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BENEFICIAL BOMBING

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MARK CLODFELTER

BENEFICIAL BOMBING

The Progressive Foundations of American Air Power, 1917–1945



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My dad—Walter Allen Clodfelter Jr.—is a part of America’s greatest generation, and served in a control tower on Tinian during the early morning of 6 August 1945 when the *Enola Gay* took off on its fateful mission to Hiroshima. His stories of what it was like in the closing stages of the war—to include talking down a squadron of Mustangs through a solid overcast over

Tinian’s runway—planted the seed that got me interested in the Air Force and air power, and I’m sure were instrumental in my decision to attend the Air Force Academy. He also read an early draft of this work and, as the most meticulous proofreader I have ever seen, pointed out errors I would not otherwise have caught, as well as asked me “big picture” questions that I had not considered. He is a continual source of inspiration, and I dedicate this book in part to him.

Despite the considerable advice and assistance that I have received, the responsibility for all that is written is mine alone, and my work does not necessarily represent the views of the National War College or any government agency.

I have already mentioned the role that my father played in helping me craft this work, but I must also mention Mom as well, for together my parents provided an unceasing amount of guidance and support. I also cannot fail to mention Donna, for without her this project would never have happened. She never doubted my instincts, constantly encouraged me through difficult periods, plus gave me that greatest of all commodities—time—and she never laughed too much when I came bursting through the door after a run on the GW Parkway Trail and madly scrambled to find a pen and paper.

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M. C.
Mount Vernon, Virginia

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Introduction

In October 1910, former president Theodore Roosevelt was in St. Louis campaigning for the Republican governor of Missouri, Herbert Hadley. Upon learning of an “International Aeronautic Tournament” outside the city, the energetic and always inquisitive Roosevelt demanded to see it. “TR” and Hadley arrived at Kinloch Field on 10 October by an eighty-automobile motorcade—the largest such procession St. Louis had then seen—just as one of the Wright brothers’ six aircraft landed near the grandstand. The pilot of the fragile machine was Arch Hoxsey, a pince-nez-wearing aviator who earlier that year had made America’s first recorded night flight, and who had recently set an endurance record of 104 miles by flying non-stop to St. Louis from Springfield, Illinois. Hoxsey jumped out of the Model B biplane and walked to Roosevelt’s car through an array of Missouri National Guard troops surrounding the vehicle.

“I was hoping, Colonel, that I might have you for a passenger on one of my trips,” Hoxsey said to Roosevelt.¹

“By George, I believe I will,” Roosevelt replied. He accompanied Hoxsey to the Model B and, to the surprise of those who had arrived with him at the air show, sat down in the passenger seat and said, “Let her go!”

After a four-minute spectacle above Kinloch Field that included a series of climbs and dives—punctuated by “oohs” and “ahhs” from the crowd below—Roosevelt became the nation’s first president to fly in an airplane. During the flight he pointed to a Signal Corps building close by and had Hoxsey pretend to attack it. “War, army, aeroplane, bomb!” Roosevelt shouted as Hoxsey

flew back and forth above the installation. Onlookers mobbed TR once he landed, despite the best efforts of the Missouri guardsmen to keep them away. When the crowd finally parted enough to give him a chance to speak, he triumphantly exclaimed, “By George, it was fine!”²

Roosevelt’s flight befitted the sense of American adventurism that he embodied, and it also befitted his role as a leader of the progressive movement in the United States. Indeed, as a standard-bearer of the progressives, Roosevelt was on the lookout for ways to improve the daily lives of American citizens, and the airplane offered to do just that. The “flying machine” portended revolutions in transportation and communications; commerce and trade would benefit enormously from its continued development. Yet as Roosevelt’s comment to Hoxsey above Kinloch Field indicated, the airplane also offered tremendous potential as an instrument of war. A generation of American airmen would view the airplane’s military promise in progressive terms—as the key to winning conflicts quickly, cheaply, and efficiently.

For most Americans, though, progressivism had nothing to do with war. The movement, which spanned the nation during the late nineteenth and early twentieth centuries, affected many different groups and encompassed several disparate threads. All focused on progress and reform, and included efforts to reduce inefficiency and waste in manufacturing and business practices, eliminate corruption from government and business, increase the responsiveness of government institutions, promote fairness and equality for all social classes, improve working conditions and protect workers, and enhance the public’s general well-being. At its heart, progressivism promised change that was just, rational, positive, and efficient. Roosevelt emerged as a progressive leader of the Republican Party famous for his “trust busting” and would

later break away from the Republicans to form his own “Progressive Party” in 1912. Democrat Woodrow Wilson, the winner of the 1912 election, also considered himself a progressive, and worked hard to assure the success of the “individual entrepreneur” against the perceived evils of “big business.” The progressive movement’s span across political party lines demonstrated its wide national appeal.

The devastation and ugly realism of World War I ended the progressive era for most Americans; the repudiation of the Versailles Treaty and Wilson’s League of Nations exemplified the public’s postwar rejection of the movement’s ideals. Yet for Army Air Service officers like Edgar Gorrell and William “Billy” Mitchell, the carnage and waste that they witnessed on the Western Front sparked the beginning of a progressive effort that was unique—an attempt to reform *war* by relying on its own destructive technology as the instrument of change. They were convinced that the airplane—used as a bombing platform—offered the means to make wars much less lethal than conflicts waged by armies or navies.

The airmen contended that a clash of armies, with its subsequent slaughter, was unnecessary to fight and win future conflicts. Instead, the truly vital ingredients of modern war—the essential industries that produced weapons and fuel, key communications centers, and lines of transportation—were vulnerable to attack from the air. The loss of those installations would not only wreck a nation’s ability to fight, it would also sap the will of the populace, because the same facilities needed to wage modern war were also those necessary to sustain normal, day-to-day life. Aircraft would destroy the vital centers through *precision* bombing—sophisticated technology would guarantee that bombs hit only the intended targets, and few lives would be lost in the process. The finite destruction would end wars quickly, without crippling

manpower losses—maximum results with a minimum of death—and thus, bombing would actually serve as a beneficial instrument of war.

To assure the success of their ideas, the advocates of “progressive air power” also called for reforming America’s defense structure, with the establishment of a separate air force as a new armed service. They set out to convince the nation of that perceived need, and along the way recruited a core of like-minded officers who took their ideas and further refined them. The conviction that the “strategic bombing” of vital centers offered the solution to fighting and winning future wars efficiently blended with the belief that service autonomy was essential to assure the bomber’s proper wartime use against industrial targets—not against armies or navies. Ultimately, the two notions became inseparable—the ability of air forces to fight and win wars independently of armies and navies justified an autonomous air force—and an autonomous air force was necessary to assure that air power could efficiently achieve victory on its own.

By the eve of Pearl Harbor, Mitchell disciples like Henry H. “Hap” Arnold and Frank Andrews, and a legion of officers inculcated with Mitchell’s notions refined by the Air Corps Tactical School, combined to produce a substantial coterie of airmen who subscribed to a belief in “progressive air power.” Most would not have used such a term to describe their convictions; Mitchell himself used the term rarely. Yet they were just as committed to reforming war as the muckrakers had been to reforming industrial working conditions.

Collectively, the airmen subscribed to the following central tenet: air power was a more efficient military instrument than land or sea power because it offered a way to fight and win wars more quickly and less expensively (in terms of lives lost on *both* sides) than did armies or navies. The plan devised by former Tac-

tical School instructors in August 1941 for using American air power in the ongoing European war called for strategic bombing to wreck Germany's war-making ability to such a degree that an invasion of the continent might prove unnecessary. Arnold, by then Commanding General of the Army Air Forces, approved the plan, as did Army Chief of Staff George Marshall and Secretary of War Henry Stimson. The promise of progressive air power had broad appeal.

The reality of war—which revealed that American bombers and their crews were rarely capable of pinpoint destruction during combat conditions, and included an overarching political objective of “unconditional surrender” that allowed unlimited devastation—generated a momentum of its own that undermined several of the progressive notions that had guided American airmen before the conflict. By 1945, “progressive air power” meant quickly ending the war to reduce American casualties. Still, many air commanders continued to believe that the destruction of vital centers—despite the accompanying death and desolation—not only hastened the war's end, but also ultimately saved lives on both sides. As a result, the progressive mindset that guided airmen on the eve of war never really disappeared during its conduct.

The progressive notions of beneficial bombing—germinated in World War I and tested in World War II—became the basis of doctrine for an independent Air Force in the immediate postwar era, and continue to guide Air Force thought today.

1 • Genesis in the Great War

Accurate bombing on a large scale is a new science and requires the entire time and study of the man who is to shoulder the responsibility for success or failure during the coming year.

• LT. COL. EDGAR S. GORRELL, 2 JANUARY 1918

29 May 1910

On a warm Sunday morning, U.S. Military Academy cadets assembled at Trophy Point to witness a spectacular event. Aviation pioneer Glenn Curtiss had announced that he would pilot his thirty-foot-long biplane from Albany to New York and claim the *New York World's* prize of ten thousand dollars for making the first flight between the two cities. The initial leg of his journey had gone well: Curtiss had taken off shortly after 7:00 a.m., had stopped for fuel at Camelot, and had taken off again at 9:30. Yet as he approached Storm King Mountain a few minutes later at an altitude of one thousand feet, violent air currents above the Hudson River plummeted his frail craft to within fifty feet of the water. He struggled with the flight controls to prevent a further loss of altitude and, as he did so, flew past West Point. His dive hid the airplane from the cadets' view and caused them to run to Cullum Hall, perched high on a bluff overlooking the Hudson. From there they could clearly see the tiny craft, the first flying machine that most of them had ever witnessed. Oblivious to the pilot's difficulty, the cadets tossed their caps into the air and shouted their favorite football cheer, with a slight modification: "Rah, rah, ray! Rah, rah, ray! West Point, West Point, Armay! Curtiss! Curtiss! Curtiss!"¹

One of those chanting was Edgar Staley Gorrell, a diminutive nineteen-year-old “yearling” from Baltimore. Gorrell’s small stature and boyish features had earned him the nickname “Nap” from his classmates, and Nap was mightily impressed by the spectacle. From the day he viewed Curtiss’s flight—which arrived in New York City after two hours and forty-six minutes of air travel—Gorrell determined that he too would become an aviator. Assigned to the infantry after graduation, he transferred to the Signal Corps’ Aviation Section in 1914 and then completed flight training. Two years later, as one of eleven pilots in the First Aero Squadron, he helped track Pancho Villa’s band of outlaws across northern Mexico. He became the first American to fly an aircraft equipped to take automatic photographs, the first to fly an aircraft while conducting radio experiments, the first American Army officer to volunteer for a parachute jump, and one of the first officers to fly at night. He also developed the first plan for an American bomber offensive against an enemy nation.²

Early Notions of American Air Power

Gorrell’s scheme for attacking Wilhelmine Germany called into question the basic purpose of an air force: whether to support the Army directly through air operations tied to the Army’s immediate progress on the front lines or to conduct “independent” operations, such as “strategical” bombing, that would ultimately improve the Army’s situation at the front but that also offered the prospect of a rapid, cheap victory by destroying the enemy’s war-making capability and will to fight. *If* air power *could* achieve victory independently of ground forces, it implied that the Army’s “air” branch might deserve a measure of autonomy. Before World War I, however, such concerns were minimal, even among airmen. When Congressman James Hay proposed a bill in February 1913 to create an “Air Corps” equivalent in stature to the

infantry, cavalry, or artillery, aviators were almost unanimous in condemning the proposal. Lieutenants Benjamin D. Foulois and Henry H. “Hap” Arnold testified that the Signal Corps’ control of aviation was satisfactory.³ Captain William “Billy” Mitchell, at that time a non-flyer and the lone Signal Corps representative on the Army’s General Staff, argued that aviation was essential to Signal Corps reconnaissance and communication. “The offensive value of this thing has yet to be proved,” he stated.⁴

The outbreak of war in Europe heightened interest in the airplane’s military potential. That conflict, combined with a growing rift between Signal Corps aviators and their non-flying superiors, spurred Secretary of War Newton D. Baker to launch a General Staff investigation in April 1916 on the appropriateness of severing aviation from Signal Corps control. Many pilots bemoaned the “under 30, bachelor only” restrictions on flying, while many of their non-flying superiors regarded the young aviators as undisciplined. Baker decided that air autonomy was not the answer, but also admitted that combat in Europe had demonstrated that the air arm was more than just an auxiliary service.⁵ The next year, on the eve of America’s entry into the Great War, a joint Army-Navy panel recommended purchasing “a rigid airship of the zeppelin type” that could bomb an enemy’s homeland.⁶ Although the dominant focus of America’s air power vision remained on supporting the Army, that view did not exclude independent operations.

The failure of American civilian and military leaders to articulate a definitive concept of military aviation likely stemmed from the paucity of military aviation available. When Congress declared war against Germany on 6 April 1917, the Signal Corps’ Aviation Section numbered only 65 officers on active duty, of whom 26 were certified pilots, backed by 1,100 enlisted men and 200 civilian personnel. The Army’s sole example of applying air

power against an enemy was the use of eight Curtiss JN3 training aircraft in Brigadier General John J. Pershing's expedition to Mexico, and all had broken down. That fiasco caused Congress to lavish appropriations of almost thirteen million dollars on the Aviation Section, but by the end of 1916 the Army possessed only 149 aircraft—mostly trainers and virtually all obsolete—while another 302 were on order but undelivered. Only twelve companies were capable of building airplanes for the government, and they produced just 90 aircraft in 1916. In contrast, twenty-seven British firms built 5,716 airplanes that year. The chairman of the National Advisory Committee of Aeronautics, the civilian preparedness agency that initially coordinated Army wartime aviation policy with American industry, warned: "Though millions may be available for a specific purpose in time of great need, no amount of money will buy time."⁷

Yet time would not be forthcoming. On 23 May 1917, French Premier Alexandre Ribot, responding to pleas from his generals for American material as well as men, cabled his ambassador in Washington DC and requested 4,500 airplanes for the 1918 campaign, along with 2,000 replacements per month. Given the state of Army aviation, Ribot's request bordered on the fantastic—multiplied out for just the first half of the year, it totaled 16,500 aircraft! Moreover, the cable failed to mention what *types* of aircraft the United States should produce. With Foulois, now a major, serving as Signal Corps representative, the Joint Army-Navy Technical Board hurriedly sketched out a program for a 9,000-aircraft force with a reserve of 3,000 airplanes. Of those totals, the board slated 1,000 and 333 respectively as bombers; the remainder would be fighters and observation aircraft. The program's magnitude disheartened many members of the Army's General Staff, who believed that the emphasis on aviation might limit the nation's capability to manufacture other needs for the service.⁸ Their reser-

ventions led Brigadier General George O. Squier, the Army's chief signal officer, to present the board's proposal directly to Secretary of War Baker. Baker then took it to Congress, which appropriated a staggering \$640 million to fund the entire program. President Woodrow Wilson signed the measure into law on 24 July.

Even before Congress approved the plan, an American mission departed for Europe to obtain information on the best aircraft designs to produce in the United States. Arriving in Liverpool on the twenty-sixth, the mission spent the next five weeks interviewing air officers and industrialists in Britain, France, and Italy. Led by Major Raynal C. Bolling, a former U.S. Steel lawyer who had organized the National Guard's first aviation unit, the group consisted of 105 military and civilian aviation experts. One of them was Captain Nap Gorrell, fresh out of MIT and sporting a master of science degree in aeronautical engineering.

Despite the group's qualifications, Bolling faced a difficult task. Besides the time constraint demanding an immediate start to full-scale American production, the mission suffered from two key problems. First, it would not finish its work before the arrival of General John J. Pershing's American Expeditionary Force (AEF) staff, which would evaluate air requirements from the vantage point of the force that would do the fighting. Bolling's mission reported to General Squier in Washington DC, not Pershing, and the mission's conclusions would not match those of Pershing's officers. Second, the group's departure for Europe almost a month before Congress approved the air arm's structure compelled its members to devise a structure of their own, and doing so required making determinations about air strategy that would dictate aircraft roles and the types needed to fulfill them.⁹ Many of their decisions stemmed from the ideas of Allied airmen. For Nap Gorrell, the insights gained would endure, and would form the basis of his plan for a bomber offensive.

Bolling's group spent its first week in Britain meeting with British Director-General of Military Aeronautics and General Officer Commanding the Royal Flying Corps, Sir David Henderson. He suggested that the Americans concentrate exclusively on bomber production and not try to develop a balanced force of fighters, bombers, and observation aircraft.¹⁰ The first attack on London by German Gotha bombers a fortnight before the Bolling mission arrived may have triggered Henderson's recommendation. In two minutes, fourteen Gothas had dropped nearly two tons of bombs, killing 162 people and injuring 432.¹¹ The bombers attacked in daylight and with impunity; none fell to anti-aircraft fire or fighters. Many of London's East End workers, fearing the bombers' return, stayed away from their factories. Meanwhile, British Prime Minister David Lloyd George and his War Cabinet ordered two squadrons of fighters home from France. Britain's leaders also looked to pay the Germans back in kind. Before the Gotha assault, the British had shunned the development of an independent bombing force. In April 1917, their air strength in France consisted of twenty-seven fighter squadrons, twenty-one army support squadrons, and two bomber squadrons. After the Gotha raid, the British government's Air Board recommended developing forty squadrons of long-range bombers.¹²

In France and Italy, Bolling's group also discovered a strong preference for bomber development. The French could not produce enough aircraft to satisfy both the demand for additional air support at the front and the desire for bombers to attack Germany. They hoped that the 4,500 figure mentioned by Premier Ribot could form a strategic force—that intent had been mistakenly omitted from the cable—and they made certain that Bolling's mission understood their wishes.¹³ In Italy, the Americans found bombing operations that were more than mere speculation. The Italians had begun a long-range air campaign against targets in

Austria and were, at the time, the only Allied nation conducting “strategic” bombing. Their air offensive, sporting as many as 140 aircraft on a single raid, impressed Bolling’s group.¹⁴ The group was also impressed by the man who had molded the Italian bomber force, the designer and theorist Gianni Caproni. Gorrell in particular was inspired by Caproni’s vision of air power, which paralleled the thoughts of Giulio Douhet, Caproni’s close friend and confidant.¹⁵ Caproni maintained that for bombing to be effective it had to be “systematic, thorough, and consistent.”¹⁶ This assertion became a cornerstone of Gorrell’s plan.

Submitting his initial report to General Squier on 15 August 1917, Bolling called for the production of training aircraft, aircraft to support American troops in the field, and “aircraft in excess of the tactical requirements of the Army in France.”¹⁷ His group had selected four types of Allied aircraft for American production: the British Dehaviland DH-4 for day-bombing and observation; the British Bristol and French SPAD for air-to-air combat, and the Italian Caproni Tri-motor for long-range night bombing. He recommended that the United States build as many of all types as possible. Bolling contended that the number of airplanes needed to support the ground forces depended on the size of the Army and would vary in proportion to it. Combat aircraft in excess of those required for Army support could conduct “independent” air operations, such as night raids on Germany. He further suggested a precise apportionment of aircraft types for this independent force: 37.5 percent of its aircraft should be fighters capable of escorting bombers, 25 percent should be day bombers, and the remainder should be Caproni night bombers.¹⁸ He found the prospects of night bombing especially appealing, and noted that if it were conducted “on a sufficiently great scale and kept up continuously for a sufficient time, there seems good reason to believe that it might determine the whole outcome of military

operations.”¹⁹ Yet Bolling’s “third-place mention of the strategic force was apparently taken to mean that it was third in order of relative importance,”²⁰ and bombers did not appear in the initial American aircraft manufacturing program.

One individual had no intention of allowing the notion of an American air offensive to wither away—Billy Mitchell. Since opposing an autonomous air service four years earlier, Mitchell had come to believe that air power might hold the secret to winning wars. After finishing his General Staff assignment in June 1916, he became General Squier’s deputy in the Signal Corps’ Aviation Section and was promoted to major. He then took advantage of a provision in the 1916 National Defense Act lifting the ban on flight training for servicemen over thirty (Mitchell was thirty-six). From September 1916 to January 1917, he paid a dollar a minute for 1,470 minutes of off-duty flying instruction at the Curtiss Aviation School in Newport News, Virginia.²¹ His flying “experiment” likely caused the War Department to send him to Europe as an aeronautical observer, and he arrived in Paris four days after America’s declaration of war.²² Two weeks later he spent ten days at the front lines observing French General Robert Nivelle’s disastrous offensive and visiting French aviation units. He recalled his thoughts after first viewing trench warfare from the air:

A very significant thing to me was that we could cross the lines of these contending armies in a few minutes in our airplane, whereas the armies had been locked in the struggle, immovable, powerless to advance, for three years. To even stick one’s head over the top of a trench invited death. This whole area over which the Germans and French battled was not more than sixty miles across. It was as though they kept knocking their heads against a stone wall, until their brains were dashed out. They got nowhere, as far as ending the war was concerned.²³

In May, Mitchell visited the headquarters of Major General Hugh Trenchard, commander in the field of Britain's Royal Flying Corps (RFC). Mitchell arrived abruptly, wearing an extravagant uniform that he designed himself, but his unbridled exuberance persuaded the general who was "decided in manner and very direct in speech" to give him a three-day dose of RFC operations and Trenchard philosophy. Mitchell was particularly impressed by Trenchard's commitment to a single, unified air command that would allow him to "hurl a mass of aviation at any one locality needing attack." For the British air leader, a tightly controlled, continuous aerial offensive was the key to success, and assigning air units to individual ground commanders for defense was a mistake. Trenchard highlighted the RFC's General Headquarters Brigade, a force designed to destroy the German army's means of supply and reinforcement, but which possessed too few aircraft to do so in the spring of 1917. He argued that air power should attack as far as possible into the enemy's country, and noted that the development of new airplanes with greater ranges would make Berlin a viable target. He did not, however, contend during his first encounter with Mitchell that the quickest way to defeat the German army was through an air offensive aimed at the German nation. While others around Trenchard stressed a "radical air strategy" against the German homeland, he remained focused on using air power to defeat the German army on the Western Front. Nonetheless, Mitchell emerged from his initial contact with Trenchard profoundly affected by the general's ideas and convinced that an aerial offensive was a key to winning the war.²⁴

As a result of observing Allied operations, Mitchell proposed dividing the American air contingent into categories of "tactical" and "strategical" aviation. He made his proposal to Pershing's chief of staff, who arrived in France with the commanding general in mid-June. Tactical aviation would consist of squadrons

attached to divisions, corps, or armies and would operate as any other combat arm. In contrast, strategical aviation “would be bombardment and pursuit formations and would have an independent mission very much as independent cavalry used to have. . . . They would be used to carry the war well into the enemy’s country.”²⁵ This mission, he insisted, could have “a greater influence on the ultimate decision of the war than any other arm.”²⁶ Soon after receiving Mitchell’s plan, Pershing selected a board of officers to determine the proper composition for AEF aviation. Because Mitchell was the senior American aviator in Europe, the general made him chief of the newly created Air Service, which had replaced the Signal Corps as the Army’s air organization in the AEF.²⁷ Mitchell’s appointment did not, however, guarantee his proposal’s acceptance. On 11 July, Pershing outlined a comprehensive plan for AEF organization that authorized fifty-nine squadrons of tactical aircraft for service with the field armies. It made no mention of an independent force for “strategical” operations.

A Plan Evolves

Pershing’s failure to approve the proposal caused Mitchell to redouble his efforts. In August 1917 he asked the AEF Intelligence branch to provide information on strategic targets in Germany, and later received a list of industrial targets in the Ruhr from the French.²⁸ He also created a staff to explore the possibilities of bombing Germany in more detail. To direct the Air Service’s Technical Section, Mitchell picked the twenty-six-year-old Gorrell, who had just completed his work with the Bolling mission. Gorrell’s job for Mitchell would be similar to his former work for Bolling: to determine Air Service requirements, including the various types of aircraft needed. In trying to estimate the correct number of bombers, Gorrell considered the prospects of strategic bombing, and ultimately produced America’s first plan for a stra-

tegic air campaign. He developed this plan in relative splendor, for Mitchell chose the Chateau de Chamarandes, a magnificent hunting lodge built by Louis XV, as his headquarters. Located within a mile of Pershing's headquarters at Chaumont, the chateau provided both living quarters and office space. It continued to serve as Air Service headquarters after Mitchell left in October to become Air Service Commander in the Zone of the Advance.²⁹

Besides Mitchell, a variety of individuals helped Gorrell develop his plan. Gorrell stayed in contact with Bolling, who remarked in early September that the importance of "bombing operations with direct military ends in view" could not be overestimated.³⁰ In addition, veteran pilots Harold Fowler and Millard F. Harmon, both Air Service majors, assisted Gorrell.³¹ Fowler flew with the Royal Flying Corps before America's entry in the war, while Harmon was an Air Service pilot in the Philippines before the conflict. Gorrell also received a large measure of support from three individuals uniquely qualified to help develop an air campaign plan: Wing Commander Spencer Grey of the Royal Naval Air Service (RNAS), Gianni Caproni, and Major Hardinge Goulborn Tiverton, a British Lord and, like Grey, a pilot with the RNAS. Grey was a liaison officer attached to Air Service headquarters and had participated in raids against German inland targets from the RNAS base at Dunkirk, plus he had helped develop a 1,650-pound bomb. Gorrell considered him the "world's greatest authority on questions dealing with aerial bombardment" and relied heavily on his expertise.³²

Caproni, whose bomber was slated for American production, met frequently with Gorrell in the autumn of 1917. Besides providing Gorrell with a list of Germany's major industrial targets,³³ Caproni also sent him an English-text copy of a new book, *Let Us Kill The War; Let Us Aim at the Heart of the Enemy*, by the Italian journalist Nino Salveneschi. The book was a compilation

of Caproni's major thoughts on how air warfare could achieve an independent victory, and Gorrell embraced its message enthusiastically. "I have read with great interest your book entitled 'Let us Kill the War; Let us Aim at the Heart of the Enemy,' which you so kindly gave me," he wrote Caproni on 31 October. "May I ask you to let me have half a dozen copies of this book and I will guarantee to spread the gospel in all directions."³⁴

Salveneschi's book—an unabashed endorsement for Caproni's Tri-motor bomber—contained a number of perceptions that reappeared in Gorrell's plan. The Italian argued that victory in the current conflict meant destroying the enemy's army rather than occupying his country, and that the key to destroying his army was to take away its means to fight. The Allies could thus obtain victory in one of two ways: by exceeding the enemy's armament production, or by wrecking the factories that built the weapons.³⁵ Out-producing Germany's enormous industrial capacity would be difficult, Salveneschi asserted. Air power, however, offered the means to destroy the factories, which were the "heart" of the enemy war effort. Stabbing the heart would in turn kill the war.³⁶

Salveneschi warned that the Germans would build up their own bomber force for an offensive against Allied production centers unless the Allies first attacked German industry. He listed the major German factories as those in Essen, Munich, along the Rhine, and in Westphalia. Allied bombers did not have to destroy all of them, however, to achieve success—wrecking other factories closer to the front might produce greater results. "In this war there is, among the factories, as far as the front, a mechanism like a perfect watch-making workshop," Salveneschi wrote. "Enough to destroy a 'specialized' factory to obtain, in a short time, enforced inaction of the enemy."³⁷ Because the Central Powers were likely to defend their key factories with fighter aircraft, the attacking air fleet needed to be as large as possible and com-

posed of sturdy aircraft (like the Tri-motor) so at least part of the bombers could hit their target. The Italian acknowledged that some bombs would miss their aim points and kill civilians, but cautioned that “one must not permit sentimentality to interfere with the destruction of factories. . . . [T]he life of every German labourer at work for the war has less value than one of our boys who is fighting for his country.”³⁸ Yet Salveneschi did not advocate killing civilians to defeat the enemy. Rather, he moved past that question to assert, somewhat antiseptically, that Caproni’s dream of an aerial victory could “be converted into [the] reality of figures and *formulae*.”³⁹

Salveneschi’s writings meshed neatly with those of RNAS Major Lord Tiverton, whom Gorrell met in France during the autumn of 1917. While serving as technical liaison officer for the Royal Navy’s Air Department in Paris, Tiverton completed his own thorough study of long-range bombing in early September, and his analysis compared favorably to that provided by Salveneschi and Caproni.⁴⁰ Gorrell found Tiverton’s views particularly compelling—so much so that he used Tiverton’s paper, virtually verbatim, for the body of his own plan that he finished in late November.⁴¹ Although Gorrell’s plan took into account Grey’s expertise and Caproni’s images, as well as Mitchell’s ideas, gleaned largely from Trenchard, about air power’s ability to destroy the German army’s means to fight, Tiverton’s notions had a telling impact on Gorrell’s thoughts. Gorrell added an introduction and conclusion to address strictly American concerns, but most of the remaining words came from Tiverton.⁴²

Gorrell began by noting that three and a half years of conflict had produced a stalemate on the ground and at sea, and that only “a new policy of attacking the enemy” would affect the war’s conduct.⁴³ That new policy was “strategical bombing,” which he defined as air attacks on commercial centers and lines of commu-

nication to stop the flow of enemy supplies to the front. Much like Salveneschi, Gorrell asserted that “there are a few certain indispensable targets without which Germany cannot carry on the war.”⁴⁴ The German army could be likened to a drill, whose point could continue to bore only if the shank—the German national effort—remained durable. Four target groups were essential to keeping the shank strong: the industries surrounding Dusseldorf, Cologne, Mannheim, and the Saar. If those vital factories and their transportation links were destroyed, the drill would become impotent. “German shells are being fired at Allied troops and positions over a large area of the Front,” he observed, “but the manufacture of these shells and bombs is dependent upon the output of a few specific, well-known factories turning out the chemicals for them. . . . If the chemical factories can be blown up, the shell and bomb output will cease, to a greater or lesser degree, dependent upon the damage done these chemical plants.”⁴⁵ In addition, Germany’s main aircraft engine factory and magneto plant were both in Stuttgart, and their destruction would severely hamper Germany’s ability to sustain its air power on the Western Front.

The belief that the essence of an enemy nation’s war-making capability consisted of certain key components linking together its industrial complex was the crux of Gorrell’s proposal—and a conviction that ultimately became a central pillar of the American approach to strategic bombing.

Although destroying German war-making capability was the focus of Gorrell’s plan, his scheme presupposed that attacks on industrial targets would also break the morale of the German work force. His rationale stemmed partly from the effects of German air raids on the French factory at Pont-St. Vincent, where workers had been reluctant to return to their duties even though the bombs had missed the mark; he knew as well of the work stoppages resulting from the Gotha offensive against London.⁴⁶ Gor-

rell believed that a concentrated air attack against the four enemy target groups would persuade the German populace to demand an end to the conflict, and called for one hundred bomber squadrons to start the campaign by simultaneously attacking armament works in Mannheim and Ludwigshafen for five continuous hours. “If immediately afterwards, on the next possible day, Frankfurt were attacked in a similar way, judging from the press reports of what has already occurred in Germany,” he contended, “it is quite possible that Cologne would create such trouble that the German government might be forced to suggest terms if that town were so attacked.”⁴⁷

To Gorrell, a nation’s will to fight equated to the population’s willingness to endure the conflict. A mass revolution that threatened to dislodge the enemy government—and forced its government to make peace to stay in power—would certainly indicate that bombs had broken enemy morale. Yet a popular revolt was not necessary to break German will. For Gorrell, widespread absenteeism would suffice, and would have the same impact as factories destroyed by bombs. The ultimate goal was to prevent the German army from waging war.

The enemy’s capability and will to fight were complementary objectives, and Gorrell’s offensive aimed at both. “From both the morale point of view and also that of material damage, concentration of our aerial forces against single targets on the same day is of vital importance since it tends to hamper the defense and also to complete in a thorough manner the work which the bombardment is intended to perform,” he observed.⁴⁸

Gorrell estimated that between three thousand and six thousand American bombers were necessary to carry out his plan, provided that the force received adequate logistical support and aircrew training.⁴⁹ The armada would fly en masse, and concentrate on destroying a particular set of targets completely before assaulting a

different target group. Harkening to Trenchard, Gorrell stressed continuous, systematic bombing as the key to overwhelming German defenses while unnerving workers and preventing them from making repairs. Yet the Germans, Gorrell warned, also realized the potential of strategic bombing and aimed to launch a similar large-scale effort against the Allies during the next year. Thus, the sooner the American campaign began, the better. “This is not a phantom nor a dream,” he wrote to Bolling in October 1917, “but is a huge reality capable of being carried out with success if the United States 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 here in Europe.”⁵⁰

Gorrell submitted his plan on 28 November to Brigadier General Benjamin Foulois, who had become Chief of the AEF Air Service the previous day. The two had served together as pilots in the First Aero Squadron during the Mexican punitive expedition and knew each other well. Like Mitchell, Foulois had changed his attitude on the value of independent air operations since his 1913 testimony that Army aviation belonged under Signal Corps’ control. He approved Gorrell’s plan in December and sent it to General Pershing for his endorsement. Foulois also placed Gorrell—now a lieutenant colonel—in charge of Strategic Aviation in the Zone of the Advance. Persuaded that an independent bombing force would not deprive him of air support for American ground troops, Pershing approved the plan in early January. Gorrell then transferred to Pershing’s staff as the Air Service’s G-3 (War Plans and Operations) representative to oversee the plan’s implementation, but he remained attuned to Pershing’s concern that the Air Service might neglect American armies.

To assuage this fear, Gorrell produced a written analysis of his plan’s impact on Army aviation for Pershing’s staff. Entitled “The Future Role of American Bombardment Aviation,” the study bor-

rowed heavily from a report that Trenchard had presented to the British War Cabinet in December 1917, as well as from a recent French bombing plan that American staff officers had translated into English.⁵¹ Yet Gorrell made certain that his paper addressed the Army's anxiety over air support while emphasizing the great benefits of strategic bombing. He pointedly observed in the first paragraph: "The Air Service is an integral part of a homogeneous team, no portion of which, working by itself, can alone decisively defeat the enemy."⁵² Gorrell then noted that air power would continue to support ground combat operations by serving as a "long range gun" that could attack the enemy's rear echelons beyond the range of fixed artillery, as well as by attacking the enemy's front-line positions when necessary. Raids would also occur against important road and rail junctions near the front, which would prevent the flow of vital supplies and cause the enemy "grave results." Attacks against enemy industries would pay dividends at the front as well. "To successfully strike at such works, is to injure the source of the current which furnished the combative energy of the enemy," he maintained.⁵³

Besides devoting a large amount of attention to "tactical" air power, Gorrell provided ample insights on "strategical bombing," many of them courtesy of Hugh Trenchard. Gorrell stated that such bombing occurred mainly at long distances and was integral to the air offensive on the Western Front. It was not primarily a vehicle for retaliation. Instead, its basic purpose was "to weaken the power of the enemy both directly and indirectly; directly, by interrupting his production, transport, and organization through the infliction of damage on his industrial, railway, and military centers and by compelling him to draw back his [aerial] fighting machines to deal with the enemy's; indirectly, by producing discontent and alarm among the industrial population. In other words, it aims at achieving both a material and a moral effect."⁵⁴

Gorrell reiterated that German war production depended on a

few key links in its industrial complex and that destroying them would grind the German war effort to a halt. Pinpointing those links was the essence of successful bombing. Thus far, the lack of “proper scientific knowledge” and the failure to identify “the real object” of an air offensive had prevented bombing from achieving its potential.⁵⁵ Gorrell claimed that the necessary expertise now existed, and he was determined to use it. Aircraft would attack the industrial centers earmarked in his plan, and the bombs that missed would have “the desired moral effect” by depriving the enemy of “the enormous number of man-hours that a single aerial bombardment of necessity always causes.”⁵⁶ Attacks would occur throughout daylight and darkness, with day bombers flying at high altitude in tight formation to overcome enemy defenses, while night bombers flew with the impunity that he believed allowed them to conduct the most accurate bombing.

Implementation Problems

As Gorrell worked to sell his scheme at AEF headquarters, Lieutenant Colonel Ambrose Monell took over in late January as Chief of Strategical Aviation in the Zone of the Advance. An ex-president of the International Nickel Company, Monell was assisted in his new endeavor by Gorrell’s former compatriots Fowler and Grey. Meanwhile, Gorrell helped create an Office of Air Intelligence in the G-2 (Intelligence) Section of the AEF staff. This section contained a “bomb target unit,” described by historian Thomas Greer as the “prototype of the organizations which played such an important role in the strategic operations of World War II.”⁵⁷ The unit produced target maps, anti-aircraft defense maps, and maps of key German railroads and industries, all divided into “target folders” for specific installations.

While the Americans geared up to bomb Germany, the British had already launched the assault. In October 1917, in response to

the Gotha raids, Prime Minister David Lloyd George had promised London's citizens: "We will give it all back to them and we will give it to them soon. We shall bomb Germany with compound interest."⁵⁸ Limited attacks began before the end of the year, and many of them were indiscriminate. Trenchard announced at a meeting with Gorrell and French representatives on 22 December that he aimed to establish a special force for bombing German industry and asked whether the French and Americans would contribute to it. Gorrell stated that the Americans planned to begin a similar effort but that he could not pledge the Air Service to a joint endeavor without Pershing's approval.⁵⁹ In contrast to the eagerness for bombing Germany that they had displayed to the Bolling mission, the French were lukewarm now that the idea had become a reality. They stressed Germany's ease of retaliation against French cities, and indeed in January 1918 German bombers attacked Paris for the first time in two and a half years.⁶⁰ The British then confined their raids to factories and rail yards, but they did not curb their plans for a separate bombing unit. On 5 June 1918, Trenchard took command of the Independent Air Force (IAF) of the newly created Royal Air Force. The need to devote half his sorties against German airfields, and the small number of aircraft available (his force varied between five and ten squadrons), limited the amount of IAF bombs dropped on Germany to 550 tons, which were spread over fifty towns and cities.⁶¹ Nonetheless, Trenchard claimed that the "moral effect" of his bombing outweighed its material impact by twenty to one.⁶²

Because Trenchard took orders only from the British Air Ministry, the IAF effort endeared itself to neither the French nor the Americans. The French were particularly incensed, as their Marshal Ferdinand Foch was Supreme Allied Commander. Trenchard's restricted chain-of-command also led the AEF Chief of Staff, Major General James W. McAndrew, to prohibit American bombing

with the IAF once Air Service bombardment units reached sufficient strength to conduct separate operations. In January 1918 Pershing had agreed that British personnel could organize, train, and equip the thirty projected American night bombing squadrons, and British flying schools also taught some American day bombing aircrews. In all, thirty-six Americans attached to the IAF flew combat “training” missions over Germany, and half of them were killed, wounded, or captured.⁶³ Yet just as Pershing prohibited American ground combat units from amalgamating with Allied armies, he would not condone American bombers flying to achieve British objectives, especially when American ground forces needed air support. “In making arrangements with the British it must be thoroughly understood that when our [air] forces reach a certain importance the regions to be bombed will be designated by these headquarters and that the selection of targets will depend solely upon their importance with respect to the operations which we contemplate for our ground forces,” McAndrew told Major General Mason Patrick, who had replaced Foulois as AEF Air Service chief.⁶⁴ The issue of cooperative allied air operations was a sticky one, however, and Americans would revisit it with the British in the years to come.

In the end, America’s bombing contribution to the Great War consisted of day bombers raiding targets in France, and that contribution was meager. Eight antiquated Breguet-14 B-2 biplanes of the Ninety-sixth Aero Squadron flew in the first American bombing raid, a 12 June 1918 attack on the rail yard and warehouses in Dommary-Baroncourt. Two planes returned to base with engine problems, while three others ran out of gas after dropping their bombs. Because of the Breguets’ feeble engines, it took several minutes for the tiny formation to climb to its bombing altitude of four thousand feet. Still, some of the aircraft hit the target, and they survived attacks by three enemy fighters on the way

home. This first attack typified those occurring for the remainder of the war. In August the Ninety-sixth flew twenty missions and dropped forty-three thousand pounds of bombs against transportation and supply targets; in September and October it teamed with the Eleventh and Twentieth Aero Squadrons to support the American ground offensives at St. Mihiel and the Argonne.⁶⁵

Colonel Billy Mitchell, who directed almost 1,500 allied aircraft at St. Mihiel as Chief of Air Service, First Army, now stressed air power's auxiliary mission rather than its independent one. In February 1918, as Chief of Air Service, First Corps, he had argued that the first mission of offensive air power must be the destruction of the enemy's air force. Thereafter, bombing operations "should be essentially tactical in their nature and directed against active enemy units in the field which will have a direct bearing on operations during this Spring and Summer, rather than a piecemeal attack against large factory sites and things of that nature. The factories, if completely destroyed, would undoubtedly have a very far-reaching effect, but to completely demolish them is a tremendously difficult thing, and, furthermore, even if they were ruined, their effect would not be felt for a long period of time (possibly a year) upon the fighting of their army."⁶⁶

Although after the war Mitchell berated Pershing's staff for "trying to handle aviation as an auxiliary of some of the other branches, instead of an independent fighting arm,"⁶⁷ such criticisms during the conflict were infrequent. All his duties after leaving the Chateau de Chamarandes—Air Service Commander in the Zone of the Advance; Chief of Air Service, First Army; Chief of Air Service, First Corps; Chief of Air Service, First Brigade; once again Chief of Air Service, First Army; and finally, Chief of Air Service, Army Group—directly supported American troops at the front. As a result, his focus changed. "The Air Service of an army is one of its offensive arms," he stated after taking command in the Zone

of the Advance. “Alone it cannot bring about a decision. It therefore helps the other arms in their appointed missions.”⁶⁸

Late in the war, knowing that the Germans could not stop the continued American ground advance, Mitchell’s focus returned to the possibilities of strategic bombing. Yet as long as the Army’s progress remained uncertain, he devoted his full energies to providing it with immediate air support. Of course, Mitchell’s ego had much to do with his pragmatic approach to air power—he craved a combat command, and the only combat air commands available were those attached to Army headquarters. Still, by the summer of 1918, he realized that America’s major contribution to the Allied advance would be made by AEF *ground* echelons, and that air support would enhance their impact.

McAndrew and Pershing agreed with Mitchell’s emphasis on supporting the ground battle. Besides limiting air operations with the British, in mid-June Pershing’s chief of staff had admonished Patrick that his officers who stressed an “independent” air campaign must realize that their views were contrary to the needs of the service. “It is therefore directed that these officers be warned against any idea of independence and that they be taught from the beginning that their efforts must be closely coordinated with those of the remainder of the Air Service and those of the ground army,” McAndrew stated.⁶⁹ Recent savage fighting by the American Second and Third Divisions at Chateau-Thierry had helped stop the German drive on Paris, and further bloodshed was imminent as Pershing readied his troops to support Foch’s counteroffensive. When the assault began, the American commander wanted his soldiers to have maximum backing from their Air Service. The June name-change of the Strategical Aviation branch to the General Headquarters (GHQ) Air Service Reserve reflected this continuing concern.

By the summer of 1918 Gorrell’s scheme for a massive Amer-

ican air offensive had atrophied. Colonel Monell had, in Gorrell's words, worked on developing a strategic air force for only "a month or so,"⁷⁰ and Major Fowler left Air Service headquarters to command the American air units operating with the British. Discouraged by production deficiencies and convinced that an American strategic bombing campaign would never materialize, Wing Commander Grey returned to a British assignment. Monell succeeded during his tenure as Chief of the Strategic Section/GHQ Reserve only in selecting prospective airfields for his phantom force.⁷¹

After the war, Gorrell wrote that a major reason American strategic bombing never materialized was that his plans "were not synchronized properly, especially from a mental point of view" with the Army's General Headquarters.⁷² General Foulois concurred, declaring in October 1919: "The General Staff of the Army, either through lack of vision, lack of practical knowledge, or deliberate intention to subordinate the Air Service needs to the needs of other combat arms, has utterly failed to appreciate the full military value of this new military weapon, and, in my opinion, has failed to accord it its just place in our military family."⁷³ Even Mitchell, who had worked tirelessly to support the ground forces with air power, agreed that Army officers—with the sole exception of Major General Hunter Liggett, who had commanded the First Army—did not know what "air power" meant.⁷⁴ In July 1918, Mitchell had insisted that the Chief of the Air Service, rather than the Army's General Staff, should direct the Air Service's GHQ Reserve. He based his argument on the need for unity of command, which would allow the Air Service chief to concentrate all available air power in a critical area for maximum impact.⁷⁵ His plea went unheeded, even though the GHQ Reserve existed in name only—an American squadron of night bombers did not arrive at the front until 9 November 1918.

In his memoirs, Pershing articulated his views regarding the subordination of air power to ground combat. He remarked in his discussion of the Argonne offensive: “The tendency of our air force at first was to attach too much significance to flights beyond the enemy’s lines in an endeavor to interrupt his communications. However, this was of secondary importance during the battle, as aviators were then expected to protect and assist our ground troops.”⁷⁶ To him, the main functions of an air force were to drive off hostile aircraft and provide the infantry and artillery with information on enemy troop movements. Many Army officers agreed. One week before the Armistice, a General Staff analysis noted that the meager number of American bombers at the front (the Air Service had six squadrons of day bombers at the end of the war) and the small number of bombs they carried made their destructive potential “practically the same as long-range artillery.” Ignoring the issue of range, the study’s authors concluded that it took “two squadrons of bombing planes to equal the work of one 155mm. gun.”⁷⁷

In the final analysis, the key reason that the United States never mounted a bomber offensive was indeed the failure to build bombers for it. “Aircraft production [was] the greatest American air headache of World War I,” recalled Hap Arnold, who tracked the building of warplanes as a thirty-year-old colonel and assistant to the director of the Signal Corps’ Aeronautical Division.⁷⁸ Arnold bemoaned the inefficient organization that divided responsibility for developing aircraft between the civilian Bureau of Aircraft Production and the Signal Corps’ Production Division. The Bureau, led by the former chief of Hudson Automobiles, Howard Coffin, supervised engineering, supply, and testing, while the Production Division oversaw procurement. Neither organization had an aviator assigned to it on a full-time basis. Arnold remembered that after Coffin boasted forty thousand aircraft would be

built by June 1918, he asked the industrialist how many spare parts he had ordered. “What do you need spare parts for?” was Coffin’s reply.⁷⁹ Competing guidance from Americans in Europe matched the overlapping authority of production agencies in the United States. After the Bolling mission recommended building the Caproni bomber, General Pershing claimed final authority to determine aircraft types, and in November 1917 he recommended production of the British two-engine Handley-Page.⁸⁰ Incredibly, despite the difficulties that would stem from building two types of bombers, the Joint Army-Navy Technical Board suggested producing both—and the Secretary of War and the Secretary of the Navy approved the recommendation!⁸¹

European designs compounded American production problems. Most of the materials provided by the French, British, and Italian builders to serve as guidelines for Coffin’s manufacturers were incomplete or delayed. American production centered on the machine tools and detailed blueprints of the assembly line, whereas European production stressed skilled craftsmen and individual workmanship.⁸² Not until 16 January 1918—almost six months after the Bolling mission’s initial selection—did Caproni’s representatives arrive in the United States. British designers for the Handley-Page had arrived only two weeks earlier.⁸³ The combination of differing production philosophies, delayed arrivals, and overlapping authority produced construction programs with wildly fluctuating numbers of projected aircraft. The planned number of Caproni bombers went from 500 on 9 August 1917 to 9,000 a week later, to 2,000 on 24 August, to 50 on 19 February 1918, and to 250 on 3 May.⁸⁴ In actuality, the United States built only one Caproni before the Armistice. As for the Handley-Page, plans to assemble 300 bombers in Britain resulted in only the *shipment* of parts for 101 before the war’s end, and none were assembled in time to fight.⁸⁵ General Patrick’s July 1918 proposal of an Air

Service of 202 total squadrons, of which 41 would be bombers, compared to his proposal six weeks earlier for 261 squadrons, of which 101 would be bombers, reflected no loss of faith in the bomber's ability to change the war. Rather, it displayed a realistic appraisal of America's dismal production capability.⁸⁶

That the war ended before American bombers had the chance to bomb German soil proved significant. Production deficiencies had prevented Gorrell's dream of defeating Germany through strategic bombing from becoming a reality, yet the dream endured. Gorrell, Mitchell, and other Air Service officers could speculate about the probable effect that an American bomber offensive might have had on the outcome of the war, and blame the lack of aircraft as a reason why the offensive never materialized. Such difficulties could be overcome. Now air officers were aware of Gorrell's post-war admonition that "money and men could not make an air program over night,"⁸⁷ and they would make amends.

Had the war continued into 1919, Mitchell, certain that the German Army could not stop the American ground advance, planned an aerial assault against Germany's interior. "I was sure that if the war lasted, air power would decide it," he wrote after the Armistice.⁸⁸ According to his diary, he intended to combine incendiary attacks with poison gas to destroy crops, forests, and livestock. This air offensive, he mused, "would have caused untold sufferings and forced a German surrender."⁸⁹ Yet the likelihood of Mitchell's vision becoming reality was remote. President Wilson told Congress in his war message: "We shall, I feel confident, conduct our operations as belligerents without passion and ourselves observe with proud punctilio the principles of right and fair play we profess to be fighting for."⁹⁰ Secretary of War Baker reflected those sentiments, telling Army Chief of Staff General Peyton March to notify the Air Service that the United States would

not conduct any bombing that “has as its objective, promiscuous bombing upon industry, commerce, or population, in enemy countries disassociated from obvious military needs to be served by such action.”⁹¹ Moreover, in early January 1919, Mitchell revealed that his notion of strategic bombing had come to resemble Gorrell’s. In a treatise entitled “Tactical Application of Military Aeronautics,” he argued that the main value of bombardment would come from “hitting an enemy’s great nerve centers at the very beginning of the war so as to paralyze them to the greatest extent possible.”⁹²

Gorrell’s plan, which initially had won Pershing’s approval, borrowed heavily from Caproni and Tiverton in stressing attacks against key industrial centers rather than the German populace and its livelihood. By destroying those elements of Germany’s industrial complex that were essential components of the army’s means to fight, Gorrell aimed to render enemy forces impotent. For him, the key to applying air power successfully was identifying those industries that made the German army tick and then wrecking them through accurate bombing. Such bombing would also terrify the German work force and keep it away from the target factories. “Precision” bombing had proved far from precise, though.⁹³ Night raids were notoriously inaccurate, despite Gorrell’s belief that accuracy increased because of immunity from enemy defenses. American day raids, which relied on formation bombing aided by a primitive bombsight in the lead aircraft,⁹⁴ also offered less than pinpoint accuracy. Still, the problem of bombing precisely appeared to be a mechanical one that could be solved through improved equipment, much like production problems could be eliminated through efficient organization.

For both Mitchell and Gorrell, scientifically applied air power offered the prospect of ending a war without the horrendous slaugh-

ter of trench warfare. If bombing achieved that objective, the Army's air units might merit status as an independent service—and armies would perhaps become obsolete.

In the aftermath of the Great War, the clamor for air independence would become a roar, with Mitchell howling loudest of all. The Air Service had achieved an enduring measure of autonomy at the end of May 1918, when the Overman Act removed it from Signal Corps' control and created a "Director of Military Aeronautics" directly under the Army's Chief of Staff. Three months later Congress named Jack D. Ryan, who had succeeded Howard Coffin as chief of Aircraft Production, as Second Assistant Secretary of War and Director of Air Service. Yet for Mitchell these steps were not enough. As his cry became increasingly shrill, it welded the bond between air power's independent application and service autonomy until the link was impossible to break.

In October 1918, the twenty-seven-year-old Gorrell became the youngest American colonel since the Civil War. He served as Assistant Chief of the Air Service until the Armistice, and then began writing the Air Service's combat history. In March 1920 he left the military to try his hand as a corporate executive, ultimately becoming director and president of the Stutz Motor Car Company and president of the American Air Transport Association. In the meantime, his plan for bombing Germany, and his 1918 analysis of it, inspired lectures for a future generation of air strategists at Maxwell Field's Air Corps Tactical School. Three days after he died in March 1945, a single Army Air Forces airplane scattered Gorrell's ashes across the plain at West Point, where he had sprinted almost thirty-five years before to catch a glimpse of Glenn Curtiss's flying machine. The tribute befitted the man who laid the cornerstone for vast air campaigns then underway in Europe and the Pacific.