

**The Origins of American Strategic Bombing Theory:
Transforming Technology into Military Doctrine**

by

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Abstract

Perhaps no other technology changed how Americans viewed warfare in the twentieth century more than the airplane. In the minds of forward thinking aerial theorists this new technology removed the limitations of geography, defenses, and operational reach that had restricted ground and naval forces since the dawn of human conflict. With aviation, a nation could avoid costly traditional military campaigns and attack the industrial heart of an enemy using long-range bombers. Yet, the acceptance of strategic bombing doctrine proved a long and hard-fought process that required the combination of individual efforts, technological developments, organizational factors, and political and economic context to transform the technology of flying into an accepted military strategy. In this way, the story of strategic bombing is not that of any one person or any one causal factor. Instead, it is a twisting tale of individual efforts, competing priorities, organizational infighting, budget limitations and most important technological integration. At no point was strategic bombing preordained or destined to succeed. In every era, the theory had to survive critical challenges. By tracing the complex interrelationships of these four causal factors, this study provides a greater understanding of the origins and rise to dominance of American strategic bombing theory. Thus, it aids in understanding the process of how new technologies spur fresh thinking that offer potentially revolutionary new strategies.

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reminding me to look beyond the accepted storyline and seek a deeper understanding of what was going on inside the minds of the key theorists through their writings.

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The views expressed in this dissertation are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government.

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Chapter 1

Introduction

It was a blustery British day, 12 May 1942, when the first B-17s of the 97th Bomb Group arrived in High Wycombe airfield northwest of London. These initial aircraft represented the beginning of a massive buildup of American combat air power in Europe. Less than a month earlier, on 24 April 1942, Maj. Gen. Carl Spaatz had provided the strategic direction for these bombers when he established the headquarters 8th Air Force just thirty miles away at Bushy Park.¹ At the time, the 8th commanded only a bomber group, a fighter group, and a transportation group, but these initial forces foreshadowed the rise of the “Mighty Eighth” into the formidable air fleets that attacked the Nazi war machine.

While the deployment of the first bomber group to England may seem like the beginning of an epic history, in one way it was the end of another narrative. The establishment of the 8th Air Force represented the fruition of a generation of air power dreamers stretching back to World War I. This vision centered on one idea: aircraft could forever change the nature of warfare. In the minds of forward thinking aerial theorists this new technology removed the limitations of geography, defenses, and operational reach that had restricted ground and naval forces since the dawn of human conflict.

¹ Geoffrey Perret, *Winged Victory: The Army Air Forces in World War II* (New York: Random House, 1993), 240.

When married to the concept of the industrialized nation, airplanes offered the ability to strike strategically. No longer did nations have to grapple with an enemy's army or navy to win a war. With aviation, they could avoid those costly endeavors and attack directly at their industrial heart using long-range bombers. Thus, a new technology spurred fresh thinking that offered a revolutionary vision of warfare.

There were practical problems with converting a technological innovation into a new form of warfare, though. First, not everyone agreed that air power was transformational. Many military and political leaders saw aircraft as only one more component of their traditional naval and ground schemes. In their minds, airplanes did not change warfare; they merely provided new capabilities to support tried and true strategies. Next, as with any new technology, the first design evolutions often failed to match expectations. For aviation to transform warfare, technology had to advance to meet the speculative visions. Finally, the theorists' conceptions had to be turned into a workable doctrine. While H. G. Wells could depict large aerial fleets laying waste to enemy cities, military professionals knew that for air power to be transformational it required organization, training, funding, and logistics planned out in an accepted strategic doctrine.

In this way, a long-lasting argument over the proper role of air power in national security started in the early American Air Service. The debate contained two equally important questions: should air power be independent, and what was the best way to employ it? This dilemma was evident in the first Air Service doctrinal manual written by Maj. William C. Sherman in 1921. He wrote, "In deriving the doctrine that must underlie all principles of employment of the air force, we must not be guided by conditions

surrounding the use of ground troops, but must seek out our doctrine...in the element in which the air force operates.”²

Perhaps this viewpoint helps explain some of the confusion in the study of early American air power. For decades, historical accounts sought to explain how the two elements of Air Service doctrine interrelated to form the Army Air Corps and then after World War II the independent Air Force. In this light, historians sought individuals who advocated both an independent air force and strategic bombing as the *raison d'être* for that service's existence. Hence, William “Billy” Mitchell and Benjamin Foulois appear as the most important actors in early Air Service history, as they both shaped and combined independence and strategic bombing.

There are three major problems with this approach. First, it falls victim to what David Hackett Fischer called the historian's fallacy, where authors assume future leaders fully understood and worked towards historical outcomes.³ For instance, because World War II saw a mostly independent Army Air Forces committed to strategic bombing, then its founders must have been early advocates of both. Next, the traditional approach often obscures other truly important figures who do not quite fit the stereotypical mold. The attention given to Mitchell and Foulois hides the work of quieter, less well known, but truly innovative thinkers. Finally, the approach misses the importance of social factors in shaping the thinking of the men who created strategic bombing and the organizations that implemented the concept.

² Robert F. Futrell, *Ideas, Concepts, and Doctrine: A History of Basic Thinking in the United States Air Force, 1907-1964* (Maxwell AFB: Air University Press, 1989), 4.

³ David Hackett Fischer, *Historians' Fallacies: Toward a Logic of Historical Thought* (New York: Harper Torchbooks, 1970), 210-13.

In this way, strategic bombing was not the work of one man or the result of a natural progression. Instead, the complex interaction among air power theorists, technological changes, organizational dynamics, and political realities shaped the evolution and eventual ascension of strategic bombing as the air power doctrine of the United States. This was not a linear progression and was in no way preordained. As late as 1938, the status of strategic bombing was highly in doubt with the purchase of heavy bombers all but stopped and strategic bombing theory largely limited to the backwaters of the Air Corps Tactical School (ACTS) in Montgomery, Alabama.

Unfortunately, this muddier storyline often conflicts with the Air Force's own vision of its past and the historian's search for primary causal factors. This divergence can be seen in both the original explanations for the success of strategic bombing and the recent revisions of those assessments. While each approach has value, they all tend to downplay varied aspects of bombing's evolution in favor of a preferred causal factor. By doing so, however, these academic studies miss the larger interplay among men, technology, organizations, money, and politics. They rob the reader of both the true story of strategic bombing and the greater understanding of how different elements mesh to transform technologies into military strategies.

Mostly written from the 1950s to the 1980s, the early strategic bombing analyses largely follow the then widely accepted linear progression storyline. By doing so, they depict bombing's rise as an unstoppable force that was at least partially choreographed by the central players. This is clearly observable in the early histories of American aviation in World War I and the interwar years.

Four foundational books combine to depict this linear evolution. First, Air Force historian Maurer Maurer's *U.S. Air Service in World War I* sets the stage by depicting the British influence over key aviation figures as the catalysts for using aircraft to attack an enemy's industrial system. Retired general and military historian I. B. Holley's *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States during World War I: A Study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons* supports the linear history with his argument that aviation's unfulfilled promise during World War I guided American aviation thought in the interwar years, as Mitchell pushed for increases in bomber production, the strategic use of air power, and Air Service independence. Robert Futrell's *Ideas, Concepts, and Doctrines: Basic Thinking in the United States Air Force, 1907-1964* takes up where Holley leaves off. Futrell portrays the interwar years as a competition for dominance between the Army and its Air Corps where the lessons of World War I merged with the technological advances of the interwar years to push air power towards a doctrine based on strategic attack. Finally, Robert Finney's *History of the Air Corps Tactical School, 1920-1940* describes the mechanism for the ascension of strategic bombing through the lectures, theoretical debates, and officer interactions at the Air Corps' doctrinal training ground.

In this way, the authors present a complex and at times contradictory narrative of air power doctrine development. American airmen, fascinated by strategic bombardment, brought the idea back from Europe after World War I. The new concept grew inside the nurturing environment of the Air Corps Tactical School where aviators married strategic bombing theory with the new capabilities of modern aircraft. In the lead-up to World

War II, political support and military necessity ensured strategic bombing became the grand aerial strategy used to degrade German war industries.

As might be expected, this officially accepted narrative has flaws. A new group of military aviation historians delved into these problem areas in a series of books during the 1990s and 2000s. This reawakening of strategic bombing historiography looks past the traditional explanations and seeks new causations to explain how an unproven aerial theory weathered a myriad of challenges in the interwar years to become the strategy and planning behind the massive American bomber fleets in World War II.

The most important of the new books was Tami Davis-Biddle's *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914-1945*. Biddle pursues a more nuanced understanding of bombing by exploring the wildly inaccurate predictions concerning the effectiveness of air power in the interwar period. She compares the theoretical progressions in Britain and America as a means of understanding how military institutions create and implement new ideas. In doing so, she sheds light on the role of organizations in the development of strategic bombing theory.

Similarly, Mark Clodfelter's *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917-1945* also searches for new causal factors to explain the rise of strategic bombing. Instead of a linear history or the work of great aerial leaders, Clodfelter explores how the social and economic context of progressivism directed the way strategic bombing advocates and political leaders thought and thus also how they shaped their theories. While Clodfelter's work may leave room for argument, his

introduction of social context as a causal factor is an important step in understanding strategic bombing's history.

Stephen McFarland's *America's Pursuit of Precision Bombing 1904-1945* adds to this trend by exploring the technological basis. He contends that far from being the result of a linear process, interwar doctrine was a back-and-forth effort to find an acceptable air power doctrine based on the ideal of precision. While this was most often associated with strategic bombing, McFarland argues that it just as easily could have been precise operational air power as the primary tool. In doing so, he suggests that doctrine development took a back seat to technological change with military engineers working feverishly to develop a bombsight that could account for speed, altitude, wind, and bomb aerodynamics as the real story behind the success of strategic bombing theory. Consequently, McFarland brings in technology as a causal factor in the maturation of strategic bombing theory.

Finally, John Buckley's *Air Power in the Age of Total War* introduces the role of politics. He argues that geography and political policies in large part determined aerial strategy in the interwar years. In the United States and Britain a desire to bring the fight directly to the enemy without the need for ground invasions led to a focus on strategic bombing. Meanwhile, Germany and France accepted the need for a ground war and directed aviation towards operational support. Finally, the Japanese and U.S. Navies preferred a more tactical dive and torpedo-bomber maritime aviation doctrine to help fight their expected great naval battles in the Pacific.

While these books greatly contribute to a better understanding of strategic bombing's evolution, there was still something missing in the historiography. No

detailed and comprehensive analysis integrating the efforts of individuals, technology, organizational influences, and social context exists. Therefore, this dissertation will reassess the origins of strategic bombing and provide a comprehensive analysis explaining the interplay of the different causal forces. Using the British aviation historian Neville Jones's masterpiece *The Origins of Strategic Bombing: A Study of the Development of British Air Strategic Thought and Practice up to 1918* as a model, the dissertation uses a chronological approach, interspersing the actions of critical individuals against the backdrop of larger contextual factors and world events. In this way, it seeks a new understanding of the origins of American strategic bombing by exploring how outside factors such as political pressures, economic stresses, and organizational conflicts intertwined to shape strategic bombing during its evolution in World War I and the interwar years.

Chapter two explores how the Mexican Expedition of 1916 prepared the United States Army and its Air Service for the trials of World War I. The deployment of the 1st Aero Squadron to Mexico was a wake-up call to the poor state of military aviation. The chapter explores how this alarm bell led not only to increased spending, but also to a theoretical awakening in the minds of future strategic bombing advocates.

The next chapter broadens the scope to explore how the nature of World War I influenced the development of strategic bombing theory in Europe. It investigates the theoretical foundations established through air combat from 1914 to 1917, which the United States inherited when it entered the war. Chapter four builds on this work by exploring how the Americans created their own version of strategic bombing theory in the summer and fall of 1917. By tracing the linkages between the early American

aviation leaders and their British, Italian, and French confidants, the chapter demonstrates how the Air Service aviators internalized external European lessons.

After building the theoretical foundations for American strategic bombing, chapter five analyzes how such men as Mitchell and Edgar Gorrell attempted to turn theory into workable plans for air campaigns. It delves into Mitchell's vision for American air power and Gorrell's bombing plan of November 1917 as the foundational efforts to establish a strategic bombing campaign. Despite this planning, technological shortcomings in aircraft design and production and conflicting leadership visions forced America's military leaders to shelve strategic bombing until 1919. Hence, the war ended before the bombing advocates could test their plans in combat.

With strategic bombing as an untested theory at the end of the war, chapter six analyzes how these advocates kept the concepts alive in the war's immediate aftermath by incorporating bombing theory into a series of operational manuals and the Air Service's official history. Having transitioned to the position of AEF Air Service Chief of Staff, Gorrell now took on the responsibility of completing the official history. In this role, he ensured the core elements of strategic bombing survived by writing a chapter describing his bombing plan and including a survey of Allied bombing efforts against German industry. When combined, these two sections provided future theorists with background information and statistical data to support their own concepts.

Gorrell's efforts appear well founded, as strategic bombing was largely lost in the military drawdowns and tight budgets of the 1920s. Chapter seven traces the political, economic, and service rivalries that modified American aerial thought and pushed strategic bombing out of the military's lexicon. Instead, Mitchell's fight for Air Service

independence occupied center stage. Bombing was still part of this design, but with no peer competitor nation threatening American security, strategic bombing fell out of favor as coast defense took the prominent role for America's remaining bombers.

Many historians see the Air Corps Act of 1926 as the turning point for strategic bombing, contending that the autonomy it granted allowed a revival of strategic bombing theory. Chapter eight argues this is a misguided interpretation. The concept of strategic bombing was almost completely absent from Army policy during the Air Corps era. The lack of adequate budgets, a defensive national security policy, and rapid technological change all coalesced to stymie strategic bombing advocates. Instead, the Air Corps Act created small independent pockets of theoretical development. While these mainly focused on using bombers in coast defense, in the quiet backwaters of ACTS and the Air Corps Material Division the newfound freedom allowed individual theorists and engineers to explore how air power might be used in the future without the constraints of budgets, political support, or technological limitations. Outside the political glare of Washington, this allowed the Air Corps vision of long-range bombing once again to drift towards strategic ends.

Chapter nine concludes the dissertation by turning the traditional strategic bombing storyline on its head. Whereas, the conventional version of events describes the late 1930s as a period of triumph, it was actually the greatest trial faced by the strategic bombing. A resurgent Army General Staff supported by a new Chief of Staff dedicated to rebuilding the conventional combat branches nearly eliminated the primary technology required for strategic bombing: the heavy bomber. It was only the advent of World War II and the political support of President Franklin Roosevelt that saved the day. Luckily

for the Air Corps, the men who had developed the concepts behind strategic bombing while assigned to ACTS in the early 1930s now stood ready to realize their ideas in this new political environment. This combination of world events, new technology, political support, and a well prepared staff of experts helped turn strategic bombing theory into a strategic bombing plan in just nine short days in July 1941.

Thus, the dissertation traces the history of a technology and an idea. When the United States Army bought its first airplane it had little inkling of how this new technology would one day challenge the traditional understanding of warfare. As the machinery evolved in both America and across the Atlantic, airplanes spurred the imagination of military thinkers and civilian dreamers alike. During the horror of World War I, air power promised to break the deadly trench stalemate through a combination of industrial infrastructure and terror bombing. While the war ended before the technology was capable of matching theory, the concept survived to influence a future generation of aviation leaders. The process was slow, as economic problems, political support, and organizational rivalries combined to shunt long-range bombing to the periphery of military thought. Fortuitously, bombers proved elastic enough to morph into more acceptable missions like coast defense and later hemisphere security. This enabled the technology to survive until the world situation once again changed and America needed a strategic theory to counter a major peer competitor.

While many histories search for simplicity or primary causal factors, this dissertation embraces the complexity of reality. Strategic bombing was not the work of one person or the result of a linear progression. Instead, the complex interaction among theorists, technology, organizations, and politics explains the true story of strategic

bombing. Within the twists and turns of those conflicting priorities and evolutions is a story of technological transformation that turned a new invention into a tool for warfare and later a strategy that forever changed how America viewed and exercised its military might.

Chapter 2:

A Late Night Wake Up Call in Mexico

It was a cold brisk spring evening when Lt. Edgar Gorrell found himself hopelessly lost in the ever-darkening skies of northern Mexico on March 19, 1916. It had only been a few short hours since his unit, the 1st Aero Squadron, had received orders to deploy to Nueva Casas Grandes. When the orders arrived, it seemed like a simple task to prepare and fly eight Curtiss JN-3 aircraft the relatively short distance from Columbus, New Mexico; however, things started to go awry almost immediately. By the time the pilots took off, the evening sun was already low on the horizon. With only one pilot having experience flying at night, the stage was set for a calamity.

Fortunately, skills merged with a considerable amount of luck to avoid any fatalities that night. Still, four of eight aircraft lost sight of the formation and landed on their own in the opaque Mexican desert with one damaged beyond repair.⁴ Gorrell had perhaps the worst experience that night. After attempting to turn back to Columbus, his JN-3 had engine problems and settled down deep within enemy territory. He spent the rest of that night wandering around until the combination of money and the threat of his service revolver convinced a local farmer to help him link up with the nearest American soldiers.

This event forever changed the young Gorrell's mindset. He realized that he had been purely focused on gaining access to the Air Service and then learning to fly and had

⁴ Roger G. Miller, *A Preliminary to War: The 1st Aero Squadron and the Mexican Punitive Expedition of 1916* (Washington, DC: Air Force History and Museum Program, 2003), 29.

spent little time contemplating about the larger state of aviation. What exactly were the roles and missions for aircraft in the Army? How should the aviation section organize itself to conduct those missions? Was the technology on hand sufficient? These were all questions that had largely been ignored in his zeal to get into the air. As the events of March 19 combined with Gorrell's other experiences in Mexico, he began to question the preparedness of both himself and his squadron for military operations.

Gorrell was not alone in this self-reflection. Newspaper reporting from Mexico indicated that most pilots had similar concerns. Even the 1st Aero Squadron commander, Capt. Benjamin Foulois, submitted multiple critiques of the equipment, organization, and usage of the squadron during the campaign.⁵ Thus, the unit's experience in the Mexican Punitive Expedition was an alarm clock waking up not only the Air Service, but also the Signal Corps, Army leadership, and eventually Congress to the problems facing America's flying forces on the eve of their entry into World War I.

In this way, Gorrell's own experience before, during, and immediately following Mexico represents a metaphor for larger trends in the fledgling Air Service. His personnel reflections provide insights into the thinking, organizational difficulties, and technology concerns facing the young aviators. The solutions developed by these pioneers laid the technological, organizational, and doctrinal foundations that future strategic bombing advocates built upon when the United States entered World War I in April 1917.

⁵ Capt. Benjamin D. Foulois, "Report of the Operations of the First Aero Squadron, Signal Corps, with the Mexican Punitive Expedition, for Period March 15 to August 15, 1916" Call# 168.68 IRIS# 125302, Air Force Historical Research Agency, Maxwell AFB, AL, 1-2.

Shaping the Man: West Point to Mexico (1912-1916)

Edgar Staley Gorrell was born in Baltimore on 3 February 1891. By all accounts, he was a smart, quiet lad with a knack for numbers and a keen sense of exploration. This combination of intelligence and adventurism served him well when he entered Baltimore City College at the tender age of thirteen. Yet, young Gorrell's sense of adventure pushed him towards a military career. In February 1908, he joined the freshman class at the United States Military Academy. Classmates remember him as slender and a bit shy, but they also noted he was an avid sportsman and a surprisingly good athlete. They affectionately called him "Nap" based on his diminutive stature and shy nature. Overall, Gorrell fit nicely into the structured academic and military lifestyle of the academy. He ended his time at West Point as the captain of a cadet company and graduated in the top third of his class in June 1912.

Perhaps the defining moment of Gorrell's life occurred on 29 May 1910. On that morning, he joined his classmates on a hill overlooking the Hudson River as they waited for Glenn Curtiss to pilot his airplane from Albany to New York. As the group cheered, Curtiss struggled to keep his aircraft aloft in the turbulent air over the river valley.⁶ Gorrell stood mesmerized by the spectacle of Curtiss's flight, the longest city-to-city flight so far. Captured in this moment was everything Gorrell hoped for, the thrill of flying, the adventure of a new frontier, and the technical challenge of aeronautics. From that point on, Gorrell determined to seek a career in aviation.

Army rules at the time required West Point graduates to serve two years in combat arms before they could transfer to support assignments. Hence, Gorrell's dreams

⁶ Mark Clodfelter, *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917-1945* (Lincoln: University of Nebraska Press, 2010), 8.

of flight were delayed. Instead, he served his first tour of duty with the infantry at Fort Seward, Alaska. There he spent an undistinguished couple of years as a junior officer in Company L of the 30th Infantry before seeking reassignment to the Signal Corps.⁷

His dreams of flight finally came true with his transfer to the Aviation Section in December 1914. The eager lieutenant arrived at Coronado, California, later that month itching to learn how to fly. Gorrell joined a growing list of Air Service pioneers trained at the military's west coast center for aviation on North Island, next to Coronado and across the bay from San Diego. Gorrell proved to be an avid student and a steady pilot, receiving Expert Pilot License No. 39 in 1915. At the same time, he joined another small, but growing group of international aviators, when he received Pilot's License No. 324 from the Federation Aeronautique Internationale (FAI) later that year.⁸

Upon completion of his training, the Army assigned Gorrell, now a first lieutenant, to the 1st Aero Squadron. The 1st started its life in September 1914 at North Island, but quickly deployed to Galveston, Texas, as part of the Army's response to strained relations with Mexico. When tensions on the border did not explode into fighting in 1915, the 1st Aero Squadron moved to Fort Sill, Oklahoma, for better flying and weather conditions. While at Fort Sill, the squadron received their new Curtiss JN-3 aircraft. The JN-3 proved underpowered and difficult to fly. After several accidents with injuries, many of the artillery officers designated as spotters refused to fly unless "during war and in the case of absolute necessity."⁹

Gorrell entered this atmosphere of increased tensions with Mexico and disappointment with aircraft performance when he joined the 1st Aero Squadron shortly

⁷ Edgar S. Gorrell Obituary, United States Military Academy, Cullum No. 5049, 5 March 1945.

⁸ Ibid.

⁹ Miller, *Preliminary to War*, 8.

after it moved from Fort Sill to Fort Sam Houston near San Antonio, Texas, in November 1915. By the time Gorrell arrived, the squadron was hard at work building an airfield and training.¹⁰ Unfortunately, the manual labor disrupted the pilots' training schedules, leaving Gorrell and his compatriots less than fully prepared when instability along the Mexican border once again flared up.

On 9 March 1916, men under the command of Francisco "Pancho" Villa raided the town of Columbus, New Mexico, killing seventeen Americans. The United States government responded swiftly by ordering Brig. Gen. John J. Pershing to lead a force of 15,000 troops into Mexico to capture or kill Villa.¹¹ Pershing took what was then a radical position in his plan for the expedition. He decided to use mechanization to make up for the lack of railroad support along the border and in northern Mexico. Pershing planned to rely on trucks for transportation and resupply of his combined cavalry and infantry forces.

Meanwhile, he looked to the new mechanical marvels of aircraft for a two-fold mission. First, Pershing understood that the 1st Aero Squadron could aid his units in searching for Villa's troops in the vast desert region. Aircraft offered mobility and reconnaissance at speeds and distances beyond anything his cavalry formations could achieve. Second, aircraft offered a means of communication with swift-moving independent cavalry formations. If these new mechanical contraptions could search for Mexican bandits, they could also find U.S. Army columns operating independently. The pilots would then land with critical messages from the expedition commander and return with up-to-date reports from the field. This system promised a good backup for the early

¹⁰ Ibid., 13.

¹¹ Ibid., 10.

wireless sets that often proved unreliable in the cold and wet conditions of the Sierra Madre Mountains.

Thus, a day later on 10 March 1916, Foulois, as the 1st Aero Squadron's commander, received word that his unit would join Pershing's expedition.¹² Foulois understood the underprepared condition of his squadron and the harsh terrain they would operate in, but he also knew this was an important moment for air power to prove its worth in combat conditions. It was a monumental endeavor to deploy the aircraft, operate from remote locations, and most important keep the squadron supplied. Luckily, Foulois had Gorrell as his combined adjutant and supply officer. Between 10 and 12 March, Gorrell oversaw the acquisition of \$19,000 in parts and ten new trucks to haul the unit's men and equipment. The trucks included seven new Jeffrey "Quad" one and a half ton, four-wheel drive trucks, and three others leased from local businesses in San Antonio.¹³ This proved fortuitous as the 1st Aero Squadron arrived in theater as the only American unit fully mechanized with not only aircraft, but also trucks to transport the fuel, equipment, and personnel required to keep the airplanes flying.

Gorrell's efforts prepared the squadron in just two short days. When orders arrived on 12 March 1916, the 1st Aero Squadron left by rail for Columbus, with eight aircraft, eleven officers, eighty-two enlisted men, and ten trucks.¹⁴ By the time they arrived on the fifteenth, the ground forces had already left in two columns for Mexico. This late arrival meant Foulois could not coordinate his unit's first flights with the ground column commanders directly. Yet, it did not hinder the squadron for long. The unit immediately uncrated its aircraft and prepared for support missions. Just a day later, on

¹² Ibid., 13.

¹³ Ibid., 14-16.

¹⁴ Foulois, "Report of the Operations," 1-2.

16 March, the squadron flew its first combat observation mission, confirming there were no enemy forces near the advancing cavalry formations.

The 1st Aero Squadron's early contributions were not just in the air. Logistics problems plagued Pershing as he hunted for Villa. The trucks Gorrell bought before leaving San Antonio became a rare commodity in the confusion of the expedition's advance. Gorrell often drew double duty flying on one day and commanding truck convoys on another. For instance, on 15 March he led a truck convoy bringing replacement officers and supplies to Las Palomas, Mexico. Gorrell remembered the day in a later article, "what an experience it was, driving this original truck train into unfriendly territory, with a guard consisting of airplane mechanics."¹⁵ Yet, once again the 1st Aero Squadron was splitting its duties when it should have been focusing on its primary mission of flying. Why were untrained mechanics serving as convoy security? Why was an extremely rare quantity, a qualified pilot, traipsing about the desert leading truck convoys? These distractions likely played a role in the troubles that beset Gorrell and the squadron. At the same time, they underscored the immaturity of the command structure, doctrine, and technology of the squadron and fledgling U.S. Army Air Service.

Shaping the Service

The problems facing Gorrell and his fellow pilots in Mexico were not overnight developments. These issues were the result of a long string of decisions made at many levels. As aircraft became a functioning part of the Army, a myriad of political, economic, and service culture issues shaped the early development of military aviation.

¹⁵ Edgar S. Gorrell, "Why Riding Boots Sometimes Irritate an Aviator's Feet," *U.S. Air Services* 12 (Oct. 1932): 24.

While the Wright brothers made their first successful flight on 17 December 1903, the ever cautious and spendthrift Army did not buy a machine until after the Wrights completed two trial flights and received approval from a specially convened Board of Officers on 2 August 1909.¹⁶ Even then, aviation had to endure a long tenure as an underfunded experimental program before it could approach operational status. Thus, the birth and infancy of military aviation represents a long, almost flat trajectory on the learning curve from roughly 1903 until the formal organization of a controlling staff function and a training school in 1912.

During this period, important decisions occurred in both the Army and Congress that proved instrumental in shaping military aviation. These decisions related to three areas: funding, technology, and organization. Not all of the judgments were military related or even made for military concerns, yet they combined to shape the early Air Service with long-lasting effects.

Perhaps the greatest of issue was funding. From the start, military aviation suffered from a lack of adequate finances. While part of this related to the general dearth of military spending, other factors also played important roles. Most notably, military aviation suffered from congressional and public outrage after the failure of Dr. Samuel P. Langley's Great Aerodrome. In 1898, the U.S. War Department's Board of Ordnance and Fortification granted \$50,000 to the Smithsonian director to develop a heavier-than-air flying machine.¹⁷ Unfortunately, his abject failure in 1903 created a backlash in both the newspapers and Congress questioning how the Army could spend so much with so

¹⁶ Charles deForest Chandler and Frank P. Lahm, *How Our Army Grew Wings* (New York: Arno Press, 1979), 160-61.

¹⁷ John H. Morrow Jr., *The Great War in the Air: Military Aviation from 1909 to 1921* (Washington, DC: Smithsonian Institution Press, 1993), 5.

few results. The intense political pressure made the Army reluctant to provide any further money for aviation research. This policy effectively shifted developmental cost to the early pioneers of aircraft building.

While it is impossible to calculate how long the requirement for self-funding delayed aircraft development, it did create other long-term effects. Beside any delays in technology, the requirement also created a mentality towards funding that plagued early aviators. For example, after acceptance of the Wright machine, the Army tasked a single pilot, then Lt. Benjamin Foulois, to take eight enlisted mechanics, one aircraft, and \$150 to San Antonio and “teach yourself to fly and evaluate the military possibilities of aviation.”¹⁸ These interesting orders stemmed from the aforementioned Army policy of not creating separate funding lines for experimental programs in the wake of the Langley fiasco. As Foulois’s budget came from the Signal Corps’ operations allocation, it in effect equated to what was available after the branch paid for its normal communications support functions.

This funding issue cannot be solely laid at the feet of the Army though. As Lieutenant Foulois continued to make strides in Texas, his leadership in the Signal Corps began to take notice. The Chief Signal Officer, Gen. James Allen, requested \$200,000 for aviation in both 1910 and 1911, including a request for the purchase of twenty new aircraft. Yet, despite growing public pressure from aviation enthusiasts, Congress refused to create a separate allocation for aviation. Instead, congress continued to fund aeronautics through the Signal Corps’ general operating account of \$250,000 annually.¹⁹

¹⁸ Benjamin D. Foulois, *From the Wright Brothers to the Astronauts* (New York: Arno Press, 1980), 70-71.

¹⁹ Chandler and Lahm, *How our Army Grew Wings*, 182-83.

This mentality both slowed progress and fostered the perception of aviation as the realm of tinkerers and experimenters, at least for the time being.

The budget issues exacerbated another problem for the early air service: technology. With barely enough money to keep aircraft flying, there was little thought of improving aircraft design for military usage. Instead, technological change occurred through trial and error as the mechanics and pilots identified modifications that could be made in the field to improve their ability to train and participate in public demonstrations. Foulois's own memoir describes one of these technological innovations. Almost immediately after arriving in San Antonio, he determined that the catapult-sled launching system for the Wright airplane hindered his freedom of action. Foulois preferred a system that would allow him to land and take off from any level field. He worked feverishly to devise a tricycle landing gear to alleviate the need to reposition the ramp for each flight. Yet, by this time Foulois had long ago spent his \$150 budget on replacement parts after several minor accidents.²⁰ Hence, he was forced to delay the installation of the technological improvement until after the Signal Corps made new funds available.

Finally, the treatment of aeronautics as a low-budget experimentation created organizational and staffing issues that hindered early military aviation. Not only did the Signal Corps have a tiny budget to share, it was also a small branch within the larger Army. In 1908, the Signal Corps consisted of only 118 officers filling staff duties in Washington, support responsibilities at all major bases, and operational requirements in three field companies.²¹

²⁰ Foulois, *From the Wright Brothers*, 75.

²¹ "Report of the Chief Signal Officer to the Secretary of War" (Washington, DC: Government Printing Office, 1908), 6-7.

This paucity of manpower meant the Signal Corps had to look to other branches to provide pilots. Initially, this took the form of temporary duty assignments. The unsatisfactory nature of the relationship became apparent immediately with the first two Army pilots trained by the Wright brothers: Lts. Frank P. Lahm and Frederic E. Humphreys. Both officers conducted flight training with Wilbur Wright in October and November 1909. As soon as Humphreys completed his training, the Corps of Engineers demanded his return to former duties at the Washington Barracks. Meanwhile, Lieutenant Lahm faced a similar problem. Army regulations required all line officers serving exchange tours to return to their primary branches after four years of detachment. This caused Lahm, a highly experienced airship and now airplane pilot, to return to the cavalry shortly after training with the Wrights.²² More important, it left the Signal Corps with no trained pilots for its only aircraft, resulting in the aforementioned orders to Foulois to take the aircraft and \$150 to Texas and learn how to fly.

By the end of 1911, Foulois's work in Texas was starting to pay dividends. The combination of his aerial feats and a growing public fascination with aviation spurred change to the three basic problems military aviation initially faced: funding, technology, and organization. The period from 1912 to 1916 saw military aviation in the United States propagate at an exponential rate, both in numbers and in capabilities. With this growth came the promise of great things to come, but it also foreshadowed problems that would have to be solved before aircraft could prove their worth as an instrument of war.

Meanwhile, a greater appreciation for the promise of aviation meant more money in the larger military budget battles. On 3 March 1912, the annual War Department appropriation bill included its first ever allocation for aviation, totaling \$125,000, of

²² Chandler and Lahm, *How Our Army Grew Wings*, 182-83.

which \$25,000 was made available immediately for the purchase of two new aircraft.²³

This new money spurred technological and operational change.

On the technology side, the new funding created both strategic and tactical advances. First, the Signal Corps bought two new aircraft from different builders. These included a new Wright Type B flyer and one Curtiss airplane. This multi-aircraft purchase introduced the first cross-pollination of aircraft design into the Army. Next, the Signal Corps began to experiment with onboard technological advances that paved the way for future aviation capabilities. Foulois described some of these advances in his depiction of 1914 as a year of experimentation. He explained how pilots in the newly formed 1st Aero Squadron married aircraft with wireless telegraphs, cameras, machine guns, and early bombs.²⁴ In this way, increased funding produced technological advances as the young pilots had more training time in the air, which provided them more incentive to think about new ways to utilize the new weapon.

Improved funding also aided organizational changes. New money equated to new aircraft, which required more pilots to operate them. This growth necessitated a system to manage the training of pilots, the acquisition of aircraft, and the supply of required equipment. The first step in this process was to create a staff function in the Signal Corps to oversee the growth of Army aviation. Originally started in 1907 as a three-person staff element to manage airship and airplane acquisitions, by 1912 the Aeronautical Division of the Signal Corps grew to include the financial management of the \$125,000 budget for aeronautics. This created the first piece of the organizational puzzle, a staff function to manage resources and requirements.

²³ Ibid., 187.

²⁴ Foulois, *From the Wright Brothers*, 116.

The next step was to organize a system to recruit and train the ever-growing numbers of pilots. The Signal Corps met the requirement with the formation of a flight training school at College Park, Maryland. Recruitment proved fairly easy, as the War Department had by this time collected a number of applications from eager officers desiring flight duty. What was missing was a scheme for formally training pilots. Hence, the school's new commander, Capt. Charles deForest Chandler, set out to create a training syllabus to ensure novice pilots learned the prerequisite skills. The end result was a program that required pilots to pass the Federation Aeronautique Internationale certification before granting them their military wings.²⁵ This requisite created the bedrock of pilot training as the school moved first to Augusta, Georgia, and then to North Island for better flying weather.

As the flying school settled into daily operations, it also became a haven for new ideas and experimentation. As early as the fall 1911, the school began to participate in technology experiments. One of the most interesting of these was Riley E. Scott's testing of a new bombsight in October 1911. The school mounted Scott's sixty-four pound telescopic device on one of its Wright B aircraft and conducted multiple drops of two eighteen-pound bombs to test the apparatus's accuracy.²⁶ While the equipment proved that bombing accuracy needed much more work, it also demonstrated how the new service was already thinking in terms of operational requirements. This trend continued with further trials of airborne cameras, wireless sets, and machine guns throughout 1914.

Aviation also showed its potential value during operational maneuvers. A detachment from the flying school made an impression on senior leaders during the

²⁵ Chandler and Lahm, *How Our Army Grew Wings*, 195-99.

²⁶ *Ibid.*, 206.

Connecticut maneuvers of 1912. Foulois led seven pilots and four aircraft from College Park to the maneuvers in July and August. Foulois's own words best describe the effect of the mission: "We proved that airplanes could replace the cavalry and could prevent surprise mass attacks by providing information on enemy troop buildups and movements much faster than ever before."²⁷ While Foulois's own recollections of the event may not have been the accepted Army position on aviation, the participation in maneuvers like these opened the eyes of many senior leaders to the possibilities of aircraft as a military tool.

By 1914, both Congress and the Signal Corps realized military aeronautics needed restructuring. On 18 July, Congress passed House Resolution 5304, "An Act to Increase the Efficiency of the Aviation Section of the Army." This legislation created a formal staff element within the Signal Corps to manage all Army aeronautics. More important, the law created permanent funding and personnel accounts for this new staff function to manage.²⁸ For the first time in its history, the Army now had a dedicated Aviation Section inside the Signal Corps with its own manpower and budget allocations. The legislation also spurred change within the Army. With a permanent budget in place, the Signal Corps determined it was time for an operational aviation unit dedicated to preparing for military operations. Therefore, on 5 August 1914, Signal Corps General Order #10 created the 1st Aero Squadron with Foulois as its commander.²⁹

When combined, these two accomplishments represented a great leap forward for military aviation. They went a long way toward solving the early problems of funding,

²⁷ Foulois, *From the Wright Brothers*, 101.

²⁸ House Resolution 5304: Act to Increase the Efficiency of the Aviation Section of the Army, 18 July 1914 (Washington, DC: Government Printing Office, 1914).

²⁹ Signal Corps General Order #10, 5 August 1914, Record Group 18.2, National Archives.

organization, and technology. The Aviation Section's guaranteed budget line meant that it could now plan for the future with some semblance of stability. While it could be argued that the funding was still insufficient, at least aeronautics was no longer funded out of Signal Corps surplus funds. Similarly, the creation of a staff function, training school, and operational element went a long way towards preparing military aviation for combat. Although it was still a small organization compared to that of European nations, the U.S. Army's air service contained all the required elements needed for combat. Finally, the combination of funding and organization helped create a system for properly testing and acquiring new airframes and equipment for the fledgling service.

Even with these dramatic changes, all was not sunshine and flowers. Contained within the law itself were the kernels of new problems that the 1st Aero Squadron would face in Mexico and during the buildup of the AEF Air Service in World War I. The first of these issues was personnel policies. From the beginning, aviation was seen as the realm of youth. This played a large part in the Army's initial policy of only allowing junior officers to train as pilots while on temporary duty of no longer than four years. House Resolution 5304 codified this policy into law when it decreed that only unmarried lieutenants under thirty years of age could serve in the Aviation Section of the Signal Corps. Foulois himself describes the unintended consequence of this policy; "the result was that the section was being filled with young, inexperienced second lieutenants, leaving no one with age and experience to command an aviation organization."³⁰

When extrapolated across the air service, the personnel policy created a two-fold problem. First, operational commands at the training school and the 1st Aero Squadron were held by junior officers who lacked the experience an equivalent commander in the

³⁰ Foulois, *From the Wright Brothers*, 119.

more robust infantry, artillery, or cavalry formation would have had. This may explain some of the issues faced by the 1st Aero Squadron as their commander, Foulois, lacked a general staff tour that would have built planning and coordination skills before he went to Mexico. Second, the policy helped create an attitude towards nonaviators commanding aeronautical organizations. In an interesting historical quirk, Foulois complained in 1916 about the replacement of the experienced Col. Samuel Reber with the inexperienced Maj. William “Billy” Mitchell. In what may seem like a foreshadowing of Mitchell’s own later objections, Foulois argued that while Mitchell was an experienced staff officer, his inexperience in solving the practical problems related to flying made him a poor choice to lead the Aviation Section of the Signal Corps.³¹

This closely relates to the second issue facing the air service after 1914: aviation culture. As the personnel policies created a separate world for the young pilots, they soon saw themselves as different from the traditional Army officer. Theirs was a world of daredevil feats and danger. House Resolution 5304 reinforced this attitude when it awarded pilots a 50 percent increase in pay while on flying duty.³² These changes helped create a separate military identity in the young pilots, which often hindered their ability to coordinate properly with fellow officers in the combat arms branches. This was not completely negative, though. The sense of individuality bred a willingness to innovate that served the air arm well in the coming years. When faced with troubling situations that the young pilots were not fully prepared for, they more often than not found innovative new technology or strategy solutions to overcome those problems.

³¹ Ibid., 125.

³² House Resolution 5304.

Finally, the air service faced one more problem after 1914: a lack of integration. The aforementioned junior rank of many aviators and the distinct aviation culture combined with a general lack of understanding by ground commanders to create a misperception of aviation's capabilities and roles. This often meant that aviation faced operational difficulties due to the lack of close cooperation with ground commanders. Some of this can be seen in the immediate run up to the Mexican Expedition. Gorrell's own writing describes a shortage of flight training in Texas because the 1st Aero Squadron was building its own living quarters, operational buildings, and maintenance structures.³³ Inter-staff coordination could have alleviated the problem, but the combination of separate command chains, different cultures, and split operations limited cooperation. The trend continued into operations as many field commanders lacked an understanding of how to use aircraft properly, while the junior aviators did not have a structural method to advise those commanders on proper aeronautical roles and missions.

In this way, the early air service overcame the worst of its funding, technology, and organizational issues. Nevertheless, in doing so, it encountered new problems. Thus, the decisions made by early aviation pioneers, Army leadership, and politicians shaped the foundations of military aviation. These were both physical as in aircraft technology, but also mental as in the start of a separate aviation culture. While these foundations often created problems for the early aviators, they also created an openness to new ideas that served the air service well in the Mexican Expedition.

³³ Gorrell, "Riding Boots," 22.

The Wake Up Call

Flight training, administrative duties, and social obligations filled Gorrell's military aviation career before Mexico. This busy schedule left the young pilot little time to concentrate on policy or doctrinal issues. Even when Gorrell's unit prepared to deploy to Mexico, he was so busy with supply duties, convoy commander missions, and training that he had little time to think of anything else. That all began to change as the 1st Aero Squadron started flying combat missions in March 1916. Gorrell and the other squadron pilots became dissatisfied with their aircraft and the missions they were given. While this experience may have remained a localized concern, the grumblings of the aviators eventually became known in the halls of power in Washington. Thus, Mexico served as an alarm clock for not only the pilots, but also for senior leaders as to the poor state of American military aviation preparedness.

This clock first rang on 19 March 1916, when the 1st Aero Squadron received orders to deploy to Nueva Casas Grandes. Desiring to complete the move that day and restart observation missions the following morning, Foulois ordered his pilots to fly their aircraft to Nueva Casas Grandes, while the enlisted men packed the trucks and convoyed overnight to meet them. Unfortunately, the squadron's and its commander's lack of experience combined to create a near disaster. Foulois's inexperience caused him to take the additional risk of an overnight deployment, when there was no external pressure for such a quick move. Meanwhile, the squadron's greenness meant that flight planning and equipment packing took much longer than expected. The pilots did not depart from Columbus until 5:10 PM. The delay meant that much of the flight occurred in darkness.

While some of the pilots had experience flying at night, none of them had flown long distances over sparsely inhabited territory in the dark.

The flight to Nueva Casas Grandes became the second life-changing moment for Gorrell. From the start, things went awry. Weighed down with fuel and personal baggage, Gorrell's aircraft barely cleared a fence at the end of the field.³⁴ The bad luck did not stop there. As darkness fell, Gorrell lost sight of the other aviators in his formation. He attempted to navigate alone, but became hopelessly lost over the darkened desert. When he realized his predicament, he turned back north with the intention of returning to Columbus, but his JN-3 had reached its limits. When the engine started to overheat, he made a forced landing inside enemy-controlled territory. Knowing his extremely dangerous situation, Gorrell gathered a pistol and a few supplies before heading into the desert. He spent the rest of the night in the wilderness until near dawn he happened upon a Mexican national. Gorrell used his weapon and eight dollars in silver coins to persuade the reluctant man to return him to American forces. After an arduous trip, Gorrell finally made it back to the squadron on 23 March 1916, bedraggled and the worse for wear.³⁵

The deployment fiasco was not the only issue that drew attention. Instead, it represented the first of a series of events that demonstrated the unpreparedness of military aviation. Problems with technology, planning, and doctrine came to the surface as Foulois's pilots increased the number and difficulty of their missions. As before, the independent and resourceful aviators often developed work-around fixes, but in the end,

³⁴ Miller, *Preliminary to War*, 20.

³⁵ *Ibid.*, 27-28.

significant complications were visible not only to the Army, but also to the public and political leadership.

Almost from the beginning, technology was a problem for the 1st Aero Squadron. While the Curtiss JN-3 proved adequate for training, its low power and poor service ceiling showed its true limitations during operations in Mexico. When patrols moved to the Sierra Madre Mountains, the squadron's pilots discovered their aircraft could not climb high enough to overfly the 10,000-foot ridgelines. To make matters worse, the JN-3 proved difficult to control in the high winds and snow. On 22 March 1916, Foulois even sent a memorandum to the Chief of the Aeronautical Division in Washington informing him of the incapability of the present aircraft to meet mission requirements. By this time, he had already lost two of his eight aircraft in crashes. Therefore, Foulois requested ten new aircraft--two each from the Martin, Curtiss, Sturtevant, Thomas, and Sloane companies.³⁶ Unfortunately, the Signal Corps lacked a system rapidly to buy and deploy airplanes and Foulois had to sustain operations as best he could.

The squadron continued to lose aircraft to accidents through the end of March and into April. By 20 April 1916, the squadron was down to just two functioning JN-3s. Therefore, on 22 April Pershing sent the 1st Aero Squadron back to Columbus to refit and receive new equipment. Waiting for them was the first of twelve new JN-4 aircraft, part of the Army's 1916 purchase of ninety-four JN-4s for the air service. During flight-testing, the men of the 1st Aero Squadron disliked the JN-4 so much that Foulois complained directly to Maj. Gen. Frederick Funston, the commander of the Army's Southern Department. Through Funston's intercession with Secretary of War Newton Baker, the Army withdrew the JN-4s and replaced them with the 160-horsepower Curtiss

³⁶ Foulois, "Report of the Operations," 2.

R-2 equipped with machine guns and bomb racks. Still, this took time with the first two Curtiss aircraft not arriving until 1 May 1916. Even then, teething problems with the propeller required additional delays as the 1st Aero Squadron mechanics developed a new method to build propellers capable of operating in dry desert climates.³⁷ These delays effectively ended the squadron's operational role in the expedition.

The 1st Aero Squadron's problems went beyond aircraft. A poor doctrinal understanding of how to use aviation also hampered the squadron's success. Initially, Pershing saw two roles for his aviation squadron: reconnaissance and communications. Not only could the aircraft search for Villa's forces, but they could also find independently operating U.S. columns and deliver orders from the commander. This seemed like a reasonable approach not only to Pershing, but also to Foulois, who voiced support for the plan. Yet, as the squadron's JN-3 aircraft demonstrated difficulty with reconnaissance missions in the Sierra Madres, they were increasingly relegated to courier duty. During the heart of the expedition from 26 March and 4 April, the squadron flew seventy-nine missions carrying mail and dispatches along Pershing's line of advance, but only two reconnaissance missions.³⁸

The unbalanced nature of operations drew the ire of many of the pilots. Not only were they risking their lives flying incapable JN-3 aircraft, but also the vast majority of their missions were delivering mail. Foulois even addressed the issue in his summary report of 28 August 1916. One of his five recommendations was to confine flight duties

³⁷ Miller, *Preliminary to War*, 32.

³⁸ *Ibid.*, 29.

to military applications to avoid the loss of aircraft and flight time for missions that could be better carried out by other service elements.³⁹

These complaints might not have created a call for change outside of the few pilots in the 1st Aero Squadron except for the work of newspaper reporters attached to the expedition. On 3 April 1916, an article in Joseph Pulitzer's *New York World* claimed several pilots complained to reporters about airplane deficiencies and poor Signal Corps oversight of aviation.⁴⁰ Almost immediately, a backlash occurred in the Army leadership. Who were these young, brash pilots questioning Army and Signal Corps leadership, especially in the open press? The Army launched an investigation into the matter and sent officers to interview the men of the 1st Aero Squadron. Most pilots denied talking to reporters, but Gorrell admitted he discussed "foreign aviators, the lack of engine power in the aeroplanes of the First, and military aeroplanes, past and present" with the reporter Webb Miller.⁴¹

Interestingly, this admission did not hurt Gorrell's standing or career. Despite the initial anger at the newspaper article, most Army leadership and especially General Pershing recognized the value of aerial observation and were aware of the technical and logistics problems the infant branch faced. In this environment, Gorrell's points became a rallying cry for more investment in the air service and not a hindrance to his career.

Despite the best efforts of the 1st Aero Squadron, General Pershing could not locate and capture Pancho Villa. Still the squadron's pilots accomplished much in this early test of air power. They flew 540 missions, greatly aiding in intelligence gathering

³⁹ Foulois, "Report of the Operations," 9-10.

⁴⁰ "Aviators in Mexico Tell World," *New York World*, 3 April 1916.

⁴¹ Miller, *Preliminary to War*, 34-35.

and facilitating communications between Pershing's often widely separated forces.⁴² Additionally, the expedition woke up the American public and its leaders to the overall weakness of its aviation forces. With the European war threatening to draw in the United States, Congress acted to remedy the situation. In June 1916, it took the first step with the National Defense Act. In addition to other funding increases, the act provided \$13 million to expand the Army Air Service to eight squadrons and buy more capable aircraft.⁴³ Although this was still a drop in the bucket compared to the needs for World War I, it was a timely step in preparing the nation for the eventuality of war.

Education and Preparation

The Mexican Punitive Expedition also led to internal changes in the air service. Signal Corps leadership decided they needed to build the novice aviation section along the Army's traditional branch model. This required them to grow talent and experience from within their own personnel. Hence, the Signal Corps focused on educating its officers and developing doctrine on how to use military air power.

One of the key beneficiaries of this new focus was Gorrell. On a personal level, he emerged from Mexico with an increased reputation. He had become a recognized figure in the Air Service, the Signal Corps, and the Army as a whole. Gorrell was not just a talented flyer, but also a keen intellect, proficient planner, and technical expert. Even if he had a reputation as being too candid with his opinions, his skills outweighed the negatives. In what became his third life-changing event, the Army rewarded these

⁴² Ibid., 8.

⁴³ National Defense Act as amended, 3 June 1916 (Washington, DC: Government Printing Office, 1921), 5, 14, 48.

attributes with an assignment to the Massachusetts Institute of Technology to pursue a master's degree in aeronautical engineering.

MIT had a long history in aeronautical research that both the Army and Navy supported with funding and students. Six years before the Wright brothers' pioneering flight, MIT built its first wind tunnel as part of a student thesis. Still, it was not until 1909 that the program truly started to expand. In that year, a U.S. Naval Academy graduate, Jerome C. Hunsaker, enrolled at MIT. Hunsaker applied his passion for aviation to his studies in engineering. By the summer of 1913, he had helped create the core of an aeronautics program at MIT. This program blossomed into a government-funded endeavor when Hunsaker and Donald Douglas built a permanent research wind tunnel in 1914, the first structure on the new MIT Cambridge campus.⁴⁴

Gorrell entered this new program in September 1916 and once again proved a stellar performer. Detached from military operations, Gorrell focused his attention on the science behind flying. His graduate thesis, "Aerofoils and Aerofoil Structural Combination," became a noted pioneering work in the field, receiving accolades from military, industrial, and academic sources.⁴⁵ By June 1917, only two months after the United States entered World War I, Gorrell had graduated with a Master of Science degree and returned to the Army as a captain with an assignment to the Chief Signal Officer's staff.⁴⁶ His job on the staff was planning the operational structure and technology required for the Air Service in World War I. Members of the staff remember Gorrell spending his days working out personnel, aircraft, and budget requirements on

⁴⁴ Lauren Clark and Eric Feron, "A Century of Aerospace Education at MIT" (paper presented at the annual meeting of MIT's Tech Aero Conference, Cambridge, MA, 2001), 1.

⁴⁵ Edgar S. Gorrell, "Aerofoils and Aerofoil Structural Combination" (M.S. thesis), MIT, 1917.

⁴⁶ "Scientific School Gives Stamp of Approval Upon Seven," *Washington Times*, 12 June 1917.

large sheets of wrapping paper spread out on the floor of his office.⁴⁷ These calculations became the core of the original appropriations for World War I U.S. military aviation.

Gorrell also benefitted from the second aspect of the Signal Corps response to Mexico: doctrine development. In the aftermath of the Mexican Punitive Expedition, the Signal Corps realized it needed to focus attention on the proper use of aircraft in military operations. Luckily, they had the perfect place to learn about aerial combat in the war in Europe. From the outbreak of hostilities, the American Army received reports on the growing importance of aviation in the war effort. The Signal Corps' 1915 annual report included information on the air war and demonstrated how it influenced operational thinking. The report described airplanes as proving their value in reconnaissance and artillery fire control. It then went on to describe the growing importance of a new type of aircraft, the combat machine in both a pursuit and bombing role.⁴⁸ Yet, at this early stage in the war, the American conclusions were less about technology and planning than funding. The annual report's recommendations focused on the additional budget requirements the Signal Corps would need should the Americans enter the war and not on the types of aircraft and missions it would fly.

After the experience in Mexico, this attitude started to change. While budget numbers were still the primary concern, there was a greater appreciation for planning and operational lessons. Therefore, the Signal Corps decided to send observers to Europe to garner as much as possible from the British, French, and Italian air services. The most famous of these observers was Col. Billy Mitchell, who left for Europe on 17 March with orders to investigate the status of French aviation. When he arrived in Europe, Mitchell

⁴⁷ Edgar S. Gorrell Obituary, 5 March 1945.

⁴⁸ Report of the Chief Signal Officer, United States Army, to the Secretary of War, 1915 (Washington, DC: Government Printing Office, 1915), 37.

discovered that his nation was now an active participant in the conflict, having declared war on 6 April 1917. This invigorated Mitchell as he toured French factories, aeronautical schools, and even flew over the front with French pilots.

Mitchell's most dramatic experience occurred when he visited the headquarters of Royal Flying Corps (RFC) commander, Maj. Gen. Hugh Trenchard. Mitchell arrived during one of the many mini-crises that often beset combat command headquarters. When Trenchard's aide tried to reschedule the visit, Mitchell complained. Instead, as Trenchard came out of his office to see what the noise was about, Mitchell informed him that he would "like to see your equipment, your stores, and the way you arrange your system of supply. Also, I need to know all you can tell me about operations, because we will be joining you in these before long."⁴⁹ Luckily, the usually quick-tempered Trenchard found Mitchell's impudence charming and coordinated a three-day demonstration of the RFC's training, supply, and flying operations. The results led Mitchell to prepare a memorandum for the soon to arrive Gen. John Pershing describing his concept for the organization and use of an AEF air service.

While Mitchell was developing his vision, Gorrell participated in another study group with the task of learning from European examples, determining proper technology, and securing the initial support agreements from the allied nations. This group, led by Col. Raynal Bolling included Gorrell and was important for the development of American strategic bombing theory. As Bolling and Gorrell visited with their British, French, and Italian counterparts, they developed an appreciation of the air power theories propagated within each nation. This turned the summer of 1917 into an important era of

⁴⁹ Rebecca Grant, "The Real Billy Mitchell," *Air Force Magazine* 84 (2001): 67.

learning, thinking, and strategy development for the small, but important band of American aviators in Paris.

In this way, Gorrell became the model for the new breed of aviator the air service needed as it entered World War I. He had grown into not just a steady pilot, but also a proven academic, gifted planner, and talented logistician. The process had not occurred overnight, but rather it was a gradual shift from the adventure-seeking young cadet to the open-minded military expert ready to make his mark. Key moments along the way shaped Gorrell and prepared him for the great challenges that lay ahead. West Point taught him discipline, but also kept his sense of adventure alive. Aviation focused that pioneering sense towards a new military field with great possibilities. His experiences in Mexico tempered his adventurism and taught him skills in the more mundane, but equally important areas of logistics, engineering, and planning. Perhaps even more important, Mexico taught Gorrell to think for himself and to remain open to new ideas and concepts. Finally, MIT cemented his professional credentials. In this way, Gorrell proved the perfect combination of aviator, engineer, and planner needed by the Army to prepare its Aviation Section for entry into the war in Europe.

Conclusion

While most people probably do not think of 1903 to 1916 as a formative time for U.S. strategic bombing theory, the era is remarkably important. This early stage laid the technical, organizational, and doctrinal foundations that air strategists built on when the United States entered World War I. Like any other foundation, this one had advantages in some areas, while limitations in others.

In terms of technology, the era was a mixed bag. Funding problems delayed the acquisition of new aircraft and the modification of designs to meet military needs. This led to a weak aircraft industry and military aviation procurement system that was severely overtaxed when asked to produce large numbers of more capable aircraft. Even after funding was no longer an issue in the robust budgets of 1916 onwards, problems with aircraft production remained. As the old saying goes, you cannot buy back wasted time. Military aviation definitely felt the sting of this rule. Aircraft producers simply could not ramp up production fast enough to fill the growing air service requirements in World War I. Thus, Army leaders had to prioritize which types of aircraft to build first. With observation and pursuit aircraft to protect them the highest priority, bomber production remained low until 1918. This foundational issue dramatically limited the efforts of strategic bombing advocates.

On the organization side, the era saw the formation of an aviation staff and command structure capable of growing with the expanding air service in World War I. More important, the experience in Mexico convinced the Signal Corps to grow its own internal expertise to manage the structure. Therefore, when the United States entered World War I, a core of experienced and educated pilots was ready to expand the fledgling service in terms of size, capabilities, and strategy. Edgar Gorrell was a perfect example of this newly minted scholar aviator. Given a baptism of fire in Mexico, shaped by MIT, and finally polished on the General Staff, Gorrell represented an ideal officer to learn from the Europeans and help craft an American vision of aerial warfare.

Finally, the doctrinal work in the era represents a small, but important early step in the formation of American military aviation thought. Mexico forced the service to

recognize that a proper operational usage concept was the core building block of aircraft design, organizational structure, and operational integration. No longer blinded by the need to fight for funding, the young aviators turned for inspiration to the great air war being fought over Europe. Just as the air war itself was evolving at a lightning pace, so too did the appreciation of strategy in the newly minted AEF Air Service. As the first officers arrived on the continent, they experienced a learning curve akin to drinking from a fire hose. Yet, in a handful of key American theorists this overwhelming situation produced new strategic insights.

In this way, the early aviation era and the Mexican Punitive Expedition in particular were critical events in the development of strategic bombing theory. The era is best summed up as a long slow period of initial learning, followed by a wake up call to the poor state of American military aviation, before a brief, but important period of sharp growth. This air service development did not evolve from a planned strategy. Instead, it resulted from the combination of internal and external decisions that shaped the very nature of aviation, the Signal Corps, and the air service. In doing so, the decisions often had lasting, if not always planned, effects as the American flyers entered World War I.

Chapter 3

The War in Europe

American and European military aviation shared many similarities in the early twentieth century, but one critical difference separated their evolution. In Europe, the all-consuming national rivalries acted as a catalyst to spur aeronautical funding and thinking. The United States, seemingly safe behind its twin oceans, took a much slower and less costly approach. This relative safety did not exist for Britain, Germany, and France, who all saw a direct threat only a few short hours flight away. Hence, these nations were willing to fund aeronautics at rates American aviators could only dream of.

Still, European aviation revolved around the same three issues as it did in America: technology, organization, and doctrine. Whereas funding problems focused American development towards technology at the expense of doctrine, in Europe, national tensions brought doctrine into its rightful place. Both government and military leaders understood that conflict was likely and from the start envisioned aircraft playing a role. This image differed depending on nationality, but overall the early acceptance of aviation as a military tool instilled new thinking that differentiated European aviation development and policy from that of the United States.

Yet, technology and organization did not always match the visions of aviation enthusiasts. While ahead of their American counterparts, European nations suffered from similar technological and organizational problems. At the start of the war, most had adequate airplanes and organizations to support the observation mission, but lacked long-

range bombers or agile pursuit aircraft. The vortex of combat rapidly changed the situation. By 1916, technology and organization started to catch up to the concepts of air power advocates. By 1917, all three elements--technology, organization, and doctrine--were largely in place. All that was needed was the political commitment to expand military aviation beyond supporting ground and naval forces. Into this dramatic period the first American aviators arrived in the late spring of 1917, eager and ready to learn.

Strategic Bombing: The Concept

The notion of strategic bombing originated long before the outbreak of World War I. Visions of destruction by aerial bombardment were popular in Europe since the first balloon flights in the late eighteenth century. As the historian L.T.C. Rolt indicated, while the most obvious use for military balloons was observation, many strategists envisioned airships flying over enemy cities and dropping bombs on the populace below.⁵⁰ Still, it was not until the turn of the twentieth century that strategic bombing caught the public's attention, largely through the work of popular novelists.

Authors like Jules Verne, H. G. Wells, and R. P. Hearne excelled at playing on the fears of the time. Verne's 1893 novel *Clipper and the Clouds* depicted a mysterious aviator named Robur using a zeppelin-like airship to influence national leaders. While Verne's work left room for interpretation, H. G. Wells's 1908 *The War in the Air* was more direct. Wells depicted a massive German aerial flotilla destroying New York in a surprise bombing attack. Despite Verne's and Wells's fame, perhaps the most influential of the three was R. P. Hearne's 1909 *Aerial Warfare*. In this analytic evaluation of air

⁵⁰ L.T.C. Rolt, *The Aeronauts: A History of Ballooning, 1783-1903* (New York: Walker and Company, 1966), 137.

power, Hearne claimed that all of Britain was at the mercy of German zeppelins. Hearne's warning soon became widely accepted in the public and government ministries. Historian John Morrow even credits Hearne with turning a general fascination with bombing into a full-fledged airship scare that lasted into World War I.⁵¹

While the futuristic literature may have generated an abundant readership and instilled a general fear in the public, the reality was that current aviation technology could never hope to match the visions of the early authors. Even Hearne's clarion call of warning lacked substantive evidence of German capabilities to deliver on his perceived threat. In the end, though, it did not matter as fear overcame rational thought. Public anxiety drove measures that both excited and frightened military professionals. The German ballooning authority, H. W. L. Moedebeck, best described this disconnect in an 1886 paper on the value of bombing, stating that, "while the physical effects of bombing were almost nil, it undoubtedly produces a depressing effect to have things dropped on one from above."⁵² In this simple statement, Moedebeck captured the dichotomy of early strategic bombing. The current technology promised little in terms of physical destruction, yet the psychological fear of bombing was a primal force causing national and popular responses.

This trepidation eventually worked its way into the thoughts of government leaders. Initially, they attempted to control the threat through international agreements. In the Hague Conference of 1899, the nations of Europe agreed to prohibit the discharge of any projectiles from balloons or similar devices for five years.⁵³ Yet, international

⁵¹ John H. Morrow Jr., *The Great War in the Air: Military Aviation from 1909 to 1921* (Washington, DC: Smithsonian Institution Press, 1993), 21.

⁵² Lee Kennett, *A History of Strategic Bombing* (New York: Charles Scribner's Sons, 1982), 7.

⁵³ *Ibid.*, 10.

agreements could not stop the progress of technology. As heavier-than-air flight became a reality, European nations began to see value of airplanes in their arsenals.

By the time the prohibition on bombing came up for renewal at the Hague Conference of 1907, too much had changed. The majority of nations refused to renew the articles based on three rationales. First, the newly invented airplane showed too much promise as a military weapon. While no country had plans for a bomber force at this early stage, neither did any of them want to forego the potential advantages airplanes might deliver in the future. Next, most nations expected to use aircraft, both lighter and heavier than air, as observation platforms. Surely, the enemy would defend against this threat with antiaircraft fire. If pilots were fired upon from the ground, should they not be able to fire back? Finally, all agreed that limitations already in place on assaulting undefended cities applied to aircraft as well as artillery. Hence, there was no need to limit aircraft specifically.⁵⁴

The catalyst for this international change of opinion proved to be the tremendous advances in aviation technology. While Lord Northcliffe may have observed that “England was no longer an island” after Alberto Santos-Dumont’s groundbreaking flight on 20 October 1906 in Paris, the twelve-hour zeppelin flight on 1 July 1908 truly brought home the possibilities of long-range aviation.⁵⁵ This flight produced a combination of fear and excitement throughout Europe. Many politicians and civilians saw a new terror that threatened their peaceful lives miles behind potential front lines. Meanwhile, military professionals saw a means to target distant industrial and political centers.

⁵⁴ Neville Jones, *The Origins of Strategic Bombing: A Study of the Development of British Air Strategic Thought and Practice up to 1918* (London: William Kimber, 1973), 25-26.

⁵⁵ Morrow, *Great War in the Air*, 4.

How each nation viewed the possibilities depended on its particular circumstances. In Germany, long-range aviation offered a means to target directly the previously untouchable British homeland. This tied in with increasing German nationalism, which saw zeppelins as a symbol of German power. The Germans even carried this attitude over to their international negotiations. At the May 1910 International Conference on Aerial Navigation in Paris, they proposed that “the navigation of the air above a foreign country should be free in principle, and that foreign airships should not be treated less favorably than those of nationals.”⁵⁶ While the other European nations immediately rejected the proposal, it helped define Germany’s attitude toward aviation in the run up to World War I. Aeronautics represented a critical strategic threat that Germany could use to show its strength.

Sometimes though, attitudes carry unintended consequences. In 1911, Germany faced a critical choice between developing airplanes or airships. Even at that early date, aeronautical advances suggested that airplanes might offer a cheaper and more flexible capability than costly zeppelins in the not too distant future. Yet, the zeppelin was a critical component of the German national identity. Therefore, on 25 October 1911, the Prussian War Minister Josias von Heeringen convinced Kaiser Wilhelm that Germany must preserve airship superiority over the other European nations.⁵⁷ This decision effectively limited aircraft development through the diversion of exorbitant funds to the production of zeppelins. At the same time, German strategic thought gravitated towards zeppelin raids as the primary strategic attack method. In the end, this cultural decision

⁵⁶ S. W. Roskill, ed., *Documents Relating to the Naval Air Service, vol. 1, 1908-1918* (London: Naval Records Society, 1969), 14-18.

⁵⁷ Morrow, *Great War in the Air*, 18.

meant Germany started the war with ten zeppelins, but only 245 airplanes, none of which had long-range bombing capability.

The French public mirrored the German enthusiasm for aviation. Airships and airplanes became both a fascination and a cause for fear. The French historian, Edmond Petit, sums up this period nicely as aviation became a “universal preoccupation” in France.⁵⁸ As with Britain, the exuberance made its way into government policy. The French War Ministry used its relatively larger aviation budgets to set the standard for air power development. The Army became an active part of the aviation industry by directly funding many aircraft designers. Besides the expected technological advances, the investment program created valuable connections between French military leaders and the aviation industry that helped foster an understanding of air power absent in most other nations. The most notable example was the future French military commander, Joseph J. C. Joffre, who chaired a commission on aviation experiments in 1905.⁵⁹ This interaction with aviation introduced Joffre to the potential for air power and likely made him more open to innovative uses for aircraft.

Nonetheless, French aviation enthusiasts, like their American counterparts, often met resistance when dealing with senior military leaders. Ferdinand Foch, the future allied Commander-in-Chief, stated in March 1913 that “Aviation is a fine sport. I even wish officers would practice the sport, as it accustoms them to risk. But, as an instrument of war, it is worthless.”⁶⁰ Foch’s attitude demonstrated the suspicion of aviation that many senior leaders held in the early twentieth century. Yet, Foch’s own words highlight

⁵⁸ Edmond Petit, *La Vie quotidienne dans l’aviation in France au debut du XXe siècle, 1900-1935* (Paris: Hachette, 1977), 79.

⁵⁹ Morrow, *Great War in the Air*, 11.

⁶⁰ Louis Morgat, “L’aviation en Berry avant la Grande Guerre,” *Revue Historique des Armees* 1 (1980): 199.

a major difference in American and European views before World War I. In France, aviation was perfectly in line with the offensive spirit and esprit de corps the French military wanted instilled in all officers. In America, on the other hand, early aviators were often considered eccentric daredevils and outside the normal behavior for an army officer. This more accepting attitude in France helped create perhaps the best prepared air service in August 1914 with 141 combat planes organized into twenty-one squadrons and another 176 in reserve or training roles.⁶¹

Where the Germans and French represented straightforward approaches to military aviation, the British took a more complex path. In October 1908, Britain's Committee on Imperial Defense set up a subcommittee headed by Reginald Baloil Brett, the 2nd Viscount of Esher, to investigate the dangers aerial navigation posed to Britain and what advantages Britain might gain by developing its own airships and airplanes. Lord Esher's own report speaks best for the guiding principles behind early British aviation development. He wrote, "the evidence before the Committee tends to show that the full potentialities of the air-ship, and the dangers to which we might be exposed by their use, can only be ascertained definitely by building them ourselves. This was the original reason for constructing submarines, and in their case the policy has since been completely vindicated."⁶²

Lord Esher's report formed the basis for one avenue of British aeronautics growth. A strong desire to match the German zeppelin program pushed Britain towards developing its own airships and strategic air power. In a reflection of naval policy, this aerial arms race offered security through parity as a means of

⁶¹ Morrow, *Great War in the Air*, 35.

⁶² Report of the Esher Committee, 28 January 1909, AIR 1/2100, 207/28/1, The National Archives of the U.K.

deterrence. As might be expected, the Royal Navy favored this vision for aviation as it coalesced with traditional naval strategies of attacking an enemy's means and will to resist through blockades and direct attacks.

Yet, airships were only one aspect of British aviation. A second focus evolved around the growing importance of heavier-than-air flying machines. On 17 February 1912, the Committee on Imperial Defense Sub Committee on Aerial Navigation recommended the formation of an airplane equipped flying corps to support army operations. The subcommittee even prioritized the missions for the new flying corps in this order: reconnaissance; reconnaissance protection; communications; artillery spotting; and bombardment.⁶³

This dual nature of air power in England both shaped and was shaped by the divide between the Army and Navy. The Army's steadfast concentration on ground support drove technology, organization, and doctrinal thinking in its air service, the Royal Flying Corps (RFC). Technological development moved toward slow, but highly stable aircraft well suited for observation missions. Organization centered on squadrons directly tied to Army commands, with little latitude for independent operations. Finally, doctrine mirrored the thinking of ground officers who saw aviation as a tool to augment the cavalry in reconnaissance or support the artillery in correcting fires.

These early changes set the tone for future RFC air operations. They ingrained not only a way of thinking, but more important, they created foundations that proved difficult and costly to correct. A good example is the first widely produced RFC aircraft, the Royal Aircraft Factory Be2a. While the

⁶³ Jones, *Strategic Bombing*, 38.

Be2a's inherent stability aided the reconnaissance mission, its top speed of 70 miles per hour and bomb load of only one hundred pounds limited its use as a pursuit or bomber aircraft.⁶⁴ Moreover, designing a new airplane took time. Hence, the RFC had to manage with poorly suited designs for a large portion of the early war.

On the other hand, the Royal Navy viewed air power in a strategic light. Naval thought centered on using airplanes to help maintain sea control through attacks on enemy ships, ports, and support facilities. This vision of air power led to different technologies, organizations, and doctrinal concepts. From the start, the Navy pursued aircraft designed for long overwater flights and bombing. By 1913, the Royal Navy led the world with the first published manual of air navigation, the first purely designed aircraft compass, and a circular slide rule for calculating wind drift. At the same time, navigation in the RFC meant little more than map reading.⁶⁵ Similarly, the Navy differed from the Army in organization. Naval aviation favored the independent wing concept, which offered more latitude for aerial operations. Finally, the First Lord of the Admiralty Winston Churchill's policy of the offensive-defensive guided doctrinal thought. In the policy, Churchill advocated for attacks on the zeppelin bases as the best means to prevent their use against England. At first, his policy channeled doctrine towards eliminating the zeppelin threat by destroying their bases and support facilities. As the war progressed, though, it was only a small jump to apply Churchill's and the Navy's construct to strategic attack against German industry.

⁶⁴ Robin Cross, *The Bombers: The Illustrated Story of Offensive Strategy and Tactics in the Twentieth Century* (New York: Macmillan Publishing Company, 1987), 8.

⁶⁵ Jones, *Strategic Bombing*, 43.

The consequence of the dichotomy was that Britain started World War I with in effect two air forces. The Army brought fifty airplanes with the British Expeditionary Forces (BEF) for direct ground support. Meanwhile, the Royal Naval Air Service (RNAS) had ninety-three long-range airplanes and six airships at their disposal when the war began.⁶⁶

Two other nations merit consideration in the run up to World War I. Foresighted aircraft designers in both Italy and Russia helped steer technology towards long-range aviation. Italy was perhaps the more important of the two. The Italian aircraft designer Giovanni Caproni led the way with his three-engine 260-horsepower Ca-1. This aircraft, which first flew in late 1914, carried a crew of four and up to 460 pounds of bombs with a range of 344 miles.⁶⁷ Caproni's aircraft fit nicely with Italy's strategic problem. If the Italians joined the war, they almost certainly faced the need for a long and costly offensive through the Alps against Austria-Hungary.

Long-range aircraft seemed to offer the potential to avert this grueling land campaign. As Caproni advised, his bombers could overfly the Alps to strike at important Austro-Hungarian military targets. At the very least this would act as super long-range artillery to support the ground offensive. Yet, in some Italian aviators' minds, particularly Giulio Douhet, a new more exciting possibility started to coalesce. If built in sufficient numbers, long-range bombers could attack Austro-Hungarian war industries directly, potentially even forcing them to cease hostilities for a lack of armaments.

⁶⁶ Morrow, *Great War in the Air*, 45-46.

⁶⁷ Michael Sharpe, *Biplanes, Triplanes, and Seaplanes* (London: Friedman/Fairfax Books, 2000), 43.

Meanwhile, the Russians had their own visionary aircraft designer in Igor Sikorsky. Under Sikorsky's direction the Russians built the Ilya Moromets Type A, which had its maiden flight on 11 December 1913. Originally designed for commercial passenger transport, its 113-foot wingspan, four engines, and a fully enclosed cabin held immense military potential especially in long-range bombing and reconnaissance roles.⁶⁸ This melded ideally with the Russian strategic situation. With long distances separating them from German industrial and logistics facilities, the Russians required such an aircraft to have any hope of attacking German strategic targets. Unfortunately, the size and complexity of the Ilya Moromets limited Russian production with only twenty examples available for operations in 1916. Still, the bomber succeeded in flying more than four hundred missions against mainly the German Army from February 1915 until Russia's departure from the war.⁶⁹

The Ilya Moromets seems to represent a technological advance that other European nations could have used. Unfortunately, the remoteness of Russia tended to shield their technology and doctrine from aviation strategists in the west. While Sikorsky did eventually license production of his aircraft to the British and French, by 1916 the cost of the bomber and the allied nations' own bomber developments precluded building large numbers of them.⁷⁰

⁶⁸ Cross, *The Bombers*, 7.

⁶⁹ Sergei I. Sikorsky, *The Sikorsky Legacy* (Charleston, SC: Acadia Publishing, 2007), 10.

⁷⁰ *Ibid.*, 34.

The Early Months of the War

When war broke out in August 1914, many waited apprehensively for the predicted aerial assaults. Yet they did not occur. The immense military exertion from the Schlieffen plan for the Germans and Plan XVII for the French and British limited strategic air operations. During this period of full effort, all military and air power was concentrated on defeating the enemy's ground forces. This reality differed greatly from the novelist visions of bomber fleets roaming free to attack European cities. Instead, most bombers were drawn to operational targets such as railyards and supply depots in an effort to aid ground forces.

It did not mean that the fear of bombing evaporated, though. A great concern still existed in the public and governments of the warring states. This fear was even evident in the German declaration of war on France. As part of the rationale for war, the Germans cited the French bombing of Nuremburg on 2 August 1914.⁷¹ This was interesting considering that the Germans knew that no aircraft in the French arsenal could fly as far as Nuremburg. Many historians explain this occurrence as a combination of fear and rumors influencing the German government. Another possibility is that the Germans understood the psychological fear of bombing and used the reports to galvanize their population.

Either way, instead of the predicted aerial bombardments of national capitals, the early bombing efforts took the form of small independent raids. On 6 August, the Germans launched their first zeppelin attack on Liege, Belgium, with minimum results. Perhaps more foretelling was the 30 August 1914 raid by a small German Taube airplane on Paris. Lt. Ferdinand von Hiddessen broke

⁷¹ Kennett, *History of Strategic Bombing*, 19.

Paris's usual Sunday morning routine when he dropped five small bombs along with a note warning that "the German army is at the gates of Paris."⁷²

Hiddessen's raid started a mini-bombing campaign as individual Taube pilots visited the city ten times between 30 August and 12 October. These raids did not cause the public panic many prewar visionaries predicted. Despite eleven deaths, most Parisians considered the raids a spectacle and jockeyed for positions to watch the aircraft drop their bombs.

The reality of these early raids was that they were not part of any organized effort. For their part, the Germans likely saw them as a diversion to keep pilot morale high during dangerous reconnaissance missions. Meanwhile, the French and British were too involved in the Battle of the Marne to think much about single aircraft raids. All sides were too engrossed in the all-consuming early battles on the western front to consider strategic bombing.

This situation in France began to change after the Battle of the Marne. Once the German race to the sea was halted and trench lines established, aviation units had more freedom to return to prewar doctrines. The first such effort was by the British RNAS. While the First Lord of the Admiralty Winston Churchill had long been concerned over the Zeppelin threat, this new stage of the war provide the opening he needed to launch the first RNAS long-range aerial attacks against their bases. With the bulk of the RFC in France, the British government gave the Navy the task of defending English airspace. Using his vision of the best defense is a good offense, Churchill proposed controlling the air for 100 miles around the

⁷² Cross, *The Bombers*, 10.

RNAS base at Dunkirk and attacking the zeppelin sheds as the best means of stopping German air raids.⁷³

Despite Churchill's plans, for much of August and September the overwhelming needs of the ground forces required the RNAS to lend its full support to the ground effort. Even when the Navy could deviate from Army requirements, greater priorities meant naval aircraft targeted submarine pens and port facilities. It was not until the end of September that the RNAS turned its bombers towards the zeppelins. The service conducted four raids between 22 September and 25 December 1914. The raids on 22 September, 8 October, and 25 December were traditional counterforce missions aimed at destroying zeppelin sheds and the airships inside them. The raid on 21 November targeting the zeppelin factory at Friedrichshafen was more important for strategic bombing. It required the RNAS to move secretly four new single-engine Avro 504s to Belfort on the Swiss border. These aircraft then flew low over Lake Constance, attacked the airship works, damaged a zeppelin under construction, and created a tremendous explosion at the factory's hydrogen gasworks.⁷⁴ Despite the heroic nature of the raid, its true importance lies in the target selection. For the first time, air power attacked an industrial source of an opponent's military power.

This must have seemed like a foreign concept to the RNAS's sister service the RFC. Unlike the RNAS, the RFC's prewar focus on ground support meant the RFC in France had limited long-range assets and capabilities. The Army's decision to take the most experienced officers to France only exacerbated the

⁷³ Morrow, *Great War in the Air*, 80.

⁷⁴ Cross, *The Bombers*, 12-13.

situation. The decision meant mainly inexperienced men filled the critical staff functions needed to grow the RFC.⁷⁵ The task of buying aircraft and training thousands of new pilots rapidly overwhelmed these green staff officers. In the melee of staff work, they all too often ignored issues of technology development, aerial strategy, or even garnering lessons from the front.

Accordingly, British historian Neville Jones describes this early era as critical for strategic bombing. On one hand, the RNAS laid a foundation capable of growing to meet the needs of strategic bombing in the later stages of the war. On the other, the RFC failed to set a solid foundation for future operations. Failure to collect lessons from the front meant delays in technology, organization, and doctrine change, which created long-term problems for the RFC.

The First Strategic Bombing Campaigns, 1915

While the story of strategic bombing in 1914 revolved around the British RNAS, 1915 saw the French and then the Germans take the lead. Their air forces introduced new technologies, organizational schemes, and planning methodologies into strategic bombing. In doing so, they added to the foundation laid in the prewar era and tested by the RNAS.

In late 1914, the new French Director of Aeronautics Col. Edouard Bares envisioned a specially designed air unit focused on strategic attack. The result was Groupe de Bombardment no.1 (GB 1) consisting of eighteen single pusher engine Voisin bombers divided into three escadrilles placed under the direct

⁷⁵ Jones, *Strategic Bombing*, 51.

control of the French Commander in Chief General Joffre.⁷⁶ Here the early French efforts to garner senior leader experience with aviation paid off. Joffre's background on the 1905 aviation commission opened him to new air power ideas and he supported Bares's concept to use the group to strike German communications and industry. With the full support and protection of Joffre, GB 1 flew its first mission against the railway station at Freiburg on 4 December 1914.

While this was an important first for French strategic bombing, Bares must have understood that for bombing to succeed it needed a well-thought-out targeting strategy. This is evidenced by the new strategic campaign plan for 1915 he built in December and January. The heart of his plan was a target selection model based on weighing a target's importance against its vulnerability to French raids.⁷⁷ This refinement proved the most lasting part of Bares's plan as it counterbalanced the need to strike critical industries with the reality of limited aerial resources. Perhaps more important, it afforded a means to modify priorities as new technologies made their way to the battlefield.

Joffre approved the plan in late January and even went one step further and earmarked twenty-one out of the planned seventy-one new escadrilles for 1915 as bomber units. Thus, GB 2 came into existence in January and GB 3 in March.⁷⁸ This expanded force conducted raids on primarily chemical and iron works in Karlsruhe, Trier, and Saarbrücken throughout 1915. Initially, the French met with a modicum of success, but their Voisin bombers proved difficult to

⁷⁶ Cross, *The Bombers*, 15.

⁷⁷ *Ibid.*, 16.

⁷⁸ *Ibid.*, 16.

navigate and lacked adequate bombsights, often missing their intended targets by miles. Moreover, as the Germans learned the art of aerial defense, French aircraft losses mounted. By late 1915, the French turned to night bombing and limited their efforts.

Historian John Morrow best sums up the early French strategic bombing campaign: “Aware that the war was becoming a conflict of material, GQC selected industrial targets for a strategic bombing campaign intended to shorten the war. Unfortunately, their simple and robust Voisin aircraft, modified artillery shell bombs, and primitive techniques proved unsuitable.”⁷⁹ Still, the French campaign added to the foundation of strategic bombing that future advocates built upon. This is especially true for Bares’s targeting scheme, which survived into future British and American strategic campaign plans.

The French were not the only nation to set their sights on strategic bombing. By late 1914, the German military turned its attention to prewar thoughts of zeppelins terrorizing French and British cities. Initially, the Kaiser resisted these efforts. He feared killing a member of the British royal family or destroying an important historical site.⁸⁰ The French campaign against German cities that started in December helped change his mind. After a particularly strong raid against Freiburg, the Kaiser finally relented. On 15 January 1915, he gave permission to target the British coastal ports, but in this escalating cycle of violence, London could not remain unscathed for long. Finally, in an Imperial Order of 12 February, the Kaiser designated the London docks as a valid military

⁷⁹ Morrow, *Great War in the Air*, 93.

⁸⁰ Douglas H. Robinson, *The Zeppelin in Combat: A History of the German Naval Airship Division, 1912-1918* (Seattle: University of Washington Press, 1980), 49-50.

target. Almost immediately, the German Naval Airship Division mounted a mission with London as its target, but weather precluded its success. It was not until 31 May that zeppelin *LZ38* finally reached the city, dropping thirty small bombs and ninety incendiary devices in the northeast of London.⁸¹

This attack started a series of nineteen raids over the remainder of the year that dropped thirty-seven tons of bombs and killing 209 people. The year 1916 started even better for the Germans. On 31 January, nine zeppelins converged over Liverpool. While the bombing produced little in physical destruction, it had two important psychological affects. In Germany, it enabled the leader of the Naval Airship Division Capt. Peter Strasser to convince the Kaiser that his zeppelins could overpower Britain if he could only solve problems with navigation and bombing. Hence, at a critical moment, Germany continued to split its limited resources between airships and airplanes. On the other side of the North Sea, the zeppelin raids caused widespread panic among many night-shift workers who refused to come to work for up to a week.⁸² The threat to war production focused the British government and military on the morale effects of bombing. Perhaps, this early German campaign even ingrained a particular significance for the morale aspect of strategic bombing in the British psyche.

Finally, 1915 saw a small, but important foray by the Italians. When Italy joined the war on 23 May, it was the only nation with an airplane specifically designed for long-range bombing, the three-engine Caproni Ca-1.⁸³ Yet, the

⁸¹ *Ibid.*, 95.

⁸² Cross, *The Bombers*, 24.

⁸³ Despite the Ilya Mouromets preceding the Ca-1, the IM was originally designed as a passenger plane and later converted to a long-range bomber.

initial push for ground support overwhelmed calls for strategic bombing. For most of their first year in the war, the big Capronis flew ground support and reconnaissance missions. This slowly started to change in the late summer of 1915, mainly through the efforts of Giulio Douhet.

Born near Naples in 1869, Douhet entered the Italian Army as an artillery officer in 1888. Throughout his career, Douhet maintained a precarious position. On one hand, he demonstrated a keen intellect advocating the benefits of increased mechanization. On the other, his constant public critiques of military planning and funding created tensions with his superiors. The result was a mixed record of prestigious commands and menial staff jobs.⁸⁴

Perhaps these mixed results led to Douhet's fascination with aviation in 1908. While still attached to the artillery, he wrote a series of articles advocating air power as a powerful military tool. When Italy formed its first aviation element in 1910, Douhet used his connections to secure a transfer to the newly formed Aviation Battalion in late 1912.⁸⁵ While in the battalion, he continued to learn about air power and wrote articles advocating for more funding. By 1914, Douhet had succeeded to command the battalion, where he took a great interest in strategic bombing. He worked feverishly on a plan calling for large multicrew Caproni bombers to operate independently against industrial targets. Unfortunately for Douhet, his personality got in the way of his dreams. After he overreached his authority by authorizing the purchase of Caproni bombers, the

⁸⁴ Frank J. Cappelluti, "The Life and Thought of Giulio Douhet" (PhD dissertation, Rutgers University, 1967), 3.

⁸⁵ *Ibid.*, 14.

Italian Army removed Douhet from command and exiled him as the Chief of Staff for the Lombardy Division.

Before departing from the Aviation Battalion, Douhet wrote a series of articles in *Gazzetta del Popolo* advocating for a strategic bombing campaign to destroy Austria-Hungary's industrial capability and will to resist.⁸⁶ While these ideas did not capture the attention of the Italian military in 1915, they did work their way into the growing cross-pollination of Allied ideas on strategic bombing. Douhet addressed some of the key problems early French and British bombing efforts faced. Both nations realized small single or two-seat bomber crews became overwhelmed with navigation, bomb aiming, and defense during long missions, leading to poor results. Douhet suggested a dedicated large multicrew bomber like the Caproni could solve this problem.

In this way, 1915 proved a critical first step in strategic bombing. The French took their first tentative steps towards strategic bombing, while the Germans attempted their own campaign with their zeppelin fleet. The results of both campaigns were minor, but the doctrinal changes were long lasting. The Bares targeting strategy became a foundational element present in all future French, British, and American strategic campaigns. Meanwhile, the Germans learned from their early efforts and set in place a system to prepare their air services for a new and larger effort against England. Even the British, who did not conduct a strategic campaign in 1915, learned from the German raids. Their experience with panics in the wake of zeppelin raids raised the importance of morale effects in their future strategic bombing plans. Finally, the Italians

⁸⁶ Morrow, *Great War in the Air*, 129.

provided an important element by theorizing that large multicrew bombers were needed for successful strategic operations.

Verdun and the Somme Intrude

What started as a promising year for strategic bombing advocates quickly turned into a setback. First, the lackluster results from French and German bombing efforts of 1915 caused many military and political leaders to turn away from strategic bombing as a method to win the war quickly. Next, the major battles of Verdun and the Somme once again required a full commitment of military resources, leaving little available for strategic bombing. Hence, 1916 was mostly a retreat for strategic bombing advocates. Still, there were some success stories such as the British RNAS's 3 Wing, which shaped bombing technology, organization, and doctrine.

The year started with a difficult situation for the French. On 21 February 1916, the Germans launched their effort to bleed the French army white at Verdun. As part of the offensive, the German air service conducted a massive aerial assault designed to seize the initiative in the skies. The French knew they had to act swiftly. On 29 February, the French aviation commander Bares decided to concentrate the French air forces at Verdun to win back the air. This included the formation of fifteen elite fighter squadrons.⁸⁷

Verdun became a killing ground for French pilots just as it was for the common Poilu. This caused an increasing draw on French resources and its aviation industry. By June 1916, the French amassed 1,120 aircraft in the Verdun

⁸⁷ Ibid., 132-33.

sector.⁸⁸ Unfortunately for them, the Germans fielded a similar force. In the daily battles over the trenches, the French lost pilots and airplanes at almost unsustainable rates. To meet this need, the French modified their production priorities. Whereas 1915 saw observation and bomber aircraft as the greatest priority, in the spring of 1916 the French changed to observation and pursuit.

This does not mean strategic bombing stopped completely. GB 1 and GB 2 continued raids on German economic targets in early 1916, striking the railroad station at Metz, ironworks in Lorraine, and munitions factories in the Saar region. Yet, as Verdun consumed more resources and then the Somme offensive started, the French strategic bomber units found themselves increasingly pulled out for tactical support. The final straw occurred on 12 October 1916. On that day, the French conducted a joint raid with the RNAS against the Mauser factory at Oberndorf. Losses from the mission were high, with seven of twenty-four aircraft lost.⁸⁹ With factories unable to make up the losses in bombers due to increased pursuit production, the French turned to night bombing for the remainder of the year, despite its poor accuracy.

One major lesson for the French in 1916 was the need for a dedicated strategic bomber. Their two-seat Voisin bombers lacked the range and sturdiness to penetrate enemy defenses and bomb strategic targets. Meanwhile, the Caproni bombers built under license from Italy proved too underpowered for sustained combat operations.⁹⁰ In this way, a failure to advance strategic bombing technology combined with a decrease in priority to push French strategic bombing

⁸⁸ Ibid., 135.

⁸⁹ Cross, *The Bombers*, 34.

⁹⁰ Morrow, *Great War in the Air*, 138.

to ineffective night raids. In doing so, technology also shaped thinking about air power. While there were still advocates of strategic bombing in France, the trials of 1916 focused French politicians and military leaders on the dire need to win air superiority over the front for successful ground operations. In this environment, strategic bombing suffered from a paucity of resources and a low priority.

Meanwhile across the Channel, the early bombing efforts of the RNAS seemed to increase the prospects for a British strategic bombing campaign. New long-range aircraft like the Sopwith 1 ½ Strutter and more accurate bombsights offered greater capabilities. Additionally, growing cooperation with the French offered the prospect for a joint strategic campaign. Finally, the stand up of a purely strategic bombing wing with British Expeditionary Force Commander Gen. Douglas Haig's expressed blessing seemed to indicate that political will might finally exist for a large bombing effort.

Unfortunately for British bombing advocates, the war also intervened to hinder their plans. Just as with the French at Verdun, the Somme became an all-consuming vortex, which captured the full might of the British military. In this all-out effort, strategic bombing not only became a low priority, but a cause for concern. Simmering rivalries between the RNAS and RFC came to the surface in the fight for resources against the backdrop of the Somme. In this interservice conflict, critical technology, organization, and doctrinal issues came to the forefront that had to be addressed.

The RFC spent the early part of 1916 preparing for the Somme offensive. Virtually all of its attention was focused on building up forces, preparing the

battlefield through interdiction missions, and conducting reconnaissance of German activities. This left strategic bombing to the RNAS, which was ready to expand its antizeppelin campaign into a much larger strategic bombing effort.

In May 1916, the British Admiralty ordered Capt. W. L. Elder to stand up RNAS 3 Wing at Luxeuil twenty-five miles northwest of Belfort. Elder quickly realized that this location did not meet the needs of the new wing, so he convinced the Admiralty to move the wing to Ochey near Nancy in late June.⁹¹ This new locations placed the wing within range of many industrial targets in western Germany, but it also put it in the middle of many French and RFC bases.

The idea of a sixty-aircraft naval wing operating the new Sopwith 1 ½ Strutters in central France was likely to touch sensitive nerves in the RFC. The Admiralty fully understood the danger and only allowed the unit to become operational after the Navy obtained the consent of the BEF Commander. On 3 June 1916, GHQ released this statement, “The C-in-C sees no need to object in any way to long distance bombing being undertaken by the Royal Naval Air Service, with the proviso that any such bombing undertaken in the area behind the German lines in front of the British Army shall be subject to his concurrence.”⁹²

Despite General Haig’s official acceptance of 3 Wing, the RNAS effort faced opposition from both internal and external sources. The external opposition came from the expected source, the RFC. Leading the opposition was Sir David Henderson, the former commander of the RFC. He saw 3 Wing as a direct threat competing for valuable aviation resources. In his current position as Director-

⁹¹ Cross, *The Bombers*, 33.

⁹² Policy Statement on Air Bombing, GHQ, 3 June 1916, AIR 1/978, 204/5/1139, NAUK.

General of Military Aeronautics in the war office, Henderson viewed 3 Wing as a grave threat to his resources. Consequently, he used his connections to the Joint War Air Committee (JWAC) to challenge the RNAS plans.

The JWAC was a government committee designed to limit overlap and waste in the often-competing army and naval air forces. Henderson seized on the concept of overlap when he sent a memorandum to the JWAC on 4 February 1916, stressing that the competition for long-range engines was hurting the RFC's ability to produce observation aircraft needed for the Somme offensive.⁹³ He followed up this complaint with two other objections that summer arguing that long-range bombing operations from land was an RFC mission and a duplication of effort.

The internal opposition to 3 Wing came from an unexpected source. The commander of the Dover Patrol, Adm. R. H. Bacon, also voiced opposition to the plan. He wrote on 1 June 1916, "warfare in the air, to be useful, has to be entirely subservient to warfare on land or sea"⁹⁴ Because Admiral Bacon controlled all naval activities at Dunkirk, 3 Wing could only expect limited support from the primary British naval base in France.

Bacon's disapproval could not have occurred at a worse time. The start of the Somme offensive on 1 July created a logistical and organizational nightmare for 3 Wing. Still in the process of standing up the wing, Captain Elder found himself without a strong supporting command just when he needed it most. Instead, he had to contend with three major problems and no easy solutions.

⁹³ Jones, *Strategic Bombing*, 85.

⁹⁴ "Memorandum in response to Captain C. L. Lambe's Assessment on Air Warfare," Admiral R. H. Bacon, 1 June 1916. AIR 1/633, 17/122/90, NAUK.

First, in order to gain basing rights and encourage cooperation, the Admiralty had agreed to provide one third of the first sixty aircraft to arrive to the French to build a bomber force to work with 3 Wing.⁹⁵ Unfortunately for the British, this plan backfired on them. The Sopwith 1 ½ Strutter proved itself not only a good long-range bomber, but also a good observation and tactical bombing aircraft. Hence, the Army began to take an ever-increasing number of the new deliveries to France. This combined with the French agreement to create a critical aircraft shortage in 3 Wing and delayed their operations status until October.

The second problem was the lack of a campaign plan. As the RNAS did not have a strategic bombing command structure, there was no higher staff to develop targeting priorities, coordinate operations, or evaluate mission results. Therefore, the Admiralty agreed to place 3 Wing under the guidance of the French, who had developed a staff support structure to command the operations of their bombardment groups.⁹⁶

This was not necessarily a bad decision. The French had more experience than the British in commanding and controlling larger bomber units. In addition, their bombing campaign plan of September 1916 was ahead of its time. It called for targeting industrial categories based on their importance to the German war effort. In this way, French planners could weigh the relative importance of iron, chemical, or munitions industries without the added confusion of trying to rank order individual factories. Finally, the French planners continued Bares's system of weighing the importance of individual targets versus the risk of attacking them.

⁹⁵ Jones, *Strategic Bombing*, 104.

⁹⁶ *Ibid.*, 107.

In the end, the French system allowed them and the British to make rational choices on which sites to attack that would hurt the German economy the most, while reducing the risk to their own severely underequipped bombing forces.

The final problem for the RNAS was the loss of governmental support. Despite initial inferiority in numbers, the Germans quickly reinforced their aerial forces in the Somme region. By late 1916, casualties over the Somme became critical with the British recording the loss of 782 aircraft from July to November; almost twice the number they started the campaign with.⁹⁷ With the RFC constantly arguing for greater priority in aircraft production, the British government disbanded the JWAC in October and created the new Air Board under Lord George Nathaniel Curzon. The government tasked this new committee with determining the priority of aircraft production, the best strategy for military aviation, and the structure it should use.⁹⁸

The Air Board set about its work immediately. Unfortunately, with the prohibitive attrition rates it was difficult for any government organization to limit assets to the RFC. After receiving a memorandum from General Haig describing the immense need for aircraft replacements for the RFC, the board ruled against the Admiralty and gave production priority to the Army. The board even went one step further; it recommended that the Navy lend both aircraft and pilots to the RFC during this time of crisis. Not wanting to appear adversarial, the Admiralty ordered 3 Wing to provide nineteen pilots and six aircraft to augment the RFC.⁹⁹

⁹⁷ Morrow, *Great War in the Air*, 173.

⁹⁸ Jones, *Strategic Bombing*, 90.

⁹⁹ Morrow, *Great War in the Air*, 175-76.

This double whammy not only slowed the arrival of new aircraft at 3 Wing, but also removed critical assets already in place.

Still, 3 Wing's story is not one of failure. Despite the delays and setbacks the wing achieved operational successes. By the time they flew their last mission on 14 April 1917, the wing's pilots had conducted eighteen raids, including four night missions with the new four-engine Handley Page 0/100 bombers.¹⁰⁰ While these numbers were low compared to the fifty-two tactical raids conducted from Dunkirk in the same period, 3 Wing had many more logistical, distance, and command issues to overcome than other units.

A better methodology for measuring the wing's success is to examine its contribution to the advancement of strategic bombing technology, organization, and doctrine. In technology, 3 Wing operations reinforced the need for dedicated multicrew bombers. The use of the Handley Page showcased the advantages offered by large multicrew aircraft for improved navigation, bombing accuracy, and defensive capabilities. Meanwhile, the wing's use of the Sopwith 1 ½ Strutter demonstrated the overwhelming requirement for a two-seat daylight bomber, leading to the highly capable DH 4. Organizationally, 3 Wing highlighted the need for an independent bomber force. The operational delays caused by logistics and inter service fighting hampered the wing's operations. When government attention once again turned towards strategic bombing as a priority, the lessons from 3 Wing drove their thinking. Finally, the wing's work with the French ingrained their target selection and prioritization schemes into British doctrine.

¹⁰⁰ Cross, *The Bombers*, 36.

When the time came to develop a British bombing plan, French concepts provided guidance.

In this way, 1916 saw the tremendous cost of two massive ground offensives intervene to put strategic bombing on the back burner in all nations. The French, caught off guard at Verdun, rapidly switched their priority to meet the German onslaught. The British, on the other hand, meticulously prepared for the Somme, but a combination of Trenchard's aggressive offensive plan and poor aircraft technology caused extremely high attrition rates. In this light, British strategic bombing fell to an under-supported wing operating without strategic guidance. Finally, the Germans were overwhelmed with the tactical air war and largely ignored strategic campaigns outside of a few raids.

Still, the year was not a total loss for strategic bombing. The hard-won lessons the previous year remained intact and survived until the bombing's renewal in 1917. Additionally, the British learned important lessons through the limited operations of 3 Wing that shaped British aviation strategy when the government once again called on its long-range bomber forces.

The Renewal of Strategic Bombing, 1917

Even though the great offensives of 1916 exhausted all sides, the relentless attrition continued into 1917. All air forces prepared themselves for even more sacrifice as the war dragged on without an end in sight. Nevertheless, change was in the wind. On the allied side, April brought a tremendous psychological setback for the French when their army mutinied after the abortive attack on Chemin des Dames. Meanwhile, the entry of the Americans into the war on 6 April 1917

seemed finally to offer the hope of overcoming aircraft shortages. On the other side, the Germans understood they could not win a war of attrition once the Americans arrived in force. Therefore, they must strike at the very heart of the allied alliance before the full weight of the Americans became a factor. On the ground this translated into preparations for a new offensive, but in the air it meant trying to knock the British out of the war once and for all.

Throughout 1916, the German Navy never forgot about its efforts to attack Britain directly. Led by the energetic Chief of the Naval Airship Division, Capt. Peter Strasser, the Navy continually pushed for larger zeppelins and more raids on England. Following the success of his Liverpool raid on 31 January 1916, Strasser proposed a new strategic effort against England to be carried out by larger and higher-flying zeppelins.¹⁰¹ Unfortunately for Strasser, a combination of Verdun, the Somme, and Jutland disrupted his plans and required the services of many of his zeppelins.

By the autumn of 1916, the situation started to change. With the High Seas Fleet unable to break the British blockade and the German Army locked in a battle of attrition, the zeppelin seemed to offer a potential means for the Germans to break the stalemate. Strasser seized on the moment when he wrote to Commander of the High Seas Fleet Adm. Reinhard Scheer on 10 August 1916 that, “the performance of the big airships has reinforced my conviction that England can be over come by means of airships.”¹⁰² With Scheer’s full approval, Strasser set out on one last big effort to break the British economy and will.

¹⁰¹ Robinson, *Zeppelin in Combat*, 128-29.

¹⁰² *Ibid.*, 165.

Unfortunately for the zeppelin crews, Britain had also spent 1916 working on improvements to its air defense system. Better tracking, more capable interceptors, and new incendiary bullets drew a heavy toll on the attackers. Of the 187 zeppelins launched against England that year, only 111 reached their targets. Meanwhile, during the height of Strasser's all-out offensive six costly zeppelins had been lost in combat.¹⁰³

More important than the losses was the successful testing of the new Gotha bomber in the autumn of 1916. These new twin-engine long-range bombers offered a means to strike England without the cost or dangers of vulnerable slow-flying zeppelins. The German Army decided to invest its future in this new technology and officially cancelled its zeppelin program in January 1917.

With this change in thinking, the commander of the German Air Service, General Ernst von Hoeppner proposed to create a thirty-aircraft bombing squadron of Gotha bombers for a strategic campaign against Britain. The German high command, or OHL, saw value in the plan and ordered Capt. Ernst Brandenburg to establish Kagohl 3, the England Squadron, in February 1917 at St. Denis Westrum in Belgium.¹⁰⁴

By May, the squadron was ready for operations. On the twenty-fifth, the unit flew its first mission when twenty-one Gothas targeted London, but were forced to bomb Folkestone due to poor weather. Despite its poor results, the initial raid anticipated a new aerial campaign against London, for which the

¹⁰³ Ibid., 203.

¹⁰⁴ Cross, *The Bombers*, 41.

British were not fully prepared. Lulled into a false sense of security by the dwindling zeppelin raids, the British had relaxed their defenses. This weakness was soon brought home when fourteen Gothas dropped seventy-two bombs on London, killing 168 people. What was perhaps more galling than the deaths from the 13 June raid was that despite launching ninety-two aircraft to intercept the bombers, the British recorded no aerial victories that day.¹⁰⁵

Concern over the losses and seeming impotency of the air defenses led to a public outcry. This demand for increased protection led to the recall of Generals Haig and Trenchard to testify to the cabinet on 20 June 1917. In typical fashion, Trenchard advised that the best defense was to occupy Belgium to push the German bases back beyond the range of the Gotha bombers.¹⁰⁶ Unmoved by his logic, the cabinet ordered Haig to release two pursuit squadrons from the continent to bolster homeland defenses. Trenchard acquiesced, but when no new raids appeared by the end of June he started actions to return the squadrons to the front.

Trenchard's move coincided with a new raid by the Germans, who sent twenty-one Gothas over London on 7 July, causing fifty-four deaths and more than 200,000 pounds in damage.¹⁰⁷ This new round of bombing turned the previous clamor into an uproar. Fear gripped the public in ways that even the government focused on the front could not help but observe. By the summer of 1917, up to 400,000 Londoners left the city or sought nightly air raid shelters.

¹⁰⁵ Harvey B. Tress, *British Strategic Bombing Policy through 1940* (Lewiston: The Edwin Mellen Press, 1988), 34-35.

¹⁰⁶ *Ibid.*, 132.

¹⁰⁷ *Ibid.*, 134.

Even the London newspapers were referring to the Gotha campaign as an aerial siege of the city.¹⁰⁸

The public outcry soon drew action. On 7 August, Prime Minister David Lloyd George appointed a commission under the leadership of the South African soldier and statesman Gen. Jan Smuts to investigate the status of aviation and aerial defenses. The Smuts Commission released two important findings that summer. First, on 19 July 1917, the commission called for a reformation of the aerial defense system. This led to the creation of a single command system integrating observers, command and control, antiaircraft artillery and interceptor aircraft.¹⁰⁹

While this was an important step, the Smuts Commission's second report released on 17 August had greater implications. The report is most famous for recommending the formation of an independent Royal Air Force by combining the resources of the RFC and the RNAS, but it also had a significant effect on strategic bombing. Section seven of the report gave a strategic direction to the new RAF when it said:

The magnitude and significance of the transformation now in progress are not easily realized. It requires some imagination to realize that next summer, while our western front may still be moving forward at a snail's pace in Belgium and France, the air battlefield will be far behind on the Rhine, and that its continuous and intense pressure against the chief industrial centers of the enemy as well as on his lines of communication may form the determining factor in bringing about peace.¹¹⁰

¹⁰⁸ Kennett, *History of Strategic Bombing*, 26.

¹⁰⁹ Reprint of the Smuts report in, H. A. Jones, *The Official History of the War Volume VI: The War in the Air* (Oxford: Clarendon Press, 1937), Appendix II, 2.

¹¹⁰ *Ibid.*, Appendix II, 7.

This report created a firestorm in both the Army and Navy as senior commanders fought to keep control over their own air services. Nonetheless, in the wake of the Gotha raids on London, the public clamored for revenge against the Germans. This attitude filtered into the government, which accepted the Smuts proposal and began work to create an independent RAF with an Army and Navy support mission as well as an independent element to focus on strategic bombing.

As part of the formation of the independent force, the Assistant Director of the Royal Naval Air Service, Capt. Arthur Vyell Vyvyan, asked Lord Hardinge Tiverton to submit a paper on bombing to the newly revamped Air Board describing the best method for the pursuit of a strategic campaign against Germany. As a Royal Navy aviator, Tiverton had served as the armaments officer for 3 Wing during its truncated bombing effort. This was a deceptively important position. With so many officers called to support the RFC, Tiverton's interest in bombing theory led to his selection to work with the French on strategy issues.¹¹¹

In this role, he likely garnered a deep appreciation for Bares's targeting methodology, which he modified to his own needs. Bares's influence is clearly seen in the paper Tiverton submitted to Vyvyan on 2 September 1917. Tiverton recommended creating an independent bomber force based in the Verdun area targeting the critical industrial categories of iron and chemical works in Dusseldorf, Cologne, Mannheim, and the Saar region.¹¹² Even considering the French influence, Tiverton produced a uniquely British vision of a strategic bombing campaign. Most notably, he recommended a

¹¹¹ George K. Williams, "The Shank of the Drill: Americans and Strategical Aviation in the Great War," *The Journal of Strategic Studies* 19 (Sept. 1996): 384.

¹¹² Jones, *Strategic Bombing*, 142-44.

combination of daylight and nighttime operations to maximize physical destruction and morale effects.

In this way, the first half of 1917 saw the rebirth of strategic bombing after the horrendous year of 1916. With a war of attrition settling over the trench lines, all sides sought a new means to bring decision to war. Strategic bombing advocates leapt at the chance to test their theories. While political will did not exist in 1916, the disheartening outlook for the Germans and the reaction to Gotha raids provided a previously unavailable political will to both sides. Even with this newfound incentive, there were still problems to overcome. Logistical and production problems plagued everyone. Additionally, the allies suffered from the question of how to integrate the soon-to-arrive American forces. Still, the future looked promising for strategic bombing during that critical summer of 1917.

Conclusion

Into this maelstrom of aviation growth, new thinking, and political pressures the first American aviators stepped in the late spring of 1917. The British were moving towards an independent RAF, with a strong strategic bombing element. Yet, this was far from a done deal. Just because the Air Board recommended the policy did not mean that the leaders of the former RFC and RNAS would drop their long-held opinions and rivalries. Instead, proponents on both sides of the strategic bombing argument sought support for their ideas in their new allies, the Americans.

Meanwhile, the French and Italians had their own concepts they wanted to stress to the Americans. Hurt by losses in 1916 and mutinies in 1917, the French were more focused on maintaining the morale of their people during that critical summer. Gen.

Maurice Duval, the head of the French Air Service, noted to General Pershing that Britain's bombing plan had "come to draw lightning, which would then strike their host."¹¹³ This reflected the main concern of French political leadership in 1917 that British bombing of German cities would surely lead to German retaliation against French and British cities in an ever-increasing war of terror. Therefore, the French military often guided their American counterparts towards using aviation in a more traditional role of ground support and achieving air superiority.

The Italians still viewed strategic bombing as a possible war-winning strategy, but acknowledged that the distance and terrain in the Alps forbade that strategy with current technology. Still, the Americans could easily use their Caproni bombers to attack German industry from its more suitable bases in eastern France. Hence, early American visitors often received a dual sales pitch for strategic bombing and the Caproni bomber.

In the end, it was left up to a select group of American aviators and strategists to sort through the complex mix of technology, political pressure, and operational lessons. Luckily, the Americans had spent the year between the Mexican Punitive Campaign and their entry into the war preparing just such a group. Men like Billy Mitchell, Raynal Bolling, and Edgar Gorrell soon found themselves at the center of a grand decision. It became their role to select the best elements of each nation's aerial strategy and merge them into a uniquely American doctrine.

¹¹³ Kennett, *History of Strategic Bombing*, 29.

Chapter 4

The Birth of American Strategic Bombing Theory

The latter half of 1917 proved pivotal for the United States, its Army, and especially its Air Service. The technological, organizational, and doctrinal foundations set between 1903 to 1916 came home to roost with a vengeance as the United States entered the war. Poor technological planning meant that the Air Service never had the numbers of aircraft they needed, especially lower-priority bomber aircraft. Organizationally, inexperienced junior officers, hurriedly promoted to senior leadership positions, often found themselves with little or no guidance while making important decisions. A lack of a solid doctrinal foundation compounded the issue, frequently splintering the air service's plans. Finally, a separate service culture made coordination between these newly promoted flyers and senior ground commanders a difficult process at best. All these issues combined to create confusion, inefficiencies, and misdirection that affected the size, structure, and missions of the rapidly expanding air service..

Adding to the perplexity was a complex situation requiring the integration of multiple high priorities. Establishing the new American Expeditionary Force (AEF) Air Service in Europe required the production of thousands of combat aircraft, the training of massive numbers of new pilots, and, most important, the development of strategy and tactics. It is not unexpected, then, that in this situation confusion, redundancy, and uncertainty seemed to rule the day. Still, the actions taken after the Mexican Punitive Expedition alleviated the worst of the effects. Bright, energetic, and highly motivated

young aviators worked tirelessly to achieve success in the critical deployment and training phases of 1917.

A quotation from the Commander of the AEF, Gen. John Pershing, best reflects the AEF Air Service staff during those critical months. When hiring Maj. Gen. Mason Patrick to be the new AEF Air Service Commander in May 1918, Pershing indicated to Patrick that the Air Service's senior staff were "good men running around in circles."¹¹⁴ This quotation highlights both the frustration and empathy that Army leaders felt toward the Air Service. These were good men who knew how to fly, but lacked the experience required to turn their ideas about air power into viable military plans.

Perhaps no other element of the AEF Air Service felt the sting of this situation as much as the proponents of long-range bombing. As an only lightly studied offshoot of aerial strategy in the pre-1917 American Air Service, bombing faced an uphill battle to gain traction in the strategy and planning worlds. Nevertheless, it had many supporters both within the American Army and among its new European allies. Unfortunately, the lack of an agreed-upon bombing doctrine as America entered the war meant that many different visionaries advocated for their own opinions. Aerial bombing thought diverged into two distinct areas: strategical and strategic bombing. Historians often overlook this slight variance, but their different connotations contain one of the core strategy debates guiding American bombing theory development. In the end, the resulting American concept for strategic bombing was not a choice between strategical or strategic, but represented an amalgamation of these internal and external ideas, influenced by the realities of war.

¹¹⁴ Mason Patrick, *The United States in the Air* (Garden City, NJ: Doubleday, 1928), 7.

Starting from Scratch

As the United States entered World War I, the debate swirled over what would be the role of American air power. As no commonly held doctrine existed, the door was open to many personalities and influences. Aerial bombing was often far from the minds of the political and military planners working to determine the size, technology, and mission of the soon to be formed AEF Air Service. The idea of using large dedicated bombing aircraft to hinder an enemy's ability to prosecute a war was not completely new to the close-knit community of Signal Corps aviators. Still, it was going to be a long road to overcome the traditional Army vision of air power.

Aviation was always a secondary consideration for the U.S. Army. Aircraft had a role to play, but that role was subordinate to the primary functions of the infantry, artillery, and cavalry. The Army's gospel on military operations, the Field Service Regulation of 1914, cemented aviation's supporting role. While a full section of the manual discussed aviation, its missions were limited to reconnaissance, observation, and aerial artillery spotting. The only direct combat role for aviation was a single sentence in section 31: "Aeroplanes are also used to prevent hostile aerial reconnaissance."¹¹⁵

This should not be surprising, though. In 1914, most European armies also thought aviation's primary role would be in observation and artillery support. Few theorists saw an independent combat mission for these often-fragile aircraft. The key difference between Europe and America was the combat experience of World War I. In Europe, necessity forced pilots, air services, and eventually the armies themselves to think differently about air power. This was especially true in the critical summer of 1917 during the reaction to the German Gotha raids on London. The massive public outcry for

¹¹⁵ War Department, *Field Service Regulations*, United States Army, 1914.

revenge bombing against German cities gave the British advocates of strategic bombing an opening as the British government considered the possibilities of this new type of warfare.

America's path was different. Isolated from the context of fighting in Europe, Army doctrine inculcated itself deep into military thinking. This is evident in the Chief of the Signal Corps Brig. Gen. George P. Scriven's testimony before the House Military Affairs Committee in December 1914. As Scriven defended the aviation budget request, the Democratic Committee Chairman, James Hays of Virginia, asked him if aircraft had developed any practical value for offensive military purposes. Scriven responded, "No, sir, I believe not." He then went on to describe how recent tests in San Diego showed U.S. aircraft could carry only about 120 pounds of bombs and had difficulty hitting selected targets. Scriven ended this portion of his testimony with a statement that doomed American bombing for the next two years: "nor do I wish to be understood as saying that in a few isolated cases bomb dropping may not do harm, but only that as a fighting machine the aeroplane has not justified its existence, except aeroplane against other aircraft."¹¹⁶ With this simple statement, Scriven effectively rank ordered U.S. air power missions as observation first, pursuit second, and bombing third.

As the conflict in Europe evolved, even the Americans could not ignore the rapidly developing air war. In March 1915, the Army War College started a study on the proper size, constitution, and missions of the Army should it enter World War I. The military aviation section of this report demonstrates that thinking on air power was slowly changing. While the study still relegated bombing to a tertiary role, for the first

¹¹⁶ Maurer Maurer, ed., *U.S. Air Service in World War I* (Washington, DC: Office of Air Force History, 1978), 29.

time it recommended a dedicated bomber force. Section sixteen of the study called on America to adopt the European model where “a special type of aeroplane has been developed for dropping bombs, these machines are sent in flotillas of from 30 to 60 machines. Against railways, roads, bridges, and hostile parks of various kinds, this method of attack has given considerable success.”¹¹⁷

This slow evolution of doctrine would have likely continued except for the entry of the United States into World War I in April 1917. The rapid pace of military expansion quickly changed the dynamics of the doctrinal debate. The initial problem for air power planners seemed to be where to start. There simply was no accepted concept for the mission, size, or structure of the soon to be created AEF Air Service. That changed on 24 May 1917 when President Woodrow Wilson received a telegram from French Premier Alexandre Ribot spelling out the French vision for American air power. Premier Ribot’s cable is important enough that it deserves a full review.

It is desired that in order to cooperate with French aeronautics the American government should adopt the following program: The formation of a Flying Corps of 4,500 aeroplanes to be sent to the French front during the campaign of 1918. 2,000 planes should be constructed each month as well as 4,000 engines by the American factories. This is to say that during the first six months of 1918, 16,500 aeroplanes (of the latest type) and 30,000 engines will have to be built. The French government is anxious to know if the American government accepts this proposition, which would allow the allies to win supremacy of the air.¹¹⁸

This request from the French soon became the guiding principle behind American air power planning. On 3 April 1917, the Secretaries of the Navy, the War Department, and the Chairman of the National Advisory Committee on Aeronautics came together to create the Joint Army-Navy Technical Board. This six-person committee was tasked to

¹¹⁷ War College Division, *Military Aviation Study* (Washington, DC, 11 September 1915).

¹¹⁸ Cable from Premier Ribot to French Ambassador in Washington, 23 May 1917, BAP Hist. box 6, 311.2, National Archives.

coordinate the development of aircraft between the Army and the Navy.¹¹⁹ Without any other guidance, the board decided to accept Ribot's request as a starting point for planning the size and makeup of the American air contingent.

There was one major flaw with using the French request though. The Ribot's cable, at least as delivered, did not address the doctrinal roles for the American air forces. This is an interesting quirk of history as Ribot's cable was based on a French General Staff study of the structure of American air forces required to win the war. In an almost mirror image of accepted American policy, the French study prioritized aviation requirements as first aircraft to search for submarines, then pursuit and bombing aircraft for offensive operations, and only then observation and artillery spotting aircraft for direct ground support.¹²⁰ Had the strategy portions of the French study been included in Ribot's cable, perhaps American doctrinal thought would have developed differently.

Instead, as historian I. B. Holley suggests, Ribot likely relied more on a clarifying memorandum submitted by the Commander of the French Armies of the Northeast to build his cable. In this memorandum, the commander recommended that the American offensive group in the General Staff study consist of thirty pursuit groups and thirty bomber groups, or about 4,320 aircraft.¹²¹ It is highly likely that Ribot simply borrowed this easily defined number to base his request for United States production. Unfortunately, without the corresponding General Staff Study, the doctrinal guidance became lost in the transatlantic communication.

¹¹⁹ I. B. Holley, *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States during World War I: A Study in the Relationship of Technological Advances, Military Doctrine, and the Development of Weapons* (Washington, DC: Office of Air Force History, 1953), 40.

¹²⁰ Contribution to aviation to be demanded of the United States, translation from French Army General Staff Study, April 1917, BAP Hist. 311.2, box 6, National Archives.

¹²¹ Holley, *Ideas and Weapons*, 43.

Thus, on 29 May 1917, the Joint Army-Navy Technical Board sent a production plan to the Secretaries of War and the Navy for approval. Lacking any direct guidance on production priorities, the board developed a 3:5:1 ratio of observation to pursuit to bomber aircraft.¹²² This decision had two major ramifications for the development of strategic bombing. First, it formalized the long-held Army vision of air power dominated by observation and pursuit missions. Next, by prioritizing bomber production at such a low ratio, the board ensured that any delays in aircraft construction would exponentially affect bomber deliveries to combat units.

Luckily there was one bright spot for the future of aerial bombing in the board's process. It introduced a newly minted Capt. Edgar S. Gorrell to doctrinal debates. Freshly returned from his MIT masters program, Gorrell's status as one of the few aeronautical engineers in the military made him the ideal choice for an Air Service member of the Joint Army-Navy Technical Board. The board's president and Gorrell's old squadron commander, Benjamin Foulois, quickly secured his posting to one of the Air Service's positions. In this role Gorrell became an integral part of the stateside planning effort, while gaining an appreciation of the production numbers and their lack of doctrinal basis.

In the end, the Joint Army-Navy Technical Board's recommendation was the best vision for American aviation expansion available at the time. It soon became the core of the War Department's aviation appropriation request for \$640 million. Considering this bill was the then largest single amount ever approved by Congress, the Army sweetened the deal with assurances that these 4,500 new aircraft would be at the front by May 1918.

¹²² Report of the Joint Army-Navy Technical Aircraft Board, 29 May 1917, Sec A11, in Gorrell History, 11-12.

In this light, the House approved the bill on 14 July, the Senate followed suit on the twenty-first, and the president signed it on the twenty-fourth of July.¹²³

While the production numbers were sufficient for budgeting, they told little of how America planned to build or use those airplanes. The Signal Corps rapidly saw the problem and took steps to fix it. On 16 May 1917, the Council on National Defense authorized the creation of the Aircraft Production Board to advise and aid in the coordination between the Army and the civilian aircraft industry. Its first chairman, Howard E. Coffin, soon saw to it that the board was moved under the Army with the mission of advising the Signal Corps on aviation technology.¹²⁴ Coffin started his professional career in the automobile industry, gaining a reputation for standardizing material and production processes. With this background, he quickly identified the need to produce only a few aircraft types if American industry was to have a reasonable chance of making the 4,500 aircraft production goal.

As the Aircraft Production Board and the Signal Corps leadership began to ponder which aircraft types to produce, the need for aviation strategy to drive those choices became apparent. Unfortunately, the guidance that existed from the Joint Army-Navy Technical Board and the old Army War College study were of limited value. Therefore, key leaders often advocated their own visions for American air power.

One such example of this occurred in a joint interview on 6 June 1917 by the *Sun Newspaper* with Brigadier General Squier and Howard Coffin. While Coffin limited his statements to the industrial might American could bring to the war, Squier discussed his vision of how American air power would help win the war. Most of the article followed

¹²³ Maurer, *U.S. Air Service in World War I*, 105.

¹²⁴ Charles C. Mooney and Martha E. Layman, "Organization of Military Aeronautics, 1907-1935," Army Air Forces Historical Study No. 25 (1944), accessed online at AFHRA.AF.MIL, 28-29.

the Army doctrinal view, as he described the important missions of observation and pursuit. Then, he included a small, but telling discussion on the potential role bombing could play in winning the war. He indicated “the Allies so far have not been able to develop and use bombing machines to the needed extent because they could not secure enough airplanes to carry out this work on a great scale.” This was not an insurmountable issue, though. Squier went on to say “that once furnished with all necessary numbers of airmen and aircraft, we (America) can speed victory by carrying out bombing and observation work unhindered.”¹²⁵ This newspaper article is evidence that the growing acceptance of bombing as an offensive tool was starting to inculcate into key aviation leaders inside the American Army.

Given the contrast between their own thinking and the official Army position, the Signal Corps leaders understood they needed to know more about the European air war before deciding exactly what types of aircraft they would need. Therefore, the Signal Corps coordinated with the Aircraft Production Board to sponsor a fact-finding mission to Europe. This was not an unusual step, as even before General Pershing left for Europe teams of U.S. Army officers were en route to the continent to study the situation, make recommendations, and start the process of buying supplies and equipment.

The Army airmen joined in the fact-finding process when the Secretary of War, Newton D. Baker, selected the successful corporate lawyer and New York National Guard aviator Maj. Raynal Bolling to lead a team to Europe. Bolling’s team consisted of two army pilots, two naval aviators, two civilian automobile executives, and ninety-three

¹²⁵ “General Squier and Howard Coffin Discuss Opportunity this Country Has,” *Sun Newspaper*, 16 June 1917, 3.

civilian aircraft industry experts.¹²⁶ Their mission was to study the French, British, and Italian air services and make recommendations on the types of aircraft the U.S. should buy.

With such a critical mission, the Signal Corps faced a tough decision on who should accompany Bolling on the mission. The then head of the Signal Corps Aviation Section, Lt. Col. John B. Bennet, realized his two nominees needed a unique set of skills. These men must be experienced aviators, but they also needed to be technical experts in aeronautics and aircraft design. Who could be a better choice than Gorrell as the combat-proven new graduate of the MIT Aeronautical Engineering program and member of the Joint Army-Navy Technical Board? That he was then working on the estimate for the air service's \$640 million congressional funding request only sweetened the deal. Gorrell's combination of aeronautical engineering expertise, planning experience, and growing reputation as an intellectual secured him one of the two Army positions on the commission.

On 16 June 1917, Gorrell joined the other military members on the White Star passenger liner *Adriatic* as it departed from New York for Liverpool.¹²⁷ The ten-day crossing proved useful as the members of the team socialized and shared their backgrounds and thoughts on aviation. As historian I. B. Holley rightly points out, Bolling left New York before the Joint Army-Navy Technical Board finalized its recommendations. Hence, he infers that Bolling had to rely on the Ribot cable and what he garnered from the board's initial report for doctrinal guidance.¹²⁸

¹²⁶ History of the Civilian Motor Mechanics Group, 18 December 1918, Sec A-2, in Gorrell History, 21.

¹²⁷ George K. Williams, "The Shank of the Drill: Americans and Strategic Aviation in the Great War," *The Journal of Strategic Studies* 19 (Sept. 1996): 384.

¹²⁸ Holley, *Ideas and Weapons*, 54.

Yet, Holley missed a unifying element in Gorrell. As a member of the Joint Army-Navy Technical Board and of Benjamin Foulois's team drafting the Air Service appropriations request, Gorrell offered a wealth of information for Bolling to draw upon. Perhaps this explains the strong professional bond that developed between Gorrell and Bolling during the Atlantic crossing. Members of the commission remember the two staying up late into the night discussing their flying experiences, aeronautics, and the proper use of aircraft.¹²⁹ It is possible these late-night discussions turned Gorrell's mind towards more than just the purchase of aircraft and to how best to use these aircraft in combat. Despite the silence of Gorrell's own records on the matter, it is reasonable to assume the discussions rekindled an interest in aerial strategy he had shown during the Mexican Expedition.

Still, the commission had a task to accomplish and not much time to achieve it. Once Bolling arrived in England his team split into two groups. The civilian experts under the supervision of Rolling I. Mowry of the Cadillac Motor Company dispersed to aircraft factories around Europe to observe and determine how best to integrate American manufacturing into their processes.¹³⁰ Meanwhile, the military members conducted a whirlwind tour of the major combatants to garner information on their aircraft designs, production capabilities, and ability to support U.S. aircraft needs. Bolling's own report on the trip gives a hint at the frantic pace the commission members kept during that early summer: "landed at Liverpool June 26, 1917, proceeded to London, remained there about a week, proceeded to France and to Paris, remained there about two weeks, proceeded

¹²⁹ "The Men and Machines: Air Operations in World War I, Part V," *Air Power Historian* 5 (January 1958): 42.

¹³⁰ History of the Civilian Motor Mechanics Group, Gorrell History, Sec A-2, 21.

thence to Italy, remained there about ten days, returned to Paris and remained there about ten days.”¹³¹

By late July the commission’s leadership was once again in their Paris headquarters at 45 Avenue Montaigne, near the Arc de Triomphe. Here Bolling started work on his final report. The report released on 15 August 1917 identified three required elements for American air power. The first priority was to build a sufficient number of training aircraft to support the required numbers of new pilots. The second priority was to build aircraft for direct support of ground forces. Then in a new twist for American air power theory, Bolling recommended the creation of a force in excess of tactical requirements consisting of fighting and bombing airplanes for independent military operations against Germany.¹³²

This offensive force cannot yet be associated with strategic bombing, though. Strategic bombing was still too nebulous a concept in the AEF Air Service for such a linkage at this early point. Bolling reinforced this position in a memorandum to Coffin on 15 October in which he indicated strategic bombing was still a widely debated concept throughout Europe in the summer of 1917. He depicted the British government as becoming supportive of bombing as a tool for revenge, but balanced that against British Army resistance to anything beyond a ground support role. Meanwhile, Bolling portrayed the French as hesitant due to concerns over German retaliation and a “temporal lack of interest.” In the end, Bolling described only the Italians as fully supporting bombing, but painted them as overblown in their claims. For instance, he quoted the commander of aerial operations with the Italian Fourth Army, General Magreatti, as

¹³¹ Report by Maj. Raynal C. Bolling, 15 August 1917, Section A-23, in Gorrell History, 80.

¹³² Bolling Commission Report, 15 August 1917, Gorrell History, I-1, 82.

telling him that “with systematic and sustained bombing...he could force a retreat of the Austrian Army within fifteen days.”¹³³

Despite these problems, Bolling went on to predict that bombing success was possible if carried out in a systematic, thorough, and consistent manner. Because this was a difficult task with the limited assets on hand, Bolling indicated that “the Allies must combine towards certain definite operations for which the preparation should be begun at once.”¹³⁴ Bolling seemed to peer into the future when he predicted that the only obstacle to thwart strategic bombing success was if individual nations refused to participate in these combined operations, instead coveting their air power solely for their own purpose.

While important, the Bolling Commission members were not the only Americans working out the details of American aerial strategy and policy in Europe. Even before April 1917, American air power theory was changing rapidly because of increased coordination with the British, French, and Italians through a series of military observers. For the Air Service, Lt. Col. William Mitchell was the most important observer. On 17 March, the Chief of the Signal Corps ordered Mitchell to investigate the status of French and British military aviation.¹³⁵

Upon arriving in Europe, Mitchell threw himself into the task of learning as much as possible about both nations’ aviation efforts. In typical Mitchell fashion he did not let little things like regulations stop him from flying with the French over enemy lines or proper decorum stop him from visiting Maj. Gen. Sir Hugh Trenchard unannounced and

¹³³ Memorandum Bolling to Coffin, 15 October 1917, Bolling Collection, box 1, folder 9, Greenwich, CT Historical Society, 3.

¹³⁴ *Ibid.*, 4.

¹³⁵ James J. Cooke, *Billy Mitchell* (Boulder, CO: Lynne Rienner Publishers, 2002), 46-47.

practically demanding a tour of British aerial operations. Still, his short time in Europe made him the most experienced American aviator in theater. He used this experience to ensure he was with the party welcoming General Pershing when he arrived in Paris on 13 June 1917.¹³⁶ Mitchell did not wait long to get his ideas on aviation into the AEF commander's hands. He quickly submitted a paper on air policy and organization to Pershing's Chief of Staff, Maj. Gen. James G. Harbord.

Mitchell's memorandum is an interesting study in contradiction. What at first appears to be a prioritization argument likely hides a deeper doctrinal subtext. At first glance, the structure of the memorandum seems to push for more emphasis on strategic aviation, yet his definition is not consistent with the later understanding of strategic bombing. His explanation of "the air attack of enemy material of all kinds behind his lines" hints at something broader than attacking an enemy's industrial production capability or morale. It is likely Mitchell was still forming his concept of strategic aviation as this terse definition is strikingly different from his short, but informative definition of tactical aviation: "to ensure observation for fire and control of our own artillery...airplanes and balloons observe the fire while others fight off hostile aircraft which attempt to stop it."¹³⁷

Still, the memorandum provides insights into two important aspects of Mitchell's thinking at this early stage that historians often misinterpret. The first of these relates to independence. At two points, Mitchell clearly suggested that air power ought to be an independent element in the Army combat structure. First, he proposed that the entire AEF Air Service should be on an equal footing with other combat branches. Mitchell

¹³⁶ Ibid., 48.

¹³⁷ Memo, Mitchell for the Chief of Staff, U.S. Expeditionary Forces, 13 June 1917, contained in Gorrell History, Sec A-23, 81.

then specifically addressed strategical forces in section three when he wrote, “strategic aviation must be organized, separate from those directly attached to army units.”¹³⁸ This was a clear break from the previous Signal Corps’ position that air power was purely supportive to ground combat operations. Instead, Mitchell hinted at a separate, possibly independent, role for the AEF Air Service.

Next, the memorandum brings up an interesting conundrum related to the understanding of strategic aviation. Was Mitchell truly advocating strategic bombing in the summer of 1917? On one hand, he talked in general terms about using air power to attack the enemy’s war making material. Some of his own wording can even be interpreted as supporting the modern understanding of strategic bombing. For instance, his claim at the end of the memorandum that “with this class of aviation the United States may aid in the greatest way and which, it is believed if properly applied will have a greater influence on the ultimate decision of the war than any other one arm,” seemed to hint at a war-winning role for independent strategic bombing.¹³⁹

On the other hand though, Mitchell’s broad use of strategical aviation was more in line with the modern definition of aerial interdiction. His statements like “they would be used to carry the war well into the enemy’s country” could be interpreted to mean interdicting the flow of supplies and reinforcements well behind the front lines. Additionally, this application of air power was more consistent with Mitchell’s appreciation of the British model he garnered during his meetings with the RFC Commander, Sir Hugh Trenchard. By the summer of 1917, Trenchard viewed air power’s primary role as supporting Army offensive operations by constantly attacking

¹³⁸ Ibid., 82.

¹³⁹ Ibid., 81.

the enemy deep in his own territory.¹⁴⁰ Mitchell's memorandum appears to support Trenchard's viewpoint more than a modern understanding of strategic bombing.

Thus, it is most likely that Mitchell's memorandum actually advocated a two-fold mission for air power. On one level it described a tactical force conducting observation and artillery spotting missions in direct support of ground commander. Meanwhile, on a different level Mitchell advocated for a semi-independent strategical element that would attack the enemy's war materials behind the front lines. It is quite likely that a misunderstanding of Mitchell's use of strategical aviation in this memorandum explains many historians' belief that Mitchell advocated the modern understanding of strategic bombing early in World War I.

Still, Mitchell's radical proposal caused concern in the AEF staff. Even if he was not advocating for strategic bombing as a war-winning tool, he seemed to support an independent role for the AEF Air Service that many senior ground commanders deemed threatening. It is likely that Mitchell's memorandum was fresh in the AEF Chief of Staff's mind, when less than a week later, on 19 June, Major General Harbord convened a Board of Officers to make recommendations on aviation matters. The board contained a mix of aviators, combat arms members, and staff officers. At their first meeting, the board assigned individual members to research specific aviation areas and make recommendations. Maj. Frank Parker received the task of reviewing bombardment aviation.

Although Parker was a cavalry officer, he had close ties to military aviation. He had married the daughter of Lt. Col. Frank S. Lahm, the first Army officer to fly in a

¹⁴⁰ Neville Jones, *The Origins of Strategic Bombing: A Study of the Development of British Air Strategic Thought and Practice up to 1918* (London: William Kimber, 1973), 205.

Wright airplane.¹⁴¹ This family connection gave him access into the ever-widening circle of military aviators. Additionally, Parker had an above average intellect capable of expanding strategic aviation thought, while not overstepping the Army's limited vision of the airplane's military potential.

Parker delivered his response at the board's meeting on 4 July 1917. He redefined aerial bombing in a manner that was acceptable to AEF leadership. He wrote that "the objective is to attack the supply of an enemy army, thereby preventing it from employing all of its means of combat."¹⁴² Parker even provided an initial list of objectives and target types including: destroying enemy depots, factories, and lines of communications. This application of air power was more in line with army expectations. It offered support for the ground forces, while excluding the controversial language of independence contained in Mitchell's original memorandum. At the end of the board's meeting that day, the members approved Parker's recommendations and forwarded them to General Pershing.¹⁴³

In this way, a myriad of sources worked on aerial strategy both alone and in coordination with others. This system created four categories of strategy available to Pershing and his command staff in the late summer of 1917. The Joint Army-Navy Technical Board provided a numerically driven plan based heavily on observation and pursuit. The Bolling Commission modified this slightly by recommending the addition of an offensive aerial force for bombing support of ground forces. Then, Mitchell added a Trenchard-inspired concept of an independent aerial offensive to the table. Finally, through Parker, the Board of Officers redefined bombing into something more acceptable

¹⁴¹ Maurer, *U.S. Air Service in World War I*, 123.

¹⁴² The Role of Aviation, report by Maj. Frank Parker, 2 July 1917, Sec A-23, in Gorrell History, 194.

¹⁴³ Maurer, *U.S. Air Service in World War I*, 123.

to American senior military leadership. All of these options had to be filtered through the lenses of General Pershing and his senior staff, who often had deeply held convictions on the role of air power as a supporting force to the infantry soldier. Still missing from the mix was a strategic bombing option similar to the earlier French proposals of 1915 or the British plans working their way through Parliament in the summer of 1917.

Sowing the Seeds of Strategic Bombing

As the Bolling Commission's efforts drew to an end, Pershing sought to keep the best and brightest staff officers in Europe for the cadre of his rapidly forming AEF. Between 1 and 15 August, Pershing promoted Gorrell to major, made him the Chief Engineer of the AEF Air Service, and placed him in charge of the Technical Section. This new position not only kept Gorrell in Paris, but it also placed him in charge of executing the aircraft purchase and support recommendations he contributed to during the Bolling Commission. Between 1 August and 5 September 1917, Gorrell oversaw the acquisition of approximately \$80 million worth of aircraft, engines, radios, guns, buildings, and even whiskey for the AEF Air Service.¹⁴⁴

While this position was taxing, Gorrell rose to the occasion. In an unpublished article on Gorrell, Maj. Gen. (Ret.) Orvil Anderson jokingly posited his importance: "at the end of this hectic period an entire boat load of people landed in France to take on the jobs that Gorrell had been holding down."¹⁴⁵ His success in the position quickly got him noticed by senior leaders in Europe, who admired his keen intellect and ability to think strategically.

¹⁴⁴ Holley, *Ideas and Weapons*, 83-84.

¹⁴⁵ Edgar S. Gorrell Biography, undated, Call# 168.7006-47, IRIS# 125903, in Maj. Gen. (Ret.) Orvil A. Anderson Papers, AFHRA, Maxwell AFB, AL.

Gorrell's success also came to the attention of senior leaders in Washington. In a memo to the Chief of the AEF Air Service General Kenly dated 9 October 1917, Bolling opposed a request to send Gorrell back to the capital to represent the Signal Corps on the General Staff. His wording reflects his high esteem for Gorrell. Bolling indicated, "Frankly, I do not see how we can get along without Maj Gorrell in France as his knowledge goes far beyond mere technical matters. He does not confine his work merely to technical matters, but is my chief advisor on all matter requiring knowledge of military aviation."¹⁴⁶

Consequently, when Benjamin Foulois, now a brigadier general, arrived with senior personnel for the AEF Air Service staff, Pershing moved Gorrell to the AEF Air Service operations directorate. In this new position, he led the development of aerial strategy for the service's impending combat operations. In this way, his duties transferred from the daily grind of logistics to more cerebral, but no less critical, planning responsibilities.

From late September to December 1917, Gorrell focused on developing a strategic plan for the AEF Air Service. As an experienced staff officer, he sought guidance from previous Army studies and international sources. He effectively built on the ties made during his travels with the Bolling Commission and later as Chief Engineer of the Air Service while constructing recommendations for a strategic bombing effort.

Two influences helped guide Gorrell's ideas on strategic bombing. On one hand, the internal debate about the role of air power within the United States Army shaped his thinking. On the other, British, French, and Italian aviation strategists expanded his ideas

¹⁴⁶ Memo, Bolling to the AEF Air Service Chief, 9 October 1917, box 1, folder 9, Greenwich, CT Historical Society.

beyond their conservative American foundation. When examined in detail, we can see that Gorrell's ideas represent a fusion between the changing American concept of bombing and the more advanced European attitudes in 1917.

Gorrell was perhaps the best-placed officer in the U.S. Army to watch the evolution of the internal debate on aerial strategy. Before leaving the United States, his membership on the Joint Army-Navy Technical Board and Benjamin Foulois's staff gave him a solid foundation in debates about the force size and structure. Once in Europe, Gorrell was perfectly situated to observe the doctrinal evolution of the AEF Air Service. He was collocated in Paris with both Mitchell and the Board of Officers. Additionally, his role on the Bolling Commission and later as Chief Engineer of AEF Air Services provided him with plenty of opportunities to discuss strategy with key staff members and to read the findings of the many different strategy boards.

In addition to closely observing the American deliberations, Gorrell's foreign contacts molded his thoughts on the air weapon. The most important of these was his close relationship with Lord Tiverton. Hardinge Goulborn Goffard Tiverton, the second Earl of Halsbury, was a Royal Navy aviator assigned to the British Aviation Commission in Paris in 1917. The British Commission was only a few blocks from the offices of the Bolling Commission in a requisitioned apartment house near the Arc de Triomphe.¹⁴⁷ In both his time as Chief Engineer of the AEF Air Service and as an operational strategist, Gorrell often sought Tiverton's advice. This informal coordination blossomed into a friendship between the two aviators during the fall of 1917 and Tiverton became a leading confidant and advisor to Gorrell on strategic bombing.

¹⁴⁷ Williams, "Shank of the Drill," 384.

Tiverton was born on 20 June 1880. His life followed a typical British upper-class trajectory including attending Eton and Oxford before becoming a barrister in 1906. This traditional life changed rapidly when Britain declared war on Germany in 1914. Tiverton left his law practice and entered the Royal Naval Air Service. After serving briefly as an armament-training officer, he moved to No. 3 Wing of the RNAS at Luxeuil in the summer of 1916.¹⁴⁸ No. 3 Wing was initially created to hinder German zeppelin production. Yet, when the RFC became too heavily engaged in the Somme offensive to conduct their strategic mission against German military production facilities, the Navy expanded No. 3 Wing's mission to include targeting German industrial targets. As the wing's armament officer, Tiverton was closely involved in the planning and target selection for the unit's Sopwith 1 ½ Strutters and Shorts bombers.¹⁴⁹ This mission suited Tiverton, who quickly evolved into the wing's primary strategist.

Unfortunately for Tiverton and the No. 3 Wing, the RFC successfully countered the RNAS expansion. This opposition centered on two elements. The first was traditional interservice rivalry. The RFC did not look favorably on naval aircraft flying from ground bases in central France against targets deep in enemy territory. While the RFC did not support strategic bombing per se, they saw it as their mission and viewed No. 3 Wing as an unwanted incursion into their domain. More important, though, was the second issue of aircraft production. Problems with production of the new Sopwith 1 ½ Strutter bomber and continuous high losses from the RFC's offensive policies caused concern over a lack of suitable aircraft to support the Somme offensive. Trenchard even complained to the Air Board that "if the Navy obtained large numbers of engines and

¹⁴⁸ Neville Jones, *The Origins of Strategic Bombing*, 22.

¹⁴⁹ Bob Pearson, "More Than Would be Reasonably Anticipated: The Story of No. 3 Wing, RNAS," *Over The Front* 13 (Winter 1998): 284.

machines that the Army required, the effect will be seriously felt.”¹⁵⁰ In the end, interservice fighting and the dire need for aircraft to replace RFC losses doomed No. 3 Wing.

By June 1917, the Navy decided Tiverton’s planning capabilities were needed elsewhere. The RNAS transferred him to the Aviation Commission in Paris to work on a strategic bombardment policy for 1918.¹⁵¹ Tiverton worked closely with the RFC officers assigned to the commission and the French air staff to build recommendations for the equipment, training, and planning of a major bombing campaign in 1918. When in the summer of 1917 the French started to focus more on tactical aviation and proved unhelpful in Tiverton’s mission, he turned to the new aviators in town, the Americans. Tiverton worked hard to cultivate friendships with both members of the Bolling Commission and the early AEF Air Service staff officers.

While Tiverton and Gorrell initially met as part of discussions on the feasibility of buying British bomber aircraft for the fledgling AEF Air Service, their shared interest in strategic bombing cemented a friendship. In many respects, the more senior Tiverton served as a mentor to the younger Gorrell. Tiverton had spent most of the summer of 1917 working on the Strategic Bombing Policy for the RNAS. In September, he shared this policy memorandum with Gorrell.¹⁵² It is clear that the four themes of strategic bombing Tiverton identified struck a chord with Gorrell as they continually show up in his later writings. It is too far of a leap, however, to say Gorrell simply took Tiverton’s ideas as his own. The themes of objectives, offensive force, concentration, and morale

¹⁵⁰ Jones, *The Origins of Strategic Bombing*, 93.

¹⁵¹ *Ibid.*, 24.

¹⁵² Williams, “Shank of the Drill,” 391-94.

effects of bombing were well known to Gorrell and were key concepts in Mitchell's and Parker's policy recommendations.

Perhaps it is best to think of Tiverton as a source of inspiration for the overworked young staff officer. As many historians have noted, Gorrell copied large parts of Tiverton's memorandum. Yet, this does not necessarily mean he simply stole his ideas. In the time-honored world of military staff work, copying others' writing that makes one's argument is simply good time management. Lifted statements like "unquestionably, the greatest morale effect is by day, compared to night attacks when German workers are in their own houses" cannot be considered solely a British idea. All air services held similar beliefs. Thus, there is definitely an amalgamation of Tiverton's work into Gorrell's, but to claim it is the sole source seems a stretch.

At the same time, the British were not the only source of international inspiration for Gorrell. From his first visit to Italy with the Bolling Commission, Gorrell maintained a close relationship with Count Giovanni Battista Caproni, an aircraft designer and close friend of the Italian bombing theorist Giulio Douhet.¹⁵³ During his initial trip to Italy in June 1917, Gorrell formed a relationship with Caproni. This rapport, like that with Tiverton, took on a senior-mentor flavor. Both men shared an interest in bombing, which they discussed on numerous occasions when Gorrell was in Italy. Caproni's journal mentions several conversations over dinner where he and Gorrell discussed air warfare and the role of bombing in destroying an enemy's capability to fight.¹⁵⁴

It appears Caproni captured Gorrell's imagination during these sessions. In a memorandum dated 15 October 1917 to Colonel Bolling, Gorrell channeled Caproni's

¹⁵³ J. L. Boone, "Italian Influence on the Origins of the American Concept of Strategic Bombardment," *Air Power Historian* 22 (July 1957): 142.

¹⁵⁴ *Ibid.*, 145.

ideas when he described how the United States should approach strategic bombing. He stated, “This is not a phantom nor a dream, but is a huge reality capable of being carried out with success if the U.S. will only carry on a sufficiently large campaign for next year, and manufacture the types of airplanes, that lend themselves to this campaign, instead of building pursuit planes already out of date.”¹⁵⁵

As the memorandum suggests, Gorrell’s friendship with Caproni did not end with the conclusion of the Bolling Commission. They continued to correspond through the end of 1917. Sometime before 31 October, Caproni gave Gorrell the book *Let Us Kill the War; Let Us Aim at the Heart of the Enemy*.¹⁵⁶ This book, reprinted in English, described how strategic bombing could destroy an enemy’s industry and civilian morale. On 31 October, Gorrell wrote to Caproni thanking him for the book. He again wrote on 17 November asking for more copies to share with his fellow aviators. In this same letter, Gorrell also called on Caproni to recommend targets inside Germany for an American strategic bombardment campaign.¹⁵⁷

Tiverton’s and Caproni’s influences on internal American debates are visible in Gorrell’s first two formal reports from Europe. The Bolling Report on 15 August 1917 specifically highlighted the need to buy long-range bombardment aircraft to sustain a strategic effort. Meanwhile, Gorrell’s companion memorandum to the Chief of the Signal Corps, Brigadier General Scriven, dated 27 September 1917, provided more information on the possibilities of bombing.¹⁵⁸ In the letter, Gorrell set the stage for his later proposal by describing the state of British, French, and Italian bombing efforts. It is

¹⁵⁵ Gorrell Memorandum on the Caproni Contract, 15 October 1917, Bureau of Aircraft Production Hist. box 21, 425.1, National Archives.

¹⁵⁶ Boone, “Italian Influence,” 146.

¹⁵⁷ Gorrell to Caproni, 17 November 1917, Call #168.661-86, IRIS #125201, AFHRA, Maxwell AFB, AL.

¹⁵⁸ Maurer, *U.S. Air Service in World War I*, 131-32.

less of a policy recommendation than a description of the current technology, tactics, and strategy used by each nation. Still, the memorandum demonstrated the strong influences from the British and Italians that formed the basis of Gorrell's seminal Strategic Bombardment Plan of November 1917.

In this way, it is clear that there was more than just one source of information guiding Gorrell's thinking. Yes, he did borrow heavily from Tiverton's work for his own writings, but they were leavened with elements of American and Italian thought. It is difficult to say exactly where Gorrell got each idea as his strategic bombing theory was just coalescing at the time. It is most likely that he borrowed heavily from Tiverton because his paper contained three important elements that resonated with Gorrell. First, it closely matched his own vision of strategic bombing. Next, Tiverton's work often mirrored the ideas of Caproni in his correspondence with Gorrell. Finally, because it was written in English, Tiverton's work was readily available and easy to include as the basis of his report. This last consideration surely had the most appealed to Gorrell.

The Americanization of Strategic Bombing

Gorrell's strategic bombardment plan began to form as early as 15 August 1917 when Pershing selected him to lead the Air Service's Technical Section.¹⁵⁹ In this position, Gorrell led efforts to buy the combat aircraft required by the newly arriving American squadrons. On the surface this may seem like a simple task, but no accepted concepts of air power employment existed in the AEF during the summer of 1917. As Gorrell wrestled with the issue of what types and how many of each aircraft to buy, he

¹⁵⁹ Early History of the Strategical Section, by Col. Edgar S. Gorrell, 28 December 1919, Sec B-6, in Gorrell History, 374.

rapidly discovered that he had first to determine how America would use air power before he could make decisions about numbers and types of aircraft.

Gorrell's linkages with the Bolling Commission, the Board of Officers, and foreign aviation theorists helped guide his thoughts. The observation and pursuit missions were well developed, and the AEF leadership held definite opinions on those missions. Therefore, they became straightforward problems for Gorrell to solve by simply matching the best European aircraft to each of the accepted mission sets. Bombing was another issue. While most nations utilized tactical bombing, strategic bombing was still largely theoretical, but this was changing rapidly. The summer of 1917 saw an increase in strategic bombing planning, especially after the Germans started Gotha raids against England on 25 May 1917.¹⁶⁰

It is likely the newness of bombing appealed to Gorrell's adventurism. While still fulfilling his primary duties as chief of the technical section, Gorrell started to turn his attention to the problem of strategic bombardment. Yet, this might have remained just a personal fascination if not for the consequences of AEF structural changes.

When Pershing received command of the American Expeditionary Force, he thought long and hard about whom his subordinate commanders should be. For the Air Service, he favored Brig. Gen. Benjamin Foulois. The two had built a professional relationship when Foulois served under Pershing in the Mexican Expedition as the commander of the 1st Aero Squadron. Regrettably, only one month before, in March 1917, Foulois had started a critical assignment as Chairman of the Joint Army and Navy Technical Board in Washington. By 30 June 1917, this role had expanded when Foulois

¹⁶⁰ John H. Morrow Jr., *German Air Power in World War I* (Lincoln: University of Nebraska Press, 1982), 136.

became the Chief of the Aviation Section of the Army Signal Corps. This position placed him in charge of all production, training, and deployment of Air Service forces inside the United States.¹⁶¹ Even with Pershing's influence, this job was too important to remove Foulois during the critical buildup.

Nevertheless, the need for Foulois in Washington only delayed Pershing's choice and did not thwart it. By late October, the situation had stabilized enough for Foulois to transition to Europe to replace Brig. Gen. William Kenly as the Chief of the AEF Air Service. Word spread quickly that a new commander was on his way with a large staff to take over operations. Gorrell must have realized his junior rank of major likely meant he would lose his posting to a more senior officer. A memorandum from Bolling to Howard Coffin just two days before Foulois's arrival supports this assessment. In the memo, Bolling indicated that his staff was excited about the new officers, as they had been severely undermanned. Yet, at the same time there was apprehension over transitioning new senior officers into key staff billets.¹⁶² With this air of uncertainty as a backdrop, Gorrell started codifying his thoughts into a formal proposal to present to Foulois on his arrival.

As many expected, Foulois showed up in November with a large cadre of senior officers to supplant the existing command structure. On 21 November 1917, seven new officers arrived at the technical section. One of them, Lt. Col. Halsey Dunwoody, replaced Gorrell as the chief of the section.¹⁶³ This might have been the end of Gorrell's vision, but Foulois was concerned about the lack of operational and strategic employment

¹⁶¹ Holley, *Ideas and Weapons*, 41.

¹⁶² Memo, Bolling to Coffin, 17 Nov 1917, Bolling Collection, box 1, folder 9, Greenwich, CT Historical Society, 2.

¹⁶³ Williams, "Shank of the Drill," 398.

planning in the AEF Air Service. With the heavy workload of buying aircraft, setting up airdromes, and training personnel, the staff had paid scant attention to how to use the Air Service in combat.

Gorrell was ready to meet this concern. Following Mitchell's example, he presented his proposed strategic bombing plan on 28 November 1917, only a day after Foulois assumed command of the AEF Air Service.¹⁶⁴ The plan must have met his intentions because Foulois rapidly approved it before combining it with other proposals to forward to Pershing. Foulois's own note to AEF Chief of Staff Harbord on 1 December 1917 indicated that his staff had been working on "the air policy to be recommended for adoption by the American Forces for the past ten days and would forward it to HQ AEF soon."¹⁶⁵ Gorrell's proposal was part of this overall air policy package that arrived at Pershing's office in early December 1917.

A large portion of the document borrowed heavily from Tiverton's British bombing proposal, but there were differences. Gorrell started his plan differently from the British version. The American introduction sounded more like a sales pitch to the AEF senior leadership. This emphasized a major problem American strategic bombing advocates faced in the fall of 1917; senior Army leaders still viewed air power as primarily a support function for ground operations. Therefore, Gorrell used a two-pronged methodology to garner the attention of senior commanders.

First, he made an argument that bombing could help the U.S. Army win the war. Historian George Williams best describes his logic: "land battle is in stalemate; artillery is the key to the land battle; ammunition production is the key to artillery; factories are

¹⁶⁴ Early History, 28 November 1917, Gorrell Hist, B-6, 373.

¹⁶⁵ Memo, Foulois to AEF Chief of Staff, 1 December 1917, Sec A-1, in Gorrell History, 9.

the key to ammunition production; therefore, aerial bombardment should attack munitions factories, thus influencing the land battle.”¹⁶⁶ While not expressed quite as succinctly, Gorrell’s introduction made a similar point as to how strategic bombing would facilitate victory.

Next, Gorrell alluded to the German bombing effort against Britain in the summer of 1917. The Gotha campaign against Britain, and London in particular, was changing how military leaders and politicians viewed air power. The Trenchard and Mitchell vision of strategical aviation as the semi-independent use of aircraft in a primarily interdiction role behind the front lines to support ground offensives was challenged by a new strategic vision of air power as a potential tool to break an enemy’s industrial might and will to fight thus ending a war without the need for a ground victory. While the British led the way in this thinking mainly due to the civilian clamor for revenge and a political fear of industrial and morale damage from the bombing, other aviators were starting to garner an appreciation for strategic bombing.

Gorrell was one of the first Americans to discuss the strategic implications of the Gotha campaigns. He made three conclusions in his memorandum concerning the German campaign. First, if the Allies did not respond the Germans would hurt allied industries, while their own remained safe. Next, the Germans had the geographical advantage of proximity to allied industry to make their task easier than the American one. With the front lines in France, bombing German industrial cities required long, dangerous flights, whereas French and British industrial cities were only relatively short flights away from German bases in France and Belgium. Finally, the Germans had the biggest

¹⁶⁶ Williams, “Shank of the Drill,” 403.

advantage of all: “the Germans words were being rapidly turned into deeds.”¹⁶⁷ In this way, Gorrell created two rationales for why America had to pursue strategic bombing: it would help win the war; and there had to be a response to German strategic bombing.

Gorrell went on to explain his campaign plan in four steps, which borrowed heavily from Tiverton’s four themes but also made sense from the American perspective. First, the AEF Air Service needed to separate strategic bombing from the tactical forces. Independence would ensure the strategic forces focused purely on their mission without interference. Next, the strategic forces needed to identify and prioritize target areas that would cause the most damage to enemy production. Then, the Air Service should concentrate bomber bases in the proper area to support concentrated attacks against those target areas. Last, the planning staff needed to structure operations to focus attacks on one target per day to maximize both destruction and the morale effects of bombing.¹⁶⁸ Contained within these four steps are the foundations of American strategic bombing: independence, targeting, and concentration.

There was one key difference between Gorrell’s recommendation and Tiverton’s. In keeping with the earlier Board of Officers’ recommendation, Gorrell supported a system of round-the-clock bombing against German targets in order to “give the Germans no rest from our aerial activities and no time to repair the damage inflicted.”¹⁶⁹ This position diverged from the British who favored night operations to limit aircraft losses.

Gorrell’s position on daylight bombing may seem out of place considering the lessons Allied aviators took from the earlier German raids. High aircraft losses also

¹⁶⁷ Early History, 28 November 1917, Gorrell Hist, B-6, 373.

¹⁶⁸ Ibid., 376-78.

¹⁶⁹ Ibid., 380.

forced the Germans to move to night bombing by the fall of 1917.¹⁷⁰ Given this experience, it was only reasonable for the British and Americans to expect similar losses in daylight operations. Still, as George Williams points out, this American position may have been a combination of theory and real-world practicality.¹⁷¹ From his time as the Chief of the Air Service's Technical Section Gorrell must have understood the realities of bomber aircraft production and delivery timelines. The primary planned daylight bomber, the DH-4, was already in production in Britain with allotments for delivery to the AEF Air Service scheduled, meanwhile the Handley Page night bomber required the delivery of Liberty engines from America. Hence, they were not scheduled to arrive in the AEF Air Service operational units until May 1918.¹⁷² This meant that daylight bombers would arrive at the front months before night bombers. Starting daytime operations would not only take the fight to the enemy sooner, but it would also provide pilots with experience navigating far behind the front lines without the extra complication of darkness. While daylight losses might be higher, the Americans felt this tradeoff was worth the cost.

Gorrell returned to his salesmanship in the conclusion of his proposal. While this last section was brief, it was a clarion call to action. A single sentence in the section sums up the entire proposal's urgency: "Unless a decision is made to commence it immediately, we cannot hope to operate during 1918."¹⁷³ This tone must have resonated with Pershing who approved Gorrell's plan on 5 January 1918.

¹⁷⁰ Morrow, *German Air Power*, 162.

¹⁷¹ Williams, "Shank of the Drill," 401.

¹⁷² Memorandum to Air Service Chief of Staff, 18 January 1918, A-15, in Gorrell history, 122.

¹⁷³ Early History, 28 November 1917, Gorrell Hist, B-6, 401.

The strategic bombing proposal won support on the AEF staff and enhanced Gorrell's career. Recognizing him as the American expert on strategic bombing, Pershing promoted him to lieutenant colonel and gave him command of Strategic Aviation in the Zone of Advance on 3 December 1917.¹⁷⁴ Gorrell immediately started preparations for the strategic bombing campaign. While he could not control the pace of aircraft deliveries, he took steps to ensure the facilities, training plans, and bombing doctrine would be ready when they arrived.

Conclusion

Out of this maelstrom of a rapidly expanding AEF, a newly developing Air Service staff, and international influences emerged the first clearly defined American vision of strategic bombing. Years later Gen. Laurence S. Kuter described Gorrell's 28 November 1917 plan as the "earliest, clearest, and least known statement of the American conception of the employment of airpower."¹⁷⁵ Yet Kuter's description belies the complicated mixture of historical precedent, new thinking, and wartime realities that underlay the plan. Instead of viewing Gorrell's plan as the work of one theorist, it is more accurate to see it as the amalgamation of many internal and external ideas shaped by the realities of combat, all brought together by one individual.

The foundation for Gorrell's work was laid in the early development of the air service from 1903 to 1916. This foundation proved sturdy, but was limited by the Army's narrow vision of air power. Change occurred rapidly, though. Once America's

¹⁷⁴ Ibid., 371.

¹⁷⁵ Alfred Goldberg ed., *A History of the United States Air Force, 1907-1957* (Princeton: Van Nostrand, 1957), 30.

entry into World War I threw open the doors, men like Billy Mitchell, George Squier, and Frank Parker each molded the doctrine through their early writings.

At the same time, European air power strategists connected with their new allies to structure American air power. Men like Caproni, Trenchard, and Tiverton shared their visions for strategic air power with up-and-coming members of the AEF Air Service during that critical summer and fall. In this way, they conveyed three years of aviation thought and development to the newly arrived American strategist.

Finally, the realities of the battlefield played a role in shaping American strategic doctrine. By 1917, senior leaders understood this was an industrial war where the ability to keep armies fed, supplied, and fighting was of critical importance. The idea of attacking the source of supply in the enemy's factories and transportation system appealed to almost all leaders. Still, aircraft were a limited asset that required husbanding to ensure they were available when needed. The Gotha raids on England during the summer of 1917 helped spur changes to this traditional way of thinking. Without a response, the Allies risked letting the Germans gain the advantage in this new form of industrial warfare. Consequently, leaders slowly became open to risking air power in deep strikes against enemy resources.

All three factors came together at the right place and right time for Gorrell. His background not only opened him to the possibilities of strategic aviation, but also led him to address the problems at hand for the American air service. His connections with key strategists in the American, Italian, French, and British air services guided his intellect during those critical days. Finally, the imperative to get his ideas presented in the turmoil

of changing staffs in the fall of 1917 secured his reputation as a superior air planner and eventually led to his own combat command where he could test his ideas.

Unfortunately for Gorrell, the technological, organizational, and doctrinal problems facing the AEF Air Service were a long way from solved in December 1917. In the coming months, he faced delays in aircraft deliveries, organizational infighting, and failures in senior leadership support that dramatically hindered his ability to execute his vision. These trying times both modified Gorrell's visions of strategic bombing and affected the entire AEF Air Service's visions of air power doctrine.

Chapter 5

The Hard Realities of War

In the fall of 1917 two separate forces drove the expansion of strategic bombing theory. On the British side of the English Channel the public demand for a response to the German bombings of London and other cities reinvigorated British advocates. Meanwhile, the newly arrived American aviators received a rapid education in air power doctrine. This tutelage must have been akin to drinking from a fire hose for the young Americans who had spent little time thinking about air power's role in a war. In this situation, the youth of America's Air Service proved a positive attribute. They maintained open minds to the new methods of warfare their French, British, and Italian allies espoused. Gorrell, Mitchell, Parker and others took to these new doctrines like fish to water, immersing themselves in the debates and actively seeking out the European experts.

In this way, early American bombing strategy became an amalgamation of European ideas and American theories. Gorrell's strategic bombing plan of 28 November 1917 was the best example of this new vision. His proposed bombing campaign seemed to win quick support from AEF leadership as both Foulois and Pershing rapidly approved the plan. Foulois then promoted Gorrell to the position of Commander, Strategic Aviation in the Zone of Advance on 3 December 1917 to oversee the preparations and execution of his plan.

By January 1918, it seemed Gorrell was a rising star in the AEF Air Service. Yet the hard realities of war were about to affect his plans. Just as the earlier French and British strategic bombing advocates ran afoul of the great battles of Verdun and the Somme, so too would the Americans during the Ludendorff Offensive. The tremendous expenditures of military might first to stop the Germans and then to start the slow process of pushing them back effectively precluded any strategic bombing campaigns in 1918.

Still, the idea of a strategic campaign never totally died in the American Air Service. Instead, its advocates continued to work with their allies and proposed new plans to the AEF staff. While this proved a difficult process, with pressure from the British to mount a bomber offensive and a planned surplus of aircraft in 1919, the Americans finally started to turn their attention back to bombing in the fall of 1918. What would have happened in such a campaign remains a mystery, though, as the armistice on 11 November 1918 ended the war before any concrete actions were taken.

Gorrell's Strategic Bombing Plans

After Gorrell's promotion to Commander of Strategical Aviation in the Zone of Advance, he immediately began work to turn his bombing recommendation into a functioning plan. The timing must have encouraged Gorrell, as it coincided with a major British move towards strategic bombing and the American leadership's seeming openness to new doctrines. Yet Gorrell was to learn through trial and error that not all senior leaders were open to potentially radical new air power theories. Many of them remained steadfast in their opinion that the only role for aircraft was in direct support of ground forces.

Still, in December 1917, Gorrell appeared to be perfectly situated to turn American strategic bombing into a reality. Upon assuming his new command, he quickly surrounded himself with highly capable deputies, beginning with Maj. Harold S. Fowler as his executive officer. An American, Fowler had joined the British Army in 1914 as an artillery officer before shifting to the RFC as first an observer and in 1916 as a pilot. When the United States entered the war, he transferred back to the fledgling air service and helped develop America's pilot training program.¹⁷⁶ Gorrell used his talent to speed the building of bomber bases and the training of bomber crews. Next, Gorrell hired Maj. Millard F. Harmon as his pursuit support planner. Even at this early stage, most aviators understood that bombers required protection to reach their targets without excessive losses. Harmon's background in pursuit aviation made him a good candidate to plan escort missions. Finally, Gorrell looked to a British officer on loan to the AEF Air Service for his strategic bombing planner. After suffering injuries that limited his ability to fly, the British assigned Wing Commander Spencer Grey to assist the American airmen on 30 October 1917.¹⁷⁷ Gorrell himself stated that Grey was then considered "the world's greatest authority on aerial bombardment," having commanded both day and night bombing squadrons in the Royal Naval Air Service.¹⁷⁸ Therefore, Gorrell sought and garnered Grey's assignment to the Strategical Aviation in the Zone of Advance.

The British readily agreed to Grey's new position as they were also moving towards implementing a new vision of strategic bombing in late 1917. After the

¹⁷⁶ Harold S. Fowler Biography, undated, Call# 168.7006-47, IRIS# 125903, in Maj. Gen. (Ret.) Orvil A. Anderson Papers, AFHRA, Maxwell AFB, AL.

¹⁷⁷ Geoffrey Rossano and Thomas Wildenberg, "Striking the Hornet's Nest: Naval Aviation and the Origins of Strategic Bombing in World War I" (Naval Institute Press, prepublication manuscript courtesy of the authors), 90-91.

¹⁷⁸ *Ibid.*, 371.

confusion and fear of the 7 July Gotha raid on London, the public outcry forced the British government to explore new options. At a cabinet meeting four days later, the government agreed to set up a two-man committee with Prime Minister Lloyd George as the chair and Lt. Gen. Jan C. Smuts as the main investigator to explore how best to counter the German raids.¹⁷⁹ This led to two major recommendations. On 19 July 1917, Smuts addressed the issue of protecting London from air raids by advocating the coordination of air defense under one command. He then went one step further on 17 August by recommending a complete restructuring of the air services into an independent air force combining the RNAS and the RFC. This new Royal Air Force (RAF) would maintain the previous ground and naval support roles, but Smuts specifically recommended adding an independent long-range bombing mission against German cities and industry. He believed this new focus would turn the RAF into a force capable of winning the war through aerial bombardment.

While many disagreed, Smuts had two aces in the hole. First, he had the public pressure for revenge against Germany on his side. More important, he had help countering the old argument that there were not enough aircraft to meet ground, naval, and bombing needs simultaneously. Shortly after the Smuts report, the Chairman of the Air Board Sir Weetman Pearson, the First Viscount of Cowdray, released a study indicating production increases would result in a large surplus of aircraft by the summer of 1918.¹⁸⁰ This new information helped quell some of the dissension based on limited

¹⁷⁹ Neville Jones, *The Origins of Strategic Bombing: A Study of the Development of British Air Strategic Thought and Practice up to 1918* (London: William Kimber, 1973), 135.

¹⁸⁰ H. A. Jones, *The Official History of the War Volume VI: The War in the Air* (Oxford: Clarendon Press, 1937), 16-17.

aircraft numbers. Meanwhile, public pressure helped convince many political leaders to overcome British Army and Royal Navy resistance to the formation of the RAF.

This change in governmental direction was not lost on the field commanders, who also felt pressure to respond in kind to the German bombing attacks. On 11 October 1917, after receiving orders to begin the bombing of targets in Germany, Trenchard authorized the creation of 41 Wing under the command of Lt. Col. Cyril Newall at Ochey, France. The wing had the primary mission of conducting bombing raids against German cities.¹⁸¹

At the same time BEF commander Haig also felt increased governmental pressure for revenge bombing strikes against German cities. For the first time in the war, Haig referred to large bombing campaigns in his annual report on combat operations in 1917. He wrote that “the persistent raiding by hostile aeroplanes and airships of English cities and towns have recently decided our own Government to adopt counter-measures. In consequence of this decision a series of bombing raids into Germany began in October 1917, and have since been continued whenever weather conditions have permitted.”¹⁸²

Consistent with the new public and political pressure to bomb German cities, 41 Wing started operations on 17 October with a raid on the Burbach iron foundry near Saarbrücken. The British continued operations until the onset of winter weather limited flying in late November.¹⁸³ Given this pressure for strategic bombing, it is understandable that the British desired to have one of their best officers intimately involved in creating and coordinating any American bombing campaign. Thus, they

¹⁸¹ Jones, *Origins of Strategic Bombing*, 149.

¹⁸² Sir Douglas Haig’s 4th Annual Dispatch (1917 Campaigns), 25 December 1917, accessed online at firstworldwar.com.

¹⁸³ Andrew Boyle, *Trenchard* (London: Collins, 1962), 239.

readily agreed with Spencer Grey's move to the Strategical Aviation in the Zone of Advance staff with an eye towards linking British and American efforts.

On 22 December, when it became clear the three major allies needed to coordinate their bombing plans to garner the most benefits, the British hosted an allied bombing conference. Major General Trenchard represented the British, General Duval, the commander of French Air Services, represented the French, and Lieutenant Colonel Gorrell represented the Americans.¹⁸⁴ This major rank difference should have given the British and Gorrell their first indications that AEF leadership attitudes towards bombing were changing. Nevertheless, the conference proved useful in determining each nation's readiness to participate in a combined bomber offensive.

The British led the effort with their proposal for a strategic campaign against German industrial cities with a combined bomber force based in the Nancy area. The French did not support the British, feeling the plan was too difficult to achieve in 1918 without pulling resources away from the ground battles. Additionally, the French feared German retaliation would cause more damage to their factories than the allied bombing would to German industry. Finally, Gorrell expressed an American desire to participate in the effort, but also showed his tenuous position when he announced that he could not pledge support without first garnering the approval of the AEF commander.¹⁸⁵

Gorrell and Foulois followed up the conference with a visit to Trenchard's headquarters over Christmas. In their meetings, Trenchard proposed that American bomber forces join with his recently established 41 Wing in the Nancy area. His vision was to speed the American training process by integrating them into British groups to

¹⁸⁴ Early History of the Strategical Section, by Col. Edgar S. Gorrell, 28 December 1919, Sec B-6, in Gorrell History, 401.

¹⁸⁵ Ibid., 391.

learn from the more experienced English aviators. Once, the Americans fielded enough squadrons to form their own group, Trenchard recommended they operate as an American bombing group under the British wing. Eventually, when the Americans had the preponderance of bomber forces in a region, Trenchard indicated his desire to turn over command of that region to the American Air Service with the remaining British forces coming under U.S. command.¹⁸⁶

This plan offered many benefits for the growing AEF Air Service. First, there was the obvious learning value of flying under the tutelage of experienced British pilots. Additionally, cohabitation on British bases would lessen the numbers of American airfields needed in the resource-constrained environment. Finally, collocating with the British offered the use of their superior maintenance and supply systems. As the U.S. supply system was struggling just to deploy and provision the Army, this promise of logistical support must have seemed ideal to Gorrell and Foulois.

Yet, the plan met with stiff resistance at the AEF staff level. The American generals saw the subjugation of U.S. forces, even air forces, under a British commander as problematic. This is evidenced by a report Foulois sent to the AEF Chief of Staff on 23 December 1917. After describing the British progression towards strategic bombing that fall, Foulois warned the staff that the British Air Ministry and the British War Cabinet were preparing a communication to be referred to the Commander in Chief, AEF recommending that the British, French, and American air services take the necessary steps to integrate into a combined strategic offensive against German industry. Maj. Gen. James W. McAndrew, the AEF Chief of Staff's, responded to the memo, recommending

¹⁸⁶ Maurer Maurer, *U.S. Air Service in World War I* (Washington, DC: Office of Air Force History, 1978), 152.

that a three-member panel explore the issue, while advising that the need to ensure American air support requirements was totally filled before exploring any cooperation with Allied units in bombing campaigns.¹⁸⁷

Gorrell's subordinate position at the conference and AEF reluctance to approve a combined bomber force demonstrated a problem for American bombing advocates. Although Pershing had approved Gorrell's initial proposal, his staff began to worry about the independent nature of the bomber force. Just as Mitchell learned after his initial air strategy proposal, the AEF command staff would not accept an independent air force. The December conference entrenched this viewpoint, as it not only spoke of an independent bomber force, but also of subordinating that force to a British-led effort. This dual affront likely made many staff officers drop any support they may have had for strategic bombing.

Gorrell surely felt the sting of this attitude change. Despite his best efforts, he faced long delays in both policy decisions and aircraft deliveries. He even argued that the AEF staff deliberately saddled him with many additional duties to keep him closely tied to their command structure.¹⁸⁸ In a first attempt to fix the situation, Gorrell wrote a memorandum to Foulois on 2 January 1918. In the memo, he contended that the AEF command structure must coordinate with the Allies and take tangible steps to provide aircraft, pilots, and bases for the force to start operations.¹⁸⁹

This memorandum likely ruffled feathers in the AEF headquarters. It included not only a critique of staff support, but also called for independent bomber operations and even subordination to the British effort. While this opinion likely won Gorrell favor with

¹⁸⁷ Memo, Foulois to Chief of Staff, 23 December 1917, Sec A-1, in Gorrell History, 135.

¹⁸⁸ Early History, 28 December 1918, 395.

¹⁸⁹ Ibid., 396-98.

his British compatriots, it merely angered his American superiors. This anger seems to have caught Gorrell by surprise, and he he rapidly took steps to modify his proposal to win back staff support.

Sometime between late December 1917 and the end of January 1918 Gorrell wrote a second proposal on strategic bombing titled “The Future Role of American Bombardment Aviation.”¹⁹⁰ Gorrell once again turned to the British, copying heavily from Trenchard’s December 1917 report to the War Cabinet. Despite lifting entire paragraphs from the British document, this policy memorandum contained more American ideas than his previous one. In many ways, it reflects Gorrell’s attempt to update his 28 November recommendation to match senior U.S. leadership concerns more closely.

To accomplish this, Gorrell used a three-part approach. First, he tried to assuage concerns about independence. In the first paragraph, he paid homage to a single unified Army effort by claiming that “the Air Service is an integral part of a homogeneous team, no portion of which, working by itself, can alone decisively defeat the enemy.”¹⁹¹ He then continued the theme, often comparing air power to a long-range gun and describing how strategic aviation could help sway the outcome of a battle.

Next, he eschewed his earlier advocacy of aviation’s ability to win a war directly by suggesting that strategic bombing would make the infantry’s job on the battlefield easier. He challenged commanders to envision “what would happen if communications were destroyed, supplies of rations and material cut, and if reserve troops were subjected

¹⁹⁰ Original contains no date. Note: Mark Clodfelter, *Beneficial Bombing* footnote 46 indicates it was likely written in February or March 1918, but this would push the document’s origins beyond Gorrell’s tenure as Chief of Strategical Aviation in the Zone of Advance, which ended on 21 January 1918.

¹⁹¹ The Future Role of American Bombardment Aviation, by Edgar S. Gorrell, circa Dec 1917 to Jan 1918, Call# 248.222-78, IRIS# 00161162, AFHRA, Maxwell AFB, AL, 1.

to the demoralizing effect of fire without defense?”¹⁹² In this manner, he hoped to convince commanders that bombing factories would directly aid ground combat.

Finally, Gorrell added a new element: the morale effect of bombing. In his discussion of daylight versus nighttime bombing, Gorrell spelled out the tradeoffs between the two. Daylight bombing caused more damage, but also meant more losses. Nighttime bombing lowered losses, but also caused less accuracy and damage. Gorrell argued that this was not a tradeoff the U.S. Army had to make. Previewing future thought, he contended that daylight missions flown in large formations with escorts would keep losses at acceptable levels. Meanwhile, the morale effect of bombing both in daytime and at night would offset the limited physical damage from night bombing.¹⁹³

This morale effect is perhaps the most interesting part of Gorrell’s new recommendation. His earlier correspondence with Tiverton and Caproni indicated he knew of both men’s views that morale effects might be greater than physical destruction, but he had not addressed them in writing until this point. Gorrell used two examples to support his argument that even if bombers missed their targets, they would still produce enough discontent and alarm to disrupt production. He cited British statistics of factory man-hour losses due to evacuations during the Gotha raids and French reports on their labor difficulties after German raids near Pont-St Vincent. Concerning the French raids, Gorrell wrote that “though they have never interrupted the work for more than a few hours, it has become increasingly difficult to persuade the workmen to remain.”¹⁹⁴

Consequently, Gorrell modified his earlier core components of strategic bombing. Target selection and concentration remained his chief focus, but he toned down

¹⁹² Ibid., 4.

¹⁹³ Ibid., 10.

¹⁹⁴ Ibid., 15.

independence to mitigate Army fears. Additionally, he added a psychological element by arguing that the morale effects of bombardment were as important as physical destruction. While Gorrell cannot claim to have created any of these concepts, he does deserve credit for linking them in a formal policy proposal for a uniquely American vision of air power.

Despite Gorrell's effort to meet American concerns, his second bombing proposal fell on deaf ears. This likely occurred for three reasons. First, Gorrell's earlier memorandum caused too much bad blood with senior AEF staff officers. With their feathers already ruffled, they were likely predisposed to look unfavorably on any new strategic bombing proposal even with Gorrell's new terminology limiting independence or war-winning capabilities. Next, by early 1918 aircraft production shortages were readily observable to the AEF staff. Gorrell's new proposal must have seemed like an extravagant use of limited bombing aircraft that ground commanders wanted for direct support. Finally, Gorrell's close ties to the British caused consternation as many senior army officers likely saw his recommendations as the first step in losing command of their bomber forces to a multinational independent bombing command led by the British.

Given this convergence of forces, Gorrell faced an impossible task in creating a strategic bombing force and utilizing it in a major campaign. Thus, Pershing removed him from command of Strategic Aviation in the Zone of Advance on 21 January 1918 and moved him to the AEF G3 operations staff.¹⁹⁵ He still worked on long-range bombing policy, but his location outside the Air Service proper severely limited his influence on future operations. Gorrell eventually worked his way back into the Air

¹⁹⁵ Early History, 28 November 1917, Sec B-6, 398.

Service as Major General Patrick's Chief of Staff, but by then the Army's need for direct air support during combat operations limited the appeal of his previous plans.

Consequently, the removal of Gorrell effectively killed any strategic bombing campaign during 1918 as the Army and the Air Service turned their attention towards ground combat. With resources limited, bombing lay at the short end of operational planning and logistics systems. Nevertheless, the idea of strategic bombing did not completely die out and continued to simmer just below the surface in the minds of many air power leaders. When projections for 1919 finally showed a significant increase in the numbers of bomber aircraft available, many AEF Air Service planners began to reconsider Gorrell's ideas. Yet, much water had passed under the bridge. In the intervening months competing plans for air power started to gain favor with senior American military leaders. These competing visions not only threatened Gorrell's ideas, but also shaped a new vision for strategic bombing in late 1918.

Competing Plans for Air Power

By February 1918, Gorrell had settled into his new job in the G3 operations division of the AEF staff. While he continued to work on strategic bombing, the realities of war soon intervened. In early 1918, the Germans realized they had to use their temporary numerical superiority for one last offensive in the west before the American military might made its presence felt on the battlefield. Therefore, on 21 March 1918 they launched the Ludendorff Offensive designed to break through the trench lines and isolate the British BEF. While the still-training AEF initially refrained from the battle, by June the Americans entered combat at Château-Thierry and Belleau Wood. When the

German assaults culminated in July, the Americans took a predominant role in the counteroffensive to push the Germans back and eventually win the war.

This new combat role for the AEF consumed the priorities, resources, and focus of its leadership. As the campaign continued through the summer and fall, the American Army became more and more involved in ground combat. In this environment, aviation resources, already scarce, became almost totally allocated to ground support. Historian John Morrow best sums up this change of events when he describes the U.S optimism of 1917 yielding to the realities of 1918.¹⁹⁶

The German offensive occurred at an important time for the American Air Service. In March 1918, the service was just starting to field trained operational units, initially deployed in April under the command of Col. Billy Mitchell to the mostly quiet Toul sector of the front. The plan was for the new units to garner combat experience away from the major fighting occurring to the north.

Besides the experience given to the new pilots, the operations in the Toul sector also provided time for the new air commander to spell out his vision for air power. On 30 April, Mitchell released a General Principles for American Aviation Bulletin to all squadrons under his command. Originally drafted by Maj. Frank Parker, the bulletin contained a wealth of tactical principles to help squadrons develop their own standard operating procedures.¹⁹⁷

Mitchell's preface to this bulletin spelled out his new vision of air power. In only five paragraphs he laid out the core elements of his strategy. First, decision on the field

¹⁹⁶ John H. Morrow Jr., *The Great War in the Air: Military Aviation from 1909 to 1921* (Washington, DC: Smithsonian Institution Press, 1993), 331.

¹⁹⁷ Bulletin of the Information Section, Air Service, AEF, Vol III, No. 132, 30 April 1918, Muir Library Special Collections, Maxwell AFB, Al.

of battle was the key to winning the war. Next, all arms of the Army had to work together for this victory to occur. Finally, the air service was one of the offensive arms of the Army. As with artillery or infantry it could not bring about a decision, but working with the other offensive elements it could ensure victory.¹⁹⁸

This preface indicated that Mitchell had come down on the opposite side of the doctrinal debate from Gorrell. Whereas Gorrell espoused a strategic war-winning role for air power, Mitchell sided with Trenchard's and Pershing's vision of a ground-centric mission. This is interesting, as both men had discussed aviation theory with many of the same British, French, and Italian bombing advocates. Gorrell and Mitchell even had a cordial rapport during their shared time on the Air Service staff where Mitchell read Gorrell's proposals. According to Maj. Gen. Mason Patrick their relationship did not sour until the summer of 1918 when Mitchell became angry when Gorrell coordinated surprise inspections of Mitchell's units while they were involved in combat operations.¹⁹⁹ Given this relationship, it is possible that Gorrell's failure in advocating a strategic mission might have encouraged Mitchell to adopt the ground-centric doctrine he was already predisposed to from his study of Trenchard's air power vision. Either way, Mitchell's new strategy effectively avoided Gorrell's pitfalls of complete independence and claims of war-winning capabilities that so agitated the senior AEF.

Still, it would be a mistake to claim that Mitchell's strategy was a reaction to Gorrell's proposal. Instead, it represented a fusion of the concepts he had learned during the previous year in Europe. For instance, Mitchell appropriated elements of Trenchard's conception of air power as an integral element in a ground-offensive-based

¹⁹⁸ Ibid.

¹⁹⁹ Robert P. White, *Mason Patrick and the Fight for Air Service Independence* (Washington, DC: Smithsonian Institution Press, 2001), 33.

strategy. Historian Alfred Hurley suggests Mitchell saw the close relationship between Trenchard and Haig as directly linked to both men's steadfast determination to support a ground-centric plan for winning the war.²⁰⁰ It is possible that Mitchell saw direct support of Pershing's plan as a method to garner a similar close relationship with Pershing. Of course that is not the only possibility. Thomas Wildenberg offers a different model. He suggests that "Mitchell took to Trenchard's ideas about air power like a duck takes to water."²⁰¹ Hence, Wildenberg paints Mitchell as more of a true believer in a ground-centric strategy. Whether it was an attempt to gain favor with the AEF senior leadership, to emulate the British model, or an acceptance of the reality of the need for ground support, Mitchell's strategy offered a different role for air power than the one Gorrell proposed.

In May 1918, Mitchell's vision received an unexpected boost when Pershing removed Foulois as the Chief of the AEF Air Service and replaced him with Brig. Gen. Mason Patrick. There had long been a sour relationship between Foulois and Mitchell. Often considered rivals in the Air Service before its entry into World War I, Mitchell and Foulois clashed when Foulois arrived in Europe more than six months after him and was placed in command of the AEF Air Service. This dislike turned into an outright war between the two men with the release of General Order No. 81 on 29 May.

Besides formally replacing Foulois with Patrick, the order also modified the Air Service command structure. Previously it was divided into the Zone of the Interior and the Zone of the Advance. The Zone of the Interior was responsible for pilot training,

²⁰⁰ Alfred F. Hurley, *Billy Mitchell: Crusader for Air Power* (Bloomington, IN: Indiana University Press, 1975), 26.

²⁰¹ Thomas Wildenberg, *Billy Mitchell's War with the Navy: The Interwar Rivalry over Air Power*, (Annapolis, MD: Naval Institute Press, 2013), 12.

supply, and depot level maintenance of the air service's aircraft. Meanwhile, the Zone of the Advance was the combat arm of the American air service. It oversaw the pursuit, observation, and bombardment aircraft supporting the ground forces and battling for aerial supremacy over the battlefield. By the spring of 1918, this command structure no longer met the AEF's needs. While the Zone of the Interior remained a viable structure for supply, training, and administration duties, a single aerial combat command structure seemed to limit the ground commander's control over aviation and even hinted at an independent role for the air service. Therefore, General Order No. 81 disbanded the Zone of the Advance command. Instead, each army would have its own air units commanded by a Chief of the Air Service.²⁰²

Mitchell considered the order a demotion and a slap in the face. General Order No. 81 eliminated his position as Commander of the Zone of Advance and specified that Foulois was to become the Chief of the Air Service for 1st Army with Mitchell as his subordinate in the position of Chief of Air Operations for the 1st Corps.²⁰³ As might be expected, the new commands and their close proximity only exacerbated the feud between the two men. Foulois documented one of the resulting exchanges in his memoirs. He described a strong-headed Mitchell refusing to release his staff, supplies, and equipment to Foulois upon his arrival to take command of the 1st Army Air Service. The situation had to be resolved eventually by calling in the 1st Army Chief of Staff to order the two men to resolve the situation.²⁰⁴

²⁰² General Order No. 81, General Pershing, 29 May 1918, reprinted in Maurer, *U.S. Air Service*, 187-89.

²⁰³ *Ibid.*, 189.

²⁰⁴ Benjamin D. Foulois, *From the Wright Brothers to the Astronauts* (New York: Arno Press, 1968), 169-70.

Interestingly, this quarrel highlighted a personnel problem dating back to the pre-Mexican Expedition aviation rules. The policy of only allowing the transfer of lieutenants below the age of thirty into aviation was showing its effects years later. Patrick's biographer Robert White suggests that had there been qualified senior officers to take their place Pershing might have removed both men from command.²⁰⁵ While this may be an analytical overreach, it is true that Pershing did have a dearth of senior aviation officers with command, staff, and operational experience. Even if Pershing had wanted to replace both men, there were no obviously qualified senior air service officers available. Thus, this policy dating back to 1909 still held ramifications well into 1918.

Luckily for Mitchell, he received a second unexpected boost when the third stage of the Ludendorff Offensive began in late May. For the first time in the war, Americans started to take a significant role in ground fighting with the 1st and 3rd Divisions fighting at Cantigny and Belleau Wood respectively. These ground troops were not alone, as Mitchell's aviation units soon joined in the battles.

Mitchell's personal flair and leadership style seemed tailor made to inspire the young pilots, many of whom were still civilian at heart and chafed under the rigid regulations of Army life.²⁰⁶ By July, Mitchell had become a celebrity in the AEF Air Service by successfully demonstrating his superior capability to motivate these young men and to organize them into formations capable of countering German air power. Not just Pershing, but also Mitchell's old adversary Foulois noticed this superior leadership. In a stunning turnaround and a statement about his professionalism, Foulois asked for

²⁰⁵ White, *Mason Patrick*, 20.

²⁰⁶ Hurley, *Billy Mitchell*, 34.

reassignment to allow Mitchell to take over aerial operations for all of 1st Army in late July.²⁰⁷

Mitchell's ascension greatly enhanced his ability to shape air power doctrine. His operational focus on ground support left little room for thinking or planning for strategic bombing operations. Additionally, logistical problems continued to slow the arrival of bomber aircraft to the front-line units. While DH-4 daylight bombers were starting to arrive, Mitchell's ground-centric strategy meant most were assigned to squadrons with a direct ground support mission. Night bomber production was even worse. A delay in the production of Liberty engines slowed the delivery of British-produced Handley Page bombers to the American Air Service well into the summer of 1918. Production plans called for the delivery of fifty engines to the British factory in May 1918 for the production of long-range night bombers for the Americans; however, by August only ten engines had arrived.²⁰⁸ Even if the Air Service had the extra bombers, it did not have the aircrews to fly them. With a greater emphasis on ground support came greater losses of observation and bomber aircraft. Much as the British experienced over the Somme, the American Air Service discovered it had an aircrew shortage during the summer of 1918. All of these issues combined to drive strategic bombing to the background during the spring and summer of 1918.

Thus, by July 1918 American strategic bombing advocates had reached a low point. During that month, the AEF staff decided to change the name of the Strategical Aviation, Zone of Advance to the G.H.Q. Air Service Reserve.²⁰⁹ While the name change was partially a response to the restructuring dictated by General Order No. 81, it

²⁰⁷ Ibid., 34.

²⁰⁸ Memorandum to Air Service Chief of Staff, 18 January 1918, A-15, in Gorrell history, 122.

²⁰⁹ Early History of the Strategical Section, 28 December 1919, Sec B-6, 401.

was also likely designed to remove the appearance of an independent bomber command within the AEF. This effectively brought home the realization that bombardment aviation, at least for the time being, was to be used only in support of ground operations as directed by the AEF headquarters.

While the name change signaled the end of Gorrell's dream of a large bomber command in 1918, it perfectly positioned Mitchell to develop a concept for offensive air operations to support the planned American counteroffensive. First at St. Mihiel and then later in the Meuse-Argonne Offensive, Mitchell masterfully integrated reconnaissance, bombardment, and pursuit aviation in support of ground forces. Perhaps the most interesting element of Mitchell's plan was the independent nature of his air forces. Mitchell successfully convinced senior ground commanders that his squadrons had to operate independently of division and corps commanders in order to gain initial aerial superiority over the front. Of course, he was far too experienced and politically savvy to push for a totally independent command. Instead, Mitchell maintained his linkages to ground commanders by ensuring that as the pursuit aircraft were accomplishing their mission, the air commander would simultaneously use bombardment aviation to interdict the flow of reinforcements and supplies and provide intelligence through direct aerial observation missions.²¹⁰ In this way, Mitchell built a balanced air strategy that included a level of autonomy, but maintained the ground combat focus required to garner the support of senior American military leaders.

Nevertheless, Mitchell's plans were not the only potential course for air power development. While Gorrell's bombing proposal may have been shelved, the British continued to work on their own plan. While this strategy became entangled in the

²¹⁰ Aviation Annex to First Army Field Order, 17 September 1918, Gorrell History, Sec. N-2, 330-35.

political and organizational turmoil of the creation of the world's first independent air force, it still had an influence on American aviation strategy.

On 1 April 1918, the RFC and RNAS formally combined into the RAF. The new independent air force faced stiff pressure from the public and the British government to conduct strategic attacks against German cities for both reprisal and industrial destruction. Therefore, the Air Council recommended creating an independent bomber force under the RAF and operating outside British Army control with a purely strategic bombing mission. As might be expected, this would be a difficult operation both to sell to the British Army leadership and to organize and execute in a short time. The Air Council saw only one man for the job: Hugh Trenchard. After a brief stint as the first Chief of the Air Staff from January to April, Trenchard had resigned his post after conflicts over the role of the new RAF. Consequently, the most experienced British air commander was without a job when the Air Council started looking for their new commander. The government rapidly approved both the independent force and cajoled Trenchard into accepting its command. On 13 May 1918, he was officially assigned as the commander of the new Independent Force.²¹¹

The debate then shifted gears into defining the Independent Force's mission. Under the guidance of Chief of the Air Staff, Gen. Fredrick Sykes, the Air Staff produced a paper for the War Cabinet in mid-May outlining a proposed strategy. The top priority for the force was what he called "strategic interception," which he defined as "attacking the root industries and morale of the enemy nation"²¹² He went on to offer two means to

²¹¹ Jones, *Origins of Strategic Bombing*, 178.

²¹² Richard J. Overy, "Strategic Bombardment before 1939: Doctrine, Planning, and Operations," *Case Studies in Strategic Bombing*, Edited by Cargill R. Hall, 11-90 (Washington, DC: Government Printing Office, 1998), 20-21.

accomplish the mission that borrowed heavily from Tiverton's earlier recommendations. First, Sykes proposed bombing specific industrial systems to attack the enemy's means of war. In this way, the bomber force would focus on critical industries like weapons assembly, coal production, or iron manufacturing. Second, Sykes recommended bombing densely populated industrial centers to disrupt work schedules and destroy the enemy's morale.

At this point, Tiverton reentered the strategic bombing discussion with a memorandum to Sykes dated 22 May 1918. In the memo, he pointed out that while Sykes's earlier paper had dealt with bombing policy, it was no substitute for an actual plan. Tiverton warned that if the British truly wanted to conduct a bombing campaign in 1918, they needed to develop a working plan in a short amount of time.²¹³

Sykes agreed wholeheartedly with Tiverton and appointed him to prepare such a document. Tiverton spent most of June 1918 working on a new bombing campaign. This new proposal followed the lines of his previous ones by focusing on industrial targets and area bombardment around densely populated worker housing.

Tiverton's dream may have finally become a reality except for the actions of the 8th Brigade commander, Brig. Gen. Cyril Newell. Upon hearing of Tiverton's plan, Newell drafted his own study of the strategic problem for the Chief of the Air Staff. In his study, titled "The Scientific and Methodical Attack of Vital Industries," Newell concluded that the first priority for any air campaign must be to gain air superiority, without which bombers operating at long ranges over German cities would face unsustainable losses from air defenses. Only once control of the air was assured could the British bombers attack their targets freely. Next, Newell contended that Tiverton's

²¹³ Memo, Tiverton to Chief of the Air Staff, 22 May 1918, AIR 1/460, 15/312/101, NAUK.

target prioritization of industrial and city centers would waste limited air power. Instead, he argued that if the enemy could not get their supplies and weapons to the front they were of no use. Therefore, he proposed targeting rail and transportation networks as the first priority, with industrial factories as a distant third priority.²¹⁴

Newell's ideas ignited a debate on the proper strategy for the new Independent Force. His ideas held much promise. The concept of winning air superiority to enable other missions was gaining rapid acceptance in all allied air forces, as evidenced by the previous discussion of Mitchell's strategy evolution. Additionally, Newell's plan matched more closely Trenchard's view of a ground-centric war. When it came time to decide on the actual strategy, the new Independent Force commander sided with Newell.

Historian Neville Jones suggests that a combination of French pressures to focus on operational bombing and Trenchard's own bias towards supporting Haig's vision of a ground war shaped his decision.²¹⁵ The new AEF Air Service Commander Mason Patrick reinforced this assessment in his postwar memoirs where he recalled Trenchard telling him that "he had fought for several years against the independent show, but that it had been forced on him."²¹⁶ In light of this attitude, it is likely Trenchard continued to focus on supporting his old boss General Haig, even in his new independent command.

The Independent Force became operational on 5 June 1918 when Trenchard took over command of the 8th Brigade. The unit consisted of two flying wings: No. 41 Wing flying three squadrons of daylight bombers; and No. 83 Wing with two squadrons of

²¹⁴ The Scientific and Methodical Attack of Vital Industries, staff study by Brig. Gen. C.L.N. Newell, 27 May 1918, AIR 1/460, 15/312/101, NAUK.

²¹⁵ Jones, *Origins of Strategic Bombing*, 190.

²¹⁶ Mason Patrick, *The United States in the Air* (Garden City, NJ: Doubleday, 1928), 136-37.

night bombers.²¹⁷ The previous commander, Brigadier General Newell, became Trenchard's deputy commander.

The statistics of the force's operations indicate Newell's and Trenchard's visions drove bombing operations. Throughout the summer and fall, the Independent Force struck industrial targets in only 20 percent of its missions. Meanwhile, airfields represented 30 percent of the missions and railways dominated at 50 percent.²¹⁸ While these numbers may not coincide with a modern viewpoint of strategic operations, when filtered through Trenchard's vision and the dominance of the ground war they make more sense. Railway targets seemed to offer the best of both worlds, as they inhibited the flow of war materials to the enemy's military forces, while representing much less risky missions for the always-scarce bomber crews.

Interestingly, when Trenchard did focus on industrial targets, destruction was often a secondary purpose. In late May, he sent a memorandum to the Chief of the Air Ministry describing his strategy for a strategic bombing campaign in 1919. He wrote that "the aim of the Air Force is to break down the enemy's means to resist by attacks on objectives selected as the most likely to achieve this end."²¹⁹ Hidden within this statement was a sobering take on the morale effects of bombing. Under Trenchard's policy, using bombing to drive workers from their homes and factories was a legitimate military objective that was much easier to achieve than destroying a factory. Trenchard even put a ratio to this idea when he advocated that the psychological yield of bombing was about twenty times the level of physical destruction achieved.²²⁰

²¹⁷ Alan Morris, *First of the Many: The Story of Independent Force, RAF* (London: Jarrolds, 1968), 64.

²¹⁸ Jones, *Origins of Strategic Bombing*, 191.

²¹⁹ Lee Kennett, *A History of Strategic Bombing* (New York: Charles Scribner's Sons, 1982), 75.

²²⁰ *Ibid.*, 51.

With the British turning to strategic bombing as a major effort, the Americans also showed signs of renewed interest in long-range bombing during the late summer and fall of 1918. The most dramatic change occurred in the long-range night bomber mission. While on the AEF G3 staff Gorrell continued to work in the background to build the forces needed for a new strategic bombing campaign in 1919 once aircraft production caught up to plans. On 26 January 1918, Gorrell helped negotiate the Rothermere-Foulois agreement, which detailed not only the British production of Handley-Page bombers for the Americans, but also enabled the British to train American bomber crews. While production delays slowed the progress, by 28 June 1918, Patrick established a Night Bombing Section to oversee the formation and basing of these new American long-range night bombardment squadrons along the front. The plans called for the establishment of the first two squadrons in November 1918, with a total of eighteen operational squadrons by April 1919.²²¹ This new force became the backbone on which to build the proposed 1919 strategic bombing campaign.

Meanwhile, daylight bombardment proceeded at a more rapid pace. The first American daylight bombing squadron, the 96th Aero Squadron, began operations with ten Breguet 14B-2 bombers on 12 June 1918.²²² Unlike the night bombing section, the daylight bombers had to contend with the heavy demand for direct support of ground forces. Thus, the 96th lagged behind its British and French counterparts in the types of missions flown. During that summer, the squadron's single-engine Breguets seldom ventured more than sixty miles behind enemy lines, preferring relatively safe targets like railway stations and supply depots behind the front lines, this at a time when British

²²¹ Early History of the Strategical Section, by Col. Edgar S. Gorrell, 28 December 1918, Sec B-6, in Gorrell History, 1-4.

²²² Maurer, *U.S. Air Service*, 365.

bombers were conducting operations against industrial targets as far away as Cologne and Coblenz, 160 and 130 miles distant respectively.

In September, the 11th and 20th Aero Squadrons joined with the 96th to form the 1st Day Bombardment Group. While this might have offered hope for a day bombardment group to support a new strategic campaign, the start of the Meuse-Argonne Offensive on 26 September meant the 1st Day Bombardment Group remained steadfastly tied to attacking German troop concentrations and lines of communication. Still, the group did occasionally venture beyond the battlefield to attack more strategic targets like important rail junctions along the German-French border.

The stand up of the 1st and the plans for a night-bomber force were not lost on the British, who saw it as a potential strategic unit that could cooperate with their Independent Force in the long discussed Allied strategic bombing campaign. By October 1918, the situation at the front was starting to change dramatically. With the Germans on the defensive and aircraft production finally catching up to predictions, American leadership showed a new openness to strategic bombing.²²³

There were differences between the allies that had to be worked out before a combined bomber offensive could be planned, but these seemed within reach. The most important was the issue of independence. Earlier that summer, the AEF Air Service had completed a third proposal for a strategic bombing campaign during 1919. General Pershing's new Chief of Staff, Maj. Gen. James W. McAndrew, immediately placed limits on this effort. In a memorandum dated 18 June 1918, he notified AEF Air Service Commander Patrick that while he approved of the planning for a future operation, he specifically precluded an independent air campaign or subordination under British

²²³ Ibid., 367.

leadership. His language left little room for doubt, “it is therefore directed that these officers be warned against any idea of independence” and “selections of targets will depend solely upon their importance for our ground forces.”²²⁴ McAndrew’s opinion had not changed by the fall, and the American Air Service found itself working under these same constraints.

Meanwhile, the issue of targeting also caused conflict between the Allies. The growing public pressure for revenge did not abate in England as the end of 1918 approached. In many ways, the attitude took even more hold of the British government. Air Minister Sir William Weir wrote to Trenchard in early November expressing that “I would very much like it if you could start a really big fire on one of the German towns.”²²⁵ It is likely this letter struck a chord with Tranchard as it meshed with his own understanding of the importance of the psychological effect of bombing.

This attitude caused consternation in the American command structure. They feared the British would inflict carnage on German cities in the name of revenge or destroying morale. Concern appeared at the highest levels of the U.S. government. In October 1918, Secretary of War Newton Baker sent word to General Pershing that the U.S. would not participate in any bombing plan that had as its objective “promiscuous bombing upon industry, commerce, or population.”²²⁶

In many ways these two issues forecast later debates on strategic bombing strategy. Yet, in the end, World War I was over before any substantive actions could be taken to ameliorate the differences between the British and Americans. The unexpected

²²⁴ Memo, McAndrew to CAS, 18 June 1918, Gorrell History, Sec B-6, 42.

²²⁵ Morrow, *Great War in the Air*, 321.

²²⁶ Memorandum on Bombing Strategy, by Newton Baker, 6 October 1918, Gorrell History, Sec A-23, 391.

timing of the armistice left many issues unresolved. Could air power be decisive through strategic bombing? What was the best way to accomplish a strategic bombing campaign? What type of force was necessary to win a war through the air? These questions were all left open to interpretation by the end of fighting on 11 November 1918.

Technological Shortcomings and Conflicting Leadership

Perhaps a more useful question at this stage is why did the Americans fail to accept strategic bombing on the same level as their British allies? While some of the reasons have been discussed in the preceding text, two other important areas deserve further study. In their own particular way both technology and leadership also doomed any American strategic bombing campaign.

Technological limitations proved a constant thorn in the side of American strategic bombing advocates. The key problem was the inability of America's aviation industry to produce large numbers of aircraft. From the beginning, the U.S. government and the Army in particular maintained policies adverse to the growth of a functional aviation industry. This dated back to the Army's initial position that all airframes had to be developed by the producer with no monetary support from the government.²²⁷ This effectively limited new developers as few had the funds on hand to produce aircraft without outside support. The Army's continual unwillingness to buy the large numbers of aircraft required to spur the growth of an aviation industry exacerbated this initial decision. Even if an aircraft developer invested its own funds, there was little chance of making significant profits of the sale of large numbers of airplanes to the military. The

²²⁷ Charles deForest Chandler and Frank P. Lahm, *How Our Army Grew Wings* (New York: Arno Press, 1979), 160-61.

end effect was to limit the size and production capabilities of the American aviation industry just when the United States needed aircraft the most.

As the United States entered World War I, the government finally addressed the issue of aviation funding. In July 1917, Congress appropriated \$640 million for military aviation. Along with this funding came the promise from industry experts that with the money the Army could field 4,500 aircraft by May 1918.²²⁸ Unfortunately, despite the promises of industrial representatives, congressional leaders, and the press, the American aircraft industry was only just beginning to make good on its promised aircraft deliveries when the war ended.

This was especially true for bombardment aircraft. On 29 May 1917, the Joint Army-Navy Technical Board all but ensured a shortage of bomber aircraft when it determined a production ratio of 3:5:1 for pursuit, observation, and bomber aircraft.²²⁹ When the American aviation industry fell behind schedule on aircraft deliveries, the manufacturers focused on the higher-priority pursuit and observation aircraft. Consequently, when Gorrell first took command of Strategic Aviation in the Zone of Advance, he had a plan for action, but only a handful of aircraft to carry it out.

The statistics demonstrate the dire state of bomber production Gorrell faced. The first American-built DH-4 daylight bomber was not shipped from Hoboken, New Jersey until March 1918. By that time, Gorrell had already been relieved of his command and strategic bombing was fast fading from the AEF leadership's attention. In the end, only

²²⁸ Maurer, *U.S. Air Service in World War I*, 105.

²²⁹ Report of the Joint Army-Navy Technical Aircraft Board, 29 May 1917, Sec A11, in Gorrell History, 11-12.

196 American-made bomber aircraft ever made it to combat squadrons in France before the end of the war.²³⁰

This bomber shortage may not have been an issue if not for simultaneous problems with British aircraft production. With their new push to produce a large bomber force, British industry had to retool to provide larger engines for the new aircraft. Unfortunately, the process often resulted in delays. A good example is the production of the Beardmore-Helford-Pulling engine for the DH-4 daylight bomber. In the fall of 1917, a problem with the engine's aluminum cylinders caused a six-month production delay, which was not completely resolved until April 1918.²³¹ Luckily, supplies of French Hispano-Suiza engines helped ameliorate the problem, but the delays in British DH-4 production meant American units did not receive their quotas of British-built aircraft until after Gorrell's plans had become overtaken by events on the ground.

A second factor disrupting bomber plans was conflicting leadership visions. Both at the AEF and the Air Service level, Gorrell had to contend with confusing and often inconsistent guidance. This surely was the case in December 1917 when Gorrell represented the Americans at Trenchard's inter-allied bombing conference. Having just received Pershing's approval for his bombing proposal and a promotion to command the Air Service's strategic bombing forces, Gorrell must have expected Pershing to support the combined strategic bombing effort fully.

Yet, Trenchard's then deputy Brig. Gen. Gerald Blaine points out this was not the case. Shortly after the bombing conference, Trenchard called on Pershing to discuss the proposal to allow the AEF bombers to work with the British forces. In a memorandum

²³⁰ Chief of the Air Service Annual Report, 1919, U.S. Air Force Academy Library, Colorado Springs, CO, 225.

²³¹ Jones, *Official History*, Vol. VI, 38.

dated 13 January 1918, Blaine described Pershing's response. He wrote, "I could see clearly and in fact he said no, that he was not at all desirous of putting American personnel under us."²³² This was an interesting turnaround, considering that Pershing had approved Gorrell's November 1917 bombing proposal, which was similar to the one Trenchard advocated.

It is likely two elements intervened to change Pershing's thinking. The first was the issue of independence. Pershing's staff warned that the Air Service's emphasis on conducting independent campaigns could hurt ground operations. The AEF Chief of Staff McAndrew's warning to Patrick that "it is therefore directed that these officers be warned against any idea of independence," demonstrates the pervasiveness of the concern in the general staff.²³³

The second issue on Pershing's mind was likely the realization that American ground forces were soon to enter combat. Given the delays in aircraft production, Pershing must have been concerned over the Air Service's ability to support the ground offensive and a strategic campaign at the same time. He even alluded to this in his memoirs when he referred to the double failure of the United States to produce aircraft and to send raw materials to allies, resulting in only nine of the planned sixty squadrons being combat ready in February 1918.²³⁴ In this light, Trenchard's proposal must have sounded like sapping U.S. air power strength when it was needed most.

Historian Robert White suggests a potential third explanation for this strategic about-face. He contends that Pershing was caught off guard by Trenchard's request due

²³² HQ RFC Memorandum, 13 January 1918, AIR 1/925/204/5/812, London: NAUK.

²³³ Memo, MacAndrew to Patrick, 18 June 1918, in Gorrell History, Sec B-6, 42.

²³⁴ John J. Pershing, *My Experiences in the World War* (New York: Fredrick A. Stokes Company, 1931), 326.

to sloppy Air Service staff work. Simply put, Foulois never notified his boss that Trenchard planned to ask him to provide U.S. bombers to the British effort. White demonstrates that Foulois knew of Trenchard's proposal for two weeks before the Pershing-Trenchard meeting, but failed to brief his commander on the plan.²³⁵ Given this information, it is possible Pershing simply reacted to being caught off guard by reverting to his staff's more conservative vision of American air power.

Either way, Pershing and Trenchard resolved the issue through a series of letters. On 6 February 1918, Pershing wrote to Trenchard to announce he would cooperate with his plan, if not fully place American forces under British command. Pershing ended the letter by promising "you may be sure that I shall do everything in my power to make this cooperation as effective as possible."²³⁶ Given the back-and-forth nature of Pershing's support for strategic bombing, it is understandable how Gorrell was caught in the middle. This helps explain why he worked so feverishly to modify his proposal in January 1918, when he perhaps should have been more focused on starting bombing missions.

A similar leadership issue existed at the Air Service level. Rapid growth created a unique problem for the Air Service command staff, which lacked a robust pool of trained and experienced officers to man the critical planning functions. What few experienced personnel were available often rapidly left staff positions to take command of important field operations. While this was good for the overall Air Service, it hurt important planning and strategy functions.

By early 1918, senior AEF commanders could see the confusion and careless staff work emanating from the Air Service. Patrick alluded to it when informing his wife

²³⁵ White, *Mason Patrick*, 29.

²³⁶ Pershing to Trenchard, 6 February 1918, AIR 1/925/204/5/812, NAUK.

about his selection to command the AEF Air Service. He described Pershing's words to him as, "the fact is I am entirely dissatisfied with the way the aviation service is getting on and I want you at the head of it and have you bring order out of what is now chaos. There is bickering, they are running around in circles. There is need for a man to take hold of it and whip it into shape. I want you to do this for me."²³⁷

Patrick's words describe a problem that also dated back to the origins of the Air Service. When House Resolution 5304 codified the long-standing Army policy of only allowing unmarried lieutenants under the age of thirty to join the service, it meant Pershing had to deal with a large number of young and inexperienced officers in his wartime air service.²³⁸ This youthful command structure often resulted in clashes of individual egos that more experienced officers would likely have been able to resolve. A good example of this is the rivalry between Foulois and Mitchell. If such a fight had broken out between two ground commanders, Pershing might have replaced them both with other experienced officers. Yet, in the Air Service's case, there simply were no other men with the pedigrees to replace either commander. Pershing had no choice other than to bring in outsiders and had to keep a lid on the conflicts as best he could.

Given this staff environment, it is understandable how Gorrell had difficulty turning his vision for strategic bombing into reality. Problems with production numbers were only exacerbated by staff confusion that limited the availability of the aircraft on hand. Competing egos often drew attention from strategy discussions. It is likely Gorrell never fully knew if he had staff support or not. Given these issues, it is understandable

²³⁷ Patrick to his wife, 11 May 1918, Mason Patrick Collection, Fort Rucker Archives, AL.

²³⁸ House Resolution 5304: Act to Increase the Efficiency of the Aviation Section of the Army, 18 July 1914 (Washington, DC: Government Printing Office, 1914).

how the already complex job of planning and executing a strategic bombing campaign became an almost impossible task.

Conclusion

If 1917 was a period of growth for strategic bombing theory, 1918 was the year that the hard realities of war once again focused military leaders on ground campaigns. This was especially true of the Americans. Lacking the political pressure to respond to German bombings of their homeland, American military leaders refocused their attention on ground combat. This focus only intensified as the Army started taking a larger role in combat operations as 1918 progressed.

Gorrell represents the perfect example of American strategic bombing theory's fate during the last year of the war. As 1918 started, he rode a wave of British pressure, American openness, and great expectations to what seemed to be the threshold of a bombing campaign. Unfortunately for him, reality did not quite meet his perceptions. Even before the year began, signs of AEF staff animosity to Gorrell's strategy became visible. The reluctance to accept the British proposal for a combined bomber offensive in December 1917 was the first sign. A lack of staff support during Gorrell's short tenure as Commander of Strategical Aviation in the Zone of the Advance further limited bombing. Finally, the resource requirements to support American ground forces in their growing combat roles spelled the end of any potential strategic campaigns in 1918.

Instead, a more balanced aerial strategy based on the traditional view of air power as a supporting element of ground forces came to dominate. Mitchell utilized this strategy to win a double battle. First, he successfully wrested control of the air from the hard-pressed German air forces. Then, he won a perhaps more difficult battle. Mitchell

convinced the majority of ground commanders that his vision of a semi-independent air service supporting a ground-centric war was the proper air strategy to use.

Interestingly, this did not spell the end of strategic bombing as an option in the U.S. military. Continued pressure from the British helped keep the idea alive within elements of the AEF and the Air Service. By late 1918, facing diminishing resistance and an expected surplus of aircraft in 1919, the AEF leadership once again showed openness to strategic campaigns. Luckily, Gorrell had been working behind the scenes to secure the production of long-range bombers and the training of their aircrews. While there was still a hesitancy to conduct any campaign outside American-approved lines, it seemed 1919 might be the year when strategic bombing would once and for all prove itself in combat. Of course, the end of the war stopped this effort, forever leaving the lingering question of whether or not strategic bombing could have worked. Future airmen would have to answer that question.

Chapter 6

Solidifying Doctrine Through History

Despite the trials and tribulations of strategic bombing advocates, in the end, events during the war may have had less effect on the future of aviation than on how the participants codified their understandings of those events and the lessons passed on to future generations. Many of the young men who fought in the skies over Europe rapidly returned to civilian life when hostilities ended. With their departure, a treasure trove of operational experience also left the military. To add to the problem, with each passing year new ideas and understandings replaced wartime experiences.

This lesson was not lost on the AEF Air Service. Many of its officers desired to encapsulate their experiences, lessons, and theories into documents to pass to the next generation. The question was how to accomplish the task. Previous examples from Army history pointed to a myriad of different techniques. Lessons-learned repositories were often turned into standard operating procedures for units to incorporate into their daily training cycles. Another more tried and true Army method was to organize material into operational manuals that defined problems, provided doctrinal solutions, and formed the core of Army thinking in the early twentieth century. Authoring a new manual for the air service seemed a perfect way to capture the important elements learned in combat. Yet, there were problems with this technique. Manuals were notoriously focused on daily operations, often at the expense of background information that explained why a particular tactic, policy, or course of action was the best choice.

To help alleviate the problem, the Air Service Chief, Maj. Gen. Mason Patrick decided to add another less utilized methodology. Shortly after the war ended, he ordered a large history of the AEF Air Service to be compiled, which would include inputs from all officers.²³⁹ At the time, this must have seemed like an unwieldy way to turn experience into doctrine. Operational manuals were much smaller and easier to use in everyday training. On the other hand, there was little chance of thousands of pages of reports being read by the average pilot or incorporated into the daily routine of a flying unit.

Yet, Patrick's decision to put his aggressive chief of staff Edgar Gorrell in charge of the project helped ensure it had a long-lasting life. While meeting Patrick's directive, Gorrell went beyond just writing a history of what happened in the air. Instead, he ensured that the theoretical debates, strategy arguments, and tactical decisions were also captured in the voluminous history. More important for strategic bombing, he even wrote a history of the Strategical Section of the Zone of Advance and included a copy of the American bombing survey conducted at the end of the war. These two steps ensured future generations had access not only to his ideas, but also a wealth of statistical data.

In this way, perhaps without truly knowing what he was doing, Gorrell effectively used an official history to shape future doctrinal debates. When the next generation of aviators turned their attention to the possibilities of bombing, they had a ready-made handbook containing insights into strategic bombing's origins and supporting data to help convince skeptics sitting in the libraries of such institutions as the Air Corps Tactical School and the general staff.

²³⁹ National Archive's Introduction, 1974, in Gorrell History, 2.

Operational Manuals

In their attempt to codify the lessons from World War I, many Air Service leaders turned to the methods they learned as young officers. The operational manual was akin to the bible for most Army branches and field services. It imparted the leadership-approved methodologies for solving various military problems. In an era before formal doctrine documents, these manuals served a similar purpose. They were literally the book in the old saying, “I want it done by the book.” Considering this history, it is not unusual that Billy Mitchell, the American Air Service’s most famous airman, utilized this methodology to capture his vision of air power for future generations.

On 15 November 1918, Mitchell assumed command of the Air Services for the U.S. Third Army, which was the American contribution to the occupation forces monitoring German compliance with the Treaty of Versailles.²⁴⁰ This command represented a unique opportunity for Mitchell. After the hectic pace of leading large air offensives, he had time to focus on non-combat-related activities. Mitchell immediately had his staff begin working on an operational Air Service manual for the Third Army based on his experience during the war.

Mitchell’s staff completed the *Provisional Manual of Operations of Air Service Units* on 23 December 1918.²⁴¹ In what today would be called a standard operating procedure, Mitchell documented the daily processes used by aviation units under his command during the battles of St. Mihiel and the Meuse Argonne. While the manual covered all aspects of aviation, two sections are important from a bombing perspective.

²⁴⁰ James J. Cooke, *Billy Mitchell* (Boulder, CO: Lynne Rienner Publishers, 2002), 186.

²⁴¹ Provisional Manual of Operations of Air Service Units, 23 December 1918, Call# 248.211-61s, IRIS# 124603, AFHRA, Maxwell AFB, AL, paragraph 1.

The first section titled “The Routine of a Day Bombardment Group” laid out Mitchell’s vision for bombing. As with his earlier operational plans drafted during the summer and fall of 1918, bombing remained mainly a direct ground support role. The section left little room for debate when it specified that daylight bombers must be used in conjunction with supporting ground operations. The section then pushed bombing further towards direct ground support when it stated, “all target selection should occur at the G-3 level to ensure targets match with the ground commander’s objectives.”²⁴² Finally, the provisional manual extended the direct ground support theme to its discussion of tactics, inferring that any potential daylight bombing target would be close to the front lines and thus defended by Army units with machine guns and light antiaircraft artillery. Accordingly, all tactical discussions revolved around the need to overcome threats associated with the forward edge of the battle area, while almost no dialogue related to issues associated with long-range flights like navigation or defense against enemy aircraft.

Night bombing, outlined in the second section of the document, also played a significant role for strategic bombing. Here Mitchell diverged from the late war use of nighttime missions targeting urban areas by suggesting the only future night role was harassing enemy troops. In just one short paragraph, Mitchell dismissed night bombing as only potentially useful in avoiding aerial combat, while still disrupting enemy operations through harassment.²⁴³

This brings up an interesting issue. Was this a sign that Mitchell’s did not support strategic bombing or was it simply his lack of knowledge resulting from Third Army’s

²⁴² Ibid., paragraph 68.

²⁴³ Ibid., paragraph 78.

Air Service having no long-range bombing aircraft assigned to it? It is clear that dating back to the April 1918 *General Principles for American Aviation Bulletin*, Mitchell advocated for air power as a semi-independent element directly tied to the ground war with little or no strategic mission.²⁴⁴ Still, this was a marked change from his earlier advocacy of long-range bombing in the early summer of 1917, when he stated that “with this class of aviation the United States may aid in the greatest way and which, it is believed if properly applied will have a greater influence on the ultimate decision of the war than any other one arm.”²⁴⁵ Whether Mitchell’s opinions truly evolved, or as some historians suggest he favored any policy that helped his personal situation remains open to debate. What is known is that Mitchell’s 1919 manual effectively turned bombing into just another tool to use in defeating an enemy army.

While Mitchell’s provisional manual had limited value in stimulating strategic air power thought, it set a precedent for codifying and sharing new ideas. When the AEF issued the manual as an Air Service Bulletin on 24 December 1918, it at once set the standard for turning operational experience into doctrine.²⁴⁶ Given the nature and origins of the document, it articulated the conventional Army vision of aviation as one element working in conjunction with others to achieve the defeat of the enemy’s army.

Despite Mitchell’s prominence, there was one important shortcoming in his approach that doomed its long-term influence. The Army intended for its manuals to be superseded as new technology and operational theories proved themselves. While

²⁴⁴ Bulletin of the Information Section, Air Service, AEF, Vol. III, No. 132, 30 April 1918, Muir Library Special Collection, Maxwell AFB, AL.

²⁴⁵ Memorandum for the Chief of Staff, U.S. Expeditionary Forces, by Lt. Col. William Mitchell, 13 June 1917, Sec A-23, in Gorrell History, 81.

²⁴⁶ Maurer Maurer, *U.S. Air Service in World War I* (Washington, DC: Office of Air Force History, 1978), 267.

Mitchell's manual started out as the gold standard, it could not remain such for long. That the manual was sent out as an Air Service Bulletin to all aviators encouraged the forces of change, as it piqued the interest of many officers and drove a few of them to start their own revisions.

Even as Mitchell's manual was garnering attention in the AEF Air Service headquarters, another senior leader attempted to codify his ideas into doctrine. Lt. Col. William C. Sherman was the Chief of Staff for the First Army's Air Service. In this position, he oversaw all aerial operational, administrative, and planning elements in the First Army's sector of the front. Much like Mitchell, Sherman understood the need to codify First Army's air power lessons into a formal document, his early 1919 a *Tentative Manual for the Employment of Air Services*.

Sherman's manual expanded on Mitchell's initial concept. Where Mitchell documented daily procedures, Sherman built a true Air Service manual on a par with the infantry's manual, *Field Service Regulation*.²⁴⁷ Sherman's document proved a success on both sides of the Atlantic. The AEF leadership cabled the manual to Washington on 11 April 1919, where it was widely read by many Air Service officers. It attracted attention because Sherman created comprehensive document covering air power theory, planning, and operations. Accordingly, his manual could be considered one of the first doctrine documents in the U.S. Air Service.

Sherman's manual even included a detailed discussion of strategic bombing. He expanded on Mitchell's direct ground support role to include "the destruction of the

²⁴⁷ Ibid., 313.

material, personnel, and morale of the enemy” as objectives for the Air Service.²⁴⁸ While this was not a ringing endorsement of strategic bombing, it did acknowledge that bombing could play a significant role in destroying enemy material and morale far behind the front lines.

Even with its popularity and acceptance, Sherman’s manual had the same institutional flaw as Mitchell’s. As with other manuals, it required regular updates. When a change occurred, the superseded version became relegated to the scrap pile or hidden away in Army archives where only intrepid historians were likely ever to see them again. By the time a new generation of aviators sought their guidance, these manuals were no longer within easy reach. Luckily for strategic bombing theory, there was another type of document produced after the war that captured more ideas in a format that would ensure its availability to future theorist.

The Official History

As the war’s end neared, Gorrell once again returned to the Air Service command staff after his tour with the AEF G3 section. On 28 October 1918, at the age of twenty-seven, Gorrell became the youngest colonel in the Army when Patrick selected him as his new chief of staff. The position fit Gorrell’s strengths perfectly. Since his arrival in France in June 1917, Gorrell had excelled at administrative staff work. As a member of the Bolling Commission, he had authored detailed descriptions of European aviation technology and had crafted well-reasoned arguments for buying aircraft from the British and French. Next, he worked tirelessly to coordinate and gain approval for a strategic

²⁴⁸ *Tentative Manual for the Employment of Air Services*, by Lt. Col. William C. Sherman, undated, Sec D-1, in *Gorrell History*, 234.

bombing plan to coordinate with the growing British and French campaigns in late 1917. When that effort failed, he kept his reputation as a steadfast planner and staff officer. As the air planner for the AEF G3, Gorrell turned his attention from strategic bombing to coordinating the tactical bombing, observation, and pursuit requirements needed by Mitchell in his successful campaigns of the summer and fall of 1918. These experiences made him the perfect fit for Patrick's staff. In just the few weeks before the war ended, Gorrell impressed Patrick with his organizational skills and ability to encourage others to accomplish difficult tasks in a timely manner.²⁴⁹

Gorrell's skills meshed well with Patrick's plan to develop a single comprehensive history of the AEF Air Service in World War I. As early as February 1918, General Pershing recognized the need to start gathering data for an official history of the American armed forces in World War I. Therefore, on 16 February, his headquarters issued General Order no. 31, tasking all subordinate elements of the AEF to establish historical sections to oversee the collection of documents and unit war diaries for a grand history of the war. The AEF Air Service followed these instructions when on 11 May Patrick selected the Information Section to fulfill this role for the AEF Air Service.²⁵⁰

The Information Section worked mostly behind the scenes during the last few months of the war to collect important orders and staff paperwork. When the war ended, the AEF Air Service staff understood that a major effort to collect information and incorporate it to an official history was only a matter of time. Therefore, on 19 November 1918, Gorrell decided to preempt the situation and sent telegrams to all Air

²⁴⁹ Marvin L. Skelton, "Colonel Gorrell and His Nearly Forgotten Records," *Over the Front* 5 (Spring 1990): 59.

²⁵⁰ Introduction, Gorrell History, 2.

Service elements asking them to prepare an official history and submit it to the Information Section in a timely manner.²⁵¹

Gorrell's insights proved accurate when on 4 December 1918 Patrick ordered him to assemble a staff and personally oversee the preparations of an AEF Air Service history. Patrick's vision went beyond just compiling the unit histories, as he expanded the task to include written inputs from every responsible unit commander and aviator. Patrick even stressed the importance of the project by giving guidance that no officer would be released to return to the United States until Gorrell accepted his lessons learned and historical records submissions.²⁵² In the end, Gorrell's efforts culminated in the officially titled *Final Report to the Chief of the Air Service, AEF*, which over time became better known as the Gorrell History due to his central role in creating the multivolume document.

Besides suiting Gorrell's administrative talents, overseeing the project also offered the chance to inculcate his own priorities into the official history. Gorrell envisioned his study as a book that each Air Service officer would own and refer to while developing his thoughts on air power doctrine.²⁵³ Therefore, he took a special interest in the history beyond that ordered by Patrick. Gorrell personally wrote several sections of the final product, including two that were critical for the how future generations theorized about strategic bombing.

The first of these was the history of the American Liaison Officer in Paris. This history recounted the Bolling Commission's travels, the early theoretical debates, and the interactions with the French and British aviation missions. Gorrell was perfectly situated

²⁵¹ Ibid., 2.

²⁵² Skelton, "Colonel Gorrell's Records," 60.

²⁵³ Ibid., 61.

to write this, as he was a central player in all of these early coordination efforts. He even included several of his personal conversations with the British and French concerning the evolving thoughts on strategic bombardment that would have otherwise been lost.

Gorrell depicted strong ties between these first American aviators in Europe and their French and British contemporaries. This is not surprising, as the young Americans often looked to the more experienced Europeans for help interpreting the evolving air war. What is more surprising, though, is Gorrell's downplaying of the Italian influences on the Americans. Despite his earlier acknowledgment of Caproni's advice in his many early reports and policy recommendations, Gorrell does not include any references to Caproni or Italian bombing in this section.²⁵⁴ Perhaps this was an attempt to make himself look better by not bringing to light his early failed attempts to convince Air Service leadership to buy large numbers of Caproni's. Another possibility is Gorrell believed that Capt. Fiorello La Guardia, who was the Joint Army-Navy Aircraft Committee in Paris liaison to Italian authorities, would cover the issue in his submission. Finally, it is also possible this was a simple reflection of the general trend of the Americans moving ever closer to their British and French allies as they started to enter combat operations. The record remains muddy on the issue, but the failure to credit Caproni could help explain why many historians overlook the Italian influence on early U.S. air power theory and technology. Despite these problems, the Paris office history was still important because it preserved most of Gorrell's theoretical influences and documented the early debates and decisions concerning strategic bombing in the fledgling AEF Air Service.

²⁵⁴ J. L. Boone, "Italian Influence on the Origins of the American Concept of Strategic Bombardment," *Air Power Historian* 22 (July 1957): 49-50.

The second portion written by Gorrell was the history of the night bombardment section, which recounted the early efforts to create American bombing squadrons and develop a strategic bombing campaign. While a large portion of the section describes Gorrell's actions as Commander of Strategical Aviation in the Zone of Advance, his inclusion of his 28 November 1917 bombing campaign proposal likely had a longer lasting effect. Without its inclusions, Gorrell's strategy may have become just another staff proposal lost to history. Instead, it maintained a prominent place in one of the few sections of the official history that discussed long-range or strategic bombing, and it was readily accessible and easy to find for future researchers.

Gorrell did not stop with just including his November proposal. He also highlighted the reasons why he believed strategic bombing failed to garner senior AEF leadership support. Gorrell placed the majority of blame at his own feet when he wrote that "the Air Service failed to secure the approval of the General Staff and consequently suffered from the fact that its plans for the use of the Strategical Air Service were not synchronized properly, especially from the mental point of view of its employment, with the ideas of the G.H.Q."²⁵⁵ He even admitted that this failure was due to inexperience. Thus, he acknowledged his inexperience as a staff officer convinced him that gaining Pershing's approval was enough to assure the cooperation of the senior members of the AEF staff. This was a serious mistake by a young staff officer.

In this way, once again the issue of inexperience in the Air Service's officer corps portended problems. As a result of prior Army rules limiting entry to only lieutenants less than thirty years of age, many Air Service officers were quite young and

²⁵⁵ Early History of the Strategical Section, by Col. Edgar S. Gorrell, 28 December 1918, Sec B-6, in Gorrell History, 400-1.

inexperienced when compared to the larger Army. Gorrell was a perfect example, as he was only twenty-six years old when he took over the Strategic section. He had limited general staff experience, had not attended the Staff College, and had little experience working with senior officers. Could a more seasoned officer have coordinated better and brought strategic bombing to fruition? Given the reticence of many senior Army officers, it is doubtful. Still, Gorrell's inexperience did not serve him well in this staff battle.

Besides poor coordination, Gorrell also saw technological problems as an explanation for strategic bombing's failure to gain traction in the U.S. Army during the war. He succinctly spelled out the problem when he wrote that "entirely too much optimism was felt for the American Production Program," which resulted in the AEF Air Service bomber aircraft shortage. Gorrell was less forgiving on this fault, indicating "it was only the cold matter of fact experience which proved to the world that money and men could not make an air program over night and that the time to prepare for war was not after war had been declared."²⁵⁶ In modern parlance, Gorrell might have said that if promises sound too good to be true, they likely are. As such, he not only castigated the Army and Air Service for believing the rosy aircraft production predictions, but also highlighted the need for industrial planning before hostilities broke out.

In addition to these two sections, one other section encompassed valuable insights for future strategic bombing theorists. While writing their histories, many officers included their own critiques and recommendations along with their documentation. Gorrell decided to include the best of these in a separate section titled Lessons and Recommendations. While these generally focused on tactical or logistical issues, the volume also contained several references to bombing.

²⁵⁶ Ibid., 401.

The Lessons and Recommendations section was comprehensive. At the end of the war, Patrick ordered that no one could depart for America until they “furnished in writing to Colonel Gorrell any information of value which he possess and which he has acquired while in the American Air Service.”²⁵⁷ As a result, a flood of submissions came in from the field. Many were quickly written memorandums of little value designed to get the author released for return stateside as soon as possible. Others, though, were well-developed and thoughtful examinations of individual experiences during the war and how they might apply to the future of military aviation. Three examples deserve special attention for their relevancy to future strategic bombing theorists.

The first was the submission of Col. Thomas DeWitt Milling, the Chief of the Air Service for the U.S. First Army. Milling had a distinguished career in the AEF Air Service, serving as the chief of Air Service Training in Europe before replacing Billy Mitchell at 1st Army.²⁵⁸ Milling’s greatest contribution was his discussion of bombing tactics and technological issues. Concerning tactics, Milling wrote one of the first recommendations that all long-distance bombing missions include pursuit aircraft to protect the bombers. He indicated that after heavy aircraft and personnel losses in the early fall, on 21 October 1918, the 1st Army Air Service decided to add a pursuit group to all bombardment raids beyond the front lines.²⁵⁹ Milling highlighted that this addition had an unexpected positive effect besides the reduction in bombers lost to enemy fighters. In the later stages of the war, the Germans often kept their aircraft grounded or attempted to avoid direct fights with Allied pursuit formations. Yet, when large bomber groups

²⁵⁷ Maurer, *U.S. Air Service in World War I*, Vol. III, 1.

²⁵⁸ Milling Biographical Note, undated, Call# 168.7006-47, IRIS# 125903, in the Maj. Gen. (Ret.) Orvil A. Anderson papers, AFHRA, Maxwell AFB, AL.

²⁵⁹ Memorandum to the Chief of the Air Service, 9 January 1919, Sec A-15, in Gorrell history, 5.

penetrated their airspace, they inevitably reacted by launching fighters to intercept them. Milling indicated this turned out to be a win-win tactic for the Americans, as the bombers proceeded to their targets unmolested, while the fighters engaged and shot down the often-elusive Germans.²⁶⁰

Milling then turned his attention to technological problems. Whereas Gorrell explored the larger issue of industrial production failures, Milling focused on one specific shortcoming, a design flaw with the De Havilland DH-4 daylight bomber that caused tremendous morale issues with its crews in the later stages of the war. Unprotected gas tanks on the DH-4 often ignited into raging fires when struck by anti-aircraft artillery or machine gun fire, usually resulting in fiery deaths for any such unfortunate aircrew. Milling pointed out that both the French and British developed protected fuel systems that almost always avoided such fires. He questioned why the United States had not either developed its own fuel protection technology or adopted the British and French models.²⁶¹

In doing so, Milling highlighted one of the major technological problems faced by the American Air Service in World War I: that is, the lack of a system to garner requirements from the field, translate them into new technologies, and then rapidly produce them. Even more tragic for the American aviators, this problem seemed to have been already addressed by their European allies. In his classic study of World War I technological innovation *The War of Invention: Science in the Great War: 1914-1918*, Historian Guy Hartcup described how both the British and French developed government-run networks of education and scientific institutions working to develop new

²⁶⁰ Ibid., 6.

²⁶¹ Ibid.

technologies to help meet requirements identified at the front. Coming late to the war and lacking experience with a military-industrial system, the Americans had their hands full just trying to build the needed aircraft. Making technological changes on an industrial scale was simply beyond their ability in 1918. Fittingly, Milling's specific example of DH-4 fuel tanks echoed Gorrell's call to build an industrial system capable of supporting military operations during peacetime, not when war demanded immediate action.

The contribution of Maj. George E. A. Reinburg, Commander of the 2nd Day Bombardment Group, straddled the fence between strategy and technology. On the strategy side, he paralleled Gorrell's earlier vision when he wrote: "observation and bombing are the principal roles of the Air Service, while pursuit is to protect those roles."²⁶² Like Gorrell, he challenged the fundamental understanding of why an air force existed. When America entered the war, the prioritization of observation and air superiority had led to a production ratio of 3:5:1 for pursuit to observation to bomber aircraft. Reinburg challenged this ratio, arguing that bombing was a core mission of the Air Service and as such should be reprioritized at least on a par with observation.

While important, Reinburg's strategy discussion paled when compared to the importance of his technology recommendations. He started by explaining that expected results for bombing, especially in the press and public, were unreasonable given the then state of aviation technology.²⁶³ Hence, the Air Service needed to develop a plan that addressed the issue from both ends. It was not enough just to develop new technologies

²⁶² Second Bomb Group Lessons from the War in the Air, 18 December 1918, Sec A-15, in Gorrell History, 209.

²⁶³ Ibid., 211.

to increase accuracy and destructive force, the military also needed to work with the public to educate and excite them about realistic air power capabilities.

At the same time, Reinburg also identified a major gap in the relationship between intelligence and air operations. He first lauded the AEF G-2's integration with the British and French intelligence's industrial analysis and targeting system, but then called for even more integration with air missions. Reinburg advocated for an intelligence office under the Air Service's command to conduct immediate assessment of operational results in order to fold them back into the campaign plan before the next mission.²⁶⁴ In doing so, he believed the intelligence analysts could reduce redundancy and bring more pressure to bear on the enemy's industrial system in a shorter amount of time.

The final input of note was that of Capt. N. W. Owens, the Air Service Adjutant and prior Night Bombardment staff officer. Owens' contribution served less as a recommendation than as ammunition for future air strategists concerning the industrial problem of building a large bombing force. While most viewed the Liberty engine as a triumph of the American industrial effort, Owens cautioned that this was not always the case. He described how problems with the engines in the Handley Page bomber program demonstrated that there were still significant failures even in this highly touted success story. The original plan called for the delivery of 50 Liberty engines to the Handley Page factory in May 1918, 100 in June, and 160 by the end of July. After that, 40 engines per week were to arrive at the factory. Reality was quite different from the plan, though, with only 10 incomplete engines arriving through the end of August. By October 1918, the factory had to request the shipment of only parts, as most engines arrived missing

²⁶⁴ Ibid., 212.

major components and were not usable.²⁶⁵ Owens used this example to recommend the establishment of an aviation industrial core during peacetime to avoid these types of problems during future rapid military build-ups.

In this way, the official history contained a wealth of information for those seeking background information on bombing in World War I. Gorrell's own two sections provided the context of his proposals and demonstrated the theories behind strategic bombing. Milling, Reinburg, and Owens added to the information with their descriptions of strategic and technical, and production problems faced during the actual bombing campaigns. From their works, future bombing advocates could garner an understanding that building and supporting a bombing force was just as critical as using it in combat. Finally, tactical hints by Milling and Reinburg provided guidance for future theorists in determining how to use bombers in combat.

The World War I Bombing Survey

The only major item missing in Gorrell's history was what actually happened during the bombing campaigns of World War I. The unit histories and individual recommendations seldom discussed the actual missions, their results, or how they affected the larger war. This omission must have also struck Gorrell, as he convinced Patrick of the need for such a study of the effects of bombing in the European war. This resulted in the analysis officially titled *Results of Air Service Efforts as Determined by Investigation of Damage Done in Occupied Territories*, commonly referred to as the World War I Bombing Survey. Gorrell then made sure to include the report as a companion to the official history so its data would not be lost.

²⁶⁵ Memorandum to Air Service Chief of Staff, 18 January 1918, Sec A-15, in Gorrell history, 122.

With the full support of Patrick, Gorrell started the process by asking the Air Intelligence Section to conduct a detailed assessment of the bombing effort. The Section quickly realized this was beyond its capability and sent a formal request for such a study to the AEF G-2 section, which approved it on 19 February and tasked the First Army G-2 to accomplish the mission. From 1 March to 20 May, teams of 1st Army intelligence officers examined bombing sites in an area bounded by the Rhine River and the line running through Dusseldorf, Duren, and Mezieres.²⁶⁶ This area covered all U.S. strategical bombing missions, while also encompassing most RAF Independent Force and some French strategic targets. The 1st Army G-2 did consider expanding the area to include more targets, but difficulties with gaining access to cities east of the Rhine frustrated their efforts.

A remarkable analysis for its time, the survey investigated 140 cities based on planned bombing missions by the western Allies. The survey combined three methodologies to garner information: physical observation; records reviews; and interviews. It even included attempts to corroborate interview data with city records and diary accounts. In the end, this high level of information requirements limited the pool of cities the survey could report on to only eighty. The authors of the survey indicated that it was impossible to obtain data from the other sixty cities as a combination of record destruction or shipments of records to Germany before the allied arrival limited their ability to garner accurate information in those areas.²⁶⁷

The report had four sections. Section one contained a general narrative on the effects of Allied bombing. In what today would be called an executive summary, the

²⁶⁶ *Results of the Air Service Efforts as Determined by Investigation of Damage Done in Occupied Territories, Vol 1: General Effects of Allied Bombing*, 1919, Sec R-1, in Gorrell history, 1.

²⁶⁷ *Ibid.*, 1.

section provided an overview of the report's findings, including an analysis of the bombing results and recommendations for future campaigns. Section two contained the meat of the data in detailed reports on the bombing effects on sixty-seven cities, with data to back up the conclusions and recommendations contained in the general narrative. Finally, sections three and four of the survey provided supporting data in the form of maps and photographs respectively.

The general narrative was the most widely read portion of the survey. Its primary importance was in providing monetary estimates of the damage done by Allied bombing. The survey started by identifying an estimated 35 million marks in physical damage to German cities and industry. While this number may seem high for the limited number of missions and the rudimentary bombing technologies utilized, it was an accurate calculation of the damage observed by American investigators or garnered through German reports of damage. Yet, when translated into today's GDP U.S. dollar value, it is only \$324 million dollars.²⁶⁸ Considering the Federal Emergency Management Agency estimated that Hurricane Katrina caused more than \$80 billion in physical damage in 2005, this estimate seems appropriate for the limited long-range bombing campaigns conducted during World War I.

The general narrative then attempted to expand beyond the physical destruction to estimate the cost of the less tangible effects of bombing. First, it calculated the expense of lost production to the enemy's economy. The investigators found twenty-two cities that kept records of lost industrial hours due to bombing. From these records, they estimated that the Germans lost more than 71 million marks due to factory disruptions,

²⁶⁸ All translations of 1918 Marks into 2014 U.S. dollars accomplished through Measuring Worth, 2014 URL:<http://measuringworth.com/exchangeglobal/>.

extra cost of transportation, and worker absenteeism.²⁶⁹ In terms of today's U.S. dollars, that was the equivalent of a little more than \$5 billion.

The authors must have understood that this number seemed high, as they included a large amount of supporting data to buttress their assertions. The section relied heavily on official reports and interviews for objective data. For instance, the authors quoted the manager of the Burbach-Esch-Dudelange Iron Works in Easch as stating; "it took about 30 minutes after a raid or alert before all personnel were back at work."²⁷⁰ Based on interviews like this, the survey calculated the loss of seventy minutes per raid or alert, as the workers went to shelters, waiting out the bombing, then returned to their workstations. At the same time the authors reminded the reader that a single raid might trigger multiple alerts as the bombers penetrated enemy airspace and threatened several cities before their intended targets became clear. Therefore, a single raid might result in production losses many times higher than the actual physical destruction accomplished by the bombs.

Next, the survey examined the morale effects of bombing. Through a series of interviews the investigators attempted to determine how bombing created such confusion and fear that it might paralyze a population. While this portion of the general narrative was the least scientific, it made a strong argument that bombing instilled fear in the local population that disrupted their daily lives and work habits. Again, the authors included specific examples to extrapolate economic costs from their subjective analysis. Items like official records reporting three people dying of fright after a raid on Ehrange on 23 August 1918 seemed to corroborate that bombing had a chilling effect on civilian

²⁶⁹ Results of Bombing, Gorrell History, R-1, 3.

²⁷⁰ Ibid., 3.

populations. Meanwhile, a railroad official in Thionville claimed that he had to increase the numbers of workmen after raids because his workers were too shaken up to accomplish tasks without extra help supported conclusions about the loss of production from fear. Finally, even military reports often supported a morale cost to bombing. One report cited in this section demonstrated that the German military closed its troop rest facility at Bouley because the frequent bombings kept soldiers from getting enough sleep.²⁷¹

Based on these factors, the report ended with a final estimate of the cost of bombing to the German economy. While it included the 641 killed and 1,263 wounded in bombing attacks, the survey stressed that the real results of bombing were economic. The study estimated bombing cost the German war effort 204 million marks. This included an estimated 133 million in direct cost from physical damage and loss of production and another 71 million in indirect cost from civil defenses, morale loss, and air defense.²⁷² To put that in today's U.S. GDP dollar value, it equaled approximately \$15 billion in economic damage. At the same time, the survey was quick to point out that this cost was only based on 66 out of 140 cities targeted in the study area where they could find verifiable data.²⁷³ This suggested that if the trends found in these 66 cities held true for the others bombed by French, English, and American aircraft, the real cost of bombing could have been three to four times higher.

Because this tantalizing possibility must have seemed far-fetched to many Army leaders., the report's authors were ready to preempt any criticism based solely on

²⁷¹ Ibid., 4-5.

²⁷² Ibid., 6.

²⁷³ While the report included data on 80 cities, only 66 were deemed verifiable enough to include in damage calculations.

numbers. On page seven of the report, they fully acknowledged that their cost estimates were just that, estimates. Still, the survey pointed out that even if the numbers were overestimated, these results occurred without a dedicated campaign specifically targeting critical military-related industries. Thus, the survey invited future readers to speculate on what might have been accomplished if the Air Service had focused on strategic bombing and not on ground support.

After the monetary discussion, the report continued with a section on recommendations for future bombing operations. It started by acknowledging the primacy of air power in supporting ground forces, but then quickly hinted that a new role for air forces was needed. An example of this occurred on page eight where the survey stated there could be no separate or independent bombing force, but then quickly went on to attack this deeply held Army belief in a discussion of target selection. It recommended reversing the long-standing priority of first enemy troops, next railroad facilities, and only then industrial targets. The survey explained there was more value in targeting industry than troop concentrations or transportation systems, as destroying the ability to make weapons was more valuable than disrupting their arrival or usage at the front. Therefore, they should be the first priority for future air forces.²⁷⁴

The final summary went even further to spell out specific recommendations that previewed the future theoretical debates of the 1930s. On targeting, the report once again diverged from the British with regards to urban bombing. The Americans refuted the British use of city bombing to break the enemy's morale, explaining that "bombing for morale effects alone such as took place over Cologne, Frankfurt, Bonn, and Wiesbaden is not a productive means of bombing. The effect is legitimate and just as considerable

²⁷⁴ Ibid., 8.

when attained indirectly through the bombing of a factory.”²⁷⁵ The quotation effectively argued the American position that precision targeting of industrial facilities combined economic and industrial destruction without the moral ramifications of targeting civilians directly.

Despite being largely hidden in the later portion of Gorrell’s official history, the bombing survey contained a wealth of information and assessments for future visionaries. As Gorrell’s history remained on the shelves in many important U.S. Army Air Service, and later Air Corps, libraries throughout the 1930s, the survey proved accessible, though sometimes hidden. When combined with Gorrell’s history of the Paris office and the Strategic Section the three documents provided a vision for strategic bombing to help stimulate the thoughts of young theorists and the statistical evidence to apply strategic bombing in the next great war.

Turning a Corner

Gorrell’s influence on aviation did not stop with his history. Even before he departed from Europe, Gorrell started to expand his aviation resume. His successful war record, degree in aeronautical engineering, and reputation for superior administrative capabilities drew Gorrell into important roles shaping aviation’s future. At the same time, he frequently showed dissatisfaction with working within the stiff confines of a bureaucracy that often did not agree with his positions. Eventually, this led him to abandon the Air Service for new adventures, but it never removed his love for aviation.

Nevertheless, in 1919, Gorrell was fully committed to shaping the future of the Air Service. This took many forms. He worked within the system as the Chief of Staff

²⁷⁵ Ibid., 8.

of the AEF Air Service to improve day-to-day operations. Gorrell also spent a tremendous effort in capturing as much of the historical lessons and critiques of the Air Service's experience in World War I as possible in his postwar official history. Finally, Gorrell's experience and capabilities led to his selection to work for President Woodrow Wilson during the Paris Peace Conference.

Wilson arrived in Europe on 13 December 1918 to prepare for the peace negotiations. Once he arrived in Paris, the president gathered a team of advisors to help prepare the American positions on the many different aspects of the proposed treaty. One of these elements concerned the future of international aviation and flying in Germany, to be addressed by a subcommission titled the Aeronautical Commission of the Peace Conference. When Wilson inquired about a qualified young officer to advise him on the subcommission's activities, General Patrick proffered Gorrell. Thus, Wilson likely started Gorrell along his future path as an expert in civil aviation when he selected him as his advisor on international aviation concerns during the Paris Peace Conference.²⁷⁶

The Aeronautical Commission did not start its formal work until March 1919 when it set about creating a set of rules for international aviation. The commission worked through a series of conventions where representatives from twenty-seven nations gathered to reach agreements. Their work concluded with the *Convention Relating to the Regulation of Aerial Navigation* on 13 October 1919. In the treaty, all twenty-seven nations agreed to adhere to international flight standards and methodologies to coordinate aviation issues that crossed international borders.²⁷⁷ This commission eventually came

²⁷⁶ Edgar S. Gorrell Biography. undated, Call# 168.7006-47, IRIS# 125903, in the Maj. Gen. (Ret.) Orvil A. Anderson papers, AFHRA, Maxwell AFB, AL.

²⁷⁷ Convention Relating to the Regulation of Aerial Navigation, 13 October 1919, http://www.spacelaw.olemiss.edu/library/aviation/intagr/multilateral/1919_paris_convention.pdf.

within the fold of the League of Nations and became the forerunner of the International Civil Aeronautics Organization.

Gorrell enjoyed his time working directly with the commission and advising the president and his successors after Wilson returned to the United States in mid-February. He continued to work closely with the commission until his own return to America in July 1919. In many ways, this experience opened Gorrell's eyes to the potential for civilian aviation in the postwar world. More important, it likely kindled a commitment to civil aviation that became such an important part of his later life and career.

While Gorrell was busy working on international aviation, his old boss Mason Patrick continued to coordinate the daily activities of the AEF Air Service, overseeing the large drawdown of American aviation in Europe, and dreaming of retirement. Like Gorrell, Patrick also worked on issues related to the peace treaty negotiations. He spent much of January and February coordinating what type of air activity Germany could maintain in the war's aftermath. Patrick reflected in his later memoirs that this was a disappointing time for him, as the closed minds of his French and British counterparts limited any debate on the issue.²⁷⁸

Then in May, Patrick returned his attention to shaping the future of the U. S. Air Service. On 19 April 1919, General Pershing convened the Dickman Board in Paris to review the performance of each branch of the AEF and make suggestions for improving tactics and organization. Patrick tasked Benjamin Foulois to draft the Air Service's response, which was fairly conservative and mirrored much of Mitchell's previous recommendations. One of the important differences came in the area of bombing. Foulois emphasized that the primary mission of an Air Service was the collection and

²⁷⁸ Mason Patrick. *The United States in the Air* (Garden City, NJ: Doubleday, 1928), 57.

transmission of information for use by the Army, followed by direct support to Army units. Foulois almost completely dismissed bombing when he labeled bombing of distant targets a luxury.²⁷⁹

Interestingly, this is one of only two areas where Patrick felt the need to disagree with Foulois in writing. He attached his own dissent, explaining that “once it is possible to place a bombing force in the field, its size should be limited only by the nation’s ability to provide it and by the numbers and importance of the enemy activities which are to be attacked.”²⁸⁰ While not an endorsement of strategic bombing, Patrick’s response represented an openness to the concept that would continue until his return to command of the U.S. Air Service in the 1920s.

The conclusion of the Dickman Board coincided with the arrival of Assistant Secretary of War Benedict Crowell in May 1919. Secretary of War Newton D. Baker appointed Crowell to lead the American Aviation Mission with orders to tour Italy, France, and Britain to observe and report on the status of their aeronautical developments. Baker even included a direct order to Crowell to “limit himself to fact-finding and submit no conclusions as to air policy.”²⁸¹ Yet, one vocal member of the mission especially concerned both Patrick and Pershing. Howard E. Coffin had long been associated with calls to consolidate all of American aviation into one department or service.

²⁷⁹ *Army Air Forces Historical Studies no. 25: Organization of Military Aeronautics, 1907-1935*. Prepared by Assistant Chief of the Air Service: Intelligence Division, December 1944, Call #168.67 Iris #0467617, AFHRA, Maxwell AFB, AL.

²⁸⁰ Memo, Patrick to Pershing, Mason M. Patrick Papers, SMS 198, Special Collections, U.S. Air Force Academy Library, Colorado Springs, CO.

²⁸¹ *AAF Historical Study 25*, 39.

As might be expected, this attitude soured both Patrick and Pershing towards Crowell's mission. Nonetheless, Patrick was still a military man and followed orders when Crowell requested he provide a recommendation for the future structure of the postwar Air Service. Patrick gave Crowell the standard vision of an Air Service as a separate combat branch operating within the Army with observation, pursuit, and ground attack as its three missions. Crowell reacted to the recommendation with near contempt and continued to search for officers willing to support Coffin's vision of a future independent air service. Patrick's attitude towards Crowell and Coffin came through in his personal reflections. His diary entry for 21 June 1919 provided a perfect example as he wrote, "I have seen little of the said Assistant Secretary, I fancy Coffin has told him he need pay no attention to me."²⁸²

While not changing the direction of the Air Service, the differences between Patrick and Crowell reflected the changing attitudes towards aviation starting to drive theoretical debates stateside. With the war over, political and economic pressures once again became part of the doctrinal and organizational debates. It was no longer a discussion solely over what air power's mission should be, but also how the mission met the political agendas and economic policies in the quickly changing domestic and international situation. Much like the arguments about air power and governmental policies of the early 1900s, the postwar vision of air power was going to be once again seen through the prism of political and economic priorities.

With this change of attitude starting to make its presence felt, Patrick and Gorrell boarded the passenger liner *Aquitania* for the return trip to the United States on 13 July

²⁸² Patrick Diary, 21 Jun 1919, Mason M. Patrick Papers, SMS 198, Special Collections, U.S. Air Force Academy Library, Colorado Springs, CO.

1919. Crowell's team also travelled home on the *Aquitania*, but both Patrick and Gorrell indicated that no one in Crowell's party paid any attention to them on the trip. Instead, Gorrell agreed to function as Patrick's aide, and the two men built a life-long friendship as they discussed the potential for air power in future wars and the long road ahead for military aviation.²⁸³ Thus, this return trip was a good model for the forces brewing that would influence aviation in the early 1920s, pitting political goals, economic realities, personality conflicts, and military desires against each other in a drawn-out debate over the role of military aviation that would drown out the question of strategic bombing.

Gorrell arrived in Washington in July 1919 and was immediately assigned to the Operations Section of the General Staff. His primary duty on the staff was to represent the Air Service during the Frear congressional investigation into U.S. aviation performance during World War I. Headed by the Wisconsin Republican representative James A. Frear, the committee conducted a long series of interviews with military officers, industrial leaders, and aviation critics before submitting a report highly critical of the Air Service. The committee castigated the Air Service for procurement, training, and operational deficiencies, especially during the build-up of forces in late 1917. Gorrell, on the other hand, helped write the minority opinion for the committee, arguing that aviation performed better than should be expected. He maintained that despite the sizeable budget allocations, there had been no foundation for building a large aviation industry, training thousands of pilots, and conducting massive aerial campaigns in such a short time.²⁸⁴ Instead, under those circumstances he argued that Congress should praise the Air Service for achieving what it did.

²⁸³ Gorrell Biography, Anderson papers, Maxwell AFB, AL.

²⁸⁴ Ibid.

Despite his eloquent defense of air power, Gorrell became frustrated with the political process. Desiring a new challenge, he resigned from the military in March 1920 to pursue a career in the auto industry, eventually rising to the presidency of the Stutz Motor Company.²⁸⁵ Still, Gorrell could never truly leave aviation behind. After a long furlough, he once again returned to aviation in the 1930s, just in time to influence a new generation of air power theorists.

Conclusion

Gorrell's history was exactly what was needed at that particular moment for strategic bombing. The breadth and depth of his study meant it remained a powerful reference work for American aviation for decades to follow. While it drifted into obscurity during the 1920s, as the political debates about air power and more exciting aerial figures grabbed the nation's attention, the history was rediscovered in the 1930s. As students at professional schools like the Air Corps Tactical School began to search the history to help them form their own ideas on air power, Gorrell's vision of bombing once again found a theoretical and intellectual home.

In this way, Gorrell created a document that unlike the manuals of Mitchell or Sherman survived the test of time to reach the next generation of aviation thinkers. It contained not only the historical documentation of what actually happened, but also gave readers a firm understanding of the theories that underlined Gorrell's, Tiverton's, and Grey's vision of long-range bombing of German industrial targets. Just as important, Gorrell was smart enough to include the World War I bombing survey as a component of his history. Therefore, when these new theorists started to create their own vision of

²⁸⁵ Edgar S. Gorrell Obituary, United States Military Academy, Cullum No. 5049, March 5, 1945.

strategic bombing, they had a wealth of statistical data to help base their assumptions on and to help convince others of the possibilities of the new offensive weapon.

Chapter 7

Strategic Bombing to the Periphery

By 1920, strategic bombing theory had become lost in the tremendous political, military policy, and strategy debates embroiling the nation. Bombing's primary American proponent during the war, Edgar Gorrell, was now firmly ensconced in his new position at the Stutz Motor Corporation. Meanwhile, a combination of geopolitical and internal Army changes conspired to thwart the efforts of the remaining bombing advocates. On the political front, a turn from the active American foreign policy proposed by Woodrow Wilson to a more isolationist version removed a primary force driving doctrinal changes. At the same time, the Army used the new political environment finally to clamp down on what it viewed as subversively independent thinking inside its Air Service.

These combined forces effectively removed both the ends and means that bombing advocates had used to support their strategy. With no peer competitor threatening war in the immediate future, there seemed little need for a strategy designed to break the industrial might of another nation. Along similar lines, if there were no immediate threats, then there was no need for a large and costly standing army to defend America. Thus, demobilization, lower budgets, and a return to prewar doctrinal thinking allowed Army leadership to reassert its dominance over aviation commanders who had become flush with independence during the war. In this way, America's political and

economic shift to Harding's "normalcy" in the aftermath of World War I worked to deemphasize strategic bombing and push it to the periphery of military doctrine.

Still, military aviation had powerful advocates in both the Congress and the press. A new breed of Air Service officer, the politically connected advocate, rose to make use of these powerful connections to fight for continued aviation growth, new missions, and independence. The key to accomplishing these goals was to remodel the Air Service based on a new defensive national security strategy. Long-range bombers would no longer strike at the industrial heart of an enemy. Instead, tactical and operational offensive power designed to find, attack, and destroy the most likely short-term threat to America, a naval incursion, made more sense from a political, budgetary, and service viability stand point.

Thus, strategic bombing was put on a back shelf as long-range bombing advocates explored a new role in coastal defense that promised prestige, budget growth, and potentially independence. Yet, much like Gorrell himself, strategic bombing theorists would not remain idle. For his part, Gorrell maintained an influential correspondence with key military aviation figures. In the same way, strategic bombing always simmered under the surface out of sight during the more flashy aviation debates occurring in Washington. In hidden puddles of strategy development in Washington and Virginia important individuals slowly and subtly reshaped the concepts developed during World War I.

Shaping Forces

At the start of the 1920s, a combination of external and internal forces limited the appeal of strategic bombardment as a primary doctrine within the newly formed Army

Air Service. Externally, forces of political change remodeled the Air Service away from its World War I size, budgets, and thinking. Internally, structural changes challenged the dual concepts of independence and strategic bombing. The combination of the reassertion of Army control, technological stagnation, and personnel problems refocused thinking towards the problems of a peacetime military.

The external changes were critical in shaping the overall atmosphere that the Army and its Air Service had to operate in during the early 1920s. Political change brought about new economic and social dynamics that defined the context in which air power evolved. These contextual factors played a major part in reshaping the tactics, policies, and goals of air power advocates, which in turn formed the Air Service's structural and doctrinal foundations.

The most important of these political shifts occurred in the immediate aftermath of World War I. The mid-term congressional elections of 1918 brought to power the opposition Republican Party in the House of Representatives. A mere week before the Armistice, the election setback portended more political troubles for President Wilson. Whereas Wilson had tried to use the election as a referendum on his plans for the postwar world, the Republicans countered with criticism that his policies made America too much a player in the international system. His Fourteen Points plan for the peace and restructuring of Europe, depending on the United States to play a major role in the newly created League of Nations, only seemed to confirm the Republican charges. Former President Theodore Roosevelt summed up the feeling of many Americans towards

Wilson's new vision when he said: "To substitute internationalism for nationalism means to do away with patriotism."²⁸⁶

In the end, Wilson's strategy was defeated when the Senate failed to approve the Treaty of Paris and accept American membership in the League of Nations. Instead of becoming a major participant in the international system, the United States returned to its more traditionally isolationist posture. With this return to an internally focused political policy, there was no longer a need to maintain the large and extremely costly wartime military.

Military demobilization followed swiftly behind the political changes with lower budgets, less equipment, and manpower shortages defining the future. The massive reductions hit the Air Service hard. Of the twenty thousand officers on duty at the end of the war, only a little more than two hundred regular officers remained in the Air Service at the start of 1920. To make matters worse, these were all officers "on detail" from other branches as the Air Service was still not a formally recognized corps within the Army, but just a subdivision of the Signal Corps.²⁸⁷

Besides the understandable problems with the loss of budgets and manpower resources, the Air Service faced other less obvious effects. A good example occurred in personnel policies. With demobilization came the return of prewar permanent ranks for many Air Service leaders. Here again, the 1909 personnel policy of only allowing junior officers to become pilots disrupted the service. Whereas, most senior infantry or artillery officers returned to postwar duties at similar ranks to their wartime ratings, Air Service officers often saw a jaw-dropping demotion. The one-time Chief of the AEF Air Service

²⁸⁶ H. W. Brands, *Woodrow Wilson* (New York: Henry Holt and Co., 2003), 100.

²⁸⁷ Robert F. Futrell, *Ideas, Concepts, and Doctrines: Basic Thinking in the United States Air Force, 1907-1960* (Maxwell AFB: Air University Press, 1989), 31.

Benjamin Foulois best described the effect of this policy when he explained the sheer shock of leaving the troopship a brigadier general and becoming a captain the minute he walked onto the dock.²⁸⁸

Besides the psychological challenge of switching from flag officer to company-grade rank in a matter of minutes, there were also important structural ramifications for the Air Service. While some officers like Brig. Gen. Billy Mitchell maintained their current rank due to statutory assignments, the vast majority reverted to their prewar ranks. The combination of allowing entry only to very junior officers and then having limited promotion opportunities meant few of these men had advanced past the rank of first lieutenant before the United States joined the war. Thus, the Air Service of the early 1920s faced a serious shortage of field-grade officers. Unfortunately, the rank gap limited the Army's ability to select qualified Air Service squadron commanders, as they had a large pool of combat experienced officers, but none at the field-grade rank. This left the Army two options. They could allow junior officers to fill command positions that called for more senior rank, or they could transfer non-flying officers of the proper rank to command flying squadrons. As might be expected, neither option excited Air Service leaders.

These personnel issues highlight a larger problem for the Air Service in the 1920s. While external forces shaped the overall context that the Air Service evolved within, there were also changes internal to the Army that influenced doctrine away from strategic bombing. First, demobilization and lower budgets convinced most Army leaders of the need to reassert control over their often-rebellious junior branch. Next, a

²⁸⁸ Benjamin D. Foulois, *From the Wright Brothers to the Astronauts* (New York: Arno Press, 1968), 112.

series of technological factors shaped air power doctrine away from Gorrell's vision of a strategic war-winning capability. Finally, the restructuring and demobilization of the Army created difficult problems for the Air Service's leaders in personnel, supply, and training that diverted their attention from theoretical debates on how to use air power in war.

The most important of these internal pressures was the return of tight Army control. While the final year of the war taught senior Army leaders the value of air power, many of them balked at talk of a war-winning role for air power or the concept of an independent air force. They preferred to find a way to alleviate aviation's budgetary, personnel, and command concerns while hewing tightly to the traditional ground-centric view of warfare.

Part of this change in thinking attacked the concept of an independent role for air power based on the mission of strategic bombing. Despite some congressional support for the model of the British Royal Air Force, the Army strongly opposed any autonomy for the Air Service based on a separate mission. Secretary of War Newton D. Baker summed up this opposition in his 1919 Annual Report to Congress when he not only castigated strategic bombing as expensive, but also indicated that he believed a policy of bombing urban areas presented a legal and moral dilemma that likely would stiffen an enemy's will to resist and prove a countervalue to any war effort.²⁸⁹ In this atmosphere, strategic bombing theory became a detriment to the Air Service in its struggles for adequate budgets and a level of independence.

The postwar status of the Air Service as a support element was confirmed in January 1919 when a two-star artillery officer, Maj. Gen. Charles T. Menoher, became

²⁸⁹ *War Department Annual Report, 1919* (Washington, DC: Government Printing Office, 1920), 74-75.

the chief of the Air Service. Menoher was the former commander of the 42nd Division and the VI Army Group during World War I, but he had no practical experience in aviation. More troubling than his lack of aviation experience was Menoher's publicly stated view that the Air Service belonged to the Army and its sole purpose was direct support of the soldier in combat.²⁹⁰ This not only created trouble for the advocates of Air Service independence, but it spelled short-term doom for strategic bombing advocates. In Menoher's vision of air power, strategic bombing was a theoretical waste of time and talk of independence was tantamount to heresy.

Menoher's viewpoints became Army policy when on 8 August 1919 Secretary Baker selected him to lead a board of four general officers to review the Air Service and determine its proper size, structure, and mission in the postwar Army. The composition of the Menoher Board left little doubt about its direction, as three other major generals, all from the field artillery, rounded out its membership. When the Menoher Board released its final conclusion on 27 October 1919, it was a major blow to the Air Service, but the board's report did have some bright spots.

The board's overall conclusion seemed to sum up the future of the Air Service when it stated that aeronautics would play an increased role in future wars, but no nation could afford to maintain a large war-ready air fleet in peacetime. Therefore, America should focus on developing a commercial aviation industry that would aid in mobilizing military aeronautics in any future war.²⁹¹ The board then used this overall assessment to determine that a separate air force was not desirable for two reasons. First, it was too

²⁹⁰ Robert P. White, *Mason Patrick and the Fight for Air Service Independence* (Washington, DC: Smithsonian Institution Press, 2001), 45.

²⁹¹ Report of Board of Officers, 27 October 1919, Call#168.1-6B, IRIS#00122088, AFHRA, Maxwell AFB, AL, 2.

costly given the current demobilization budgets, and second it would violate the principle of unity of command in war. These two core arguments against independence--the lack of money and breaking the time-honored principles of war--would become the cornerstones of Army resistance to Air Service independence for the next two decades.

Still, the board's report was not all negative news for the Air Service. Menoher understood that air power would be an important element of future wars. His report shed light on the almost total lack of an American industrial system for aviation research, aircraft production, and pilot training required for long-term preparedness. Therefore, the board recommended that Congress increase funding for military aviation and establish a single governmental agency to oversee research and development of both military and civil aviation.²⁹²

Thus, while dispelling the idea of a quick transition to an independent air force modeled on the RAF, the Menoher Board set in place long-term recommendations on aviation policy that would have tremendous payoffs for the future Air Service. By bringing the discussion to a larger one of aviation industry, military capabilities, and the proper role and structure of an air force, the Menoher Board started America down the path to building a civil-military-industrial program that would see it through the next war.

Of course, this was only a vision of the future at that point. Even in just the year since the end of World War I, stagnation best described the state of military aviation technology. Driven by demobilization and budget cuts, Congress and the Army favored the much cheaper policy of using surplus aircraft stocks over buying new more technologically advanced models. This policy especially hit bombardment aviation units hard. As a result of production ratios and manufacturing problems during the war, few

²⁹² Ibid., 6.

surplus bomber aircraft survived compared to pursuit, observation, and even attack examples.²⁹³ This translated to bombardment squadrons rapidly wearing out their surplus aircraft with few replacements available.

This technological stagnation likely seeped into the doctrinal thoughts of the Air Service. In his book *Air Warfare*, air power doctrine pioneer Maj. William Sherman explained the predominant view of the bomber in the early 1920s as “demanding so many sacrifices of flying qualities that all hope of retaining efficient combat power must of necessity be abandoned. It must rely for protection on the operations of friendly pursuit aviation and its own guns.”²⁹⁴ This quotation highlights how the bombers of the early 1920s were seen as both critical for delivering combat power, but also technologically inferior, thus requiring air superiority before they could be brought to bear in sufficient strength to play a major role in war.

Even at this early stage, though, changes were in the offering. The Chief of the Military Aeronautics Division, Col. Edwin E. Aldrin, described how the Air Service staff started almost immediately to work on solving the technological stagnation problem. Aldrin summed up the state of American aviation production in 1919 as little or no ability for aircraft or engine design. The capabilities that did exist were created during World War I and quickly atrophied with the end of wartime budgets.²⁹⁵ In February 1919, Aldrin’s division was assigned the mission to fix the problem. Just a year later, the Air Service established its own air engineering school at McCook Field, which later moved to nearby Wright Field, in Dayton, Ohio, in 1927. While the engineering school focused on

²⁹³ Edgar S. Gorrell, *The Measure of America’s World War Aeronautical Effort* (Northfield, VT: Norwich University Press, 1940), 123-25.

²⁹⁴ William C. Sherman, *Air Warfare* (New York: The Ronald Press Co., 1926), 41.

²⁹⁵ Oral History Interview, February 1967, Call#K239.0512-573, IRIS#00904575, AFHRA, Maxwell AFB, AL, 3.

identifying aerodynamic principles and not building aircraft, they had a large effect on helping mold civilian advances towards future military needs.²⁹⁶

This was especially important for the future of strategic bombardment. While serving as the Chief of the Training and Observation Group of the Air Service, Billy Mitchell asked Colonel Aldrin to work towards developing high-altitude aircraft. Aldrin described this request as the start of research that led to high-powered air-cooled engines, propeller advances, and high-altitude cooling systems, all of which aided the development of larger higher-flying aircraft.²⁹⁷ These innovations eventually made their way to the civilian aircraft industry and enhanced the development of a new line of aircraft with more lift, range, and speed capabilities.

In effect, Mitchell's request was the technological start of the transition from a pursuit-based Air Service to a bomber-based one. The changes Aldrin described eventually combined with the need to buy new bomber aircraft to produce a series of long-range aircraft designs each more capable than the previous one. Meanwhile, pursuit aviation stagnated as the ample supply of war surplus airframes restricted the need to buy new ones, and thus limited the ability of the Military Aeronautics Division to influence technological change in fighter aircraft.

The final internal shaping force affecting the Air Service was personnel issues. In the rapid demobilization post-World War I, the Air Service lost a tremendous amount of experienced manpower to civilian flying and to state National Guard units. The reversion of many pilots to their extremely low prewar ranks compounded the problem. The Army's promotion policy of grouping all officers into one pool and basing promotion

²⁹⁶ Ibid., 7.

²⁹⁷ Ibid., 8.

mostly on seniority only exacerbated the situation.²⁹⁸ This effectively meant that Air Service officers were placed behind their infantry and artillery brothers, despite many of the Air Service officers holding senior rank and commands during the war. Given the situation, it was only natural that many aviation officers became disgruntled at the system, which they saw as cutting their budgets, forcing them to fly old aircraft, discriminating against them on promotions, and now curtailing the independence they had during the war.

This attitude seems to have penetrated into the psyche of the Air Service across all components in the Army. Only one month after returning to command of the Air Service in 1921, Mason Patrick received a letter of congratulations from an old friend, Gen. Francis J. Kernan, then Chief of the Philippine Department. In his letter, Kernan expressed his concern over the state of the Air Service personnel, which he described as troublesome.²⁹⁹ Patrick's response letter perhaps even better depicts the disciplinary situation of the Air Service as it entered the 1920s. He wrote Kernan, "it is the youth and inexperience of its officers whom it is necessary to place in responsible positions that are largely the cause of the trouble. I mean to impress upon them as firmly as may be necessary the fact that their duty must be performed properly, that the constituted authorities must exercise efficient supervision over them, and that they must learn the essentials of discipline."³⁰⁰

This correspondence between Patrick and Kernan reflected another aspect of the ramifications of the 1909 personnel policy limiting military aviation entry to junior

²⁹⁸ J. E. Kaufmann and H. W. Kaufmann, *The Sleeping Giant: American Armed Forces Between the Wars* (London: Praeger, 1996), 129.

²⁹⁹ Kernan to Patrick, 18 September 1921, box 5, RG18, 228/229, National Archives.

³⁰⁰ Patrick to Kernan, 2 November 1921, box 5, RG 18, 228/229, National Archives.

officers. When combined with the freedom from traditional army discipline many of them had experienced during World War I, it created an eager group of maverick airmen ready to rebel against the reassertion of army dominance over Air Service structure, budgets, and doctrinal thinking. This not only produced a problem for Patrick, but it fashioned a ready-made group of supporters for Mitchell in his fight for independence.

The results of these external and internal shaping forces were codified in the National Defense Act of 1920, often called the Kahn Act after its sponsor Republican California Representative Julius Kahn. Signed into law on 4 June 1920, the act defined the current Air Service, but also identified possibilities for air power growth in the future. Two elements of the law were important for the Air Service. First, the measure authorized an Army Reorganization Act that significantly reduced the size of the active duty army to just 280,000 soldiers, which was later lowered to 191,000 in February 1921. For the Air Service this meant a permanent strength only 1,514 officers and 16,000 men.³⁰¹ While future funding difficulties ensured the Air Service would never reach its 17,514 personnel authorization, having congressionally approved numbers offered a level of long-term stability for planning purposes.

More important than size was the Army Reorganization Act's structural role in moving the Air Service out from underneath the Signal Corps. In doing so, the statute created a formal position for the Air Service within the Army, even designating a major general as commanding officer and alleviating a major thorn in the side of the airmen when it prescribed that only flying officers could command aviation squadrons.³⁰² While not addressing the other personnel issues, these two steps helped create a level of

³⁰¹ Kaufmann and Kaufmann, *The Sleeping Giant*, 15.

³⁰² Martha E. Layman, *Air Force Historical Study No. 39: Legislation Relating to the Air Corps Personnel and Training Programs, 1907-1939* (Washington, DC: Army Air Force Historical Office, 1945), 117-20.

autonomy where Air Service leaders could continue to pursue doctrinal development without undue pressure from Army leadership.

In the end, the Army Reorganization Act worked more to the Air Service's benefit than to its detriment. Despite reducing the service to only seven aviation groups, only one of which was bombardment, by 1921 the law's establishment of the Air Service as a separate command element paid tremendous benefits. A memorandum from the Director of the War Plans Division Maj. Gen. William G. Haan to General Pershing dated 6 July 1921 detailing the effects of the Army reorganization on all branches demonstrated that this separate status helped the Air Service fare better than most branches in the drawdown. Most branches suffered approximately 50 percent reductions during this era. Even the premier infantry suffered a 47 percent cut, going from 110,000 men to just 58,000 by the end of the year. At the same time, the Air Service suffered only a 36 percent loss, downsizing from 16,000 to 10,300 men.³⁰³

In this way, a combination of external and internal factors set the context that air power advocates would operate in during the next decade. The changing political environment meant less money and less equipment for air power thinkers to work with, while a high degree of Army control limited what was acceptable in terms of Air Service structure, mission, and doctrine. Still, the basis for continued development was hidden within the context of the larger external and internal forces. The creation of a formal Army Air Service provided just enough autonomy for air power theorists to continue their work, while the pent up frustrations of many military aviators encouraged work towards change.

³⁰³ Memo, Maj. Gen. Haan to Gen Pershing, 6 July 1921, Call#145.93-101, IRIS#00119243, AFHRA, Maxwell AFB, AL.

Air Service Reaction

Aviation leaders did not take the setbacks of the immediate postwar era lying down. Key leaders cultivated relationships with political figures and the press to counteract the official Army reticence to increase autonomy or missions that might lead to a justification for independence.³⁰⁴ Yet, these relationships were a potential problem for Air Service officers. On one hand they were dedicated to the betterment of military aviation and felt that winning over congressional and public support was a valuable tool in achieving their aims. On the other hand, they were still officers in the United States Army and limited by the orders of those above them.

Not only did these officers face the potential wrath of senior Army leaders, but they also faced problems with the new chief executive. In 1920, the Republicans returned to the White House with the election of Warren G. Harding. Harding had a tough fiscal outlook, preferring to run the government budget like a business's with a tight bottom line. As part of this transformation, he supported the Budget and Accounting Act of 1921. This law is mostly known for setting up a formal budgeting process run by the Bureau of the Budget reporting directly to the president. A lesser-known part of the bill, however, directly affected the Air Service during this critical time. Apprehensive about individual elements of the executive branch seeking funds directly from Congress, the new law forbade federal agencies from pressuring Congress for funding.³⁰⁵ In this way, Air Service officers attempting to garner allies in Congress or higher budgets faced not only internal Army retribution, but also might run afoul of the president.

³⁰⁴ Ronald R. Rice, *The Politics of Air Power: From Confrontation to Cooperation in Army Aviation Civil-Military Relations* (Lincoln, NE: University of Nebraska Press, 2004), 16.

³⁰⁵ *Ibid.*, 26.

Historian Tami Davis Biddle rightly points out that this environment led to a dichotomy in Air Service actions. Externally, senior aviation officers had to appear to tow the “company line” on subjugation to the Army, while internally they developed and nurtured a more congenial independent ideology.³⁰⁶ The problem for these aviation leaders was how to maintain the appearance of following the rules while still achieving their goal of independence.

In the next few years, three distinct approaches among the Air Service leadership emerged to advocate for independence through their own particular vision of air power and how it related to national security. These groups roughly break down into a group that favored rebellion, a group seeking independence by working within the system, and a third group that utilized a methodology drawing on parts from the other two. Each of these factions shared a vision for an independent Air Service, but differed on two important aspects: the methodology to achieve it and the rationality for why independence was needed. Contained within these differences were the seeds that grew into the air power strategy of the new Army Air Service.

The first group were those favoring a rebellious strategy led by Billy Mitchell. In January 1919, Mitchell returned from Europe as a man with a mission. He was dead set on creating a new independent air force, likely with him as its first leader. As early as 3 April 1919, he advocated before a meeting of the Navy’s General Board that the airplane’s capability to sink naval vessels required a rethinking of national defense policy. He described how the advance of military aviation demanded structural changes to organize national defense to best utilize this new element of war. He proposed a

³⁰⁶Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914-1945* (Princeton, NJ: Princeton University Press, 2002), 132.

reorganization to a Ministry of Defense model with separate Army, Navy, and Air Force elements to ensure fiscal, material, and doctrinal parity among the three military elements.³⁰⁷

This speech became the first salvo in a war to create a separate air force within the national defense structure. Over the last few decades many historians have documented Mitchell's rise and fall, and there is little new to add to that story. Still, there are three elements of Mitchell's saga that bear insight into strategic bombing's evolution.

The first is the rationale behind Mitchell's desire for an independent air force. Often lost within the debates over air power's role in coast defense was Mitchell's key argument for independence based on a separate national defense mission that only air power could accomplish. Protecting America from strategic attack and conversely providing a capability to conduct strategic attacks were the concepts at the core of Mitchell's vision for air power.³⁰⁸ In other words, the nation must have an independent air force because the new service branch had a critical national defense mission that neither the Navy nor the Army were inclined or prepared to support fully.

This overall strategic view led to Mitchell's second contribution to the advancement of strategic bombing. Upon Mitchell's arrival from Europe in 1919, General Menoher appointed him as the Chief of the Air Service's Training and Operations Group. One of the central missions of the group was to formulate the new strategy and doctrine of the postwar Air Service. Mitchell pulled together a strong group of subordinate officers to support his vision. Men like Thomas Milling, William

³⁰⁷ Alfred F. Hurley, *Billy Mitchell: Crusader for Air Power* (Bloomington, IN: Indiana University Press, 1975), 41.

³⁰⁸ Williamson Murray and Allan R. Millett, *Military Innovation in the Interwar Period* (Cambridge: Cambridge University Press, 1996), 123-24.

Sherman, Leslie MacDill, and Lewis Brereton inculcated much of Mitchell's teachings during their time in the Training and Operations Group before going on to important future positions developing aerial doctrine.

While Mitchell helped shape these men's visions of air power through direct interaction, he also gave them open bounds to explore different visions for air power. On a staff tightly controlled by Menoher and tied directly to the mission of direct ground support, this was an exhilarating experience for the young officers. Years later, Maj. Gen. James P. Hodges reflected on Mitchell's influence in those early days as "at the time Billy Mitchell was the idol of every pilot in the Air Service. And I suppose 99 and 9/10ths percent of them were influenced by his vision and strategies he advocated."³⁰⁹ This was definitely true for the important men who served directly under him developing strategy in the early 1920s. They took away the important concept that for air power to be independent it had to have a mission and strategy that offered a war-winning capability that no other service had.

The final, if perhaps least well known, way Mitchell influenced the path of strategic bombing was through formal doctrine development. Unfortunately, the immense attention paid to Mitchell's public struggles obscure his integral role in shaping the early tactical manuals that formed the basis of aviation doctrine in the early 1920s. As the Chief of the Air Service's Training and Operations Group, Mitchell supervised the creation of a series of new postwar training manuals. With no formal doctrine function inside the new Army Air Service's structure, these training manuals became the de facto doctrine for the operational squadrons.

³⁰⁹ Oral History Interview of Maj. Gen. James P. Hodges, January 1966, Call#K239.0512-565, AFHRA, Maxwell AFB, AL, 4.

One of the first manuals to come out of the division in January 1920 was the *Tactical Application of Military Aeronautics Manual*. It represented the continuation of Mitchell's doctrinal thoughts from his World War I plans and standard operating procedures. His depiction of the principal mission of the Air Service as "to destroy the aeronautical forces of the enemy, and, after this, to attack his formations both tactical and strategical" tied directly into his visions of a separate air power mission that could not be met by ground or naval forces.³¹⁰ More important for strategic bombing, the manual went one step farther in discussing the role of bombardment aviation as "probably the greatest value in hitting an enemy's nerve center" like a headquarters or communications node.³¹¹ In just those two sentences, Mitchell's concept of a strategic role for air power as its defining element and bombardment aircraft as the purveyors of that role came clearly through.

Mitchell's official role in doctrine development ended when he left the Training and Operations Group on 4 June 1920, but his later works continue to reflect this linkage between a strategic mission as a *raison d'être* for an independent Air Service and bombardment aviation as the means to achieve that mission. A perfect example was his 1921 book *Our Air Force* where he argued that the first battle of any future war would occur in the air. The winner of this battle could then use air power to attack enemy cities without retaliation.³¹² This vision of a strategic mission for the Air Service in defending America from attack and then prosecuting a strategic campaign against an enemy continued to influence doctrinal thought for years to come.

³¹⁰ *Tactical Application of Military Aeronautics Manual*, 9 January 1920, Call#167.4-1, IRIS#00120667, AFHRA, Maxwell AFB, AL), 2.

³¹¹ *Ibid.*, 22.

³¹² William Mitchell, *Our Air Force: The Keystone of National Defense* (New York: E. P. Dutton, 1921), 200-201.

If Mitchell represented the desires of those who wanted to rebel against the Army and Navy, Mason Patrick exemplified those who wanted to avoid conflict. Patrick saw military aviation at a crossroads. He described the situation in 1920 as “there are enthusiasts, on the one hand, who believe that the coming into being of aircraft have practically scrapped all other combat agencies; and on the other hand, conservatives who consider aircraft mere auxiliaries to previously existing combat branches. The truth, of course, lies between the two views.”³¹³ Given this adversarial relationship, Patrick favored working within the system to bring about a change in thinking that would eventually lead to a transformation of structure.

Patrick and Mitchell shared a motivation for why they believed the Air Service should be independent. Both men based their arguments on a core national security mission that only air power could achieve. Therefore, in the long run, a separate air force structure was required to ensure the proper budget support, training, and acquisition of new aircraft to meet that mission.³¹⁴ The real difference between the two men existed in how to achieve that goal. Perhaps it was having to deal with a rebellious Mitchell or perhaps it was a sign of his maturity and time in the regular army, but in the end Patrick believed working within the system offered the best chance for success.

The final approach to independence was the group that favored using elements of both Mitchell’s and Patrick’s policies. The best example of this group was Benjamin Foulois. While he shared the desire for an independent air force, he differed from both Mitchell and Patrick in his rationale for why. Foulois based his argument for independence on the War Department’s inability to provide adequately for and direct the

³¹³ White, *Mason Patrick*, 49.

³¹⁴ Mason Patrick, *The United States in the Air* (Garden City, NJ: Doubleday, 1928), 76.

air arm. In testimony before Congress on 16 October 1919, Foulois laid out his argument when he said that “Army leadership was only interested in the defensive side of air power and had neglected the fighting side of military aviation since the end of the war.”³¹⁵

Despite his attack on Army leadership, Foulois was more pragmatic than Mitchell. He understood that independence was likely to take a series of steps to achieve. Still, he opposed working within the system in favor of using political influence to push for quicker change. Unfortunately for Foulois, his methodology saw little success. He was not the vibrant visionary that drew young officers, the press, and public to him like Mitchell. At the same time, his direct attacks on senior Army leaders limited his ability to work within the system, as these same officers came to see him as an outsider and a threat.³¹⁶ In the end, Foulois had little effect on the air power debate in the early 1920s, but his approach shaped his actions when he once again emerged as the Chief of the Air Corps in the early 1930s.

Each of these groups had a role in shaping the future of the Air Service and strategic bombing thought. Mitchell’s rebellious stance drew plenty of attention and helped guide a legion of young officers towards his way of thinking in the early 1920s. Nevertheless, when Mitchell’s approach proved detrimental to both himself and his vision for air power these young officers began to seek a new tactic. It was then, that Mason Patrick’s long-term incremental approach won more converts. Still, Mitchell’s concepts of a distinct national security mission based on strategic defense and attack carried on in the thinking of these young officers as they transferred their allegiance from Mitchell to Patrick.

³¹⁵ Army Reorganization Hearings before the Committee of Military Affairs, 66th Congress, 1919, Call#168.68-3a, IRIS#00125299, AFHRA, Maxwell AFB, AL, 907-908.

³¹⁶ White, *Mason Patrick*, 50.

Doctrine Development in the Shadows

The internal debate on how to achieve independence played a major role in shaping air power doctrine in the early 1920s. Historian Tami Davis Biddle argues that when U.S. national security posture turned defensive in the years after the war, the main weapon of the Air Service, the bomber, had to take on a new defensive mission to match.³¹⁷ In this way, Biddle highlights a major trend occurring in air power thought, which needed to fit what was considered a purely offensive weapon into a new defensive national strategy. Mitchell again led the effort in this regard. In his vision, air power was key to the strategic defense of the United States through its ability to destroy invading naval fleets. These mental acrobatics not only helped keep air power relevant, but they helped transition the offensive theories of long-range bombing into a new defensive security mindset.

To Biddle the major trend in American air power thinking during the Mitchell era was how to make the doctrines of World War I fit into the new defensive vision of national security. Still, this overall analysis does not shed sufficient light on the highly nuanced evolution of air power thought occurring among many mid-level Air Service officers. Biddle's narrow focus causes too many historians to concentrate on the role of coastal defense and the fight for independence in driving air power doctrine. Yet, inside the important think tanks of the early Army Air Service, coastal defense was just one mission that fell within a broader vision of long-range bombing.

The first document to approach long-range bombing came from Mitchell's Air Service Training and Operations Division. The group's *Tactical Application of Military Aeronautics Manual* contained the three core elements of air power thought in the early

³¹⁷ Biddle, *Rhetoric and Reality*, 129.

1920s: the need first to gain air superiority, the requirement to support ground forces, and the desirability of an independent strategic mission. As might be expected, this manual drew the attention and ire of many senior Army officers. Yet, this focus by the Air Service leadership on one manual had an unintended positive effect. The single-minded attention on Mitchell's manual yielded a level of autonomy to the mid-level officers who developed operational and tactical guidance.

Relative independence allowed the young officers to expand strategic thought in their lower-level manuals and training texts without the direct threat of oversight. A good example was the *Aerial Bombardment Manual* produced by the Training and Observation Group in April 1920. Drafted by Thomas Milling and William Sherman, the manual was an early effort to transition long-range bombing theory from strategical to strategic. In the manual, the authors described bombardment aviation as "becoming an important part of the Air Service, and it is believed by many that with sufficient numbers it will win a war."³¹⁸ While this statement may have been similar to the ideas advocated by Gorrell and the British during World War I, it represented the key step forward in the post-World War I Air Service. Not only did it show that strategic bombing still percolated in the minds of airmen, but it also demonstrated they could keep it alive in their doctrinal manuals even during the reassertion of Army control.

Still, the Air Service's staff was located close to senior Army leaders and even seemingly routine manuals often received a critical eye. The Air Service needed an organization dedicated to developing strategy and doctrine located away from the close supervision in Washington. In the summer of 1920, this occurred with the creation of the

³¹⁸ Air Service Information Circular: Aerial Bombardment Manual, April 1920, Call#167.42-1, IRIS#00121030, AFHRA, Maxwell AFB, AL, 2.

Air Service Tactical School (ASTS) at Langley Field in Hampton, Virginia. The school traced its origins to the Army Reorganization Act of 1920, when the newly created U.S. Army Air Service started to think about how to develop its branch. Traditional Army branches like the infantry and artillery utilized a series of service schools for initial training of their young officers and then provided mid-career education on command and staff functions. As a newly minted branch, the Air Service realized that while flight schools met their initial training needs, they also required a mid-career school to prepare young field-grade officers.

This training mission merged with a new doctrine-writing mission with the War Department order in September 1921 tasking each of its combat branches to convert all their training material into a new series of formal Training Regulations. In part to meet this requirement, Mason Patrick restructured the Training and Observation Group into the Training and War Plans Division. Yet, the new division lacked the manpower to accomplish a major manual revision, so they tasked the newly created ASTS to develop the training document.³¹⁹ ASTS now had a new mission where it both trained mid-level aviators for new command and staff duties and took the lead in developing air power doctrine.

Whereas ASTS spent most of 1920 training its first class of students and participating in Mitchell's bombing experiments, 1921 saw the school turn in a new direction. It still trained students, but work on drafting Training Regulation 440-15 pushed the school into thinking about and preparing strategy, tactics, and doctrine. ASTS's first commander, Maj. Thomas DeW. Milling, took a unique approach. Instead of detailing a few instructors to write doctrine, he integrated the task into the school

³¹⁹ Futrell, *Ideas, Concepts, and Doctrines*, 40.

process by encouraging students and staff to debate air power theories and develop new doctrinal concepts as part of their education.³²⁰

As part of this process, in May 1921, Milling's assistant William Sherman drafted *The Fundamental Doctrine of the Air Service* as a precursor to the new Training Regulation. The new manual drew heavily from Gorrell's June 1919 *Manual for Air Service Operations*, which Sherman had helped draft while working on Gorrell's staff.³²¹ In the new doctrine manual, Sherman identified two core air power functions: ground support and strategic bombing operations. He even recommended proportions for the missions, arguing that strategic operations should represent 80 percent of air power missions, while only 20 percent were allotted for ground support. This ratio was hard for many Army leaders to accept. Perhaps it explains why the Air Service Training Regulation remained in draft format until 26 January 1926, as several boards of officers reviewed the draft and recommended changes in the intervening years.

Still, the slow assault on the conservative view of air power continued at ASTS in 1922. In the final draft of Air Service Training Regulation 440-15, Major Milling avoided Sherman's controversial proportionality recommendations, but did divide air power into two broad categories: direct ground support and independent offensive actions.³²² While not directly addressing or advocating strategic bombardment, this addition provided a mission justification for long-range bombing in what became the core doctrine document of the early Air Service.

³²⁰ Robert T. Finney, *History of the Air Corps Tactical School, 1920-1940* (Maxwell AFB: Air University Press, 1955), 15.

³²¹ Futrell, *Ideas, Concepts, and Doctrine*, 40-41.

³²² Air Tactics and Training Regulation 440-15, 1922, Call#248.101-4A, IRIS#00127532, AFHRA, Maxwell AFB, AL.

By 1924, these concepts were starting to make their way out of the backwaters of Langley Field and into the mainstream of Air Service thinking. On 27 March, Patrick gave a lecture to the Army's general staff officer training school at Fort Leavenworth, Kansas, titled "Fundamental Conceptions of the Air Service." He started by reassuring the officers that the Air Service saw its primary mission as "to assist ground forces to gain strategical and tactical success." Then he went on to caution that this did not mean air forces would be "under the immediate control of local commanders." Patrick insisted that ground commanders needed to understand that for air power to be successful it had to "operate independently and sometimes far afield of the current ground operations."³²³

While these examples focused on the role of air power in relation to ground forces, strategic bombing theory also continued its evolution. Determining the best methodologies to use the bomber in war often fell to the mid-level officers operating outside direct army oversight at ASTS. Their new vision of strategic bombing started to come to life in updates to the Bombardment Course textbook used to teach students the art of long-range bombing. The 1924 ASTS Bombardment Course text was of particular importance to strategic bombing theory development. This new edition started by critiquing the World War I bombing campaigns. Utilizing Gorrell's own World War I Bombing Survey for statistical support, the document argued that strategic bombing in the war had been too haphazard to succeed. Instead, it reasserted Gorrell's and Tiverton's earlier argument that target selection and concentration were tantamount for

³²³ Lecture at Fort Leavenworth, 27 March 1924, Mason Patrick Papers, Special Collections, U.S. Air Force Academy Library, Colorado Springs, CO.

success.³²⁴ Thus, for the first time since the end of World War I, a manual addressed the critical issue target selection in strategic bombing.

Given the Army's oversight into Air Service doctrine, it would have been difficult to put thoughts like that into the major doctrinal manuals. Therefore, many Air Service members took to advocating their beliefs in books outside the editorial purview of Army leaders. In 1926, Sherman took such an approach with his *Air Warfare*, in which he indicated that "from the very nature of the weapon, bombardment aviation is used for strategic purposes rather than tactical."³²⁵ Sherman then took the idea further when he foresaw four categories of future bombardment. These ranged from attacks on large population centers, to destroying enemy supply lines, to neutralizing fortifications, and in a reflection of the times, to the destruction of warships in coastal defense.

Even more important was Sherman's discussion of what a future strategic bombing campaign might look like. He argued that in modern warfare the mobilization of the military was accompanied by the mobilization of industry. Yet, it was impossible to destroy all enemy factories. Instead, he believed that a targeted bombing campaign could cripple the whole system by destroying certain specific elements of industrial network, which he called key plants.³²⁶ This vision of strategic bombing seems almost a precursor to Maj. Donald Wilson's more famous Industrial Web Theory made popular at the then renamed Air Corps Tactical School in 1933.

Sherman's book admirably depicts the evolution of strategic bombing theory from 1920 to 1926. Despite the focus on shaping air power to meet the demands of senior

³²⁴ Air Service Tactical School Bombardment Course Text, 1924, Call#248.101-9, IRIS#00157203, AFHRA, Maxwell AFB, AL.

³²⁵ William C. Sherman, *Air Warfare* (New York: The Ronald Press Co., 1926), 190.

³²⁶ *Ibid.*, 197.

Army commanders for ground support and the need to reshape air power into a coast defense capability to garner congressional support, strategic bombing always remained in the minds of key mid-level officers. Often working through smaller tactical manuals that attracted little attention even within the Army, these strategists continued the slow evolution of bombardment theory. Out-of-the-way places like Langley effectively became the think tanks not only for air power in general, but also in how to use its specific elements of observation, pursuit, attack, and bombardment. In doing so, ASTS stirred the beginnings of a new round of thought that would lead to major changes in the soon to be designated Army Air Corps.

Bringing the Elements Together

The theoretical work occurring on the Air Service staff and at ASTS would have meant little without concurrent structural changes to allow their implementation. From the start, the doctrinal debates occurred against the backdrop of political fighting over the future of the Air Service. While this political debate did have some influence on the direction of air power thought in the early 1920s, its true importance was in creating an Air Service organization capable of carrying out the developing doctrinal concepts in the late 1920s and early 1930s.

The first of these structural debates occurred with the advent of the Lassiter Board in December 1922. Throughout that year, the Air Service Chief Patrick forwarded complaints on the status and structure of the service to Secretary of War John W. Weeks. These complaints largely revolved around the limited availability of aircraft and of issues about who should command flying squadrons in the larger army structure. On 18 December, Weeks responded by asking Patrick to develop a study on what the proper

structure and size of the Air Service should be and what actions were necessary to address deficiencies.

Patrick based his study on Sherman's draft of Training Regulation 440-15, now widely accepted within the Air Service. The draft regulation called for dividing the Air Service into two structural elements: the first consisting of observation aircraft assigned to division and corps commanders for direct support; and the second dedicated to an offensive air force consisting of bombers, pursuit, and attack aircraft under the command of GHQ reserve. Sherman again used his 80/20 proportionality split for forces under GHQ reserve command and divisional or corps level command.³²⁷ Patrick believed that this plan offered enough aerial power to meet the daily needs of ground commanders while maintaining air power's ability to mass the majority of its combat forces at the proper time and place to achieve larger objectives.

With Patrick's plan as a basis, Weeks appointed a board of officers in early 1923 to review the study and make recommendations, which became known as the Lassiter Board after its chairman, Maj. Gen. James Lassiter. From the start, Patrick's plan faced stiff opposition from Maj. Gen. Hugh Drum of the War Department's General Staff. Drum countered Patrick by proposing that the proper way to determine Air Service requirements was first to figure out what aviation support the divisions and corps needed and then form the remaining air power into a highly controlled GHQ reserve to meet limited long-range bombing or reconnaissance needs.³²⁸

Lassiter largely sided with Drum when he decided to use the guiding principle that aviation in the Army should be employed for participation in battle, and all strategic

³²⁷ Training Regulation 440-15 draft, 1922.

³²⁸ Lassiter Board Meeting Minutes, 22 March 1923, Call#145.93-102, IRIS#00119243, AFHRA, Maxwell AFB, AL, 5-7.

bombardment and reconnaissance should be done by aviation in the GHQ reserve.³²⁹ This position effectively countered Patrick's plan to locate only observation planes at corps and division levels. In the end, the Lassiter Board overruled the Army Air Service's plan and recommended the placement of multifunction air force elements within each Army corps. In doing so, the board believed air power was similar to other support forces and that its assets should be divided between different levels of command. Division commanders would control observation squadrons, while each corps commander would have pursuit and attack squadrons assigned to distribute as they saw fit. This left only a small core of bombardment squadrons with some pursuit support available for strategic missions in a GHQ reserve force.

Even with this structural setback, there were still positive elements for the Air Service in the Lassiter Board's final report. The most important was an acknowledgment of the deterioration of air power capabilities since the end of the war. Lassiter even wrote that "air power has come to play an increasing role in warfare since World War I, but our nation has not kept step with the evolution."³³⁰ To rectify the situation, Lassiter recommended that America increase the number of aircraft in the Air Service to 1,655 with 1,003 stationed in the United States and the remaining 652 with overseas garrisons.

Unfortunately, tight congressional budgets meant the Lassiter Board recommendation never coalesced into legislation to fund the new aircraft. Still, the board was important in two respects. First, it set out a marker for the size, structure, and mission of the Air Service. This was now set at approximately 1,600 aircraft largely

³²⁹ Ibid., 3.

³³⁰ Lassiter Board Final Report, 17 March 1923, Call# 145.93-102, IRIS# 00119242, AFHRA, Maxwell AFB, AL.

assigned to corps commanders for direct support. More important, the board set the stage for future political battles, because its position was so far afield from the Army Air Service's vision that it motivated airmen to retrench themselves and continue the battle.

A veritable war waged during 1923 and 1924 over the status of air power and the Army Air Service in general. On one level, Billy Mitchell led a highly publicized fight against the Army and Navy in his quest for an independent air force. On another level, the Army and the executive branch fought a battle to keep Congress out of determining national defense structure. Finally, on a third level, Air Service moderates fought a battle on a smaller scale to revise the Lassiter Board's findings and create more autonomy and a better structure for the Air Service.

By late 1924, these battles boiled over. The push for an independent air force culminated in two formal investigations, the congressional Lampert Committee and the presidential Morrow Board. The results of these two inquiries would be codified in legislation that shaped the future of U. S. aviation to the start of World War II.

The first investigation started in October 1924 when Wisconsin Republican Congressman Florian Lampert chaired the Select Committee of Inquiry into the Operations of U.S. Air Service. The Lampert Committee spent eleven months hearing testimony from 150 witnesses as it explored the status, role, and required size and structure of the Air Service. While Mitchell's star power dominated the hearings, more moderate airmen like Mason Patrick also testified. Through highly publicized newspaper coverage, a general understanding of four problem areas for the Air Service emerged in the testimony. These were the Air Service's structural role in the army, the overlapping of responsibilities with the navy, inadequate funding, and the degradation of the civilian

aviation industry.³³¹ As the committee discussed these issues with different witnesses, and publicized its hearings many observers concluded that Lampert's final report would side with the Army Air Service and recommend independence and the creation of a department of national defense with army, navy, and air forces under it.

The potential restructuring of the national security system and an independent air force was too much for the newly elected President Calvin Coolidge. In September 1925, he decided to preempt the Lampert Committee and conduct his own investigative board. Coolidge appointed his friend and former Amherst College classmate Dwight D. Morrow to lead the President's Aircraft Board, commonly known as the Morrow Board. As an outside businessman Morrow seemed independent, but in reality he was a man with a mission.

Similar to the Lassiter Board, Morrow began with Patrick's plan for the Air Service as a starting point for debate. By doing so, he effectively limited the talk of total independence or a new national security structure because Patrick's vision focused on autonomy, not independence. Even so, there was no shortage of senior army officers testifying that Patrick's plan conflicted with unity of command or simply cost too much to implement.³³²

The Morrow Board proceeded rapidly and released its final report on 2 December 1925, a full two weeks before the Lampert Committee released its findings. In doing so, the president succeeded in taking the wind out of the congressional committee's sails. Far from advocating independence, the Morrow Board denied autonomy, citing unity of command issues and emphasizing that "air power has not demonstrated its value for

³³¹ Ibid.

³³² Morrow Board Testimony Minutes, Call#248.211-61V, IRIS#00159949, AFHRA, Maxwell AFB, AL.

independent operations to justify such a reorganization.”³³³ Instead, the board recommended a name change from the U.S. Army Air Service to the U.S. Army Air Corps and the creation of a new assistant secretary of war for air to help work the funding and policy issues that continued to plague the Air Service.³³⁴

In the end, the two-week head start and Coolidge’s support meant the Morrow Board succeeded, while the Lampert Committee’s recommendations were largely ignored. On 2 July 1926, the Morrow Board’s recommendations were largely enacted into law when the president signed the Air Corps Act of 1926. The law formally transitioned the U.S. Army Air Service into the U.S. Army Air Corps, but did little to increase its autonomy or to strengthen military aviation as an offensive striking arm rather than an auxiliary service.³³⁵ Still, the new law did have important benefits for air power’s future. It established a new Assistant Secretary of War for Air position that would pay dividends in future budgetary and strategy fights. It also helped address long-standing personnel issues by creating two new brigadier general positions. Most important though, was its creation of a five-year expansion program to grow the Air Corps to 1,650 officers and 15,000 enlisted men operating 1,800 airplanes.³³⁶

In this way, a series of congressional and Army studies shaped the structure of the Air Service during the early 1920s. While many view the establishment of the Air Corps in 1926 as the first step to autonomy, it was not designed that way by its instigators.

What made the new Air Corps structure the first step in independence was how the young

³³³ Report of the President’s Aircraft Board, 2 December 1925, Call#168.65411-3, IRIS#00124933, Maxwell AFB, AL, 3.

³³⁴ *Ibid.*, 6-7.

³³⁵ Harry H. Ransom. “Air Corps Act of 1926: A Study in the Legislative Process” (PhD diss., Princeton University, 1954), 66.

³³⁶ *Ibid.*, 78.

airmen in positions on the Air Corps staff, at the newly redesigned Air Corps Tactical School, and at other outlying stations used the new structure to continue the fight for autonomy and their vision for air power doctrine.

Conclusion

Historians and military professionals alike often overlook strategic bombing development in the early 1920s. They view this era as the age of Mitchell and the fight for independence, not as an important step towards the bomber fleets that would rule the skies over Europe in the late stages of World War II. There is plenty to justify their viewpoint. The combination of geopolitical and internal forces did conspire to thwart the ascension of strategic bombing theory at the end of World War I. This was followed by a new defensive national security strategy and a return to isolationist sentiment, which resulted in a large demobilization and tight budgets. Finally, strategic bombing got lost in the more glamorous fight for Air Service independence conducted by highly public figures like Mitchell. In the end, these forces combined to push strategic bombing to the periphery of military aviation.

That is not to say that strategic bombing's evolution stopped during this era. Instead, it continued in the shadows, often in directions that shaped the future of the Air Service and American's national defense policy. The new focus on coast defense spurred long-range bombing technology in ways that would one day make the vision of men like Gorrell a reality. Additionally, mid-level airmen in out-of-the-way places on the Air Service staff and at ASTS started to lay the foundations for concepts like precision, high-altitude, and Industrial Web Theory. Finally, the era's political debates on air power

brought structural changes that set the stage for the procurement and organization of heavy bombers.

Perhaps it is best to think of America in this era as a nation lulled into a sense of security behind its protective oceans. Yes, there was the remote threat from a naval fleet, but this was not likely a life-and-death issue that had to be addressed with major strategy changes. Instead, the argument flourished over which service was best able to meet the coast defense challenge. Still, in just one short year, the entire debate started to change. When Charles Lindbergh succeeded in crossing the Atlantic it presaged things to come. This one flight hinted that America needed to start thinking in terms of defending against aerial threats, and just perhaps into thinking about how to use its own air power to counter enemies that might present threats in the future.

Chapter 8

Marrying Technology and Doctrine

The Air Corps Act of 1926 was a transition point in the evolution of strategic bombing. While the law's architects designed it to limit Air Corps' freedom, it had a reverse effect in its application. Instead of restraining independent thinking, the law spurred not only new doctrinal development, but also started a process to merge that doctrine with technological advances.

Yet, there were many factors that still conspired to limit the appeal of strategic bombing within the Army Air Corps and the larger defense establishment. The long-standing fight between Army leadership and the Air Corps was in no way resolved: Senior Army generals still saw aviation as a support element for the infantry and limited budgets and resource constraints remained, especially in the severe military cutbacks after the start of the Great Depression. Finally, despite having achieved a level of autonomy, military aviation still faced personnel, organizational, and technological problems that diverted its leadership's attention from strategy issues.

Of these overarching problems, three specific factors played the most important roles in shaping the evolution of strategic bombing theory during the critical transition period from 1926 to 1934. The first was money. Both the lack of appropriations and the War Department's propensity to siphon funds for other requirements limited the ability of the Air Corps to research new technology and test doctrine in large-scale exercises. Second, strategic bombing theorists had to work against a national defense policy based

on a strategic defense concept. With this attitude, it became increasingly difficult to justify research on costly offensive heavy bombers or on testing bombing theories and doctrine in expensive large-scale maneuvers. Last, rapid changes in aviation technology impaired the ability of the Air Corps to develop new bomber designs. The state of flux meant it simply was a question of should America invest in aircraft that would be obsolete before they became operational or should it wait on promised new technology before spending large sums from preciously small acquisition budgets. At places like ACTS and the Air Corps Material Division, theorists and engineers explored how air power might be used in the future without the constraints of current budgets, political support, or technological limitations. By throwing off the shackles of current reality, these innovators shaped the future of air power towards their own visions with the idea that technology and policy would eventually catch up. While there were still many political and budgetary battles to come, the advances of the late 1920s and early 1930s set the stage for the advent of the strategic bombing age.

America Catches the Aviation Bug, 1926-1928

The year 1926 was important for military aviation. Passage of the Air Corps Act helped instill a sense of accomplishment among many airmen. While they may not have achieved the independence they advocated, the act offered a level of autonomy that helped alleviate many airmen's immediate concerns. In this new environment, they started to turn their attention back to other important questions, such as the proper use of air power in warfare and determining the technology needed by the Army's newest service element: This sparked a creative period in both strategic thought and

technological advancement as America's best military minds focused on new priorities in the post-Mitchell era.

Within a year, the American public began to rally behind its newest hero, an almost unknown young aviator from Minnesota who alone in a single-seat airplane succeeded where many had failed. On the day and night of 20-21 May 1927, Charles Lindbergh crossed the Atlantic Ocean and forever changed America's attitude towards aeronautics.³³⁷ This new public excitement merged with the military aviators' push for innovation in technology and strategy in the late 1920s to build the foundations for strategic bombing.

Yet, even before Lindbergh's flight or the enactment of the Air Corps Act, doctrinal change had begun to pick up momentum in the military. In early 1926, Maj. Oscar Westover, the commandant of the newly renamed Air Corps Tactical School released an updated version of the basic strategy manual for the Air Corps, the *Employment of Combined Air Forces Manual*. The new document codified the already emerging vision of air power. While it continued to support the Army leadership party line in stressing bombing for direct support of ground forces, the manual added a new element by contending that air power could better support ground forces through indirect attacks on command, supply, and industrial targets.³³⁸ In doing so, Westover provided a new take on the old problem for air power doctrine developers: their manuals must voice direct support of ground forces if they were to win senior Army-level approval. Instead, Westover managed to flip this problem on its ear. He simply redefined direct ground

³³⁷ Thomas Kessner, *The Flight of the Century: Charles Lindbergh and the Rise of American Aviation* (Oxford: Oxford University Press, 2010), 122-23.

³³⁸ *Employment of Combined Air Forces Manual*, 1926, Call#168.7045-28, IRIS#00127160, AFHRA, Maxwell AFB, AL.

support to include reducing the enemy's war resources and will to fight through strategic bombing.

Westover's manual represented the start of a shift in thinking back to the bomber as the primary tool for air power. The bomber offered the most support, both in a direct and indirect role, to the ground forces. This new trend was evident in many of ACTS's other manuals. Even the Pursuit Course text for 1926 reflected the growing importance of bombing in the ACTS thinking. Acknowledging that technological innovations made bombers more formidable, the text added that improvements in defensive armament made it increasingly difficult to attack bomber aircraft formations and that "attacks by individual pursuit planes in daylight would be largely limited to harassing fire."³³⁹ While this was not a ringing endorsement for strategic bombing, it did demonstrate that bomber technology and strategy were starting to gain momentum, with even pursuit courses having to discuss the difficulties of countering bombers.

Thus, American air power doctrine was primed for change. Unfortunately, none of the aircraft in the current inventory were in any way suited for a true strategic bombing campaign. The primary long-range bomber of the early 1920s, the twin-engine Martin B-2 biplane, lacked the range, lifting power, and accuracy to provide anything beyond direct ground support or harassing raids.³⁴⁰ Needed was a catalyst to match technological evolution to the growing ideas of air power theorists.

This catalyst occurred with the Lindbergh flight. Literally overnight, Lindbergh not only became an American hero, but he focused the attention of the nation on aviation. Before Lindbergh's achievement, most Americans thought of aviation as either the realm

³³⁹ ACTS Pursuit Text, 1926, Call#248.282-13A, IRIS#00162278, AFHRA, Maxwell AFB, AL, 53.

³⁴⁰ Jean H. Dubuque and Robert F. Gleckner, *The Development of the Heavy Bomber, 1918-1944* (Air Historical Study No. 6, Historical Division Air University, 1951), 7.

of stunt flyers or a military matter they may have read about during the Billy Mitchell trial. The closest thing to a civilian aviation market was the twelve contracts given out by the United States government as part of the Air Mail Act of 1925.³⁴¹ With the twenties roaring and America awash in money, good times, and self-confidence, the time was right for the rise of civil aviation.

In shaping the future for civil aviation both within America and internationally, Lindbergh functioned as a spokesman for the fledgling airlines and a good will ambassador on many trips across the globe.³⁴² Supported by Lindbergh and others, civil aviation grew at an exponential rate. In 1927, only 8,679 passengers flew on airliners. By 1928 that number quadrupled to 48,312. In just two more years, more than 380,000 Americans had taken to the skies on civilian airliners, a truly impressive increase, but only the start.³⁴³

With this growth airlines could no longer rely on the old World War I technologies. They needed new and more capable aircraft. As passenger numbers increased and routes got longer, civilian airline companies started to have similar requirements to the bombers that the Air Corps desired: long range, heavy lift capability, and reliability. In this way, the military's technological requirements meshed with those of civil aviation.

The transformation in public enthusiasm married nicely with two important changes in Air Corps' leadership. The first occurred on 16 July 1926 with the appointment of F. Trubee Davison as the Assistant Secretary of War for Air. The second

³⁴¹ T. A. Heppenheimer, *Turbulent Skies; The History of Commercial Aviation* (New York: John Wiley & Sons, 1995), 25-26.

³⁴² Kessner, *Flight of the Century*, 146-47.

³⁴³ Robert F. Futrell, *Ideas, Concepts, and Doctrines: Basic Thinking in the United States Air Force, 1907-1964* (Maxwell AFB: Air University Press, 1989), 55.

leadership change came on 14 December 1927, when Maj. Gen. James E. Fechet replaced Mason Patrick as the new Chief of the Air Corps. Both of these men helped transform Air Corps budgets, organizational culture, and doctrinal approaches.

Of the two men, Fechet likely made the larger impression. While Fechet had little operational flying experience, having spent World War I commanding flying schools in Illinois and Florida, he did have many years on the Air Service staff under his belt. During those critical years from 1920 to 1927, Fechet became familiar with major air power issues and internal staff workings in Washington.³⁴⁴ Still, his biggest contribution was likely the new attitude he brought to the service. Most notably, Fechet saw the Air Corps Act as a liberating moment for air power, interpreting the law to mean a high level of autonomy for aviation. As such, the Air Corps could now focus much of its attention on the question of how to use air power in warfare, versus constantly struggling to gain independence or focusing narrowly on the coast defense mission. Yet, realizing that creating doctrine was not the purview of his small and largely overworked staff in Washington, he decided to delegate the strategy and doctrinal development missions to ACTS.³⁴⁵

This brought up the next big issue for air power: how to build an Air Corps capable of meeting the new doctrines coming out of ACTS. The answer revolved around using the five-year expansion authorized by the Air Corps Act to buy newer and more capable bomber aircraft. Although, the law included a provision to raise the number of Army aircraft from 1,254 to 1,800 by 1932, it gave no guidance on what types of

³⁴⁴ Official Biography Maj. Gen James E. Fechet, available online at <http://archive.today/20121213031717/http://www.af.mil/information/bios/bio.asp?bioID=5401>.

³⁴⁵ Futrell, *Ideas, Concepts, and Doctrine*, 57.

airplanes these should be.³⁴⁶ Given the political and budgetary constraints on the Army to reduce costs, most senior leaders favored buying observation and attack aircraft, as they better met the accepted vision of air power for ground support. When Army leaders did approach the subject of bombers, most general staff members urged the development of an all-purpose aircraft to effect economies.³⁴⁷

As might be expected, this flew in the face of the Air Corps' growing support for long-range strategic bombing. A memorandum from the commander of the 2nd Bombardment Group, Maj. Hugh J. Knerr, best summed up the response to this outside pressure. Kerr wrote that agreeing with this recommendation would "stifle the most powerful military weapon in the army and increase the incorrect employment of air power."³⁴⁸

Fortunately, Davison's appointment in 1926 gave the aviators an ace in the hole in these budgetary battles. When he became Assistant Secretary of War for Air, Davison gave the Air Corps its own political representative on the Secretary of War's staff, something no other Army organization had. Historian Ronald Rice rightly points out that having this civilian position not liable to military rules or general orders provided the Air Corps with a senior advocate who could work within the political system to garner more resources and alleviate budget reductions in the lean time from 1928 to 1932. During that period, Army budgets fell by 37 percent, yet the Air Corps only saw only a 12 percent decline in its funding.³⁴⁹ While this was surely not the sole work of Davison, his

³⁴⁶ Air Corps Act of 1926, Call# 248.211-61E, IRIS# 00159929, AFHRA, Maxwell AFB, AL, 7.

³⁴⁷ Dubuque and Gleckner, *Heavy Bomber*, 8.

³⁴⁸ Memo, Knerr to Fechet, 28 May 1928, as cited in Dubuque and Gleckner, *Heavy Bomber*, 57.

³⁴⁹ Ronald R. Rice, *The Politics of Air Power: From Confrontation to Cooperation in Army Aviation Civil-Military Relations* (Lincoln: University of Nebraska Press, 2004), 80.

intercessions with the Secretary of War and Congress played a large role in deferring aviation budget cuts.

Even with this new source of political power, there were technological difficulties to overcome. Bomber designs advanced slowly, limited by both a lack of funding and a lack of leadership attention. Despite Davison's best efforts, no real progress on bomber acquisitions or research funding occurred from 1926 to 1928. There were three important reasons for this stagnation in bomber design,

The first was internal to the Army. After nearly a decade of drawdowns and cutbacks, mainline capabilities like infantry and artillery were sorely in need of modernization. Many leaders favored limiting bomber research in order to fund updates to these traditional combat arms. Additionally, aviation was not the only new technology in the military that sought research and development funds. In December 1927, the Army created its first experimental mechanized unit to explore how to integrate tanks into its combat plans.³⁵⁰ The combination of the need to refurbish the older combat arms and to test other new military technologies siphoned money away from aviation budgets, thus limiting the amounts available for bomber research and acquisition.

The second reason for stagnation revolved around a political issue outside the military's control. Since the demobilization after World War I, there had been little public attention to military budgets, with the notable exception of air power. The Billy Mitchell drama helped keep people interested in aviation and provided a level of budgetary support above other elements of the Army. Yet, the strong tide of isolationism and antiwar fever that gripped the American public in the late 1920s threatened to change

³⁵⁰ David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army, 1917-1945* (Ithaca: Cornell University Press, 2003), 67.

the dynamic. On 27 August 1928, fifteen nations, including the United States signed the Kellogg-Briand Pact in Paris agreeing not to use war to settle international disputes. By the end of the year, sixty-four nations were members of the treaty.³⁵¹ One of the effects of the treaty in the United States was to reinvigorate the antiwar movement and put pressure on the government to limit military spending further. After all, why should America invest heavily in its military if she and her potential adversaries had just agreed not to use war as a statecraft tool? There is evidence that the Army and even the Air Corps understood the new antiwar sentiment would affect military budgets. In his year-end report to the Secretary of War, Fechet warned that a rise in antimilitarism had created a tough political climate that limited the ability to buy new bombers perceived as offensive weapons.³⁵²

The final reason for holding back bomber development was the continuation of the larger fight with the Navy over air power missions. Many historians wrongly focus on the Air Corps Act's five-year expansion program and forget that the Navy also started its own five-year expansion with the Naval Aircraft Expansion Act of 1926, which called for a naval air force of more than 1,600 airplanes.³⁵³ Not only did this naval expansion compete for research and acquisition funds, but it also had an operational side effect that threatened Army long-range bomber production. In 1926, the Navy reignited the simmering hostilities after Mitchell's resignation when it announced that it would once again look into shore basing its aviation units to help with naval support and coast

³⁵¹ Robert H. Ferrell, *Peace in Their Time: The Origins of the Kellogg-Briand Pact* (New Haven: Yale University Press, 1952), 219.

³⁵² Air Corps Annual Report, 1928, Call#168.7330-1286, IRIS#02053550, AFHRA, Maxwell AFB, AL.

³⁵³ Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914-1945* (Princeton: Princeton University Press, 2002), 144-46.

defense.³⁵⁴ This was a major issue for the Air Corps. With no real peer competitor threatening the United States, the Army still relied on its mission of coastal defense to justify the development and purchase of long-range bombers.

The continuing disagreement with the Navy over air power missions acted as a brake in the minds of already hesitant Army leadership. Why should they provide funds for extremely expensive long-range bomber research when that was only one small portion of the Air Corps' perceived mission, which may be better suited to the naval aircraft? The Navy's success in buying fifty-four planes to protect Pearl Harbor and the Panama Canal only reinforced this attitude in the Army General Staff.³⁵⁵ Even the bomber advocate Maj. Gen. James P. Hodges reflected on the period as not a fight between fighter and bomber advocates, but a fight between the Air Corps and the Army and Navy over missions and budgets.³⁵⁶

The combination of these three factors severely limited the budgets for bomber research and production. To make matters worse, even when the Army received allocations from Congress for aviation, it did not necessarily translate into new aircraft. Historian Jean Dubuque described how the Army became proficient at diverting appropriated money away from aviation towards other priorities during the era. He explained how from 1926 to 1931 Congress allocated \$182,759,059 for the Air Corps, yet the Secretary of War allowed only \$126,136,476 of those funds to reach their intended destination. The remaining \$56,622,583 were removed from aviation budget and most likely transferred to other Army programs.³⁵⁷

³⁵⁴ Rice, *Politics of Air Power*, 87.

³⁵⁵ Wildenberg, *Mitchell's War with the Navy*, 155.

³⁵⁶ Oral History, Maj. Gen. James P. Hodges, Jan 1966, Call#K239.0512-565, AFHRA, Maxwell AFB, AL.

³⁵⁷ Dubuque and Gleckner, *Heavy Bomber*, 11.

In this way, the combination of the Air Corps Act of 1926 and Lindbergh's historic flight renewed the efforts of strategic bombing advocates. Internally, they continued the slow progress of shaping air power doctrine towards a strategic mission. Externally, the rise in civil aviation helped spur bomber design. Still, the long-lasting problems of the early 1920s remained in place to limit what bombing advocates could achieve. The combination of budgetary woes, Army intransigence, and antiwar fervor limited the money, research, and doctrinal change in the newly established Army Air Corps.

A Changing Vision of Air Power, 1928-1930

While the first two years after the establishment of the Air Corps were an important time for air power thought, the last two years of the decade proved even more fertile. As opposed to the beginning of the 1920s, this new period saw less attention to the question of independence and more to how air power should be used in war. Several factors contributed to this new vision of air power, which in many ways was a return to airmen's impressions of warfare garnered in the last year of World War I.

In this environment, the role of the bomber once again dominated strategy discussions. While Westover's 1926 manual started the switch to the bomber as the primary Air Corps weapon, ACTS's 1928 strategy revision initiated the process of codifying that thinking into doctrine. That year, Lt. Col. Clarence C. Culver became the new commander of ACTS, which was still located at Langley Field. He realized the school needed a structured curriculum based on centralized doctrine accepted by the Air Corps. Unfortunately, no such doctrine existed. Instead, the Air Corps relied on a series of disjointed strategy and tactics manuals for guidance. Therefore, Culver decided to

develop a baseline doctrine to utilize as an umbrella to guide the development of subordinate texts on pursuit, bombing, observation, and other missions.³⁵⁸

Culver summarized his new vision in a memo titled “The Doctrine of the Air Force,” which he circulated among key Air Corps staff officers on 30 August 1928. Whereas the Army remained wedded to the view that a nation must first defeat an enemy’s army or navy before it could impose its will, Culver brought in the new concepts being espoused by military thinkers like J. F. C. Fuller and B. H. Liddell Hart that overcoming the enemy’s will to resist was the true essence of warfare.³⁵⁹ Hence, Culver argued that it was no longer necessary to defeat an enemy’s army or navy to win a war. Instead, all that was required was to break the enemy’s will to fight.

Perhaps even more telling was Fechet’s response to Culver on 9 September. In his memorandum, Fechet pointed out that if taken to its logical end, this new vision of warfare meant that if “the proper means were furnished to subdue the enemy’s will...the objective of war could be obtained with less destruction.”³⁶⁰ What went unsaid, but was well understood by both men, was that only one capability offered a means to break the enemy’s will to resist without requiring the defeat of his army or navy first, namely air power.

ACTS built on this new doctrinal direction in a major curriculum revision in 1928. Much like the new vision of warfare, the school decided to switch its methodology completely. Up until 1928, individual classes focused on studying what actually happened in World War I as a guide to how air power should be used. Now the school

³⁵⁸ Futrell, *Ideas, Concepts, and Doctrines*, 57.

³⁵⁹ Memo, Culver to Fechet, 30 August 1928, Call#K239.293, IRIS#00481811, AFHRA, Maxwell AFB, AL.

³⁶⁰ Memo, Fechet to Culver, 9 September 1928, Call#K239.293, IRIS#00481811, AFHRA, Maxwell AFB, AL.

took a much more theoretical approach by focusing on how air power might have been used better in various situations. With an entirely new focus, the school was no longer just studying historical precedence; it now became an academic institution concentrating on the theoretical use of air power, an incubator for new ideas, logically testing them, and finally integrating them into air power doctrine. The predominant historian of ACTS, Robert Finney, described the lasting effect of this transition as turning the school into a “cerebral testing ground for ideas, where innovative young officers could envision air power without the restraints of reality.”³⁶¹ Thus, in a way, this curriculum change opened the door to a series of air power dreamers, who in turn shaped not only doctrine, but also the technology needed to carry out their visions.

The results of this attitude were best seen in the new capstone course added to ACTS for the 1929 academic year titled “The Air Force.” The new course came at the end of the year and consolidated all the ideas garnered from the individual strategy courses into a single integrated vision for the employment of pursuit, observation, attack, and bombardment aviation into one aerial battle plan.³⁶²

The Air Corps’ experiences in two important maneuvers that year reinforced these academic changes. The first occurred when the Air Corps observed that the Navy exercises near the Panama Canal might support the Air Corp’s requirement for a long-range heavy bomber. In the exercise, the Navy used the *Saratoga* to simulate a hostile fleet using carrier air power to attack the Canal Zone. One of important lessons cited by the Air Corps was the need to intercept any naval force with carrier-based aircraft at least 750 to 1,150 miles out to sea in order to avoid the possibility of a devastating naval air

³⁶¹ Finney, *History of ACTS*, 28.

³⁶² ACTS Commandant’s Annual Report, 1929, Call#245-111, IRIS#00155806, AFHRA, Maxwell AFB, AL.

attack.³⁶³ This observation helped justify the requirement for a 1,000-mile range heavy-bomber that proved essential for both the coast defense and later strategic bombing missions.

Even more important was ACTS participation in the annual V Corps area maneuvers in Ohio during May. During these maneuvers, twin-engine Martin B-2 bomber formations played a leading role in blunting a simulated invasion force by smashing the opposing forces' supply, communications, and command systems. The Air Corps' bomber forces were so successful at avoiding engagements and destroying ground targets that the lead aerial referee, ACTS staff member Maj. Walter Frank, wrote that the maneuvers indicated that "a well planned air force attack is going to be successful most of the time."³⁶⁴

These operational lessons were not lost on the academic side. Capt. Charles W. Walton's student paper while a member of the ACTS class of 1929 clearly demonstrated how the lessons from the exercises became ingrained into the thinking of even junior students. In the paper, Walton wrote of the maneuvers, "we can see the seeds of decisive military action, especially when aviation can operate without restrictions imposed by superior commanders."³⁶⁵

The new course structure empowered junior instructors to explore ideas more deeply and to come up with their own concepts to improve air power. In 1930, two instructors in the bombardment course, Capt. Robert Olds and Lt. Kenneth Walker, used their classes to build on Franks' observations. They modified Frank's assessment of the

³⁶³ Wildenberg, *Mitchell's War with the Navy*, 156.

³⁶⁴ Report of V Corps Maneuvers, 1929, Call#248.2122, IRIS#00160361, AFHRA, Maxwell AFB, AL, 8.

³⁶⁵ Student Paper, Capt. Charles W. Walton, 1 May 1929, Call#248-11-16F, AFHRA, Maxwell AFB, AL, 19.

power of aerial offensives to a new idea that seeped into the core of Air Corps thinking: “a well organized, well planned, and well flown air force attack will constitute an offensive that cannot be stopped.”³⁶⁶ It is easy to see how this concept became the forerunner for the more catchy *the bomber will always get through* that dominated aerial thinking during the decade.

This period of rapid theoretical growth coincided with a phase of technological advancement, especially in civil aviation. The demand for closed-cockpit, reliable high-altitude and long-distance aircraft capable of safely carrying significant loads meshed nicely with the Air Corps’ needs for a heavy bomber. Due to this similarity, a synergy developed between civilian airliner and military bomber research. For the military part, the Air Corps’ Material Division at Wright Field in Dayton played a large role in supporting this research. While the Air Corps avoided researching and developing entire aircraft, its work on high-altitude engines, flight controls, and pressurization aided both the civilian and the military requirements.³⁶⁷ At the same time, civilian airline developers incorporated these military innovations in their new aircraft designs to produce not only better airliners but also more capable bomber aircraft.

These technological developments started to make long-range bombing feasible, but it also brought up a critical question for the Air Corps; what types of bombers were needed? Maj. Hugh Knerr, the commander of the 2nd Bombardment Group, best described this choice as one between two types of bombers: fast medium bombers and long-range heavy bombers.³⁶⁸ Despite being an earlier supporter of Billy Mitchell and

³⁶⁶ Maj. Gen. Haywood Hansell, “Pre-World War II Evaluation of the Air Weapon,” Air War College lecture, 16 November 1953, Call#K239.716253-36, IRIS#00483446, AFHRA, Maxwell AFB, AL.

³⁶⁷ Dubuque and Gleckner, *Heavy Bombers*, 8.

³⁶⁸ Futrell, *Ideas, Concepts, and Doctrine*, 58.

long-range bombardment, Knerr proposed to split research and acquisition dollars between the two types of bombers. While this may have made sense in regards to the current state of aviation technology and budget pressures to fund only smaller less costly aircraft, it started a long-term problem that would last throughout the 1930s. Should the Air Corps utilize its limited research and acquisition budgets for highly expensive, but more capable long-range bombers or should it use its money to buy many less capable, but more flexible, medium bombers to fill out its ranks faster. In the end, this quality versus quantity debate shaped not only the technology of the Air Corps, but also its strategy in the coming decade.

It is important to note that Knerr's position was widely accepted even at ACTS. In early 1930, the school conducted a study of air force combat requirements and concurred with Knerr's recommendations. Therefore, Air Corps research budgets were split between medium twin-engine bombers need for ground support and long-range four-engine bombers required for strategic attack missions.³⁶⁹

Still, these were not the only limitations on the direction of Air Corps technology. Pressure also came from outside the military. While congressional spending might have been tight during the late 1920s, the economic collapse of 1929 saw budgets go into a free fall. At the start of the summer, President Hoover ordered a complete survey of the armed forces. This initially began as a policy review, but rapidly turned into a cost-cutting drill after the collapse of October 1929. As Hoover believed that the most likely use of military force would evolve from a minor maritime or trade dispute, he generally

³⁶⁹ Memo, ACTS Commandant to Chief of the Air Corps, 19 March 1930, as cited in Dubuque and Gleckner, *Heavy Bomber*, 10.

avored cutting expensive offensive weapon systems.³⁷⁰ The Air Corps' heavy bomber program seemed tailor made to fit Hoover's reductions, as big bombers were expensive and viewed by many as offensive weapons. Often with the Army General Staff concurrence, this attitude led to cuts in heavy bomber research and acquisition budgets.

Compounding the issue were the long timelines required to bring a new bomber into active service. In the 1920s, it took up to five years on average to design, test, build, and deploy a bomber with the Air Corps.³⁷¹ Added to this timeline were more delays caused by poor congressional funding and tight budgets. Unfortunately, the rate of technological change occurring in aircraft design meant that by the time these new bombers entered the Air Corps inventory they were already obsolete. Consequently, these factors combined to limit the numbers of bombers bought by the Air Corps in the late 1920s. The overriding feeling seemed to be why should we spend large amounts of a tight budget buying bomber aircraft when they would be obsolete upon delivery anyway. Would it not be better to save the money and only buy a few aircraft for training, while waiting on technological advances to stabilize before buying large numbers of aircraft? In this way, the Air Corps ended the 1920s with only fifty-one bombers in its inventory, all of which were medium bombers.

A Return to Thinking About War, 1930-1931

Despite the limitations imposed by the Army and low budgets, the early 1930s saw a renewal of interest in contemplating air power's role in warfare. The changes in curriculum at ACTS were both a product of that renewed interest and a source of

³⁷⁰ John W. Killigrew, "The Impact of the Great Depression on the Army, 1929-1936" (PhD diss., Indiana University, 1960), 11.

³⁷¹ Dubuque and Gleckner, *Heavy Bombers*, 8.

inspiration for continued evolution. Yet, it was not the only stimulus affecting doctrine. A transforming world situation slowly awakened America to the dangers of growing fascism in Europe and militarism in Japan. These new national security threats helped to counter antimilitarism and isolationist pressures. Additionally, the continued rush of technological advancement spurred new thinking about air power. As aircraft capabilities caught up to, and in many cases surpassed, the visions of men like Mitchell and Gorrell, a new generation of theorists pondered how best to use these new aeronautical capabilities to meet America's security needs.

While the early stages of the Great Depression led to cost cutting in the Hoover administration, the election of Franklin Delano Roosevelt to the presidency dealt an even more severe blow to Air Corps budgets. Not only did Roosevelt seek up to a 51 percent cut in military spending, but he also effectively eliminated the Air Corps' ace in the hole when he chose not to fill the Assistant Secretary of War for Air position.³⁷² In one fell swoop, Roosevelt both limited funding and eliminated the Air Corps' ability to mitigate the cuts.

Still, the Great Depression was not all negative for the Air Corps. The social upheaval during the economic crisis had an important side effect on air power doctrine. The sudden fragmentation of the U. S. economy seemed to indicate that a national economy was much more fragile than previously thought.³⁷³ Air power advocates could see unfolding before their eyes how once the economic linkages in an economy were disrupted, the whole system might crash. While this economic crash occurred

³⁷² Rice, *Politics of Air Power*, 96.

³⁷³ Biddle, *Rhetoric and Reality*, 147.

“naturally,” a few key air power thinkers began to stress that strategic bombing could create similar effects by disrupting critical nodes in an enemy’s economy.³⁷⁴

In this way, the early stages of the Depression both hurt and helped strategic bombing advocates. On one level, it decimated their attempts to acquire and develop more heavy bombers. On the other hand, it seemed to indicate their hypothesis that bombers could wreck an enemy’s economy through disrupting critical economic nodes might be correct. This helped buoy their morale during tough budgetary times. Nevertheless, the overarching effect of the Great Depression was negative on the evolution of strategic bombing theory. Military cutbacks further reduced bomber inventories and seemed to rule out any new designs for the immediate future. Fortunately for the Air Corps, three critical events occurred in 1931 that helped limit the effects of the budget problems.

The first was the movement of ACTS from Langley Field to Maxwell Field, Alabama. Since 1928, the Air Corps had understood that Langley Field was too busy for professional military education and doctrine development. Because operational requirements constantly pulled instructors and students away from their studies, the service needed a quiet location away from the turmoil. In early 1929, the Air Corps found just such a site at Maxwell, which offered an out-of-the way location where students could focus on academic work without the interruptions associated with an operational flying base in relative close proximity to Washington.³⁷⁵ The only limitation was the barebones status of Maxwell in 1929. There were only a handful of buildings on

³⁷⁴ Stephen L. MacFarland, *America’s Pursuit of Precision Bombing, 1910-1945* (Washington, DC: Smithsonian Institution Press, 1995), 92.

³⁷⁵ Finney, *History of ACTS*, 14.

the field at that time, and nothing like the structure a modern military school needed. Hence, a major construction effort delayed ACTS's move until 15 July 1931.

With the new location came a new commander and a new approach. Far removed from Washington and Army oversight, the new commander, Lt. Col. John Curry, once again modified the school's vision. Curry's long career in aviation made him a perfect choice to command ACTS, having flown with the 1st Aero Squadron in Mexico, experienced combat over France, and secured the purchase of Ford Island, Pearl Harbor, Hawaii, for Army aviation.³⁷⁶ Under his leadership, ACTS would now be a clearinghouse for ideas, where new concepts could be rigorously tested and doctrine created.³⁷⁷ The Assistant Commandant at the time, Maj. Hume Peabody, even recalled Curry telling the instructors that each was free to teach as they saw fit in order to get a debate going, "then with the ideas we get from the students, we are going to hit a happy medium."³⁷⁸

Perhaps even more important, the institution started a modern library system to support the academic work. From 1931 to 1934, Maxwell Field created a formal book department that maintained a library and directed the purchase of thousands of new books.³⁷⁹ The library also included an impressive collection of archival material from World War I, including Edgar Gorrell's Air Service History of World War I and his Bombing Survey. These became central documents used by future strategic bombing theorists to modify and develop their own thoughts. Most notably, Maj. Donald Wilson's

³⁷⁶ U. S. Air Force Bio, <https://www.af.mil/information/bios/bio.asp?bioID=10216>.

³⁷⁷ Memo, Curry to Chief of the Air Corps, 8 April 1932, Call#248.192, IRIS#00158554, AFHRA, Maxwell AFB, AL.

³⁷⁸ Oral History Interview of Hume Peabody, 30 September 1974, Call#K239.0512-810, IRIS#01029101, AFHRA, Maxwell AFB, AL.

³⁷⁹ Finney, *History of ACTS*, 16.

1933 Bombardment Course cited Gorrell's works on several occasions, which likely drew students' attention to these documents.³⁸⁰ The use of both indicated that Gorrell's ideas, and especially his supporting statistical data, were fresh in the minds of the bomber advocates at ACTS as they adapted the old World War I doctrine for the new era.

With a new attitude and a library in place, all that remained to realize Curry's vision was a central concept on which to base the new doctrine. In late 1932, Lt. Kenneth Walker spelled out the central tenets of the core doctrine in a memorandum critiquing a new Air Corps field manual sent to the ACTS commander. In the memo, Walker took issue with bombardment aviation's depiction stressing that three principles must guide all future doctrine. First, bombardment aviation was the basic arm of the air force. Next, for bombing to be effective, precision targeting was key. The only way to accomplish this was through daylight bombing. Finally, air power was too costly to waste; therefore, bombing raids must be focused only against targets vital to the enemy's economy.³⁸¹ In this way, Walker's memorandum included the skeleton of the future high-altitude precision daylight bombing doctrine. Although much more work would be required to turn Walker's recommendations into formal doctrine, it was a crucial document that laid the groundwork for strategic bombing

The second event of 1931 to aid the rise of strategic bombing was the settlement of a major interservice thorn in the side of the Air Corps that drew both attention and resources away from heavy bomber development. On 9 January 1931, Gen. Douglas MacArthur and Adm. William V. Pratt reached an agreement on coast defense roles for air power. MacArthur explained the agreement in a memorandum titled Employment of

³⁸⁰ ACTS Bombardment Text, 1933, Call#241.111, IRIS#468620, AFHRA, Maxwell AFB, AL.

³⁸¹ Memo, Walker to Curry, 24 September 1932, Call#248.211-13, IRIS#00159577, AFHRA, Maxwell AFB, AL.

Army Aviation in Coastal Defense, which he sent to all his subordinate Army, Corps, and Department commanders. In the memo, MacArthur explained that “naval forces will be based on the fleet and move with it as an impartial element in performing the essential mission of defending the fleet afloat. The Army air forces will be land based and employed as an element in carrying out its mission of defending the coast, both in the homeland and overseas possessions.”³⁸² This agreement left the Army and Navy air forces free to develop within defined limits each with explicit missions.

Still, in 1931, the agreement represented a giant leap forward for the Air Corps. It temporarily settled one long-standing issue that drew staff attention away from doctrine discussions and provided a mission justification for developing long-range heavy bombers with a thousand-mile range. As Air Force historian Maurer Maurer noted, the agreement “sanctioned a justifiable reason for developing long-range bombers for coastal defense.”³⁸³

Finally, 1931 saw two important technological advances that helped secure the success of strategic bombing doctrine. The first of these was the Martin B-10, the first all-metal monoplane bomber bought by the U. S. Army Air Corps. Its capabilities were an impressive technological leap forward, with a top speed of 213 miles per hour, a 24,000-foot service ceiling, and a range of 1,000 miles.³⁸⁴ While technically still a twin-engine medium bomber, the B-10 promised that advancing technology would finally make heavy bombers a reality. As such, it generated excitement in ACTS, where

³⁸² Memo, MacArthur to Commanding Generals, Armies, Corps, and Departments, 13 January 1931, Call#168.3952-91, IRIS#00123080, AFHRA, Maxwell AFB, AL.

³⁸³ Maurer Maurer, *Aviation in the U.S. Army 1919-1939* (Washington, DC: Office of Air Force History, 1987), 289.

³⁸⁴ J. E. Kaufmann and H. W. Kaufmann, *The Sleeping Giant: American Armed Forces Between the Wars* (London: Praeger, 1996), 122.

students and faculty alike redoubled their efforts to build a strategy for the new heavy bombers they felt sure were only a few years away.

Unfortunately for the Air Corps, the B-10 and its lineage lacked one important element critical to meeting ACTS's developing vision of strategic bombardment: precision. As fate would have it, another invention in late 1931 appeared to offer the accuracy needed by any bomber the Air Corps chose to buy. In October, Air Corps officers observed the naval test of Carl L. Norden's new bombsight. Their notes indicated they believed this could be the device finally to make high-altitude strategic bombing possible and they recommended its immediate purchase.³⁸⁵

The Air Corps faced a dual challenge in acquiring the Norden bombsight, though. First, they had to overcome Army reluctance to buy a new technology that supported high-altitude strategic bombing, when they preferred smaller medium bombers to help meet budget limitations and keep the Air Corps focused on its ground support role. Second, the Norden bombsight was already on contract with the Navy. With the bad blood between the two services, there was no way the Navy would give the Air Corps the rights to manufacture its own version of the sight. This was especially important, considering the Air Corps wanted to use them in the long-range coast defense mission, while naval air still saw as its role. In the end, an agreement was reached to buy Nordens from the Navy, but this proved inefficient until the requirements of World War II forced the two services to work together.³⁸⁶

In this way, the first two years of the new decade were primarily driven by budget constraints. Still, the Air Corps did not let its monetary woes completely distract it from

³⁸⁵ Maurer, *Aviation in the U.S. Army*, 289.

³⁸⁶ MacFarland, *Precision Bombing*, 72-73.

developing new technology and doctrines. Three important events in the critical year of 1931 helped advance strategic bombing and position it for wider acceptance as the decade continued. Moving ACTS from Langley to Maxwell provided new freedom that was matched by an openness to academic innovation that spurred new ideas. The MacArthur-Pratt Agreement both removed a thorn from the side of aviation leaders and also gave them a mission justification to support the purchase of heavy long-range bomber aircraft. Finally, the rapid pace of both aircraft technology and accurate bombsights indicated that heavy bombers were not only on the way, but that they would likely meet the vision of the air power theorists.

Creating an Organization, 1932-1934

When Maj. Gen. Benjamin Foulois became Chief of the Army Air Corps on 22 December 1931, he brought a wealth of knowledge with him. He was the most experienced aviator in the Air Corps, having been the founding pilot in the new Air Service in 1909. He brought operational experience commanding the 1st Aero Squadron during the Mexican Expedition and as the commander of the AEF Air Service in the early days of America's involvement in World War I. Still, perhaps his most important experience for this position was his three years as military attaché in Berlin in the 1920s. His work with the Germans convinced him that they would once again rise to threaten Europe, this time using air power as their primary means of conquering the continent.³⁸⁷ Thus, Foulois took charge of the Air Corps with a desire to increase the funding for heavy bombers as a counterweight to the threat of a resurgent Germany.

³⁸⁷ Futrell, *Ideas, Concepts, and Doctrine*, 60-62.

Foulois immediately began pressing for more aircraft, greater autonomy, and a change of mission to focus on strategic attack. On 8 February 1933, Foulois sent a memorandum to Brig. Gen. Charles E. Killbourne, the Army Assistant Chief of Staff, referencing a discussion the two men had with General MacArthur in December 1932, which had identified a structural problem that limited air power's effective use in war. While most observation and some pursuit squadrons were under the command of corps or district commanders, the vast majority of Air Corps combat power resided under the GHQ Reserve Commander. Foulois pointed out that this command and control system limited air power's effectiveness, as there was no centralized structure to train, support, and command these air force in a time of emergency or war.³⁸⁸

Foulois did not stop at just complaining. He ended the memorandum by laying out his recommendations for a new tactical structure for the Air Corps. Foulois recommended creating a command entity to control offensive air power centrally in both peacetime and war, to be called the GHQ Air Force.³⁸⁹ While Army Corps commanders would retain observation and some pursuit aircraft for support, Foulois envisioned the Air Corps' bombers falling under this new combat command. This independent force operating directly under the supervision of the overall ground forces commander would centrally plan, coordinate, and execute aerial attacks against enemy forces. Furthermore, Foulois felt this command should fall under the authority of the Chief of the Air Corps, but at a minimum should be directly commanded by an airman.

This approach must have had an effect on MacArthur, for on 11 August 1933 he convinced Secretary of War George H. Dern to appoint a board of officers led by Maj.

³⁸⁸ Memo, Foulois to Killbourne, 8 February 1933, Call#168.68, IRIS#125297, AFHRA, Maxwell AFB, AL, 2.

³⁸⁹ Ibid., 8.

Gen. Hugh Drum to review and revise the Air Corps' structure and war plans. The Drum Board's report was not a total win for the Air Corps, but it did significantly enhance its position on strategic bombing. The board continued to maintain the traditional Army control over aviation when it started with the admonition: "Whether operating in close conjunction with the Army or Navy, or at a distance therefrom, all of these agencies must operate in accordance with one general plan of national defense."³⁹⁰ Still, there was much in the report to hearten the Air Corps. Most notably, its conclusion that "a properly constituted GHQ Air Force, a unit heretofore lacking, could detect the approach of an enemy force, attack it before it reached shore, oppose a landing, and support ground operations against an invader."³⁹¹

The GHQ Air Force would not become operational until 1935, but work proceeded in accordance with the Drum Report on its structure and doctrine for employment. Perhaps the most important part of the GHQ's formation occurred when MacArthur approved its first doctrine for employment on 17 October 1934. This doctrine manual, like the earlier Drum Board report, was a mixed bag. On one hand, it clearly stated, "the idea that aviation can replace any of the other elements of our armed forces is found to be erroneous."³⁹² Thus, it continued to limit further talk of Air Corps independence. On the other hand, though, the document provided enough autonomy for the Air Corps to pursue strategic bombing when it concluded, "the GHQ Air Force will operate as a homogenous unit, capable of operations in close cooperation with ground

³⁹⁰ Drum Board Report, 11 October 1933, Call#168.7130-5, IRIS#01034484, AFHRA, Maxwell AFB, AL, 1.

³⁹¹ Ibid., 12.

³⁹² Doctrine for Employment of the GHQ Air Force, 17 October 1934, Call#145.93-95, IRIS#00119236, AFHRA, Maxwell, AFB, AL, 3.

forces or independent thereof, coming under the direct control of the commander in chief during war.”³⁹³

While this command structure may not at first glance look like a critical step in the evolution of strategic bombing, it was indeed a momentous step forward. Before the idea of a GHQ Air Force, strategic bombing was always a concept, an idea that showed promise, but that had no real path to doctrine inside the Army or even the Air Corps. With the advent of the GHQ Air Force, there was now a command structure that could take the ideas of ACTS and the technological developments of the Material Division and turn them into actual operations. In this way, biographer John Shiner concluded that perhaps Foulois’s greatest achievement as Chief of the Air Corps was establishing a GHQ Air Force that provided the organizational structure for command and control of the strategic mission.³⁹⁴

Conclusion

The era of 1926 to 1934 saw the continuation of the organizational, technological, and budgetary limitations from the early 1920s. The world situation and America’s self-perceived role in that world had not changed significantly. If anything, the advent of the Depression exacerbated America’s tendency toward isolationism and antimilitarism in the late twenties and early thirties. This created a growing set of political, economic, and social forces that influenced the direction of air power thought. These shaping forces centered on three key issues: money, defense policy, and the state of aerial technology. All were found wanting in one way or another in the late 1920s.

³⁹³ Ibid., 4.

³⁹⁴ John F. Shiner, *Foulois and the U. S. Army Air Corps, 1931-1935* (Washington, DC: Office of Air Force History, 1983), 212.

Still, the elements of change were present to aid in the evolution of air power doctrine and technology towards the strategic bomber. The growing popular support for aviation after Charles Lindbergh's famous flight helped spur excitement for civil aviation that led to the rapid advancement of airliner technology. These advances eventually spilled over into military bomber technology, with increases in range, payload, and speed, making the bomber as capable, if not more capable, than most American fighters of the time.

Advocates at ACTS quickly seized on the new capabilities to proclaim that the bomber was becoming an unstoppable force. This married nicely with the new emphasis on thinking of air power in the theoretical sense, not constrained by the current budgets, technology, or political restraints. In the minds of the bomber advocates at ACTS, advances like the Martin B-10 bomber became stepping stones to thinking about how to use the next generation of four-engine bombers. This openness to new ideas spread like wildfire throughout the Air Corps and helped transition strategic bombing theory to the early stages of strategic bombing doctrine.

As might be expected, the theoretical focus while helping overcome many limitations, also created potential problems. Yet, in the end, the work done between 1926 and 1934 proved of critical importance to the evolution of both the bomber as a weapon and strategic bombing as a doctrine. If Billy Mitchell and Edgar Gorrell had laid the foundations for bombing in World War I and its aftermath, this new generation of air power thinkers at ACTS, the Material Division, and the Air Corps staff created the skeleton that would hold the flesh of strategic bombing doctrine leading up to World War II.

Chapter 9

The Triumph of the Bomber Advocates

By the beginning of 1934, American military aviation once again appeared ripe for change. The rise of Hitler in Europe and the growing threat from Japan in the Far East swayed some political opposition. Similarly, the Army's approval of the new GHQ AF command seemed to indicate that senior leaders started to understand and perhaps even accept the new possibilities of long-range bombing. Finally, technology had evolved to where it not only matched the dreams of bomber advocates, but also started to surpass them.

Unfortunately, this was more mirage than fact. Advances in organization, budgets, and technology often hid a more troubling reality. Strategic bombing was largely a theoretical exercise almost solely taking place in Montgomery, Alabama. There were only a handful of heavy bombers in the Air Corps to add substance to the theory. To make matters worse, debate still raged inside the Air Corps itself, as some officers contended that a pursuit-heavy counter-air mission was the best aerial strategy.

Perhaps most troubling, the advances in military aviation caused a corresponding reaction from Army officers opposed to autonomy. They saw any aerial mission that justified greater independence as a direct threat to a traditional ground-centric Army. Strengthened by new senior leadership, these men focused their efforts on eliminating the core aviation technology offering greater autonomy: the heavy bomber.

It only took a catalyst to set the opposing forces into a fight for the future of American military aviation doctrine. That catalyst turned out to be the seemingly supportive changes brought about by political, organizational, and technological developments from 1934 to 1936. While on the surface these changes supported the development of heavy bombers and a new strategy to use them, they also caused resentment and a feeling in the opponents of air power autonomy that they had to strike now or never. The clash of these forces may have determined the fate of strategic bombing except for one critical world event, the start of World War II. The war changed everything for strategic bombing advocates. It relieved Army opposition, fostered political and budgetary support, and finally forced the Air Corps to draft a formal doctrine in the shape of an initial war plan.

Political, Organizational, and Technological Change, 1934-1936

The intertwining of political change, organizational evolution, and the rapid advance of technology in the middle of the decade set the stage for the great battle over the future of American military aviation. Contained in each of these forces were the promise of greater aviation capabilities, but also the threat of independence that so many senior Army officers could not stomach. In this way, events conspired to spur aviation thought and acted as a counterweight to the formation of any new doctrine.

The greatest of the three dynamics was political change. The combination of the assumption of the presidency by Franklin D. Roosevelt in March 1933 and Hitler's ascendancy to Chancellor of Germany three months earlier started a series of events that dramatically shaped American air power. By early 1934, Hitler had started the process of building a 500,000-man army while militaristic Japan was well on its way to asserting its

might in the Far East. Although the world situation did not call for drastic measures yet, many American politicians realized they could no longer ignore their forsaken military. The shift was neither immediate nor dramatic at first, but it started a slow trend of reversing years of neglect. For instance, in 1935, Roosevelt asked for and received the largest allocation for military spending since 1921.³⁹⁵

Internal dynamics from the new president's policies also led to changes in the military. The most important of these for strategic bombing was the airmail cancellation of 1934. After discovering potential illegalities in awarding routes, Roosevelt decided to cancel all domestic airmail contracts on 7 February 1934. No one knew how long the stoppage would last, but in the interim, the president needed to keep the mail routes open. With the enthusiastic assurances of his Chief of the Air Corps, Benjamin Foulois, he ordered the service to fly the mail.

In what the press dubbed the Air Mail Fiasco, the Air Corps lost twelve pilots in fifty-seven accidents from 19 February to 1 June 1934.³⁹⁶ The highly publicized difficulties caused an uproar in both the public and Congress. Illinois Democrat and Speaker of the House Henry T. Rainey best summed up the question the fiasco brought to many political and military leaders' minds: "if it [the Army] is not equal to carrying the mail, I would like to know what it would do in carrying bombs."³⁹⁷ In the end, the question was too much to ignore. America had spent a proportionately large amount of its military budget on growing air power; had that money been wisely spent?

³⁹⁵ J. E. Kaufmann, and H. W. Kaufmann, *The Sleeping Giant: American Armed Forces Between the Wars* (London: Praeger, 1996), 88-89.

³⁹⁶ Robert F. Futrell, *Ideas, Concepts, and Doctrines: Basic Thinking in the United States Air Force, 1907-1964* (Maxwell AFB, AL: Air University Press, 1989), 64.

³⁹⁷ *Congressional Record*, 73rd Congress, 2nd session, Vol. 78, pt3, 3144-3145.

Once again this led to the appointment of a board of professionals to review the Air Corps. Headed by the Former Secretary of War Newton D. Baker, the board first met on 17 April 1934 with a combination of civilian aviation experts and senior military officers. The civilian members of the Baker Board included such luminaries as Karl Compton, Clarence Chamberlin, James Doolittle, Edgar Gorrell, and George Lewis. Meanwhile, the military contributed a group of highly experienced officers such as Maj. Gen. Hugh Drum, Maj. Gen. Benjamin Foulois, Maj. Gen. George Simonds, Brig. Gen. Charles Kilbourne, and Brig. Gen. John Gulick.³⁹⁸ This represented perhaps the most experienced grouping of aviation experts ever to study the Air Corps mission, resources, and performance.

At the first meeting, the board laid out its task of considering how the Air Corps Act of 1926 had shaped military aviation and determining what actions were needed to correct any deficiencies. It then proceeded to break the work into three categories of study. First, did the Air Corps have the best technology available? Next, was its training sufficient? Finally, did structural deficiencies limit Air Corps effectiveness?³⁹⁹ With this mission, the board heard from 105 witnesses over twenty-five sessions before releasing its final report on 18 July 1934.

As with previous boards, the Baker Board's results were a mixed bag. On one level, it once again closed the door on further talk of autonomy with statements like: "The idea that aviation can replace any other element of our armed force is found, on analysis, to be erroneous." To make matters worse for advocates of an independent air force, it also recommended that any future aerial expansion should occur only as part of a

³⁹⁸ Meeting Minutes of the Special Committee on Army Air Corps and the Air Mail, 17 April 1934, Call#167.66-1, IRIS#121594, AFHRA, Maxwell AFB, AL, 2.

³⁹⁹ Ibid., 17-19.

comprehensive Army augmentation program.⁴⁰⁰ Statements like these seemed to make the job of building support for strategic bombing more difficult.

Yet, the Baker Board's report also contained findings that aided the Air Corps and in the long run the bomber advocates. One of the most important structural problems was the lack of aviation representation on the Army General Staff, which "may account for some of the misunderstanding and erroneous impressions concerning air power." The report then went further to speculate that this faulty relationship might explain the lack of an adequate operational command and control to organize, train, and coordinate air power during a military crisis.⁴⁰¹ The board felt this lack of structure hindered the effectiveness of air power; hence, it strongly supported the establishment of the new GHQ AF to fill the command and control gap.

Finally, the Baker Board decried the state of Air Corps technology. It cited the strong advances in civilian aviation as a model for the Army. It even recommended supporting linkages between the Air Corps and the aviation industry. In a section influenced by the old bombing advocate Edgar Gorrell, the board recommended that "officers should be developed who were especially qualified in engineering and for dealing with industry."⁴⁰² Along these lines, Foulois asked the Air Corps' Material Division to create a personnel development program with three objectives: tactical experience, academic training, and practical experience.⁴⁰³ Thus, the Baker Board helped

⁴⁰⁰ Report of War Department Special Committee on Army Air Corps, 18 July 1934, Call#145.93-94A, IRIS#00119235, AFHRA, Maxwell AFB, AL, 14, 75.

⁴⁰¹ Ibid., 26.

⁴⁰² Ibid., 21.

⁴⁰³ Memo, Foulois to Assistant Chief of Staff G-3, 8 January 1935, Call#145.93-94, IRIS#125295, AFHRA, Maxwell AFB, AL.

create a group of Air Corps' officers who could work directly with industry to design the next generation of military aircraft.

Consequently, the Air Mail Fiasco turned out to be a long-term boon for the Air Corps. By bringing the poor state of aviation technology and training to the forefront, the Baker Board spurred investment and structural change. This was not immediate, though. As with the previous bodies, the Baker Board's recommendations came with no funds; however, the findings did provide political support that helped the Air Corps in the coming budgetary and organizational battles.

Whereas political changes may have set the ball in motion, the resulting organizational modifications were also critical to the success of strategic bombing. It was only with the creation of new structures that the Air Corps finally had the capability to turn theory into something practical. The first of these changes occurred on 31 December 1934 when the War Department ordered the standup of the GHQ AF.

To meet the order, the Air Corps commanded the 2nd Bombardment Wing to conduct an exercise in the first week of April 1935 to test GHQ AF organization and control concepts that combined bombardment, attack, pursuit, and observation aircraft as a self-contained force operating from one location. While many senior leaders considered this the proper model, the exercise showed severe logistical problems associated with basing multiple aircraft types together. Wing commander Col. John Curry's after-action review minced few words, indicating that the concepts of constantly moving aircraft forward and building giant multi-aircraft bases were grossly outdated. Instead, he pointed out that new advances in flight ranges and communications meant

aircraft could operate from many bases well behind the lines and still achieve mass over critical targets.⁴⁰⁴

The results of the exercise fashioned GHQ AF's organization in a way favorable to strategic bombing. Large mixed aircraft units directly tied to Army corps commanders proved unwieldy. Instead, single-aircraft-type wings synchronized from a central command element offered simpler logistics, better coordination, and the ability to mass air power at the decisive time and place. This is exactly what strategic bombing advocates needed: a command structure utilizing technology to allow long-range bombers to interact with escort fighters while conducting an independent campaign.

Still, strategic bombing theory needed a methodology to become an approved doctrine. To this point, its most important advances had been through student papers, instructor discussions, and tactics manuals. For strategic bombing to make the leap from discussion topic to fully accepted doctrine it needed a formal process. Unfortunately, the Air Corps lacked either a procedure or an organization for creating doctrine. When ACTS moved from Langley Field to Maxwell Field the previous doctrinal organization--the Air Board--ceased functioning.

By 1933, this situation was unacceptable. In calling for a new Air Board, the Plans Division pointed out that the Air Corps still relied on the 1922 Training Regulation 440-15 for its officially approved aerial doctrine. Reacting to the need, the Air Corps reestablished the Air Board at Maxwell on 17 August 1933 with the same mission, members, and linkages to ACTS as the old Langley board.⁴⁰⁵ Once instituted, the new

⁴⁰⁴ "2nd Bombardment Wing Exercise Report," Col. John Curry, 19 April 1935, Call#248.224 1932, IRIS#00161170, AFHRA Maxwell AFB, AL, 2-3.

⁴⁰⁵ Robert T. Finney, *History of the Air Corps Tactical School, 1920-1940* (Maxwell AFB, AL: Air University Press, 1955), 17.

members determined to modify the board's mission similar to the way ACTS had transitioned from a tactical school at Langley into a theoretical strategy development organization at Maxwell. Therefore, in August 1934, the board members convinced the Air Corps to change the name of the board to the Air Corps Board with a concurrent mission change to develop uniform doctrines.⁴⁰⁶

The establishment of the Air Corps Board also had the effect of instilling a new emphasis on doctrine development at ACTS. When combined with the growing size of the student body, it pushed the school to restructure its entire curriculum. By the 1935 academic year, over 50 percent of instruction was related to air tactics and doctrine.⁴⁰⁷ Additionally, course structure also changed with most classes moved to a twenty-minute lecture followed by fifty minutes of student discussion.⁴⁰⁸ This schedule allowed faculty and students to bring up new concepts, logically test them in open discussion, and pursue specific ideas in additional research. If these ideas attracted enough support, the Air Corps Board often turned them into formal studies.

Thus, political changes helped spur organizational modifications that created the conditions needed for strategic bombing theory to become strategic bombing doctrine. The transformations at Maxwell and the establishment of the GHQ AF provided the process to develop new doctrines and an organization to test them. What it still lacked was the technology to implement the new doctrines.

The tremendous technological change in the mid-1930s set the stage for the advent of strategic bombing; although this trend was not so obvious to observers at that

⁴⁰⁶ Memo, Commander ACTS to Chief of the Air Corps, 14 August 1934, Call#145.91-409, IRIS#118861, AFHRA, Maxwell AFB, AL.

⁴⁰⁷ ACTS Instructors Memo #10, 12 February 1935, Call#248.126, IRIS157746, AFHRA, Maxwell AFB, AL.

⁴⁰⁸ Finney, *History of ACTS*, 20.

time. The Air Corps' earlier decision to follow Maj. Hugh Knerr's recommendation to split development funds between medium and long-range bombers led to the 1933 dual specifications for new bomber designs. The first was for a medium bomber that could carry a 2,000 lb. bomb load for 1,000 miles at 200 miles per hour. The second was for a long-range heavy bomber capable of carrying similar loads for 5,000 miles also at 200 miles per hour.⁴⁰⁹

In response to the requirements, two new aircraft designs garnered excitement in the Army and its Air Corps. For the medium bomber, the Douglas Aircraft Company produced the twin-engine B-18. Its ability to meet all medium bomber specifications and its initial price tag of only \$58,500 made it the clear favorite of the Army General Staff. On the other side, the four-engine Boeing B-17 appeared to be the perfect aircraft for the heavy bomber advocates. Its initial range of 2,600 miles and top speed of 250 miles per hour offered what General Arnold labeled "air power you could put your hands on."⁴¹⁰

The Air Corps was so excited by the B-17 that they requested 65 of them in place of 180 other aircraft previously authorized for fiscal year 1936. The service may have even succeeded in getting the bombers except for the crash of the B-17 prototype before the Army could conduct official trials. While the failure of the test crew to unlock rudder and elevator controls and not inherent design problems caused the crash, the acquisition delay gave the opponents of heavy bombers time to mount a challenge.⁴¹¹

The result was an internal debate about the proper aircraft to meet the Air Corps' combat mission. On one side, the Air Corps favored the heavy bomber for its capabilities

⁴⁰⁹ Richard J. Overy, "Strategic Bombardment before 1939: Doctrine, Planning, and Operations," *Case Studies in Strategic Bombing* (Washington, DC: Government Printing Office, 1998), 57.

⁴¹⁰ H. H. Arnold, *Global Mission* (New York: Harper & Bros., 1949), 155.

⁴¹¹ Maurer Maurer, *Aviation in the U.S. Army 1919-1939* (Washington, DC: Office of Air Force History, 1987), 354.

to deliver large bomb loads over considerable distances at speeds greater than many contemporary pursuit aircraft. The Air Corps even argued that the heavy bomber was not solely designed for strategic bombing, its capabilities also making it a cost-effective weapon in defending America's coastlines or supporting ground troops. The Army General Staff countered with three arguments of its own. First, the B-18 cost about half that of a B-17; hence, they could buy twice as many with the same amount of funds. Next, the medium bomber would keep the Air Corps focused on its proper role: ground support. Finally, the heavy bomber was too offensive and ran counter to America's stated defensive national security policy.⁴¹²

Luckily, the Air Corps received an unexpected ally in Army Chief of Staff Gen. Douglas MacArthur. MacArthur turned out to be supportive of increasing all bombers, even declaring to his staff that the bomber was the most important element of the GHQ AF because it could disrupt an enemy's rear operations as no other weapon could.⁴¹³ While this was not a ringing endorsement of strategic bombing, it provided sufficient affirmation for the Air Corps to continue buying heavy bombers and researching future technologies.

Still, opposition to the heavy bomber program remained entrenched in the General Staff. Led by the G-4, Brig. Gen. George R. Spalding, the General Staff pressed MacArthur to forgo the B-17 in favor of the B-18. Spalding appealed to two elements he knew the chief would favor. First, the low cost of the B-18 meant MacArthur could build a large bomber force in less time. Next, the medium bomber was more inline with

⁴¹² Jean H. Dubuque and Robert F. Gleckner, *Air Historical Study No. 6 : The Development of the Heavy Bomber, 1918-1944* (Maxwell AFB, AL: Historical Division Air University, 1951), 22.

⁴¹³ Memo, MacArthur to War Department Staff, 13 August 1935, in AAG321.9A, box#2583, RG#407, National Archives.

MacArthur's vision of using bombers in an interdiction role. Finally, Spalding claimed the B-17 was too offensive and completely out of step with MacArthur's and America's vision for national defense.⁴¹⁴

In the end, the untimely crash of the B-17 prototype and General Staff opposition forced the Air Corps to take extreme measures to keep the program alive. In November 1936, Major General Westover used his authority under section 10(K) of the Air Corps Act to buy thirteen Boeing B-17s for experimental service testing.⁴¹⁵ While this in no way ended the fight between the General Staff and the Air Corps, it did keep the heavy bomber program alive long enough to fight another day.

As might be expected, these political, organizational, and technological developments caused commensurate modifications in the Air Corps' strategic thinking. Although not as dramatic as those of the early 1930s, these changes were important in rounding out strategic bombing theory. The first change occurred when Maj. Donald Wilson updated his bombardment lecture for the 1934 academic year. With the growing attention given to heavy bombers, Wilson dove headlong into the archives to rediscover the writings of Edgar Gorrell. Wilson was drawn to Gorrell's discussion on targeting industrial systems. He was so interested in the writings that he started a correspondence with Gorrell on the issue.⁴¹⁶

Based on this research and his own ideas, Wilson developed a more sophisticated approach to bombardment aviation. In what he later called the Industrial Web Theory, Wilson argued that the interdependence of a national economy meant that not all factories

⁴¹⁴ Memo, Spalding to MacArthur, 8 August 1936, AG452.1, box#2583, RG#407, National Archives.

⁴¹⁵ Memo, Westover to Adjutant General, 8 November 1935, AG452.1, box#2583, RG#407, National Archives.

⁴¹⁶ Oral History Interview, Maj. Gen. Donald Wilson, Call#K239.0512-878, IRIS#01103263, AFHRA, Maxwell, AFB, AL, 6.

needed to be destroyed for a successful air campaign. Instead, attacking key nodes would be enough to disrupt an entire economy.⁴¹⁷ It is important to note that this idea was not new. Col. Edouard Bares, Lord Hardinge Tiverton, and even Edgar Gorrell had at least in part discussed similar concepts in their World War I writings. While there is no direct evidence of a causal relationship, it is possible Wilson's readings and discussions with Gorrell helped spur his thoughts on the issue. Either way, this time something different occurred. Wilson had the advantage of time to take his thoughts beyond just theory and to start to turn them into a workable plan.

With the help of one of his students, Capt. Robert M. Webster, Wilson began to turn his ideas into something tangible. Figuring most major cities worldwide would have similar networks and vulnerabilities, the two men gathered data from New York City infrastructure managers on water, gas, electrical, transportation, and public safety systems. They then compared those categories to Air Corps capabilities to determine the best places where air power could be brought to bear against industrial vulnerabilities.⁴¹⁸

Westover aided Wilson's efforts by focusing the Air Corps on finally updating its approved doctrine. In June 1935, he directed the Air Corps Board to formulate a uniform doctrine in order to justify future budget requests. Learning from the concurrent fight with the General Staff, he believed a threefold mission of continental defense, ground support, and strategic operations would best ensure the service's access to heavy bombers.⁴¹⁹

⁴¹⁷ Ibid., 8.

⁴¹⁸ "Student Research Project on New York City Statistical Data," Capt. Robert M. Webster, Call#248-211-28, IRIS#159749, AFHRA, Maxwell, AFB, AL.

⁴¹⁹ Futrell, *Ideas, Concepts, and Doctrines*, 83.

While Westover's three doctrinal missions had little chance of being approved by the General Staff, they did serve as the Air Corps' starting point in the next roles and mission fight. This was to be a three-way contest among the Army General Staff, the Air Corps, and to a lesser extent the Navy. The General Staff and the Navy sought to limit at least one of the components, whereas the Air Corps fought what it perceived as a life-or-death struggle to maintain all three missions. In the end, defining the battleground helped stiffen the airmen for the coming struggle over the future of American military aviation.

The Great Bomber Fight, 1936-1939

On the surface, the political, organizational, and technological changes from 1934 to 1936 seemed to support the growing influence of bombing advocates. Nevertheless, the old opponents of air power independence continued to attack any plan that threatened greater autonomy or perhaps independence. This fight mostly occurred outside the political limelight in the interworking of staff procedures and budgetary processes.

The first round occurred with the 2 October 1935 ascension of Gen. Malin Craig to the Chief of Staff of the Army. Whereas MacArthur was open to the idea of an increased role for heavy bombers, his successor proved an early opponent. Craig entered into leadership as a man with a mission. He wanted to use his tenure to rebuild the traditional combat elements of the Army. In order to accomplish the task, Craig pressured the entire Army to limit research and development expenditures in favor of buying readily available weapons.⁴²⁰

This coincided nicely with the General Staff's opposition to the heavy bomber. Even before Craig became Chief of Staff, they attacked efforts to acquire more B-17s

⁴²⁰ Ibid., 79.

when on 25 June 1936, Brigadier General Spalding released a study that ruled the bomber met no current or future Army missions and thus should be defunded.⁴²¹ The study did allow the purchase of a few experimental bombers, but in effect it precluded buying new operational heavy bombers. The policy also acted as a major roadblock for ACTS strategy development, as there would be no heavy bomber units with which to test theories in maneuvers. Likely based on this policy, Craig turned down Westover's request to buy two groups of B-17 aircraft, downgrading the request to two-engine medium bombers.⁴²²

The Air Corps' leadership did not take this challenge lying down. They returned the General Staff's fire using a three-part strategy. First, the Air Corps directly attacked the logic of the Army's decision to ban heavy bombers. The GHQ AF's first commander, Brig. Gen. Frank M. Andrews, led the attack when he sent a strongly worded memorandum to the Chief of Staff explaining why the Air Corps needed heavy bombers. Andrews carefully avoided confusing the issue with talk of strategic bombing; instead, he kept his arguments safely founded on approved Air Corps' missions. He first utilized air power's coast defense role by arguing that the United States needed long-range heavy bombers to "stop hostile air expeditions at their source." He then added that heavy bombers were the most adaptable weapon for finding and countering enemy aircraft carriers. Most important, if the Army did not approve the purchase of B-17s now, they would not have a long-range strike capability if and when America entered its next

⁴²¹ War Department Staff Study: Augmentation in Aircraft to be included in FY 1938 Estimates, 25 June 1936, included in Arnold Papers, Call#28211, IRIS#089007, AFHRA, Maxwell AFB, AL.

⁴²² Robert W. Krauskopt, "The Army and the Strategic Bomber, 1930-1939," *Military Affairs* 73 (Winter, 1958), 209.

war.⁴²³ In this way, he warned that General Craig's decision today would not be felt until America's next crisis moment, when it would be too late to fix today's faulty decisions.

Even after this memorandum stirred up controversy, Andrews remained the most vocal critic of Army policies limiting heavy bombers. He next targeted the General Staff in a series of speeches at the Army War College, proclaiming that "bombardment aviation is and always will be the principal striking force in air operations." Therefore, to limit heavy bombers was to throw away the weapon with the most potential to inflict losses on an enemy.⁴²⁴ This was not simply a statement to a neutral audience. At the time, men who fully supported the General Staff's position constituted the Army War College faculty. Thus, Andrews was in a way walking into the lion's den with his speeches challenging the General Staff's policies.

As might be expected, trying to change the General Staff's deeply held beliefs through logical arguments proved unfruitful. Therefore, the Air Corps turned its attention to seeking further mission justifications for heavy bombers. The changing world situation aided its efforts by modifying American national security strategy towards the idea of hemispheric defense. The ever closer relationship among Germany, Italy, and Japan in 1937 had a clarifying effect on American defense thinking, which the military aviation historian Thomas Greer summed up as being "no longer a direct threat of invasion, but concern over Axis subversion and incursions into central and South America."⁴²⁵

⁴²³ Memo, Andrews to Chief of Staff, 14 September 1936, AG452.1, box#2583, RG#407, National Archives.

⁴²⁴ Maj. Gen. Frank Andrews lecture "The GHQ AF" at the Army War College, 9 October 1937, Call#248.211-62G, IRIS#00159966, AFHRA, Maxwell AFB, AL, 20-21.

⁴²⁵ Thomas H. Greer, *The Development of Air Doctrine in the Army Air Arm, 1917-1941* (Washington, DC: Office of Air Force History, 1985), 76.

Troubled that their sole mission justification for heavy bombers was coast defense, the bomber advocates seized on this new political concern. They argued that long-range heavy bombers were the most efficient and effective way for the United States to enforce the Monroe Doctrine in the late 1930s. The Air Corps even went as far as to task the Air Corps Board with studying how air power could support the modern Monroe Doctrine. Its findings were released in October 1938, when the board concluded that hemisphere defense was an integral mission that air power could best conduct without the costly need for large fleets or massive ground force deployments.⁴²⁶ ACTS later followed up with its own analysis. It concluded that for a competent defense of the Western Hemisphere, the Air Corps needed twenty squadrons of long-range heavy bombers with bases in Panama, Puerto Rico, and possibly Brazil.⁴²⁷ This plan became the final linkage between a new role in hemisphere defense and the justification for the purchase of a large number of heavy bombers.

The Air Corps' third line of attack was to let the technology speak for itself, as the B-17 was simply too impressive an aircraft to ignore. In May 1937, GHQ AF sent its first seven experimental B-17s to participate in joint Army-Navy maneuvers off the Pacific Coast. The B-17s easily outperformed the older B-10 bombers, achieving several hits on the battleship *Utah* with as little as five seconds run in time using the new Norden bombsight.⁴²⁸ The bomber's performance was so exceptional that it led the GHQ AF Chief of Staff, now Col. Hugh J. Knerr, to declare that the B-17 was "the best

⁴²⁶ Report of the Air Corps Board No. 44, 17 October 1938, Call#3794-44, IRIS#121165, AFHRA, Maxwell AFB, AL, 3.

⁴²⁷ "A Study of Air Defense of the Western Hemisphere," 12 May 1939, Call#145.93-141, IRIS#00119305, AFHRA, Maxwell, AFB, AL, 7.

⁴²⁸ Andrews lecture, "The GHQ AF," 8.

bombardment aircraft in existence.”⁴²⁹ While Knerr’s proclamation may have been overreaching, most Air Corps officers supported his assertion that the B-17 was truly a remarkable airplane that offered a high bomb load, greater accuracy, and longer ranges than any other aircraft then available to the Army. Even if not used in a strategic role, the B-17 offered capabilities that Army leadership had to recognize as beneficial.

Of course, the General Staff did not just roll over and surrender. They countered with their own arguments of why the B-17 was the wrong aircraft at the wrong time. First, they maintained the focus on the cost, constantly citing the \$280,000 cost per B-17 as compared to only about \$120,000 per B-18.⁴³⁰ The General Staff argued the cost of this one weapon system would preclude Craig from reconstituting the ground forces, thus creating a lopsided Army, which it knew would cut deep into Craig’s balanced restructuring vision.

Next, the General Staff looked for a counter-argument to the success of the B-17 in maneuvers. The early use of aircraft in the Spanish Civil War and the Italian invasion of Ethiopia bolstered their position. Attaché reports from each war indicated that high-altitude bombing was largely ineffective. This caused the Army War College to conclude that current worldwide military operations supported the conclusion that the best method to employ air power was in support of ground forces.⁴³¹

Craig added fuel to the fire when he restricted overwater flights to 100 miles. This seemed to play into the hands of the Navy when it modified the Joint Action

⁴²⁹ Memorandum, Knerr to Andrews, 31 July 1937, Call# 168.7028-11, IRIS#126511, AFHRA, Maxwell AFB, AL.

⁴³⁰ Memo, Deputy Chief of Staff to Chief of Staff, 29 November 1938, AAG 452.1b, box#2583, RG#407, National Archives.

⁴³¹ Army War College report: “Air Forces and War,” September 1937, Call# 168.7330-1501, IRIS#2053765, AFHRA, Maxwell AFB, AL.

Agreement in November 1938 to allow the development of naval land bases and long-range aircraft. Thus, many Air Corps leaders believed that they were in some way involved, which increased tensions in a way that aided the General Staff's efforts to reduce funding to heavy bombers. General Arnold later shed light on this Air Corps' belief when he speculated the Navy was likely involved from both a concern over losing mission roles and embarrassment after the Air Corps proved it could locate the Italian passenger liner *Rex* 725 miles east of New York City based on limited information during an exercise conducted on 12 May 1938.⁴³²

As the issue festered into 1938, Brigadier General Spalding tried a new tactic. He convinced the Army Chief of Staff to initiate a Joint Board Review of the Air Corps missions and requirements. Spalding likely felt the combination of naval officers and the heavy presence of General Staff officers on the board would combine once and for all to end the debate on heavy bombers. On 29 June 1938, the board released its report indicating there was no probable military requirement for aircraft larger than B-17s. Therefore, the Army should limit purchases and reduce research and development expenditures. In response to this ruling, Spalding revised the fiscal year 1940 acquisition program to divert all funding from four-engine bomber programs to two-engine bombers.⁴³³

This step finally got the Chief of the Air Corps, Oscar Westover, directly involved. Long favoring working within the staffing process, Westover had largely avoided the fight over heavy bombers. In a delicate response to General Craig, Westover complained that the G-4 had gone beyond even the far-reaching Joint Board study by

⁴³² Arnold, *Global Mission*, 176-79.

⁴³³ Memo, Spalding to Craig, 19 July 1938, AG452.1, box#2583, RG#407, National Archives.

removing all funding for heavy bomber programs. He contended that whereas the board only recommended buying no aircraft larger than B-17s, the overzealous Spalding had used the report effectively to kill all heavy bomber acquisitions and future research.⁴³⁴ Westover warned this complete defunding would be irreversible once instituted.

In the end, world events soon overtook the intra-and interservice disputes over bombers and bombing. Still, this period represented perhaps the greatest threat to strategic bomber advocates when the combination of a hostile General Staff, a Chief of Staff with different priorities, and a renewal of the old spat with the Navy seemingly spelled the doom for strategic bombing. This might have been the end of our story except for the Munich Crisis and the start of World War II.

The Onset of World War II and the Triumph of Strategic Bombing

The Munich Crisis of 1938 and the start of World War II breathed new life into strategic bombing. On one level, these events generated political support for heavy bombers during a particularly dire moment. On another, the war finally forced the issue of Air Corps doctrine. No longer could strategic bombing remain a theoretical exercise conducted at ACTS. With the war looming, America finally had to come to grips with its national security plan and the Air Corps had to turn theoretical papers and tactics manuals into actual plans.

The Air Corps stood ready for the task with a wealth of highly experienced men ready to turn theory into doctrine. A large portion of the best aviation officers and most proponents of strategic bombing had spent much of the 1930s as either students or faculty members at ACTS. While there, they absorbed the concepts and worked through the

⁴³⁴ Greer, *Development of Air Doctrine*, 93.

theoretical problems of strategic bombing. By 1939, these officers had graduated to new staff positions in the Air Corps where they were perfectly positioned to implement the strategic bombing vision so painstakingly developed at ACTS. Thus, when the order came down to draft the Air Corps war plan, a highly experienced and knowledgeable group of aviators stood ready to turn strategic bombing theory into a plan.

Even before the European leaders reached an agreement in September 1938 on partitioning Czechoslovakia at Munich, American political leaders were starting to reevaluate air power. With growing concerns over European developments, General Craig gave way in June 1938 when he convinced the Secretary of War to approve the addition of eleven B-17s and thirty-two B-18s to the already approved 1939 acquisition program. Perhaps more impressive, this change of heart occurred despite the General Staff's warning to the Air Corps not to request any additional four-engine bombers in its 1939 budget.⁴³⁵

Just a month later, political events intervened to bring new clarity to the struggle to expand the heavy bomber forces. On 11 July 1938, Hugh Wilson, the U. S. ambassador to Germany, cabled Roosevelt concerning the threat of Nazi Germany. While viewing the Nazis as a threat was nothing new, Wilson's assessment of Germany's strength proved a turning point for American air power. Wilson advised Roosevelt that Germany's air force was more than just a tool of war; the Luftwaffe was also a means of political blackmail.⁴³⁶ Just the threat of German air attack helped determine European nations' political reactions to Hitler's strategic moves. Wilson warned that only a credible American air threat could provide a deterrence that Hitler would listen to.

⁴³⁵ Directive for Chief of the Air Corps from Adjutant General for the Secretary of War, 19 October 1937 AAG451a, box#2583, RG#407, National Archives.

⁴³⁶ Futrell, *Ideas, Concepts, and Doctrines*, 95.

The Munich crisis only cemented this vision of German air power. Historian Barry Posen argues the crisis caused a growing number of political leaders to see British acquiescence to German demands as largely submitting to Hitler's air power threat.⁴³⁷ While it maybe a stretch to view only German air power as the reason for the concessions at Munich, future events indicated the importance of this shared vision to American air power.

On 14 November 1938, Roosevelt met with his national security team to delineate a new defense policy in the wake of Munich. The president now saw an immediate need for military assets both to defend the Western Hemisphere and to deter Hitler from future aggression. Unfortunately, America's military forces had atrophied during the preceding two decades. The question now became what military strength could the United States develop quickly that would cause Hitler to take notice.

In Roosevelt's mind the answer appeared straightforward. He informed the group that he wanted a force of 20,000 airplanes for hemispheric defense, but feared that a still leery Congress would approve only 10,000.⁴³⁸ After a long discussion about the composition of such an air force, the advisers decided the proper course was to conduct a staff study before returning with recommendations.

Arnold stood ready to take advantage of the new situation, volunteering to drive Craig back to his office after the meeting. Arnold used the car ride and the follow-up meeting as a chance to educate Craig on heavy bomber capabilities and how they could

⁴³⁷ Barry R. Posen, *The Source of Military Doctrine: France, Britain, and Germany between the World Wars* (Ithaca, NY: Cornell University Press, 1984), 136-37.

⁴³⁸ Mark S. Watson, *Prewar Plans and Preparations, U.S. Army in World War II* (Washington, DC: Office of the Chief of Military History, Department of the Army, 1950), 136-39.

meet the president's guidance.⁴³⁹ The result was that Craig asked Arnold to prepare a study on Air Corps requirements needed for hemispheric defense. With this guidance, Arnold's staff worked with ACTS to develop the first draft of "A Study of Air Defense in the Western Hemisphere." The plan called for a bomber-heavy force consisting of 5,500 aircraft at a total cost of \$550 million.⁴⁴⁰

The General Staff's opposition to a bomber-centric air force did not completely die out just because the president changed his strategic focus. The staff mounted an effective campaign to convince Craig that any growth should be balanced across all elements of the Army. Therefore, Craig returned to Roosevelt with a plan that balanced the growth of the Air Corps with an expansion of the traditional combat arms and even growth in Army infrastructure.

Roosevelt responded to the plan with what has become almost legendary in the annals of air power history: "America could not influence Hitler with barracks, runways, and schools."⁴⁴¹ What it needed and wanted was aircraft. The drubbing of the General Staff's plan set the tone for the next round of military appropriations. On 12 January 1939, Roosevelt asked Congress for a \$300 million Air Corps expansion to 5,500 aircraft involving the purchase of 3,251 new airplanes, including many heavy bombers.⁴⁴² Congress started the next phase in the strategic bombing saga when it approved the request three months later.

Three other important events in 1939 also directed the future of strategic bombing. The first occurred in the realm of technology where Air Corps expansion

⁴³⁹ Arnold, *Global Mission*, 177-80.

⁴⁴⁰ Futrell, *Ideas, Concepts, and Doctrine*, 87.

⁴⁴¹ Robert Dallek, *Franklin D. Roosevelt and American Foreign Policy, 1932-1945* (Oxford: Oxford University Press, 1981), 173.

⁴⁴² Futrell, *Ideas, Concepts, and Doctrine*, 88.

caused the Material Division to magnify research and development efforts. The most important portion for strategic bombing was a report titled “Future Aeronautical Research and Development Problems.” Completed in August 1939, the report warned that American military aviation technology had fallen behind other advanced nations, calling the inferiority “a deplorable situation that could not be tolerated.”⁴⁴³ It castigated the Air Corps for having no defensive turrets on either the B-17 or B-24 bomber, while also questioning why neither aircraft had more than rudimentary navigation or communications capabilities.⁴⁴⁴ This timely study, along with information learned from the battles of France and Britain, spurred a new round of technology development that readied American heavy bombers for their combat debut.

The second event was the September 1939 appointment of Gen. George C. Marshall as the next Army Chief of Staff. Not only did Marshall prove open to air power, but he also worked to strengthen the Air Corps organizationally. He noted that the creation of the GHQ AF had solved some operational problems, but created confusion in the command structure. Therefore, Marshall established a new Deputy Chief of Staff for Air in November 1939, appointing Arnold to the position.⁴⁴⁵ This new staff organization oversaw both the Chief of the Air Corps and the GHQ AF Commander, effectively creating a staff directorate to command both support and combat elements. In doing so, Marshall alleviated much of the personnel and budgetary conflicts between the two elements while also setting the stage for the creation of the Army Air Forces on 20 June 1941. This new Army element combined the GHQ AF and Air Corps into one

⁴⁴³ “ESMR No. 50-41-351: Future Aeronautical Research and Development Problems,” 18 August 1939, Call#204-2 V.1 PT.1, IRIS#00142378, AFHRA, Maxwell, AFB, AL, 3.

⁴⁴⁴ Ibid., 34-36.

⁴⁴⁵ Watson, *Prewar Plans and Preparations*, 280-81.

functional organization, while also adding a formal air staff to coordinate air power issues in Washington.⁴⁴⁶ The timely creation of Army Air Forces ensured strategic bombing had the proper command, planning, and logistics support in place as the nation entered World War II.

The final event of 1939 affecting the future of strategic bombing was the start of World War II, where the German invasion of Poland created a sounding board for the bomber advocates to measure their theories against. From the start, German airplanes appeared to rule the skies, bringing destruction and terror to European industries and cities. Lt. Col. Donald Wilson, now the director of the Department of Air Tactics at ACTS, even wrote, “He (Hitler) is our greatest booster, without even so much as a request from us he has voluntarily undertaken the job of demonstrating our theories.”⁴⁴⁷ This initial view of the war seemed to reinforce the American vision of using strategic bombers to disrupt an enemy’s infrastructure unopposed by aerial defenses.

Perhaps more telling were the American lessons from the Battle of Britain. Carl Spaatz, who served as an observer in Britain from May to September 1940, explained the Air Corps expectations at the start of the battle were for a close fight but eventual German victory. Yet, the Germans failed to knock out the British. Spaatz believed the American lessons from this battle were both colored by preconceived notions and shaped by an already accepted American aviation doctrine.⁴⁴⁸ Therefore, two general explanations for the German defeat appeared in most of the Air Corps assessments of the Battle of Britain. The first reflected the opinion that the Luftwaffe failed because it was

⁴⁴⁶ Haywood S. Hanswell, *The Air Plan that Defeated Hitler* (New York: Arno Press, 1980), 155-57.

⁴⁴⁷ Wilson to Lt. Col. L. F. Stone (instructor at the Army Command and General Staff College), 23 September 1939, in USAFHD 4633-37, as quoted in Greer, *Development of Air Doctrine*, 131.

⁴⁴⁸ Gen. Carl Spaatz, “Strategic Air Power,” *Foreign Affairs*, Vol. 24 (April, 1941): 386-88.

too wedded to ground support and lacked heavy bombers. The second was an even more dangerous assessment that the Germans lost because they had a poor understanding of strategic airpower and that the defeat was not due to British defenses. Maj. Gen. James E. Cheney summed up this line of thinking in a 5 September 1941 letter that ascribed the Luftwaffe's failure to German errors and not because of inherent problems with strategic bombing theory.⁴⁴⁹

In this way, the American airmen were able to pick and choose the situation that best suited their own needs without challenging their base assumptions. This helped in the near term to build a stronger air force and an initial strategic plan. Yet, in the long run the approach led to the failure to identify important flaws in their own theory. For instance, correctly understanding the role of the British integrated air defense in stopping the Luftwaffe might have shed light on American problems such as the lack of a long-range escort fighter to aid the bombers in penetrating a similar German air defense structure.

While these major events in 1939 and early 1940 created the organizational structure, technological basis, and political support to bring strategic bombing to fruition, one factor still remained. The Air Corps needed a working plan for how to implement its theory. For too long it had approached strategic bombing through only a theoretical lens. Now with war looming on the horizon, there was a desperate need to turn the theoretical into the practical.

The catalyst for developing a formal aerial doctrine occurred on 9 July 1941 when Roosevelt requested a production plan for the military assets needed for a possible war with Germany. The first step in determining how many aircraft American industry

⁴⁴⁹ Greer, *Development of Air Doctrine*, 117.

needed to produce was finally to agree on a formal aerial strategy and plan for the defeat of Germany. Once this was accomplished, the Army could then establish what types of aircraft and how many of each it needed. Because the Army's operational planners were busy developing overarching war plans, this task fell to the Air War Plans Division of the Air Corps staff.

The Air War Plans Division was uniquely suited for such an endeavor. While it had only four officers assigned to it at the start of the planning process, they were key figures in the development of strategic bombing theory. The division chief, Lt. Col. Harold L. George, had served as both a student and instructor at ACTS from 1931 to 1935, including two years as the chief of the Department of Air Strategy and Tactics. His staff of Lt. Col. Orvil Anderson, Lt. Col. Kenneth Walker, and Maj. Haywood S. Hansell had also all been associated with ACTS, even becoming identified with the group of instructors known as the "Bomber Mafia" for their vocal support of strategic bombing. To this team, George added Lt. Cols. Max F. Schneider and Arthur W. Vanaman, and Majors Hoyt S. Vandenberg, Laurence S. Kuter, and Samuel E. Anderson. All but Anderson had passed through ACTS during the ascension of strategic bombing theory.⁴⁵⁰

This combined background allowed the officers to complete the plan, AWPDP-1, in just nine days ending on 12 August. Comprised of three equal parts, AWPDP-1 went far beyond a production numbers drill to become a comprehensive plan for the defeat of Germany. First, the plan included a strategic air campaign to destroy German war-making industry. Next, AWPDP-1 contained an air superiority component to restrain German air operations. Finally, the scheme included a ground support element to ensure

⁴⁵⁰ Donald L. Miller, *Masters of the Air: America's Bomber Boys Who Fought the Air War Against Nazi Germany* (New York: Simon & Schuster, 2006), 48-52.

success during the final invasion of Germany.⁴⁵¹ In this way, the authors alleviated political pressure by including the strategic campaign as only one of three elements in the overall aerial plan.

Not surprisingly, the strategic air campaign portion of the plan closely followed the tenets so familiar to its authors from their time at ACTS. It implemented Wilson's Industrial Web Theory, even identifying 154 individual targets in the electrical, transportation, oil, and aircraft production industries that it concluded would "virtually destroy the source of military strength of the German state."⁴⁵² The plan ended by estimating the force needed to meet all three military objectives. As might be expected, AWPD-1 called for a bomber force comprised of ten groups of medium bombers, twenty groups of heavy bombers, and twenty-four groups of super-heavy bombers.

Thus, the creation of AWPD-1 can be seen as the coming full circle of air power thought and strategy from World War I. America entered the Great War with a poorly prepared air force. The questions of what types of aircraft the air service needed, how many of each, and how best to use them largely evolved from French and British suggestions or trial and error during combat. These lessons sank deep into the American aviators' psyche, prodding them to use the succeeding two decades to explore military aviation organization, technology, and doctrine. In AWPD-1 they finally had a plan that started with a strategy and then figured out organizational and technological questions based on implementing the plan. With AWPD-1 completed, American strategic bombing was now ready for its moment in the sun.

⁴⁵¹ AWPD-1, Munitions Requirements of the Army Air Forces to Defeat our Potential Enemies, 12 August 1941, Chapter 2, Sec 1, Part 3, Call#145.82.1, IRIS#00118160, AFHRA, Maxwell AFB, AL.

⁴⁵² Ibid., tab 1, 1-2.

Conclusion

The era from 1934 to 1941 represents a nice bookend for the birth and early development of American strategic bombing theory. If viewed as a human lifespan, strategic bombing went through its adolescence during those critical years. It was no longer a new idea, nor was it in the early development stages. By the second half of the 1930s, strategic bombing theory was starting to take its adult form with the attachment of high-altitude day light bombing, precision, and industrial web theory to heavy bombers in the writings of ACTS students and instructors. Still, much like a human faces tremendous challenges during his or her transition from adolescence to adulthood, so too did strategic bombing. The forces of rivalry, jealousy, and budgetary woes all threatened to end the concept before it could ever prove itself during war.

Facing external and internal opposition, the founding fathers of strategic bombing established strong theoretical, organizational, and technological foundations that helped the concept weather the storms of the pre-World War II environment. While strategic bombing started this era as largely a theoretical exercise, it rapidly transitioned first to a doctrine and then to a war plan as the changing world situation started America thinking about how best to defend itself against the growing threat of Nazi Germany and militaristic Japan.

This was not a simple linear transition, as there were many obstacles that might have relegated strategic bombing to nothing more than an experimental theory. The General Staff's challenge could have removed the key technology required to carry out the concept. General Craig's new vision for the Army threatened to water down bombardment aviation to just another part of a rebuilt Army focused on ground

offensives. Even the Navy challenged the justification for heavy bombers by trying to take away the Air Corps' mission for coast defense.

In the end, though, World War II and President Roosevelt's support for aviation set the stage for strategic bombing to transition from the theoretical to the operational. With this political support, the bomber advocates were ready to accept the challenge. As luck would have it, these men were transitioning from ACTS into critical Air Corps staff positions. Therefore, when the order came to develop a war plan, men with years of experience developing strategic bombing theory were now in the right spot at the right time to implement their ideas.

Chapter 10

Conclusion

Strategic bombing theory continued to develop in the wake of AWPD-1, going through several modifications during the early American and British World War II bombing campaigns. Eventually, it codified into a stable doctrine that saw the advent of tremendous bomber fleets, akin to the early visions of H. G. Wells. Strategic bombing's evolution did not end with its rise to prominence in World War II. The dawn of the atomic age required modifications to bring the theory in line with new domestic and international political realities, but the four major factors influencing strategic bombing's evolution remained integral to the military doctrine and planning processes. Individual efforts, technological developments, organizational factors, and political and economic context still contour America's military and aviation policies. As such, understanding how these forces shaped and modified American air power history gives us keen insight into forces still at work in our present military systems.

It is clear that none of these factors alone can explain the rise of strategic bombing. Each factor has problems that limit its ability to claim primary causation. The idea that great men posited strategic bombing and then ushered it to prominence is perhaps the easiest explanation to thwart. While famous-and not so famous-aerial leaders draw the attention of historians and the public, they simply proved incapable of single-handedly creating strategic bombing. This is not to say that individuals are not critical.

A quick review of the three most important American strategic bombing theorists shows their importance, but also their limitations as causal factors.

Edgar Gorrell may have the best claim to fatherhood based on his November 1917 plan and his efforts to embed bombing theory into the official history of the war. His bombing plan modified a British theory into something acceptable to the often-conservative American Army. If the strategic bombing campaign planned for 1919 would have been executed, Gorrell may have achieved military stardom, but the war's conclusion in November 1918 forever condemned him to the back pages of military aviation history. He may have only been a minor footnote except for his work compiling the official history of the AEF Air Service in World War I that contained two sections codifying the core elements of strategic bombing theory. Gorrell even returned to the story in the 1930s through his correspondence with Air Corps officers and his participation in aviation boards. Thus, while Gorrell cannot claim to have created the concept of strategic bombing, without him it could not have developed as it did.

Despite Gorrell's efforts, Billy Mitchell is the American most associated with creating the independent air force and strategic bombing doctrine. Unfortunately, this association proves false under scrutiny. While Mitchell's early writings from the summer of 1917 seem to support the British concept of strategic bombing, his later aerial campaigns at St. Mihiel and the Meuse-Argonne are more in line with an operational ground-support role. Mitchell's plans required bombers, but they were for interdicting rail stations, lines of communications, and supply depots. After the war, Mitchell supported a bomber-centric Air Service, but his vision did not include using them to attack the industrial heart of an enemy nation. Bending to political and organizational

realities, Mitchell instead opted for long-range bombers in a coast defense role. In his mind, this offered the best combination of military necessity and an argument for air power independence. Hence, Mitchell cannot claim to be the father of strategic bombing, as his vision of air power evolved to match the political and military needs of the moment.

Still, Mitchell's role in molding strategic bombing theory is too important to ignore. He became an early acolyte for British bombing theories, which remained part of his strategic thinking throughout his professional life. His insistence on using semi-autonomous bomber units in his World War I aerial offensives helped instill the concept of an independent strategical air campaign into the Army lexicon. Mitchell played a perhaps even more important role after the war. When dwindling budgets seemed to spell doom for long-range bombers, he almost single-handedly created a new mission for them: coast defense. In doing so, Mitchell helped create a requirement for long-range bombers that eventually led to the B-17, B-24, and B-29 aircraft.

Finally, the group of officers known as the Bomber Mafia is often credited with the success of strategic bombing. There is plenty to support this conclusion. As instructors and staff at ACTS these men fleshed out the concept before turning their theoretical work into an operational plan in 1941. Yet, for much of the 1930s, the Bomber Mafia was virtually separated from the larger budgetary, strategy, and organizational debates within the national defense structure. Their isolation in Montgomery, Alabama, allowed them to work on air power theories without interference, but it also meant they had little ability to shape the larger thinking of the Air Corps, the

Army, and especially politicians. Other factors had to occur to allow the Bomber Mafia's rise to dominance and their ability to shape military doctrine.

Explanations of technology as the primary causal factor face parallel difficulties. It is true that aviation technology from the Wright brothers to the start of World War II shaped military aviation, but this did not predetermine the success of strategic bombing. For instance, the B-17 represents a historical anomaly. When it first flew in July 1935, the bomber seemed to herald the ascendancy of strategic bombing, as the Air Corps finally had the range and payload capacity to meet its doctrinal vision. Yet, the opposite occurred. In the late 1930s, the combination of organizational rivalries and a lack of political support almost doomed the heavy bomber to the budgetary scrap heap. Still, without the technology encompassed in the B-17 there could never have been a strategic bombing campaign. Its combination of range, accuracy, payload, and defensive firepower provided the necessities to carry out the strategy. In this way, the technology was neither deterministic nor irrelevant. Instead, it was another important aspect in shaping strategic bombing theory.

Organizational dynamics also needs careful and critical examination. Both internal dynamics and interservice rivalries shaped aviation budgets, technology, and strategy, but this influence cannot solely explain strategic bombing's evolution. Two examples highlight the problems with organizational culture as the principal causal factor. First, despite the public attention to Mitchell's fight with the Navy, interservice rivalries remained tense but largely irrelevant for most of the interwar years. At no point did the competition dramatically affect Air Corps budgets or its ability to acquire new aircraft. National economic pressures were much more important to military aviation

budgets than were interservice conflicts. Additionally, even the much discussed fight between the Army and its Air Service for autonomy proves opaque on closer scrutiny. At times senior army leaders supported bombers (MacArthur) and at times they opposed them (Craig). Sometimes an individual leader appeared to bend both ways, as with Pershing's early acceptance of Gorrell's strategic bombing plan, but his later refusal to send American squadrons to fight alongside the British Independence Force. While these forces definitely shaped the evolution of air power, they in no way can claim primary causality.

Finally, the issue of political pressure is once again a mixed bag. Whereas Roosevelt's policies from 1939 to the start of World War II demonstrated his critical role in bringing strategic bombing to the forefront of national strategy, his earlier political decisions often limited the development of long-range bombers and strategic bombing theory. Along similar lines, attention to isolationism and progressivism's focus on technology, efficiency, and reform appears overstated. Yes, both forces influenced political decisions, but they can only explain so much. Despite the national pressure for isolationism in the early 1920s, Air Service budgets never saw the drastic cuts that other military branches felt. Similarly, it is hard to prove progressivism had anything but a minor effect on the mindsets of military planners in ways that may or may not have affected their theories. Hence, as with the other factors, there is a mixture of correlation and disconnection between these forces and the destiny of strategic bombing.

So, what does explain the success of strategic bombing theory? The simple answer is that there is no simple answer. Instead, the complex interaction among these disparate forces that pushed and pulled American air power towards long-range strategic

bombing. This process evolved in several steps starting with the invention of the airplane and ending with the approval of AWPD-1.

In some ways, the origins of strategic bombing started with the Wright brothers' first flight in 1903. This technological leap not only made modern military aviation possible, but it also stimulated thinking about how to use the aerial domain in warfare. Still, it was the use of the fledgling technology in combat, first in Mexico and then in France, that truly turned the United States Army towards new ideas about air power. Raynal Bolling, Edgar Gorrell, and Billy Mitchell all played roles in shaping the early debate concerning the use of air power. These men were not alone, though; they learned from and incorporated the earlier work of Allied airmen like Caproni, Tiverton, Grey, and Trenchard. In this way, key individuals transformed the early technology into a potentially devastating, but not decisive, new type of warfare.

Air power's path to supremacy was not that simple. The new idea faced organizational, political, and technological complications that prevented its full adoption by the eve of World War II. First, an Army resistant to change limited independent long-range bombing operations. Next, political exigencies hampered the use of aviation in a strategic context. This pressure came from all directions with the French professing caution in the face of German retaliation, the British clamoring for revenge for German bombing, and American politicians expressing distaste for bombing civilian population centers. Finally, the technology itself proved a deterrent. There was simply not enough industrial or engineering capability to produce the required bombers before 1919. Even when aircraft production began to improve, the early bomber's range, payload, and accuracy shortcomings hindered any real chance of success.

In the end, the Armistice may have saved strategic bombing. Without an actual campaign to measure the theory's success, the idea lived on to fight another day. At this point in the story, Edgar Gorrell was a central figure who ensured the theory survived. The inclusion of his bombing plan in the official Air Service history formally embedded strategic bombing's core concepts in a relatively easy to reference document for future aviation theorists.

Gorrell's actions proved timely, as the changing political context of the 1920s saw strategic bombing almost completely disappear from the military vocabulary. With the war over and Germany defeated, there was no longer a peer competitor threatening America to justify the tremendous cost of large bomber fleets. When this international context combined with the return of traditional internally focused political priorities, it meant a rapid military drawdown and extremely tight Army budgets. In this environment, air power had to adapt to survive. One of the first casualties was strategic bombing. The Air Service quickly realized that public support and congressional funding required new missions to justify buying aircraft. Mitchell provided this justification when he used air power to challenge the Navy with his claim that airplanes could protect American coastlines more effectively than costly fleets. His brash tones and skill at catching the public's imagination worked on at least one level, as the Air Service grew in size during the 1920s.

This new coast defense mission provided the justification for continued military investment in long-range bombers. While budget realities kept investments small, it meant two important steps for strategic bombing. First, bomber technology continued to advance even if it did so in small steps. Next, bomber strategy also continued to evolve.

While the focus was no longer on strategic bombing, a dedicated strategy school like ACTS allowed theoretical development to continue, which proved critical in the next decade.

In the late-1920s the strategic bombing story took an interesting turn. The civilian aviation industry became a key shaping force with Charles Lindbergh's famous flight and America's fascination with the potential of civilian aviation creating a need for a safe and reliable long-range aircraft. This requirement spurred a series of technical and organizational advances that coincided with strategic bombing's requirement for a capable long-range bomber. At the same time, bombing theory reawakened at ACTS, where the strategy school's policy of open idea exchanges and critical debate led a small group of instructors and students to rediscover strategic bombing theory. Working without the theoretical limitations of budgets or political realities, these officers explored the potential uses of long-range bombers. In doing so, they updated Gorrell's ideas with the inclusion of Industrial Web Theory, centralized control, and high-altitude precision daylight bombing.

With the theoretical underpinnings ready, all that remained was for the political will and organizational support to shift to strategic bombing. The changing world situation of the mid-1930s played the largest role in removing both of these hurdles. European fascism and Japanese expansionist imperialism in Asia modified the baseline calculus of American national defense policy. Understanding that the United States needed a strong, but affordable counterweight to Axis aggression, President Roosevelt turned to air power. Organizational context was slower to adapt. The traditional fight between the Army General Staff and the Air Corps continued well into the 1930s. As

late as 1939, the General Staff appeared to have the upper hand, cancelling all heavy bomber procurement plans. Luckily for strategic bombing advocates, the dire threat of Nazi aggression and the political support of Roosevelt combined to overcome Army resistance. First subtly in verbal support and later in direct orders, the president ensured that America focused on building a large heavy bomber force to threaten Germany.

With the issue of American air power direction resolved, the final step was to turn theory into an actual war plan. Once again the role of the individual rose to prominence, as the members of the Bomber Mafia who had spent much of the last decade theorizing, debating, and working out the details of strategic bombing were now in the right place at the right moment. Having moved to planning assignments on the Air Corps staff, men such Harold George, Kenneth Walker, Haywood Hansell, Hoyt Vandenberg, and Laurence Kuter became the instruments of strategic bombing's final triumph when they turned a decade of theoretical work into the first American operational strategic bombing plan in August 1941.

In this way, the story of strategic bombing is not that of any one person or any one causal factor. Instead, it is a twisting tale of individual efforts, competing priorities, organizational infighting, budget limitations and most important technological integration. At no point in the story was strategic bombing preordained or destined to succeed. In every era, the theory had to survive critical challenges. Its eventual rise to dominance at the start of World War II perhaps best sums up the story of strategic bombing's evolution. Having survived a myriad of challenges, the combination of external threats and internal political support finally overcame organizational conservatism just as the technology matured to match the vision at the exact moment that

critical theorists were in the proper place to transform theory into reality. Now it was time to turn the nation's attention to the final test of this aviation doctrine in a planned and supported combat operation in the skies over Germany and Japan.

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