aircraft, 393 of them on the ground. Israel achieved complete air superiority (command of the air), and freed their ground forces from the threat of aerial attack.¹⁷ Similarly, during the first day of Operation Barbarossa in World War II, the Germans destroyed over 1,800 Soviet aircraft, most of them on the ground.¹⁸ This achieved almost complete air superiority and gave Wehrmacht forces freedom of movement over the entire battlefield for the opening phase of the operation. Indeed, in every conflict since World War II, the country with the offensive initiative and political freedom to attack the necessary targets strove to destroy the enemy air forces on the ground.

Airpower Targeting

Witnessing the carnage of World War I, Douhet concluded that the war “had demonstrated the inevitability and totality of wars and that modern technology had produced an unbreakable stalemate on the ground.”¹⁹ He saw the airplane as the means of breaking that stalemate, realizing that “*it is possible* to go far behind the fortified lines of defense without first breaking through them (italics in original).”²⁰ With the entire enemy country vulnerable to attack from the air, it created an entirely new set of targets. As Phillip Meilinger noted, “Douhet was perhaps the first person to realize that the key to airpower was

targeting, because although aircraft could strike virtually anything, they should not attempt to strike everything.”²¹

Douhet believed that:

...aerial offensives (should) be directed against such targets as peacetime industrial and commercial establishments; important buildings, private and public; transportation arteries and centers; and certain designated areas of civilian population as well. To destroy these targets three kinds of bombs are needed—explosive, incendiary, and poison gas—apportioned as the situation may require. The explosives will demolish the target, the incendiaries set fire to it, and the poison-gas bombs prevent fire fighters from extinguishing the fires.”²²

With airpower’s ability to reach every corner of a country, Douhet saw the battlefield limited only by the physical boundaries of the nations engaged in the war. Thus, in a case of circular reasoning, he believed that all of the hostile nation’s citizens became combatants, since they were exposed to attack from the air.²³ In other words, civilians were legitimate targets because of the fact that they *could be* attacked.

Douhet’s focus on targeting the civilian population was founded in his belief that “attacking an enemy’s population would inspire it to revolt, and thus lead a government that cared about its people to discontinue its policies.”²⁴ He based this idea upon his reading of the British public’s panicked reaction to the German aerial bombing attacks on London in 1915.²⁵ Although sporadic and unfocused in execution, the German bombing campaign against London had a significant effect on both Douhet and the British population. The public outcry over a lack of a coordinated British defense against the attacks led to the creation of the independent Royal Air Force (RAF) in 1918.²⁶

Douhet’s choice of aerial attack weapons was a combination of explosive, incendiary, and poison-gas bombs. He chose this mixture specifically to cause the greatest amount of terror and destruction possible.²⁷ This mix of weapons would allow an attacking air force to “completely wreck large areas of population and their transit lines during crucial periods of time when such action might prove strategically invaluable.”²⁸

To conduct these aerial attacks, Douhet proposed the use of an aircraft with an extensive combat radius, speed sufficient only to enable it to avoid aerial combat, enough armor to protect the crew, and enough bombs to destroy its targets and complete the mission. Even though it was intended to avoid aerial combat, this *battleplane* would include some defensive weaponry for the sake of the crew’s morale.²⁹ Douhet envisioned this battleplane as a cheap alternative to expensive ground and naval forces. Douhet came from a country with relatively modest resources. He saw the battleplane and its ability to defeat an adversary by attaining command of the air as an economic way to defend his country.³⁰

Although he saw an economic benefit in the battleplane, Douhet’s focus on an aircraft whose principal capability was bombing was driven by his core belief that airpower was the ultimate offensive force. Possessing superior speed and being independent of the limitations of geography suffered by surface forces, the airplane was

...free to choose the point of attack and able to shift its maximum striking forces; whereas the enemy, on the defensive and not knowing the direction of the attack, is compelled to spread his forces thinly to cover all possible points of attack along his line of defense, relying upon being able to shift them in time to the sector actually attacked as soon as the intentions of the offensive are known.³¹

This single-minded focus on the offensive shaped Douhet’s thoughts on how to employ airpower and for which missions it was appropriate.

Airpower Missions

At the time Douhet wrote, radar did not exist and pursuit aircraft, while slightly faster than bombers, were rather lightly armed. Approaching bomber formations were difficult to detect and, in Douhet’s estimation, even more difficult to shoot down. Consequently, he saw no possibility of an effective aerial defense against bomber aircraft.³² Additionally, Douhet discounted the effectiveness of any type of ground-based air defense. He considered “the use of anti-aircraft guns (as) a mere waste of energy and resources.”³³ While later in his life he admitted that *auxiliary* aircraft, such as pursuit fighters, might be useful to fend off attacking defensive fighters, he remained steadfast in his belief that there was no effective defense against an attacking bomber formation. For Douhet, bombardment, as the single best method of gaining command of the air, was the primary mission of the air force.

While the bombardment mission held primacy, Douhet recognized that auxiliary aircraft could play a valuable role as reconnaissance assets. He believed that a long-range, fast reconnaissance aircraft was necessary to photograph enemy territory. This was needed for “effective targeting, not only to pinpoint objectives but also [to] determine the effectiveness of air attacks on those objectives.”³⁴ Beyond this concession, Douhet’s airpower theory focused on the bomber.

Results

Douhet constructed a remarkable theory. He provided a framework that allowed him to explain what he saw as airpower’s unique capabilities, apply them to the strategic situation as he saw it, and act as a vehicle to predict future behavior. He established the idea of command of the air, a concept that, as we shall see, dominated early airpower theory development and eventually became a necessary condition for success in warfare. Douhet also identified numerous capabilities unique to airpower, surprise and speed principal among them. The multidimensional character of airpower’s use of the third dimension enabled an aircraft to conduct a massive surprise attack against an enemy, *anywhere* on the ground. The speed with which such an attack could be made was also crucial. Douhet understood that, as with warfare on the land and sea, the idea is to inflict as much damage as possible in as short a time as possible to maximize the effects of the attack on the enemy’s ability to recover, or even resist.³⁵

Douhet identified three of the major mission areas that would develop within air combat: bombing, pursuit, and reconnaissance. While dismissive of all but bombing, he did understand that there were multiple elements of airpower. The only major mission area we now recognize that he did not address was airlift. This may be attributed to an over concentration on the offensive nature of airpower as much as the technological limitations of the time. Even the largest bombers of Douhet’s time carried relatively small payloads. Douhet is not alone in his lack of attention to airlift. None of the theorists examined here addressed airlift as a principal mission for airpower.

Many of his ideas, though, are easy to criticize 90 years after they were written. His assertion that direct attacks against the enemy’s civilian population would break its will to continue fighting and force the government to surrender remains

unsubstantiated. “He grossly overestimated both the physical and psychological effects of bombing. Populations did not break as quickly as he thought they would under the weight of air attack.”³⁶ This, however, is more a critique of the effect of the use of power on the civilian population rather than the use of airpower. This is an important distinction. The direct attack of a civilian population, whether by air, land, or sea, is unlikely to cause its will to suddenly collapse. Occupational land forces might exert more direct control over a population, but sudden collapse of its will is doubtful without the application of a great deal of force.

Another often-criticized aspect of Douhet’s theory is his choice of weapons. It is difficult, however, to dismiss offhand this part of the theory. As David MacIsaac points out, Douhet assumed that explosive, incendiary, and poison-gas munitions would be used “in the correct proportions” in aerial attacks against the enemy population and industrial infrastructure. The fact that the Allies’ World War II bombing campaign did not cause the collapse of the will of either the German or Japanese civilian population does not necessarily disprove Douhet’s theory.³⁷ Not only was poison gas not used, the German populace was not the sole target of the Combined Bomber Offensive (CBO). British missions, conducted at night, directly targeted the German population, but the American daylight campaign largely targeted German industry and transportation.³⁸ Also, the CBO was not a nonstop, continual assault, which was a key requirement in Douhet’s strategy. A lack of aircraft in 1943 and inclement weather throughout the war thwarted Allied attempts to keep their foot on Germany’s throat.

The attacks did, however, show some of the results that Douhet had predicted. During his post-war interrogation Albert Speer, Adolf Hitler’s Minister for Armaments during the war, stated that the 1943 bombing attack on Hamburg had a devastating effect on the German population. He believed that further attacks on Hamburg, completely destroying it, or similar attacks on six or eight other German cities would have crippled German civilian morale.³⁹ Similarly, Douhet’s assertion that there was no defense against air attack has been proven wrong. Improvements in anti-aircraft artillery, the development of surface-to-air missiles, and the advent of integrated air defense systems have all been effective at destroying aircraft in the air. The first battleplane, the B-17 Flying Fortress, was not fully effective until it had defensive fighter escort to counter Luftwaffe aerial defenders.⁴⁰ Radar gave the Germans warning of the direction and timing of impending bombing raids and enabled them to mass their air defense fighters against the incoming Allied formations. Douhet, however, cannot be blamed for not forecasting major advances in science and technology.

Another enduring concept that Douhet developed was the battleplane. Envisioned as an economical alternative to expensive land and sea forces, this concept of a do-everything multi-role bomber would shape combat aircraft development in the United States for much of the next century. The B-17, arguably the first incarnation of the battleplane, was followed by the B-24, B-36, and B-52, all of which were self-protecting, heavy bombers. Multi-role fighter bombers from the F-111 through the F-16 and F-15E are close conceptual cousins to these aircraft. Development of these aircraft was not cheap. Improving flight and weapons capability and implementing new technologies took many years of expensive development and testing. The

modern incarnation of the battleplane, the stealthy B-2 bomber, illustrates the point. Able to penetrate enemy defenses, strike its targets and return to base, the B-2 is decidedly not cheap at an estimated cost of \$2B per aircraft.

One final key element of Douhet’s theory requires examination. He theorized that with sufficient airpower capability, ground forces would be necessary only to hold enemy forces in place while airplanes overflew them to attack the civilian population and subsequently win the war. Aside from Operation Allied Force, there has not been a case where air attack alone has won a war. In every other instance, airpower has been employed in conjunction with ground (and where possible) sea power.

Giulio Douhet’s airpower theory was founded on his concept of command of the air. His desire to roam the enemy’s skies without interference from enemy air forces drove his strategy of destroying those forces while they were still on the ground. More significantly, command of the air was a necessary condition in order for Douhet to execute his bombing strategy. Without command of the air, Douhet’s strategy was meaningless. The need for *total* command of the air did not dominate the thinking of all airpower theorists. A different approach to the concept and an alternate way to achieve it is a distinguishing characteristic of early airpower thought in the United States.

William C. Sherman

Giulio Douhet’s airpower theory provided the point of departure for virtually every theorist who followed. While seemingly all airpower theories were ultimately *tainted* by the discussion of a separate air service, one of the most balanced was advanced by Major William C. Sherman, a United States Army officer who remains relatively unknown to this day. Born in 1888 and a 1906 graduate of West Point, Sherman gained some combat experience in World War I and was one of a small group of Air Service officers who congregated around Billy Mitchell. While discussing Mitchell’s ideas may seem the next logical step in examining the development of airpower thought, many of his ideas were actually adaptations of Sherman’s thoughts.⁴¹ Sherman published his theory of airpower in 1926 in a book entitled *Air Warfare*, which was as much a discussion of airpower theory as it was a training manual for aerial warfare. Unfortunately, Sherman died the next year and the core of his thoughts had to be carried forward by others. Sherman was no less an advocate for a separate air service than Mitchell, but “was more intellectual in his advocacy and less zealous in his approach.”⁴²

Main Theoretical Ideas

Before evaluating Sherman’s ideas on command of the air, airpower targeting, and missions, it is necessary to examine the basic structure of his theoretical beliefs about airpower. Unlike Douhet, Sherman did not advocate for an independent air force as the sole viable military element for his country. He acknowledged the need for land and sea forces and, as such, tried to present airpower as a separate, distinct force with unique capabilities and limitations. He intended his theory “to describe in a general way the powers and limitations of aircraft, and to indicate what may reasonably be expected of our airmen, when the nation is again confronted with the necessity of waging war.”⁴³ Unquestionably a visionary, Sherman’s greatest contribution came from his understanding of airpower as a

separate *type* of force and his ability to encapsulate that idea in terms familiar to military men of his time.

Sherman used existing military concepts to describe airpower's unique strengths and limitations—the principles of war. By using terms common to practitioners of the art of war on land, sea, or air, Sherman was able to establish what made airpower a separate, distinct force without resorting to abstract concepts. He warns about drawing analogies between land and air forces too strictly when thinking about airplanes, stressing that while air warfare remains a human endeavor, understanding the intrinsic differences in air warfare is the only way to truly understand airpower.⁴⁴ This laid the foundation for the argument that airpower was most effectively employed by those who understood its strengths and limitations—airmen. He begins, not unlike Clausewitz, by addressing the nature of war itself, then proceeds to describe airpower in terms of what he viewed as airpower's weaknesses—time, or persistence, and mass. He then discusses economy of force, which, when applied incorrectly, became another weakness of airpower. Sherman then stresses what he believes are airpower's strengths—the offensive and simplicity. With this conceptual framework established, he was able to describe how airpower could be best used to exert military influence.

Sherman begins his discussion by identifying war as a “conflict of moral forces. A decision is reached not by the actual physical destruction of an armed force, but by the destruction of its believe (sic) in ultimate victory and its *will to win* (italics added).”⁴⁵ Sherman, like Douhet, was heavily influenced by the carnage of World War I. He witnessed that, although the Germans surrendered and accepted the terms of the armistice, their armed forces remained intact. Four years of attrition had not defeated the German army itself, but the German nation's will to continue using it.⁴⁶ Sherman believed, regardless of the addition of the airplane as an instrument of war, that the enemy's will to fight would remain the crucial element in warfare and that all force available must be focused on breaking that will. This belief shaped his thoughts on targeting.

Sherman realized that the airplane's ability to overfly ground forces gave unique access to the enemy that could change the way that some of the principles of war applied to airpower. Conversely, he knew that operating from the air imposed some limitations on airpower's ability to influence the battle. He used these differences and limitations to lay the groundwork for his discussion of airpower targeting and missions.

The first distinction between land and air warfare that Sherman draws is that, unlike land forces, reaching a military decision in the air does not come about by the direct clash of like forces. Instead, he draws a parallel between air and naval forces. Ramming aircraft together, as with warships, accomplishes little. It is the use (or *threatened* use) of the destructive power of the airplane and its weapons against a target on the ground that can force a decision.⁴⁷ Similarly, he drew another parallel between air and sea forces regarding their effect within the environment in which they operate. Short of blockade operations, naval forces do not generally seize and hold territory (or sea space). The ability of warships to move relatively rapidly across the sea enables them to project power to a point on the globe without actually occupying it. Airpower has this same ability to project power, but has an advantage in that air covers the entire globe.

With regard to land forces, Sherman notes that air forces are employed more by groups of individuals rather than large military formations. This relative solitude greatly reduces the possibility of a disastrous mass panic spreading through the ranks, but equally prevents the camaraderie and mutual support that can exist in ground forces, spurring them to fight beyond their limits.⁴⁸ In itself, this may seem insignificant, but it illuminates the fact that airpower differs from other forms of power on all levels, starting with the human element.

Sherman's discussion of the principles of war begins with what he perceives as airpower's limitations—persistence and mass. In land warfare, battles were generally carried on “until the fortunes of the field had been definitely decided in favor of one or the other opponent.”⁴⁹ In aerial battles, persistent combat was difficult to attain, and frequently indecisive. The opportunity for combat was limited by the fuel capacity of an aircraft, “and the difficulty of securing a decision in so short a time is greatly increased.”⁵⁰ This technological limitation obviously influenced the way airpower could be used and what effects it could have. However, identified as such it provided an opportunity for technological improvement. In January 1929, Air Corps pilots kept the *Question Mark*, a Fokker C-2 transport aircraft, airborne for over 151 hours by refueling it in flight.⁵¹ On the heels of the successful, record-setting flight, aerial refueling was developed as a successful operational concept, enabling aircraft to fly longer missions and maintain greater persistence in the battle.

While limited sortie duration may limit persistence, airpower does, however, project a persistent *threat* of destructive force. As Sherman noted, this threat may be sufficient to force a decision, echoing a thought advanced earlier by Douhet. During Operations Northern and Southern Watch over Iraq, Coalition air forces enforced United Nations sanctioned no-fly zones through a combination of aerial occupation and ground alert missions. Aerial refueling extended the periods of aerial occupation, and when Coalition forces were not physically in Iraqi airspace, the threat of retaliation from air forces on ground alert presented a sufficient threat of destructive reaction that the Iraqis did not commit significant violations of the no-fly zones. Thus, because of airpower's speed and access through the third dimension, the principle of persistence applies differently to air forces than it does to land or sea forces. Airpower can effectively project the threat of the use of force without actually occupying enemy airspace or territory. In a similar fashion, nuclear-armed bomber and intercontinental ballistic missile forces projected the threat of the use of force between the United States and Soviet Union during the Cold War. This mutual *persistent* threat of aerial attack has influenced foreign policy and national objectives for more than five decades.

Sherman regarded the principle of *mass* equally important in aerial as well as land combat.⁵² Sherman took his lead from Napoleon, understanding that an inferior force could defeat a superior one by concentrating superior numbers at a decisive time and place.⁵³ Because it was difficult to coordinate actions in the air without radio communication, the concept of coordinated, mass air attack was not a universally accepted one among the Armed Forces.⁵⁴ Sherman's identification of these technological limitations focused technology development on ways to overcome them. During the Battle of Britain (from July through September of 1940) two technological innovations enabled outnumbered RAF fighters to defeat a numerically

superior German air force. Radar detection provided advance warning of impending Luftwaffe attacks, and radio communications enabled outnumbered British Hurricanes and Spitfires to mass their numbers and conduct coordinated attacks on the German formations, ultimately defeating them.

Having identified some of the weaknesses of the airpower forces of his time, Sherman then addressed the principle of *economy of force*, highlighting that because of limitations in persistence, the skillful leader must concentrate limited strength at the point of *decisive action*, to the exclusion of other, less decisive points.⁵⁵ Herein lies two of the most important ideas regarding airpower. It must be concentrated to be effective, and it takes a *skillful leader* to employ it.

The lack of adherence to the principle of economy of force in North Africa at the Battle of Kasserine Pass (February of 1943) was responsible for one of American airpower's great failures. Allied air forces, already in short supply, were distributed to individual ground commanders to be used as each saw fit for his own needs. During the German offensive, Allied airpower was employed in small *penny packets*. This dilution of capability produced largely uncoordinated air action, focused almost entirely on defending assigned ground units, rather than executing offensive operations against enemy air and ground forces. "American air support was desultory at best, while the Luftwaffe threw itself into the fray with élan and vigor."⁵⁶ This failure spurred a radical change in the Allied air forces command and control structure. Control of Allied air forces in the region was centralized under RAF Air Marshall Sir Arthur Tedder, commander of the new Mediterranean Air Command. Air Vice Marshall Sir Arthur Coningham assumed command of the subordinate Northwest African Tactical Air Force, whose mission was "first and foremost, the neutralization and destruction of enemy air forces; next...the destruction of enemy columns by light bombers and roving fighter-bombers."⁵⁷ This assignment of central responsibility and shift to the offensive enabled the Allied forces to seize the initiative from the Germans.

The principle of *the offensive* holds primacy in Sherman's theory. Sherman, as Douhet, saw little defensive value in airpower, but Sherman's judgment was applied to the defense of land forces from air attack. Strategically placed ground forces could certainly provide a persistent defense against attacking ground forces. However, the ability of air forces to attack from any direction made it impossible to guarantee a defense against them, even with local numerical aircraft superiority.⁵⁸ However, as will be shown by his belief in the utility of the pursuit mission, Sherman understood the value of defending aircraft from attack by other aircraft.⁵⁹ The principle of the offensive was closely linked to another of airpower's strengths—surprise.

Sherman realized that, like land and sea power, it is necessary to concentrate air forces in decisive areas at a time and place which the enemy does not expect, and that airpower's ability to exploit the third dimension is an advantage over land and sea power when seeking surprise.⁶⁰ The Arab-Israeli Six Day War in 1967 illustrates how the Israeli use of airpower's inherently offensive nature and ability to surprise set the stage for victory. As Chaim Herzog highlighted:

The outstanding event of the Six Day War was the initial air strike when the Israeli Air Force...in a carefully-planned attack, took the Egyptian and other Arab air forces by surprise and, after three hours of concentrated activity, had gained complete superiority in the air

on all fronts. This move paved the way to victory for the ground forces.⁶¹

Having framed airpower's strengths and limitations in terms common to all warfare, Sherman then developed a theory that, as we shall see, has proven remarkably resilient over the course of time.

Command of the Air

Sherman recognized the need for aircraft to have freedom of action in order to effectively execute their missions. This freedom of action derived from a situation where friendly forces controlled the air sufficiently enough that they could execute these missions without undue interference from the enemy. However, Sherman's concept of *control* of the air was more limited than Douhet's idea of *command* of the air. He saw control of the air as "not an absolute but a relative condition...generally restricted in scope and fleeting in duration."⁶² For him,

...[control of the air] may be said to exist when friendly aircraft can carry out their assigned missions with only rare interruptions by hostile pursuit aviation, while hostile airplanes...generally have to fight to perform their allotted tasks.⁶³

This meant that control of the air was constantly contested and a temporary phenomenon as long as the enemy still had pursuit aircraft capable of engaging friendly air forces. The challenge, then, was to determine the best way to destroy the enemy air forces. Sherman believed that the first duty of the air arm was to wrest control of the air from the enemy by seeking out enemy air forces and destroying them *wherever they might be found* (emphasis added).⁶⁴ His belief that enemy air forces should be attacked on the air and on the ground stands in contrast to Douhet's strategy of avoiding aerial combat and destroying the enemy air forces on the ground.

The British victory in the Battle of Britain in 1940 provides an example of Sherman's concept of gaining control of the air. The Germans, with the offensive initiative, planned an air campaign originally directed against the RAF, both on the ground and in the air.⁶⁵ The British, on the other hand, did not have bombers with suitable range to attack German air forces on the ground in Europe. Massed, coordinated fighter attacks were the only method available for the defense of the British Isles. The two-month long aerial contest turned into a battle of attrition for both sides, which the British won in September when the German high command decided that it could no longer sustain the losses it was suffering. The RAF did not completely destroy the Luftwaffe, but its fighters did attain control of the air by reducing the German air forces to a level where their ability to influence the war over Great Britain was reduced to conducting only contested bombing raids, mostly at night.⁶⁶

Regardless of their differences in opinion on the best way to get command of the air, Sherman believed, as did Douhet, that attaining it was the primary mission of air forces. Command of the air was necessary to execute their respective targeting strategies.

Airpower Targeting

Sherman's targeting theory was founded on his belief that the object of warfare was to destroy the enemy's will to fight. In his opinion, "aviation forces had a twofold mission: to attack the moral and material resources of the enemy."⁶⁷ He classified targets as either *strategic* or *tactical*, a convention that, as we

will see, has caused a great deal of confusion over the years as airpower thought has developed.

Sherman's strategic aerial attack strategy focused on destroying the enemy's morale. He believed that "one should put enemy population centers, supply systems, and other rearward objectives under pressure in an effort to paralyze an entire society."⁶⁸ Sherman envisioned a Douhetian contest where countries would bomb each other's cities until one side gave up.⁶⁹ Like Douhet, Sherman understood the concept of classifying every civilian as a combatant in a nation during wartime. However, unlike Douhet, he believed in a measure of restraint when it came to directly bombing them.⁷⁰ For Sherman, the decision to bomb enemy cities was a political matter, and the true focus of his bombing strategy was on the enemy supply system.⁷¹ In longer wars, he felt:

Long range of the bomber should be utilized to the full, and every sensitive point and nerve center of the system put under pressure, in an effort to paralyze the whole (supply system).⁷²

This belief that bombardment was best focused on the enemy supply system had the greatest effect on Sherman's peers. It formed the basis of the *Industrial Web Theory* which was developed at the Air Corps Tactical School in the years between World War I and World War II and became the core of Air Corps bombing doctrine. This doctrine constituted the bulk of Air War Plans Division - Plan 1 (AWPD-1), which was the Air Corps' plan for defeating Germany during World War II through strategic bombing.⁷³

Another departure from Douhet's bombing strategy was Sherman's inclusion of a tactical target set. He recognized that a need may arise to directly support army forces on the ground and, as will be discussed, he envisioned a separate mission for that function. Sherman also realized that in a situation in which "the decisive battles were expected to be fought out within a month or two, it would have little or no influence on the campaign to conduct a concentrated air offensive against the industrial centers of the enemy."⁷⁴ In this case, he believed that the pressure had to be put on the enemy in a more immediate fashion by concentrating bombing on "the various depots and places of storage, or at the lines of communication."⁷⁵ This idea of bombing the enemy's logistical support system nearer the actual battlefield developed into the battlefield interdiction mission.

Airpower Missions

In spite of his belief that the aviation service should be an independent arm of the military, Sherman acknowledged the prevalent view within the US Army that "air activity was in support of the ground battle."⁷⁶ To accommodate this ground force support mission within his own theory of strategic airpower, Sherman saw two distinct components of aviation: air service aviation, which served as an auxiliary to ground forces, and air force aviation (bombardment, pursuit, and attack) whose purpose was to gain and exploit control of the air. Air service aviation receives relatively little attention in Sherman's book, limited to a chapter on aerial observation. He concedes that observation aviation's "reason for existence lies in its ability to furnish desired information to the combatant arms for whom it works (the Army)."⁷⁷ Sherman focused his writing primarily on air force aviation and his "emerging strategic conception of airpower."⁷⁸

As a supporter of Billy Mitchell, Sherman firmly believed that airpower's true strength laid in strategic bombing, but he was not singularly focused on that mission. In order for strategic bombing to succeed, the air force first had to establish control of the air. Unlike Douhet, Sherman believed that the instrument for attaining that control was pursuit aviation. Its mission was to:

Seek out and, to the extent possible, destroy the enemy's air force, especially enemy pursuit aviation. After achieving control of the air, the mission of the air force [meaning bombardment and attack at this point] was then to destroy the most important enemy targets on the surface.⁷⁹

Possessing no adequate protection against aerial attack, Sherman believed that airpower's inherent offensive capability made "a vigorous offensive the best defense—it is almost the only form of action which leads to successful issues in air warfare."⁸⁰

Although Sherman proposed pursuit as the primary mission for gaining control of the air, he realized that the *purpose* of gaining control of the air was to enable attack, bombardment, and observation aircraft to perform their missions.⁸¹ While he did not see an inherent defensive capability in airpower, he realized that pursuit aircraft could indirectly provide defensive support for friendly aircraft through the destruction of hostile pursuit forces.⁸² Sherman believed that the best protection for friendly aircraft did not always come through visually attaching pursuit aircraft as a defensive, escort force for observation, attack, or bomber forces. Escorting slower aircraft nullified speed, one of the pursuit aircraft's main strengths, leaving it vulnerable to attack from defensive pursuit forces (a battle that Sherman was sure that the escorts would lose). With the defensive escort eliminated, the observation, attack, and bombardment forces would be easy targets for attacking enemy air forces. Since there was little to be gained and much to be lost by staying with attacking aircraft, Sherman believed that often the pursuit mission was most effectively accomplished by allowing pursuit aircraft to act offensively, hunting down the enemy and forcing the engagement.⁸³

The relative benefit of close escort versus sweep missions has been hotly debated for over 80 years, and both sides of the argument can still be heard during mission planning and debriefs at Red Flag today. However, during World War II, escort pursuit fighters proved invaluable to Allied success in the CBO in both roles. Initially, American and British bomber crews suffered severe punishment from the Luftwaffe on bombing missions against targets that were out of the range of escorting P-47s and Spitfires. The arrival of the P-51, however, meant that bomber formations could be escorted all the way to their targets deep in the heart of Germany. The Mustangs were able to challenge the German defenders and had great success destroying Luftwaffe aircraft. However, upon taking command of Eighth Air Force Bomber Command in 1943, Jimmy Doolittle changed the prevailing pursuit tactic from close escort to sweep missions. Groups of Allied fighters roamed the skies over Europe, taking the offensive and challenging the Luftwaffe everywhere they could find them.⁸⁴ This shift in tactics spawned a battle of attrition that crippled the Luftwaffe, virtually eliminating its ability to challenge the Allies command of the air over Germany.⁸⁵

As it was the centerpiece of his theory, Sherman, like Douhet, spent a great deal of effort defining the bombardment mission. Though an avid supporter of pursuit, he considered the bomber "as the supreme air arm of destruction."⁸⁶

From the very nature of the weapon, bombardment aviation is used for strategic purposes rather than tactical, using these two words in a rather general sense. It is equipped with such powerful means of destruction, that it is obviously uneconomical to employ it when the lighter weapons of attack aviation will suffice.⁸⁷

Here we begin to see Sherman associating a specific mission (bombardment) with a specific target set (strategic). However, it seems that he is somewhat uncomfortable with this convention, as we shall see in his discussion of potential bombardment targets. Sherman divided bombardment targets into four categories, listed in order of importance.

- Large centers of population
- The enemy's system of supply
- Fortifications
- Sea craft of all kinds⁸⁸

The first two categories show an appreciation for strategic effect and fall fully within Sherman's strategic goal of paralyzing the enemy's supply system. The latter two categories, however, do not fit into the strategic bombardment strategy. Sherman classified these target sets as strategic based upon the platform that could both reach and destroy them. Fortifications were included because only large bombers could carry enough bombs to destroy them. Likewise, sea craft could easily obtain safe haven out of range from smaller attack aircraft, which could neither reach the ships nor carry sufficient bombs to destroy them. Technological limitations that originally drove strategic target classification sometimes actually included targets that were not part of the enemy war-making capacity. This convention of classifying targets based upon the type of platform that could destroy them has confused the airpower debate for decades.

Sherman's third primary airpower mission was attack aviation. He found it difficult to draw a sharp distinction between attack and bombardment aviation. The two missions had "so many characteristics in common, that much that is said...in regard to one, is almost equally applicable to the other."⁸⁹ Sherman believed, in general, that attack aviation existed for the destruction of personnel and bombardment aviation existed for the destruction of material.⁹⁰ He willfully acknowledged, though, that it was not a rigid rule. Attack aviation could be used to destroy railroad tracks or strike at small buildings, while bombardment aviation could be used to destroy personnel, although usually only when it was necessary to destroy the vessel or building that they were in as part of the overall strategy.⁹¹

Sherman considered attack aviation as primarily a support element for ground troops. Attack aviation's

Primary objectives are determined by the direct or indirect needs of ground troops. Nevertheless, it is a serious, if not a fatal, error, to ignore the peculiar characteristics of attack aviation, and to employ it in blind conformity with the detailed operations of ground troops. Such a procedure may not result in disaster, but it will certainly fail to utilize the full value of this arm.⁹²

Sherman makes an important distinction regarding troop support. Attack aircraft had the ability to strike targets that could not be struck by artillery, targets behind the fielded forces such as railroads and bridges, which could limit the enemy's ability to continue fighting. Tying airpower directly to land forces for use only as a form of precision artillery was far too restrictive,

not allowing the commander to take advantage of airpower's flexibility to attack targets across the battlefield.

Results

Sherman developed a remarkably comprehensive theory of airpower, making a case for its use and importance by using logic and a framework that could be understood by other men at arms. He believed that airpower's inherently offensive nature meant that it was best used for targeting the enemy's will to fight through strategic bombing. Unlike Douhet, though, he understood that airpower could be usefully applied across the entire battlefield.

Sherman's basic ideas, framed on his selected principles of warfare, have stood the test of time fairly well. He identified two early shortcomings of airpower—lack of persistence and lack of mass. Technology, in the form of aerial refueling has increased aircraft sortie length, and thus improved airpower's level of persistence. The 24-hour defensive combat air patrols that reestablished command of the air over the United States following the terrorist attacks on 11 September, 2001 were possible only because the defensive fighters could refuel from airborne tankers. Technology has also improved airpower's ability to mass. British success in the Battle of Britain showed how radar and radio communication enabled the numerically inferior RAF to concentrate their defensive forces on incoming German raiders, maximizing their offensive effect.

The advent of precision weapons has increased airpower's ability to mass. During World War II it took hundreds of bombers to damage a single factory. With the increased precision of present day weapons, the concept of mass must be reevaluated with regard to airpower. A single B-2 can carry 80, 500-pound bombs, each able to hit a different target. The ability to strike that many targets in one mission constitutes a mass attack from the air.

The principles of offensive and surprise, two of airpower's inherent advantages identified by both Sherman and Douhet, have also held up well. The success of offensive aerial campaigns during Operation Desert Storm proved airpower's destructive potential (when employed correctly). The six-week aerial onslaught suffered by the Iraqi forces set the stage for the lightning-quick ground victory achieved by Coalition forces. Although often "referred to as the 100-hour war, in reality it was the 1,100-hour air war that enabled the Coalition to defeat the world's fourth largest army and sixth largest air force in only six weeks and with the loss of only 240 allied lives."⁹³ Of the numerous examples of successful surprise attack, the Israeli success during the Six Day War showed explicitly how surprise can overcome shortcomings in both persistence and mass.

As with Douhet's theory, the success of Sherman's thoughts on strategic bombing remains a touchstone in the debate about airpower's effectiveness. As the intellectual forefather of the Industrial Web Theory-based strategic bombing campaign against Germany, Sherman's record is unclear. Attempts to measure the effect of the CBO on the overall outcome of the war have been the topic of countless articles and books. As Richard Overy points out:

The impact of bombing was wide-ranging and ultimately devastating for the German war effort...It inflicted terminal decline on German forces by interrupting supplies and destroying German airpower. And bombing hastened the demoralization and social impoverishment of Germany's urban population.⁹⁴

Those convinced of airpower's effectiveness readily point out that the Germans did not surrender until Allied armies had taken Berlin by defeating the Wehrmacht. Attempts to prove assertions on either side of the argument "remain clouded with ambiguity."⁹⁵

The record regarding his ideas on pursuit aviation is less ambiguous. The success of the P-51 during World War II proved the value of pursuit aircraft in both close escort and sweep missions, as well as the concept of destroying an enemy air force in the air. The concept of gaining and maintaining air superiority by engaging the enemy in the air has become embedded in US air doctrine. To this day, we continue to build faster, more maneuverable, more capable fighter aircraft whose purpose it is to eradicate enemy aircraft from the skies over our own as well as enemy territory. However, in every war since World War II, we try, as the Israelis did in 1967, to destroy enemy air forces on the ground first.

Unlike Douhet, Sherman did not live long after his theory was published in 1926, and it was left to others to promote and advance his thought. One of those who did was, arguably, America's most recognizable airman.

William "Billy" Mitchell

Billy Mitchell was America's first widely recognized airpower theorist. As mentioned previously, most of the core ideas he espoused were not his alone. What Mitchell provided was a refinement of the ideas of that brilliant group of airmen surrounding him, including William Sherman. Mitchell's true strength was his ability to capture the public's imagination while eloquently, if forcefully, explaining airpower's capabilities and advantages over naval and land forces while advocating for an independent air force. Proving himself in combat during World War I, Mitchell led nearly 1,500 Allied aircraft in what was then the largest-ever air operation during the September 1918 attack at Saint-Mihiel.⁹⁶

A controversial visionary, Mitchell spent his time trying to advance the cause of a separate air service at the expense of the Army and Navy. Mitchell's contribution to airpower theory was that he was

The first prominent American to espouse publicly a vision of strategic airpower that would dominate future war. He believed that aircraft were inherently offensive, strategic weapons that revolutionized war by allowing a direct attack on an enemy country's 'vital centers'—the mighty industrial areas that produced the vast amount of armaments and equipment so necessary in modern war.⁹⁷

Although we see once again a strategic bombing emphasis, Mitchell's ideas differed in one significant way from those espoused by Douhet. Like Sherman, Mitchell did not advocate the indiscriminate bombing of civilians.⁹⁸ Mitchell's drive and belief in strategic bombing provided the focus for airpower thought and aircraft development in the years leading up to World War II. Lieutenant Colonel Harold George and other members of the *Bomber Mafia* from the Air Corps Tactical School used Sherman's ideas, as voiced by Mitchell, to create AWPD-1 and Air War Plans Division - Plan 42 (AWPD-42), the strategic bombing plans for Europe during World War II.⁹⁹

Mitchell's ideas were driven significantly by his desire for a separate air service. His single-minded pursuit of strategic bombing (to support the formation of an independent air arm)

led him to exclude any real consideration for using airpower in support of land or sea forces. Indeed, he saw airpower supplanting naval forces for coastal defense and long-range strike.¹⁰⁰ For a broader, more inclusive airpower theory, we need to look to the Royal Air Force.

John C. Slessor

John C. "Jack" Slessor served as Commander-in-Chief, Mediterranean Allied Air Forces during World War II and eventually as Chief of Staff of the Royal Air Force. Having worked for Sir Hugh Trenchard, the British strategic bombing advocate, he believed that the primary role of airpower was strategic bombing. However, he recognized that the armed forces' object in war was to defeat the enemy's will to fight by using all forces available; naval, land, and air. While serving as an instructor at the British Army Staff College at Camberley from 1931 to 1934, Slessor developed extensive ideas about how airpower could be used in support of ground forces.¹⁰¹

Main Theoretical Ideas

Slessor believed in many of the popular airpower theories of the day, including the notion that strategic bombardment was the primary role of an air force and that control of the air was a prerequisite for all air operations.¹⁰² However, his time as an instructor at Camberley moderated his views, and he realized that airpower could play a vital role in support of army ground operations. It was on this topic that he focused his writings.

Command of the Air

Slessor adhered to the concept that gaining air superiority was the first job of an air force, but he kept his focus on the overall objective of the war.

The object of the air force in a campaign of the first magnitude in which great armies are engaged is the defeat of the enemy's forces in the field, *and primarily of his army* (italics added).¹⁰³

On the surface, this seems like a statement of the obvious. At the time, however, it was not an idea that was commonly held among airmen. Slessor's concept of command of the air was very similar to Sherman's. He wrote that air superiority "means the capacity to achieve our own object in the air and to stop the enemy [from] achieving his."¹⁰⁴ Gaining air superiority was Slessor's first priority because, "without it, ground operations would be nearly impossible."¹⁰⁵

As a participant in World War I, he had experienced major air combat, but cautioned against drawing dogmatic conclusions from a war that was dictated by "the narrow specialized conditions of trench warfare."¹⁰⁶ He realized that since air operations were focused primarily on supporting the ground armies, the particular nature of that war meant that air superiority, or command of the air, was necessary only within a few miles of the front battlelines.¹⁰⁷ In future wars, he realized that the nature of the three-dimensional space over "the battlefields is so immense that absolute command is hardly ever practicable."¹⁰⁸

A reflective, disciplined, and impressive thinker,¹⁰⁹ Slessor had a very broad view on the best way to achieve air superiority. Simply put, "the ideal method obviously would be to destroy the hostile aircraft either in the air or on the ground."¹¹⁰ As such, it was obvious to him that action against enemy air forces is a joint responsibility of both fighters and bombers.¹¹¹ As with

Douhet and Sherman, Slessor believed in the offensive character of airpower, and shaped his targeting strategy as such.

Airpower Targeting

Slessor envisioned a future war on the continent of Europe in which the RAF and army would have to work together. Success would require close coordination between the ground and air forces. In such a situation, he saw strategic bombing as peripheral to the overall goal of the deployed force. Slessor believed that the true objective of airpower was to isolate the battlefield through disrupting and destroying the enemy's lines of supply.¹¹² Previously addressed by Sherman, Slessor developed this idea of battlefield interdiction in much greater detail.

Slessor created two categories for battlefield interdiction: enemy *fighting troops* and *supply*.¹¹³ The second category included rail lines and roads used for maneuver, command headquarters, and "the whole range of food-supply and munitionment, from the raw material in the mine through all the processes of production and manufacture" as well as the delivery mechanisms.¹¹⁴ Slessor's theory applied the same reasoning as that used for strategic bombardment. The objective of both interdiction and bombardment was to stop critical war-making or war-support processes and materiel from being used by the enemy's armed forces.

As Sherman realized, a strategic bombing campaign, targeted against the enemy's industrial supply system, could take an extended period of time to be effective. By destroying the enemy's logistical support after production, but prior to the delivery of materiel to the field, Slessor realized that attacking air forces could place more pressure on enemy forces. Additionally, in a short war where the effects of a strategic bombing campaign might not be felt, eliminating enemy supplies in this fashion could have a much more immediate effect on the enemy's ability and will to fight. Used in combination with strategic bombing, battlefield interdiction places greater stress on an enemy's capacity to wage war and creates a much more complete bombing strategy.

During March, 1943, Slessor's ideas were tested by Allied air forces in Italy. Operation Strangle was a battlefield interdiction campaign that "sought to disrupt rail transportation by attacking railyards, rolling stock, and railroad bridges throughout an interdiction zone that extended from Rome to Florence and irregularly across the breadth of the peninsula."¹¹⁵ The ultimate goal of Strangle (in which airpower alone was intended to defeat the Germans in Italy) was to starve the German war machine in Italy and thereby force an evacuation of the peninsula.¹¹⁶ Ultimately, Allied airpower did not drive the Germans from Italy. However, the campaign was extremely well executed, and the destruction of the rail system severely limited German tactical mobility, forcing them to move supplies at night by trucks over inadequate roads. The ensuing German ammunition shortage proved critical in the next phase of the Italian campaign, Operation Diadem, reducing the German ability to resist and enabling the Allied ground forces to defeat them at Monte Cassino.¹¹⁷ Operation Strangle was a decisive factor, but showed how difficult it is for airpower alone to defeat fielded ground forces.

Airpower Missions

Slessor believed that battlefield interdiction was the best way to support ground troops, but did not limit his thinking to this issue

alone. He understood that under certain circumstances, direct attack of enemy troops in contact with friendly troops was necessary—known today as close air support (CAS). These three circumstances were

...*in attack*, to assist the army to break the crust of very highly organized defences; *in pursuit*, to turn an enemy's retreat into a rout; and *in defence*, to hold up the advance of a victorious enemy, and enable our own rearguards to get clear and reorganize the defence (italics in original).¹¹⁸

Because flying close to the ground exposed aircraft to much greater danger, certain conditions had to be met before these missions were to be attempted. First, air superiority was required. Second, ample reserves of personnel and aircraft were required to compensate for the inevitably high rate of losses. Clearly, airpower was better suited for interdiction and bombing and these CAS missions were for emergencies only.¹¹⁹

In order to be successful in these missions, Slessor stressed the need for close, continual coordination with the ground forces to ensure that the correct targets were attacked and that friendly troops were not inadvertently attacked.¹²⁰ This recognition of the need for joint coordination in combined air and ground operations was visionary. He was the first major airpower theorist to suggest that success in close air support or interdiction missions was dependent upon this coordination.¹²¹

Results

Jack Slessor's contribution to the field of airpower theory went beyond his recognition that direct support of the army was a legitimate role for airpower. No less a believer in the benefit of strategic bombing, he recognized that the air force could support the army without calling into question its own independence, but that support had to be well coordinated in order to be effective. It is important to remember, however, that Slessor was in the Royal Air Force, which had been independent from the Army for almost two decades by the time he was teaching at the Army Staff College. Slessor's idea of interdicting enemy supplies before they got to the battlefield restored some balance to the theoretical discussion that, by the time his book appeared, was fiercely divided into strategic and tactical camps.

More importantly, Slessor espoused the need for unified action in warfare. Clayton Chun points out that based on Slessor's own experience in Italy in 1944, he did not believe that airpower alone could defeat a disciplined, determined army and that it could not completely stop the movement of strategic reserves from the rear to the front lines.¹²² Slessor's balanced approach seems rare among the theorists of his time. While we do not have an example of airpower alone defeating a disciplined, determined army, recent experience in Operation Desert Storm illustrates the effectiveness of battlefield interdiction. Coalition air forces very effectively targeted Iraqi rail lines, highways, and roads linking the Iraqi army in Kuwait to Baghdad. According to Thomas Keane and Eliot Cohen:

...strikes against key bridges on the main lines of communication between Baghdad and Basra, as well as armed reconnaissance flights along those routes, succeeded in reducing the flow of supplies to the Iraqi army, even if the air attacks did not completely sever those lines and isolate the theater.¹²³

Keane and Cohen further point out that, although enough supplies made their way to the inert army in Kuwait,

...the evidence is not of an army facing starvation, but of an organization in which the distribution system had ceased to function: distributions appeared illogical, and goods were generally absent, hoarded, or lying unused. Airpower had dismembered the Iraqi army's transportation system within the theater, and communication between army units, which might have remedied some of the supply problems, was itself under attack.¹²⁴

The battlefield interdiction campaign severely weakened the Iraqi army, leaving it ill prepared to face the eventual Coalition ground offensive.

Slessor's ideas about the success of well-coordinated air and ground operations have been proven time and again. After improving coordination and procedures following the Battle of Kasserine Pass, combined Allied air and ground operations became increasingly effective. One of the most successful Allied coordinated air and ground operations occurred in Europe in the Falaise-Argentan pocket in August of 1944. German forces were hammered by combined infantry, armor, artillery, and air attacks directed against those units desperately attempting to escape eastward.¹²⁵ These attacks threw the Wehrmacht forces back toward Germany, forcing them to abandon valuable equipment and supplies in their haste. During Operation Desert Storm, the Coalition victory in the Battle of Khafji demonstrated the value of CAS operations through integrating air and land forces—especially at night, in bad weather, and under demanding combat conditions.¹²⁶ Today, in Iraq and Afghanistan, Coalition air and ground forces are working together almost seamlessly as a truly integrated force.

Slessor constructed his theory by integrating the ideas of those who had written before him with his own personal experience and thoughts. The full integration of the radio into aircraft enabled his ideas about close air and ground force coordination to come to fruition in a way that Sherman could only have dreamed about. Both Douhet and Sherman were able to see airpower's potential well beyond the technological limitations of their time. The ability to integrate technological advances into existing theory and adapt those advances into new aerial warfare concepts has been a hallmark of the well known airpower theorists. The works of Douhet, Sherman, Mitchell, and Slessor laid the foundation for the one airpower theorist who was not hamstrung by technological limitations—one who could truly implement what airpower had promised for almost a century.

John Warden

Colonel John Warden is arguably the first person since World War II to offer a comprehensive airpower theory. Credited as the man who devised the central idea for the air campaign for Operation Desert Storm, Warden developed a theory that radically altered contemporary airpower thought. The traditional theory of strategic bombing dominated airpower thought and theory for decades, evolving only to incorporate nuclear weapons. Nuclear weapons brought a new field of theory to the forefront—nuclear deterrence and coercion, but these had more to do with the application of power, regardless of how it was applied. However, the fact that nuclear weapons were (and are) predominantly delivered by airpower (bombers and ballistic missiles) further artificially constrained the relationship between strategic and tactical airpower. Nuclear came to mean *strategic*, and everything else was *tactical*. This influence was so strong that it dictated the organizational structure of the US Air Force.

Strategic Air Command contained long-range nuclear bombers and nuclear intercontinental ballistic missiles and Tactical Air Command contained smaller, conventional aircraft (although many had a tactical nuclear strike role). This simple construct dominated airpower thought until Warden redefined strategic and tactical targets.

Command of the Air

Air superiority was Warden's number one goal. He believed that "its possession is needed before other actions on the ground or in the air can be undertaken."¹²⁷ Warden's thoughts on air superiority were captured in his book *The Air Campaign: Planning for Combat*. In it, Warden establishes that not only is air superiority a necessity, since "1939 no country has won a war in the face of enemy superiority...(and) no state has lost a war while it maintained air superiority."¹²⁸ His concept of command of the air combines those of Douhet and Sherman by establishing two levels of command of the air: air supremacy and air superiority. "*Air supremacy*...means the ability to operate air forces anywhere without opposition. Local *air superiority* gives basic air freedom of movement over a limited area for a finite period of time (emphasis added)."¹²⁹

Warden's method of gaining air superiority is an extension of Slessor's idea that the method should depend on the context of the particular situation of the war. Ultimately, the objective is to keep the enemy from using the air for his benefit, while retaining the benefit of its use for yourself. The level of effort expended on gaining air superiority depended upon two variables. First, whether or not the friendly commander had the opportunity for offensive action, and second, the vulnerabilities of the enemy's forces and their supporting infrastructure. When possible, Warden advocated for offensive action against the key enemy vulnerability that would eliminate the enemy's ability to conduct air operations or block friendly air operations.¹³⁰ It was this idea of a key vulnerability that guided Warden's theory of how to use airpower.

Airpower Targeting

The main idea behind *The Air Campaign* is that airpower has a unique ability to achieve the strategic ends of war with maximum effectiveness and minimum cost.¹³¹ This core idea has inspired every strategic airpower theorist, beginning with Douhet. Warden held that airpower's inherent speed, range, and flexibility allow it to strike the full spectrum of enemy capabilities in a swift and decisive manner.¹³² Warden constructed a new model for analyzing an enemy, identifying critical elements that, if attacked successfully, could lead to strategic success. This Five Ring model formed the basis of his strategic targeting plan.

Warden's model viewed the enemy as a system, with strengths and vulnerabilities that made up *centers of gravity* (COG).¹³³ These COGs were arranged in rings, from the theoretical center of an enemy state or organization, as follows.

- Leadership targets
- Means of production
- Infrastructure
- Population
- Fielded forces

The most important ring was leadership.¹³⁴ Warden realized, just as others before him, that to get an enemy to do your will, it

was necessary to find a way to make him change his mind. While Douhet, Mitchell, and subsequent theorists saw the enemy's economy as the focus of strategic bombing, Warden saw the enemy's leadership as the key strategic target.¹³⁵

Warden's ultimate goal was to force the enemy to comply with friendly objectives.

At the strategic level, we attain our objectives by causing such changes to one or more parts of the enemy's physical system that the enemy decides to adopt our objectives, or we make it physically impossible for him to oppose us. The latter we call *strategic paralysis* (italics in original).¹³⁶

Warden posited that targeting the center leadership ring would have more strategic effect on the enemy, thus making it preferable to attacking the outer rings. The leadership ring, therefore, served as the focus of Warden's concept of attack, and the implicit message is that destruction or neutralization of the leadership COGs produces total *physical* paralysis of the system (italics in original),¹³⁷ thus leading to a victory independent of events on the actual battlefield.

Warden realized that circumstances or objectives might limit the ability to attack the center ring, thus dictating attacks on outer rings.¹³⁸ Attack upon the COGs within these outer rings could be expected to inflict "partial physical paralysis but unbearable *psychological* pressure upon the leadership (italics in original)."¹³⁹

In a perfect execution of Warden's theory, all COGs were to be targeted simultaneously, or in parallel, to produce a more decisive effect.¹⁴⁰ This idea of attacking an enemy in parallel in both time and space was possible only through the use of airpower. This is what made Warden's theory an airpower theory vice a theory of simply where to apply force. In his view, only airpower's speed and reach make it the single force able to attack COGs in parallel across an enemy system. Persistent, massed air attack has been a key pillar of each of the airpower theories examined. Every theorist before Warden struggled with technological limitations that limited airpower's effectiveness. Warden was the first theorist who was almost completely free of technological limitations.

The advent of precision weapons had a revolutionary effect on the concept of mass and airpower. Whereas bombing inaccuracies during World War II required hundreds of bombers dropping thousands of bombs to destroy a target, today a single aircraft with a single laser-guided bomb can achieve the same effect. It is now possible to simultaneously attack more targets within the enemy system, applying pressure to more points at the same time. Additionally, the advent of stealth technology has given aircraft access to targets that were unreachable by legacy aircraft, exposing more of the enemy system to attack. The value of stealthy aircraft carrying precision weapons was proven in Operation Desert Storm. F-117s carrying precision guided bombs flew only 2 percent of the attack sorties, but destroyed nearly 40 percent of the strategic targets.¹⁴¹ The technological shortcomings that had so limited past theorists' actual success had finally, largely, been overcome.

Airpower Missions

Warden realized the need for all of the same airpower missions as his predecessors. His first priority was attaining air superiority through bombing enemy air capability on the ground or engaging their aircraft in the air. Air superiority had to be gained

first, by whatever means necessary. Warden's emphasis, however, was on strategic attack, but not in the same sense that Douhet and Sherman emphasized strategic bombing with large bombers. With Warden's new model, strategic targets were defined as those that, if attacked, would have the greatest effect on the enemy leadership, independent of the type of aircraft carrying out the attack. The importance of the enemy leadership in Warden's system model, however, shaped his attitude toward attack of other, less critical enemy capabilities and the airpower missions that carried them out.

Warden recognized the value of battlefield interdiction, but preferred to execute these missions only after air superiority was established. "Interdiction operations should not be done at the expense of something more important. That something more important almost certainly will be air superiority."¹⁴² When necessary, Warden preferred to attack interdiction targets that benefited both the ground commander and the gaining of air superiority, such as enemy fuel supplies. Since interdiction sorties destroyed enemy equipment at or near their source, Warden viewed them as more efficient, therefore more preferable, than CAS. Warden recognized CAS as a vital air mission, but suggested that this scarce resource be committed where the ground commander would commit his last division or artillery brigade—his operational reserve.¹⁴³ In other words, CAS was the last priority mission for airpower.

Results

While Warden's theory is certainly related in concept to ideas developed earlier in the century, it is more than a gilded Industrial Web Theory. Sherman's theory envisioned an enemy country as an integrated and mutually supporting system but one that, like a house of cards, was susceptible to sudden destruction. If one attacked or neutralized the right bottleneck, the entire industrial edifice could come crashing down.¹⁴⁴ While Sherman did view the enemy as a system, his theory was economically focused. Warden's theory is not so constrained. At its root, Warden's theory, as applied to an overall strategy, is about defining the most critical enemy COGs and attacking them for maximum effect.

As mentioned earlier, Warden was the principal architect of the strategy that became Instant Thunder, the air war plan for Operation Desert Storm. As such, he deserves a great deal of credit for the Coalition success during the Persian Gulf War.¹⁴⁵ The emphasis placed on gaining air superiority enabled the Coalition to rapidly establish air supremacy over the battlefield, which enabled freedom of maneuver for both air and ground forces.¹⁴⁶ The Instant Thunder air campaign established that although airpower cannot hold ground, it can deny it to enemy forces.¹⁴⁷ Also, it showed that with strategic surprise, airpower could threaten any known static political, economic or military target with the maximum precision and the minimum collateral damage and casualties.¹⁴⁸

Warden's Five Ring model has been the subject of much debate and controversy, and he has modified it in the years since it was first conceived. Whether it encompasses the best approach to employing airpower against an enemy is not resolved, but there is no question that Warden's theory is the most comprehensive one on strategic attack produced to date. In it, aerospace technology and airpower thought finally come together at the same point. Warden also changed the discussion of strategic

versus tactical airpower. According to Phillip Meilinger, Warden moved the concept of strategic airpower away from a solely nuclear-based capability, illustrating that conventional forces could have strategic effects.¹⁴⁹ This is, perhaps, Warden's greatest contribution to the field of strategic thought.

Since Douhet, Sherman, and Slessor each wrote on airpower over 70 years ago, little has truly changed in the realm of airpower thought. Even John Warden's theory, at the core, is an application of the same basic concepts that can be traced back to Giulio Douhet. Warden benefited from the fact that technology had largely caught up to the promise of earlier theories, enabling him to see more clearly how airpower could be used to win a war. That is not to say there has been no advance. On the contrary, each theory refined previous thought and added to the overall body of knowledge, making airpower a more useful instrument. What made these three early theorists and their intellectual successor John Warden distinctive was that they recognized airpower's unique speed, reach, and access. They sought the solution as to how best to use that unique capability within the conditions that prevailed during their own time.

Although each theorist was necessarily constrained by the technology available and foreseeable at the time, we can draw upon their writings and our experience with airpower and begin to establish a true picture of the nature of airpower.

The Lessons

The Character of Airpower

Each theorist we examined identified three characteristics of airpower that make it unique from land or sea power: speed, reach, and access. Airpower is the fastest form of military power. Not only are aircraft designed to travel more quickly, the ability to move from launching point to destination over any geographical barrier makes the necessary travel distance shorter. This unique ability to overfly obstacles gives airpower the capability to project power over much greater distances than any other form of military power. Additionally, this increased reach gives airpower access to targets that are unattainable by any other form of power. This presents the opportunity for attack against previously isolated target sets, which makes airpower a uniquely strategic form of power.

Airpower has proven to be most effective when employed offensively. From the first major aerial offensive during World War I at Saint-Mihiel through the Combined Bomber Offensive in World War II, and the Instant Thunder campaign in Operation Desert Storm, airpower created effects through massed offensive action. Even airpower's great defensive victory in the Battle of Britain was attained through offensive action. The Battle of Britain also highlighted the importance of the application of the principle of economy of force and the value of massed application of airpower against a numerically superior enemy. Reinforcing this lesson, the Battle of Kasserine Pass highlighted the importance of employing airpower in a unified manner, under the command of an airman who understands its strengths and limitations.

Command of the Air

Whether called command of the air, control of the air, air superiority, or air supremacy, the freedom to act through the third dimension and prevent the enemy's freedom of action is critical

for success in warfare. Friendly command of the air enables not only friendly air action, but enables ground freedom of maneuver by eliminating a threat that can attack from any axis.

Targeting

Effective targeting is central to success with airpower. Airpower's offensive nature and ability to reach strategic targets give it the ability to most directly influence enemy leadership and their will to fight. The search for the best strategic target set started simply with Giulio Douhet identifying industrial and commercial establishments, transportation, and the civilian population as the most sensitive enemy vulnerabilities. This developed into a more purely economics-focused theory, advanced initially by William Sherman, concentrating on the enemy's industrial war-making capacity. John Warden, with his view of the enemy as a system, widened the scope of what constituted a strategic target, shifting the focus to the enemy leadership itself. In the process, he began to break constrictive (and useless) notions about what constituted strategic and tactical airpower.

Douhet's singular focus on bombing strategic targets was expanded by Sherman to include targeting enemy infrastructure, supply, and communication targets closer to the battlefield as well as direct support for friendly ground troops. Slessor greatly refined both of these interdiction and CAS missions, establishing the need for close coordination between ground and air commanders to ensure success.

Airpower Missions

Giulio Douhet identified three basic airpower missions: bombardment, pursuit, and observation. Sherman added attack, which constituted primarily interdiction and CAS. As airpower matured over the last century, each of these missions has proven its worth as part of an overall air campaign strategy. The context of every conflict has dictated the relative importance of each individual mission.

Based on past theories and experience, airpower's unique characteristics of speed, reach, and access give it the singular ability to simultaneously apply force across the battlespace through the third dimension, from directly attacking strategic targets to directly supporting ground troops engaged with hostile forces. How then, is this capability suited for our current context?

Modern Conflict

Although conflict remains as it has been for centuries—a clash of wills—modern conflict differs from that of a century ago in its rapid pace. To be successful in this modern conflict, it is necessary to be able to rapidly adapt to changing situations, determine the correct type of influence needed to win, and act with the least amount of violence necessary.

Recent advances in communications and information technology have greatly eased transition along the peace-war continuum. Increased volume and breadth of information about an opponent and the speed with which that information is collected and processed can give greater insight into their actions. More can be known about troop movement or exercises, diplomatic initiatives, and others. Whereas we did not know where the Japanese fleet was prior to the attack on Pearl Harbor, now it would be very difficult to mount a surprise naval attack of the same magnitude. Equally, easy access to satellite imagery, for any nation with the means to pay for it, may have eliminated

our ability to execute a large-scale ground surprise maneuver such as the one executed during Operation Desert Storm.

While we may be able to see more, it is still difficult to divine intent. Just as Josef Stalin missed the impending German invasion in 1941, we missed Saddam Hussein's intent to invade Kuwait in 1990. We may have access to more information, but there are still limitations in our ability to process it. However, if the steady advance in computer technology continues, we can anticipate greater ease in processing information. Nevertheless, the Clausewitzian concept of fog remains a factor in warfare. Handling the potential for rapid change and the imprecise knowledge of intent that is inherent in modern conflict requires the ability to rapidly apply influence at the right point at the right time.

Greater knowledge of an opponent also exposes a much wider range of elements that may be vulnerable to influence, whether economic, diplomatic, or military. This in turn provides a wider range of options with which to build an influence strategy and increase the chance of successfully attaining the desired goal. To take advantage of this greater knowledge and wider range of influence options, it is necessary to have the flexibility to change the type and nature of the influence rapidly as conditions change.

Access to greater knowledge, in addition to enabling a more focused influence strategy, means that while applying military force within that strategy there is potential for more accurate targeting. More accurate targeting leads to more discriminate targeting, or the ability to put pressure on the *correct* spot to exert the desired influence.

More accurate targeting, combined with increasingly accurate and precise munitions, also means that less violence may be used in pursuit of an objective. In the past, lack of knowledge led to strategies that were less focused on the points where influence would bring the greatest return. During past wars, many targets or target sets were attacked in an attempt to get the *right* one while accepting that many *wrong* ones would also be destroyed, creating huge levels of destruction. On a strategic scale, the CBO during World War II may be viewed this way. The Allies attacked as much of Germany's war making industry as they could identify and reach. Greater knowledge of the German economy and war machine would have led to an earlier identification of the key resource or industry that, if destroyed or neutralized, could have exerted the greatest influence on Germany's will and ability to resist. Lacking that knowledge, and arguably the technology to take advantage of that knowledge, much blood and treasure was expended in pursuit of crippling the German war machine. Warfare is violence, but the Western way of war no longer allows for the application of indiscriminate violence. The dead may argue the merits of *discriminate* violence, but warfare has become more restrained. With less violence and more accuracy comes the expectation that less damage, especially collateral, will occur.

This resultant ability to inflict less destruction has changed the way we in the West are expected to fight. Western publics are casualty aware (not casualty averse). The carnage wrought by trench-style attrition warfare during World War I almost destroyed a generation of Europeans. With the rapid pace that news and pictures get reported and distributed today, it is difficult to imagine that an event like the Battle of the Somme would be acceptable. There is a rightful expectation that all reasonable efforts will be made to minimize deaths, particularly on the friendly side, but also on the enemy side, especially among

noncombatants. This, it should be noted, is not a universally held principle. Groups, such as Al Qaeda and Hezbollah exist that use the death of noncombatants as a method of influence, sometimes with great effect. It should also be noted that no Western power has faced a total war since World War II. This expectation of minimizing casualties has been built in an era of limited wars, many of which were not considered as being in pursuit of vital national interests.

When events happen that seem outside the realm of the acceptable, they may receive a level of attention greater than is warranted. An example of this is the bombing of the Al Firdos bunker in Baghdad during Operation Desert Storm. A legitimate critical command and control target, Coalition planners did not know that some Iraqi leaders had brought their families there for protection. The resultant uproar over the incident led Coalition leaders to limit attacks on Baghdad.¹⁵⁰ In this case, not knowing that civilians were in the bunker proved more important than knowing that the bunker was a legitimate command and control target. Even with current advances in information gathering, we must acknowledge that we will, in all likelihood, never know everything. But, as our nation's military, we must expect to be called upon to act based upon what we do know and choose the best course of action based upon that knowledge. Results are known more quickly than in the past and adjustments are expected to be made when mistakes are made. Expectations of near perfection have changed the way that we must fight. Now, more than ever, success in warfare demands that we rapidly respond to changing conditions, apply the correct type of influence at the correct point, and do so with the least amount of violence necessary.

Contemporary Airpower

Command of the Air and Airpower

As a primary element of national power, military force must be able to set the conditions for its successful application. For air, land, and sea power that means first establishing command of their respective element. Command of an element is the ability to use power for desired purposes and to prevent an enemy from using that same power within that element.

Because airpower is the only form of military power that operates exclusively above the surface of the planet, its element encompasses a massive cubic area, something noted by Slessor over 70 years ago. Thus, command of the air must be tailored to meet every individual situation, based upon the overall policy guiding the use of military force. Command of the air is best viewed as similar to Julian Corbett's concept of command of the sea.¹⁵¹ Command can be local (limited in area) or general (less limited in area) and either temporary (limited in time) or permanent (less limited in time). An example of general permanent control of the air is the airspace over the continental United States (although local command of the air was lost over New York City and Washington, DC temporarily in September 2001). A local temporary condition could exist in a target area where attacking forces seize the airspace over a target to protect attacking aircraft from being attacked.

Command of the air has two elements: using the air for desired ends and preventing use of the air by adversaries for their desired ends. As such, command of the air need not be contested to be obtained. During Operation Desert Storm, Coalition air forces

seized command of the air from the Iraqis, facilitating the success of both the air and ground offensive campaigns. After the cessation of hostilities, following the imposition of the United Nations-mandated no-fly zones, the Coalition maintained command of the air over Iraq south of the 32^d parallel and north of the 36th parallel for years during Operations Southern Watch, Northern Watch, and Provide Comfort. For the vast majority of those operations, this command of the air was not challenged by the Iraqis, but Coalition forces maintained it nonetheless. Coalition air forces could operate as desired within the no-fly zones, and the Iraqis were prevented from using the same area for their own purposes. During peacetime, when command of the air is not contested, command of the air means using the third dimension as you wish, without interference. Airpower and command of the air are inseparable. Airpower is that which allows you to gain, maintain, and exploit command of the air.

As discussed, Douhet and Sherman held different views about the path to gaining command of the air. Douhet believed in bombing airfields and aircraft on the ground. Sherman (and Mitchell) believed command of the air could also be gained by challenging the enemy air force in the air. Both methods can and should be used as the circumstance dictates. This, however, can begin to cloud the definition of what constitutes airpower. Unquestionably, a B-2 dropping joint direct attack munitions on a runway, preventing enemy air forces from taking off is airpower. A special forces team that accomplishes the same thing from the ground may not be airpower, but that is immaterial. The intent of the mission is to keep the enemy from using the third dimension and to gain command of the air. A similar situation exists with air defense artillery. Ground based missile systems cannot fly or float, so they seem to be land power forces. However, their very reason for existence is to maintain local command of the air. The importance of these distinctions lies in the question of command and control of forces.

Exploiting Command of the Air

Exploiting command of the air is the first and most critical role for airpower. Once gained, airpower can be applied as is required to attain the ultimate goal in the conflict. Airpower's application is defined through *where* it can apply influence (targeting) and *how* it can apply influence (missions).

Targeting

Airpower has certain unique strengths that make it appropriate for use in modern conflict. It provides access and is fast and precise in application.

- **Access.** Since air covers the earth, airpower can reach any target on its surface. No other force has the degree of access to the globe that airpower has. Past limitations in the amount of distance that can be covered due to limited aircraft fuel supply have been mitigated by more efficient engines and aerial refueling. With aerial refueling, aircraft can remain in the air almost indefinitely. With adequate aerial refueling resources, the human flying the aircraft becomes the flight duration limitation. In spite of technological improvements such as aerial refueling, aircraft remain limited by the amount of fuel that they can carry. Airpower still remains the fastest form of military power. However, as Sherman pointed out, airpower is a fundamentally different form of military power. Because

it is unique, the principles of war do not apply in the same way that they do for land power or sea power.¹⁵² When applying them to airpower, we must think of the principles differently. Airpower's speed and reach has created the persistent *threat* of the use of destructive force, enabling it to exert influence over a much wider geographic area, land or sea, in a way that other, slower forms of military cannot.

- **Fast and Precise in Application or Response.** Airpower is a technology-based capability. As time has progressed, that capability has vastly improved. The speed and range of aircraft have both increased dramatically since Douhet, Sherman, and Slessor wrote. Aircraft can travel fast, and with aerial refueling can cover great distances. Aircraft flight paths are not limited by geography. The fact that aircraft can fly a straight line from departure to their destination means that they can take the shortest and fastest route. Aircraft fly faster than any land or sea based force, and air forces can respond more quickly to any point on the globe than any other force, short of one that is already deployed to the point of crisis. Sovereign countries may refuse permission to fly through sovereign airspace, but airpower has the ability to fly around these denied areas. Land and sea power are affected much more negatively by access denial. In the lead up to Operation Iraqi Freedom, the Turkish government denied the Coalition permission to stage the US 4th Infantry Division from Turkey. This eliminated the ability to attack Iraqi forces from the north, a major piece of the Coalition ground strategy.¹⁵ Airpower remains the fastest way for decisionmakers to apply power. Precision is one of airpower's unique strengths. Precision helps mitigate a limited ability to mass, in the conventional sense of the principle of war. John Warden's concept of strategic paralysis by parallel attack illustrates the point. Because weapons can be delivered with precision, fewer are needed to destroy targets. This makes more assets available to attack more targets across the entire spectrum of the enemy's capability and ability to resist. "Parallel attack deprives (the enemy) of the ability to respond effectively and the greater the percentage of targets hit in a single blow, the more nearly impossible his response."¹⁵⁴ This, again according to Warden, comes close to the Clausewitzian concept of ideal war by striking the enemy at numerous points simultaneously.¹⁵⁵

Missions

Airpower is particularly well suited for combat operations and the projection of military power. Every theorist since Douhet has improved the way that airpower is used in combat. This improvement has been possible because of airpower's inherent flexibility. It has the ability to apply different forms of influence with the same platforms, the same people, and the same doctrine and training. From force application, aerial defense, reconnaissance and surveillance, and airlift, airpower can be tailored to serve many objectives. Air forces are designed to be flexible. An F-16 can transition from flying no-fly zone enforcement sorties, enforcing United Nations sanctions, to dropping bombs on terrorist training camps on the next mission. This transition can occur within the same day, with the same aircrew flying the same aircraft. That kind of capability defines flexibility. No other force exhibits the same inherent flexibility as airpower.

The US Army is, by necessity, becoming very accomplished at counterinsurgency operations. This new capability has come, however, at the expense of conventional combat capability.

Discussions of whether we need, now or in the future, a strong conventional ground force are immaterial. Proficiency at one mission has come at the expense of another capability. Air forces are not subject to the same limitation. The same ability to drop precision weapons in major combat operations can be used in counterinsurgency operations. Working in close coordination with ground troops, as Jack Slessor envisioned, aircraft can strike singular, high value targets, even in an urban environment. This level of integrated capability was impossible 25 years ago. The same aircraft, weapons, personnel, and skill set can be used for operations ranging from low-intensity to high-intensity conflict without any loss of operational capability.

Airlift is the one unique mission that was ignored by all of the airpower theorists examined in this article. Airlift, along with aerial refueling, is among the most critical capabilities that airpower provides. It gives decisionmakers many options with regard to the type of influence that can be exerted on a given situation. In February 2008, the US Air Force delivered more than 225,000 pounds of food, medicine, and cold weather supplies¹⁵⁶ to the People's Liberation Army in China to help relieve suffering caused by severe cold weather. In 2005, the US Air Force conducted "the largest humanitarian relief effort since the Berlin Airlift in 1947"¹⁵⁷ to help the victims of a tsunami in Southeast Asia. Airpower was not the only instrument used in the tsunami relief operation, but as with the China relief mission, airpower was able to get the relief to the point of need the fastest. The ability to provide this type of assistance is a form of influence in itself, one that is not available with other forms of power.

Airpower has another key attribute that makes it far more flexible than ground or sea power. Because of its temporary nature, air forces are not generally viewed as occupation forces. The Coalition air forces enforcing the United Nations sanctions enjoyed a level of international tolerance that would not have existed if they had been forces on the ground in Iraq. This *aerial occupation* was not seen in nearly the same negative light in which United States' ground occupation forces are currently viewed. *Boots on the ground*, while possibly desirable for the type of operation now underway in Iraq and Afghanistan, seems to represent a more committed action on the part of the United States. Occupation of sovereign territory is a more significant action than penetration of sovereign airspace. Similarly, penetration of sovereign waters by naval forces carries much of the same negative connotation. Airpower gives decisionmakers more flexible options if they desire to deliver force.

The Use of Airpower

As a form of power, airpower provides access, speed, precision, and flexibility available from no other form of power. Power, however, is only as useful as the policy that guides its use. It is incumbent upon airmen, as the ones who understand the nature of conflict and the strengths and limitations of airpower, to advise policymakers on its use. Once the decision is made to use airpower, it is up to the airman to develop a strategy with the available capabilities and resources that best supports that policy. Airpower can be applied across the spectrum, from peace to conflict, and as a tool of all three instruments of statecraft: economic, diplomatic, and military. Airpower can enforce aerial blockades, such as no-fly zones. Its inherent speed can aid the diplomatic process by moving people and intelligence rapidly to points of crisis. It can provide great diplomatic and

humanitarian assistance by delivering critical relief supplies to a disaster-ravaged area. It can strike nearly any target located on the face of the earth with relative speed. As capable as airpower is, though, it is most effective when used in concert with other elements of power.

Airpower, as with each other element of power, has strengths and weaknesses, but it alone is uniquely suited to apply influence across all levels of warfare: strategic, operational, and tactical. At which level airpower is used is not defined by the type of platform that exerts the influence. To understand this, we need to break the convention started by Douhet that strategic airpower equals big bombers, attacking the enemy's war making capacity far behind the battle front. Strategic targets are ones that, if attacked, have the most direct effect on the enemy's decision whether to continue fighting. They may be located within range of and vulnerable to attack from smaller aircraft or systems. John Warden understood this as he constructed his model of the enemy as a system. It is the enemy itself, and its inherent weaknesses, that defines which targets are strategic, not the type of aircraft that can reach or destroy them.

The ability to rapidly reach out to almost any point on the earth and influence a target is a tremendous capability. As our ability to gather knowledge about a particular situation continues to increase, airpower's strengths will make it a force of choice, but we must make sure that force is appropriate. The relative ease with which we can apply influence through the air with little perceived risk may incline some to advocate the use of airpower when it is not the appropriate force or force is inappropriate. In the vast majority of cases, airpower must be employed in conjunction with other elements of power. While the application of airpower may be an excellent strategic tool, there are situations where the ability to strike a target rapidly may be needed in support of another form of power. Jack Slessor was absolutely correct when he advocated the strategic application of airpower while acknowledging the possibility of operating in support of ground forces. That operation, though, must remain in the hands of airmen so that airpower is applied in accordance with its strengths and not compromised by its weaknesses. It is critical that we continue to work together with land and sea forces, improving our ability to work together to maximize our capability.

Conclusion

Airpower and the Future

In just one century, airpower has proven a tremendously valuable tool for decisionmakers. Early airpower theorists recognized that airpower was different than other forms of power and that, if used correctly, could decisively affect a conflict. The access it provides to the third dimension makes it a faster, more flexible, and more precise than any other form of military power. Airpower has redefined persistence and ability to mass through technological advances, further increasing airpower's strengths.

What, then, is unique about airpower relative to other forms of military power? Land forces have great influence in a small area, one that is restricted to land. As seen in the case of an occupation force, perhaps too much at times. Land forces, while extremely strong, are by comparison to other forces, rather immobile. Sea forces also exert great influence over a relatively small area, but, by nature of their mobility, can exert influence

farther than land forces. Sea forces, though, are limited by their need for water to operate. The reach and power provided by aircraft carriers is due almost solely to the fact that they employ influence through airpower. Air forces exert influence over a large area, but that influence may be lesser in scope than either land or sea forces in their respective elements. Airpower does not suffer the stigma of an occupation force, so it is more easily used in a crisis. Air forces are the most mobile and have the most reach.

Airpower's greatest strength is its flexibility in application. Air forces can perform missions from strike to humanitarian relief, rapidly and precisely. The forces themselves are flexible across the spectrum, able to shift from sanction enforcement to strike and back, using the same aircraft and aircrew. Airpower makes the best use of the human ability to adapt to a situation. Economically, these facts make air forces a tremendous value. Airpower provides the best return for every dollar spent across the defense spectrum. However, airpower is not a substitute for all other forms of power. It is best used in combination with the other tools available to our decisionmakers to best fulfill our policy objectives. Each form of military power has strengths based upon its command of its physical medium. We are most effective when we employ each branch of our force to its strengths, with each supporting as necessary.

Finally, airmen need to control airpower. Only airmen can truly understand the strengths and, equally important, the limitations of airpower. The danger of the limitations is that, if not minimized, they can severely reduce the advantages of airpower's strengths. Airmen must be able to understand this, and express it to our decisionmakers.

Notes

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