

CHAPTER 1

THE ORIGINS OF MAD: A SHORT HISTORY OF CITY-BUSTING

Richard R. Muller

INTRODUCTION

The 20th century was the age of total war, and nothing symbolized that dreadful era more than the bombardment of civilian populations from the air. From its halting beginnings in the First World War, in which 1,141 Britons lost their lives, strategic bombing evolved into the mass air raids of the Second World War, in which some 52,000 British, 330,000 Japanese, and anywhere from 300,000 to 1,000,000 German civilians perished. Nations poured scarce blood and treasure into the development and manning of vast bomber fleets capable of carrying the war directly to enemy economic and population centers in the hope that this investment would prove decisive in modern warfare.¹

The underlying rationale for strategic air warfare predates the reality of manned powered flight. Before the arrival of the machine age, wars were fought primarily between the armed forces of the belligerents. The 19th century Prussian military theorist Carl von Clausewitz noted that, while the “center of gravity . . . the hub of all power and movement” of an enemy state was normally its army, it could also be the capital, a key ally, or even public opinion.² National power, therefore, could not be measured solely in terms of traditional military capability. Political will, economic productivity, transportation, commerce, and communications became increasingly important factors in struggles between the great powers. The advent of the commercial, financial, and industrial revolutions brought with it the rise of the modern urban center, in which many of these elements were concentrated. The onset of total war, and improvements in the technical means of waging it, brought about a blurring of the distinction between combatants and noncombatants, and placed hitherto protected aspects of a nation’s

civil and economic life in the firing line. Steam-powered warships and submarines made a sustained blockade of an enemy nation practicable. Its victims would be the entire population, not just the enemy's military force. The development of the long-range bomber meant that the vitals of an enemy nation would come under direct attack in a manner even the most sanguine 19th century statesmen and soldiers could scarcely have imagined. In the process, war against civilians returned to a level not seen since the Thirty Years' War.

This chapter will examine the evolution of the concept of aerial attacks against cities—the intellectual underpinnings of Mutual Assured Destruction (MAD). It will trace in broad outline the evolution of the theory and practice of attacking cities from the air. While a complete history of the development of air power is outside the scope of this project, this historical survey will examine the major “milestones” on the road to MAD. Included will be an examination of technology, theory, and changing military and civilian beliefs in the efficacy of targeting economic and population centers.

“Strategic bombing” is a much-used term, but in its 20th century context it generally refers to air attacks on the vital centers of an enemy state—its industries, ports, transportation networks, and other key targets often far removed from the fighting fronts. The central idea—and much of the allure—stemmed from air power's putative ability to bypass the enemy's military forces and strike directly at the sources of national power. Obviously, this new method of waging war would have a profound effect upon the civilian population. In some cases, even heavy civilian casualties were the indirect and largely unintended result of attacks on installations—or collections of targets—located in metropolitan areas. Yet there also have been direct attacks on civilians to shatter their morale, to remove skilled labor from the work force, and to compel their leaders to capitulate. These have been carried out as part of a deliberate policy. In practice, motive and effect have been very difficult to disentangle.

THE FIRST WORLD WAR, 1914-18

Any examination of the development of aerial warfare against cities must begin with the First World War. That conflict set the

pattern for industrialized total war between the great powers. Universal conscription put millions of soldiers into mass armies. Civilian economies were mobilized for war production, and national propaganda campaigns stressed that the workers (both male and female) in the factories stood shoulder to shoulder with the combat troops. War extended to the high seas as the German navy launched a U-boat campaign against British supply lines, and the British enacted a “distant blockade” of the Central Powers that ultimately caused the deaths of over one million German civilians. The 1914-18 war also extended to the third dimension. By 1918, the primitive air fleets of the great powers had evolved into modern air organizations, capable of conducting a wide range of combat roles. Airpower’s unique contribution to the maturation of total war was the first strategic bombing campaigns against cities.

The first tiny step on the road to MAD occurred in August 1914, when a lone German plane (the “six o’clock *Taube* [dove]”) made a series of evening visits to Paris, dropping a handful of light bombs on the City of Light. This quixotic method of attack soon gave way to a more serious and sustained campaign of deliberate attacks on urban areas, designed to shatter enemy morale and disrupt the orderly functioning of modern states.

THE ZEPPELIN RAIDS

Even prior to the First World War, the German High Command recognized the potential striking power and the morale impact of the Zeppelin airship, a remarkable and uniquely German technological innovation. There is no doubt that at the beginning of the war, the Zeppelin was the super weapon of its day, and most prewar “death from the skies” scenarios centered around fleets of airships wreaking havoc on helpless populations, sowing panic, death, and destruction.³ These visions were not the sole property of novelists, journalists or politicians. Even expert military opinion believed that a force of as few as 20 Zeppelins could ignite thousands of fires in London. Both the Imperial Army and Navy embraced the airship, although it was to be the German Naval Airship Division that pioneered sustained strategic attack against population centers. In 1912, Grand Admiral Alfred von Tirpitz mused, “The indiscriminate

dropping of bombs is . . . repulsive when they hit and kill an old woman . . . but if one could set fire to London in thirty places, then the repulsiveness would be lost in the enormity of the effect."⁴

Tirpitz's prognostications aside, the initial use of the Zeppelin force over Britain was severely restricted on the order of the Kaiser, who had close ties with the British royal family and was sensitive to charges of unleashing "frightfulness." Under pressure from his military advisors, he gradually eased these restrictions, so that by spring 1915 the Zeppelins were free to attack targets in greater London, although the specific aiming points were to be military in nature. This was fine in theory. In practice, the Zeppelins were incapable of precision attack and carried out virtually indiscriminate raids on the British capital. This was especially the case when, in the hope of causing major fires, Zeppelin commanders augmented their high explosive bombloads with incendiaries. British reaction was predictable. There was dramatic and widely reported initial panic, followed by outrage. One British tabloid featured a lurid two-page graphic decrying the "Massacre of the Innocents by Herod, otherwise Wilhelm II, King of the Huns." British defenses soon improved, and losses among the vulnerable hydrogen-filled airships mounted. Ultimately, casualty rates in the Zeppelin division exceeded those of the U-boat arm; the Navy lost 53 of its 73 operational airships. Official German historians noted that the casualties were out of all proportion to any potential benefit, but also observed that the British were forced to retain first-line fighter squadrons, anti-aircraft artillery units, and personnel to combat the Zeppelin menace, resources that were sorely needed on the Western Front.

The Zeppelin campaign was by most measures a failure, yet it established some precedents that recurred throughout the "prehistory" of MAD. Through advanced (and highly costly) technical means, a nation sought to strike directly at an enemy's commercial and population centers. What began as an attempt to strike specific military and economic objectives slowly devolved into a campaign aimed directly at the morale of the civilian population. This change was the result of a combination of technical limitations and operational realities. Results fell far short of expectations, although some ancillary benefits did accrue. All of this took place in the context of a modern total war, in which sea blockades attempted

to do much the same thing through more indirect means, and in which the actual fighting fronts were stalemated, in some cases for years. During the year of the heaviest Zeppelin attacks, the British army sustained 60,000 casualties on the first day of the Battle of the Somme, July 1, 1916, and the German and French armies were bled white at Verdun. Attempts to break the stalemate through indirect or technological means would therefore continue.

THE *GOTHA* AND GIANT RAIDS, 1917-18

Except for a few diehards within the Naval Airship Service, most analysts, both British and German, recognized the limitations of the Zeppelin as a strategic bomber. However, when the Germans began attacking London—by day and by night—with large heavier than air bombers, the concept of attacking cities gained new life. During the first 2 years of the war, the rigid airship had considerable advantages over conventional aircraft in terms of range, payload, and endurance. Spurred by the pressures of war, tremendous advances in aircraft design changed this situation. By 1917, multi-engined, long-range aircraft began entering service, and the isolated nuisance raids gave way to sustained attacks on population centers by formations of heavy bombers.

In May 1917, a special heavy bomber unit, equipped with the latest *Gotha* bombers and directly subordinated to the High Command, began conducting brazen daylight attacks against British cities. On June 13, 1917, a formation of 20 *Gothas* soared over central London and prepared to attack the Liverpool Street station. Three bombs hit the target, and the remainder fell within a one-mile radius.⁵ One scored a direct hit on a school, killing or wounding 46 young children.⁶ During the opening raids of the campaign, the bomber crews were assigned targets such as individual railway stations and communication centers. But, as with the Zeppelin campaign, such a level of precision was a dream. As the raids progressed, German targeting instructions became less and less specific. Ultimately the crews “were told that they were making war on ‘the morale of the English people,’ sapping their will to fight by showering them with high explosives.”⁷ As British defenses grew in effectiveness, the Germans switched to night attacks, further degrading accuracy. The

Gothas were joined by four and six-engine “Giant” bombers, some of which carried over two tons of bombs.

Actual physical damage from the series of 27 major raids was slight. Historian Robin Higham famously noted that while the German air raids destroyed some £3,000,000 worth of property, gnawing rats during the same period were accounting for £70,000,000 per year in property damage.⁸ The raids did have a considerable effect on British national and political will. At the height of the raids, there were isolated instances of panic in the streets, and British authorities noted a general pattern of absenteeism and economic dislocation. A committee headed by General Jan Christian Smuts was charged with assessing the situation, and on August 17, 1917, issued the “Report on Air Organization.” The Smuts committee concluded, “The day may not be far off when aerial operations with their devastation of enemy lands and destruction of industrial and population centers on a vast scale may become the principal operations of war, to which the older forms of military operations may become subordinate.” The report contained a number of recommendations; chief among them was the amalgamation of the Royal Flying Corps and Royal Naval Air Service into a single Royal Air Force (RAF). This occurred on April 1, 1918. This combined force could deal with the German aerial threat in a concerted fashion, organizing an efficient home defense organization while conducting independent air operations against German targets.

THE INDEPENDENT FORCE, 1918

Even prior to the recommendations of the Smuts Committee, the Allies had conducted strategic bombardment operations against enemy targets. Efforts by the French to attack “sensitive points” such as blast furnaces in Germany began in 1916, and British naval aircraft successfully attacked Zeppelin sheds well behind the lines. Yet it was the creation of the “Independent Force” under General Hugh Trenchard in early 1918 that established the postwar model of a large, independent bombing force used to deter or attack an enemy. The Independent Force was created in part to fulfill Prime Minister David Lloyd George’s promise to “bomb Germany with compound interest.” Trenchard initially viewed the concept of “reprisal” raids

against German civilian targets to be counterproductive. In any case, forces for this purpose were not immediately available. Nevertheless, Trenchard bent to his task with a will, and soon became one of the pioneers of “morale bombing.”

By mid-June 1918, the Independent Force was ready for action. Although the force was mainly equipped with single engine light bombers that were unsuitable for a systematic strategic campaign, it was receiving increasing numbers of huge Handley-Page 0/400 heavy bombers. These were developed under a Navy contract to produce a “bloody paralysers of an aeroplane.” During the last 6 months of the war, the Force conducted scattered raids on cities in western Germany. Trenchard was fully aware that he lacked the forces to strike a truly concentrated blow, and therefore aimed for a morale effect. His civilian masters supported and encouraged this strategy. Sir William Weir, the Air Minister, told Trenchard, “I would like it very much if you were to start a really big fire in one of the German towns. The German is susceptible to bloodiness, and I would not mind a few casualties due to inaccuracy.”⁹ Yet the limited numbers of aircraft available, mechanical difficulty, combat attrition and bad weather all conspired to limit the effectiveness of Trenchard’s offensive.

The Independent Force’s actual accomplishments were meager enough, but several factors saved it from obscurity. For one thing, far more ambitious plans were in the works for 1919, including “devastating” attacks on Berlin. For another, the British Air Staff was willing to manipulate the data of the postwar bombing survey to tell a much more optimistic story of significant physical damage and even greater psychological impact. The newly formed RAF therefore could base its postwar organization on a promise of future greatness, buttressed by empirical evidence. In addition, contacts with Trenchard’s officers had greatly impressed members of the fledgling U.S. Army Air Service, including General William “Billy” Mitchell and Colonel Edgar S. Gorrell. The latter heavily borrowed from British concepts in formulating an early proposal entitled “Strategical Bombardment.” Gorrell argued that the armies of an enemy nation were similar to a tempered steel drill, and that air power could and should bypass the “point” and strike directly at the vulnerable “shank”—the key industries sustaining the combat

forces in the field.¹⁰ As were the ambitious plans of the Independent Force, the so-called “Gorrell Plan” was rendered unnecessary by the November 11, 1918, Armistice.

Strategic airpower and the bombing of cities had certainly not proved decisive in the First World War, but the conflict established the future importance of air arms. No army, no matter how conservative, contemplated future operations without air superiority, tactical aviation, and aerial observation. These capabilities would continue to evolve and played a much more vital role in World War II. Yet to many airmen, the potential for war-winning independent air operations suggested by the Zeppelin and *Gotha* raids and the mounting campaign of the Independent Force were the most significant lessons. Air power offered the promise of the creation and survival of an independent service and an alternative to the bloodletting in the trenches of Flanders. It was a compelling vision.

YEARS OF FERMENT: THE INTERWAR ERA, 1919-39

The interwar period was a golden age of airpower writing, thought, and debate. Airmen attempted to discern the lessons of the First World War, while at the same time maintaining the position and prestige of the nascent air arms in the face of massive demobilization. The civilian leadership sought to devise effective and affordable defense policies, while at the same time yearning to avoid a repetition of the 1914-18 debacle. Proposals to “ban the bomber,” or at least mitigate the effects of air warfare against civilian targets through international agreements such as the Hague Convention, briefly flourished. Alternatively, there were proposals (originating with the French, but also endorsed by Winston Churchill) to hand over all strategic bombers to the League of Nations or some other international body, which would then use them to punish transgressors.¹¹ These visions of international disarmament or regulation foundered over issues of nationalism, verification, and mistrust. At the same time, broad theoretical arguments concerning the likely employment of air power in some future war began to solidify.

It was Italian General Giulio Douhet who penned the most famous and most systematic vision of a future aerial war. Douhet was

an outspoken critic of the traditional military establishment, and his fertile and acerbic pen earned him house arrest for his intemperate criticisms.¹² Although not a pilot and ignorant of the intricacies of aviation technology, he believed that aircraft were the solution to the dilemma of positional warfare. He was profoundly affected by the futility of industrialized ground warfare and had studied, albeit selectively, the historical lessons of the Great War. The aspects he found particularly striking were the German and Italian air raids on London and Vienna, the collapse of the “home front” in both Tsarist Russia and Wilhemine Germany, and the ability of modern states to sustain “Total War” at the front lines for years. He observed:

The outcome of the last war was only apparently brought about by military operations. In actual fact, it was decided by the breakdown of morale among the defeated peoples—a moral collapse caused by the long attrition of the people involved in the struggle. The air arm makes it possible to reach the civilian population behind the line of battle, and thus to attack their moral resistance directly. And there is nothing to prevent our thinking that some day that direct action may be on a scale to break the moral resistance of the people even while leaving intact their respective armies and navies. Was not the German Army still able to go on fighting at the time when it laid down its arms? Was not the German fleet turned over intact to the enemy when the German people felt their power of resistance weakening?¹³

Douhet reasoned that advances in aviation technology made it possible to contemplate launching massive attacks against enemy cities from the air, in the first hours of a war. His theory, laid out in a series of articles and books, including *The Command of the Air*, called for a preemptive strike against the enemy’s air force. Once “the command of the air” had been achieved, fleets of self-defending “battleplanes” would launch a punishing attack on the enemy’s capital and other population and commercial centers with a mixture of high explosive, incendiary, and chemical weapons. Douhet left no doubt as to the likely effect:

At this point I want to stress one aspect of the problem—namely, that the effect of such aerial offensives upon morale may well have more influence upon the conduct of the war than their material effects. For example, take the center of a large city and imagine what would happen among the civilian population during a single attack by a single bombing

unit . . . Here is what would be likely to happen to the center of the city within a radius of about 250 meters: Within a few minutes some 20 tons of high explosive, incendiary, and gas bombs would rain down. First would come explosions, then fires, the deadly gases floating on the surface and preventing any approach to the stricken area. As the hours passed and night advanced, the fires would spread while the poison gas paralyzed all life. By the following day the life of the city would be suspended; and if it happened to be a junction on some important artery of communication traffic would be suspended.

What could happen to a single city in a single day could also happen to ten, twenty, fifty cities . . .¹⁴

Paradoxically, Douhet believed that such a war, however horrible for the crazed and demoralized civilian population, would actually be more humane than the last war. Douhet's wars of the future were over in days or weeks, while the First World War had dragged on for 4 years.

Douhet's later critics pointed out that the Second World War proved him wrong on virtually every count. His absolute belief in the invulnerable "battleplane," the ineffectiveness of air defenses and auxiliary aviation, and the physical and moral effects of air attack, all proved misplaced. His bombers unerringly found their targets, regardless of weather conditions, and destroyed them with geometric precision. Yet his forceful advocacy of independent air power and its potential role in future war resonated with airmen worldwide. "Douhetian" became synonymous with "terror" or "morale" bombing, and first generation nuclear theorist Bernard Brodie cited Douhet as the intellectual forebear of strategic thinking in the atomic age.¹⁵

While there is some debate as to Douhet's precise impact on individual air forces in the interwar period, there is no doubt regarding Air Marshal Sir Hugh Trenchard's role in the formation and evolution of the Royal Air Force. Unlike Douhet, who in the years after World War I was a semi-retired pundit, Trenchard served 10 years as Chief of Air Staff. He was thus in a position to leave his mark on the thinking, doctrine, and force structure of the RAF. Trenchard emphasized the "moral" (psychological) effect of air attack over the potential for actual physical destruction. This emphasis was a consequence of both the limited destruction actually inflicted

by air attack in World War I and a belief in its ability to terrorize the industrial work force. "At present the moral effect of bombing stands undoubtedly to the material effect in a proportion of 20 to 1," was Trenchard's oft-cited formula. This earned him the title "master of the unfounded statistic" from one historian.¹⁶ Trenchard firmly believed that attacks on the "vital centers" of enemy war industry would cause a wholly disproportionate psychological impact upon the working population, greatly undermining the military power of a nation. While it is clear that Trenchard had objectives in large urban areas in mind when he spoke of these "vital centers," his actual targeting prescriptions, in the words of one historian, were "frustratingly vague."¹⁷ What is evident is that Trenchard's goal was to undermine the morale of the work force. The means to achieve that goal was the destruction of the physical means of production.

Trenchard spelled out the relationship between attacks on civilians and the overall objectives of a future war. He argued in 1928, with a touch of class elitism:

We shall attack the vital centers of transportation and seriously impede those arms and munitions reaching the battlefield and, therefore, more successfully assist the Army in its direct attack upon the enemy's Army. We shall attack the communications without which the national effort cannot be co-ordinated or directed.

These are the points at which the enemy is weakest. The rifleman or the sailor is protected, armed, and disciplined, and will stand under fire. The great centers of manufacture, transport, and communications cannot be wholly protected. The personnel again who man them are not armed and cannot shoot back. They are not disciplined, and it cannot be expected of them, that they will stick stolidly to their lathes and benches under the recurring threat of air bombardment.¹⁸

Trenchard thereby offered a rationale for affecting the morale of an enemy population through attacks on key industrial centers. When the RAF began its second air war against Germany, these ideas faced the test of battle.

The final great strategic airpower theorist of the interwar period was Brigadier General William H. "Billy" Mitchell. Mitchell was a diligent student of the evolution of aerial combat in World War I, and was heavily influenced not only by the theories of Douhet

and Trenchard, but also by the combat experiences of the French, British, and German air services. His immediate postwar writings focused on the many ways aviation could contribute to success in battle. Accordingly, he emphasized a wide range of airpower missions, including tactical bombing, air superiority, interdiction, and observation.

Mitchell's thinking in mid-and late 1920s was inextricably bound up in his battle for the independence of the U.S. air arm. Consequently, his emphasis on airpower's potential to strike a decisive war-winning blow loomed ever larger in his writings. Mitchell clearly recognized the increased importance of cities to the functioning of a modern state. He believed, as did Trenchard, that they contained "vital centers" susceptible to destruction from the air. In one of his later works he painted a terrifying, and undeniably Douhetian, picture for a general audience:

What will future war hold for us? Undoubtedly an attack on the great centers of population. New York, Chicago, Detroit, Pittsburgh, and Washington will be the first targets. It is unnecessary that these cities be destroyed in the sense that every house is leveled to the ground. It will be sufficient to have the civilian population driven out of them so they cannot carry on their usual vocations. A few gas bombs will do that.¹⁹

With the exception of Trenchard, who personally shaped the RAF for a decade, the impact of these theorists on the future of aerial warfare was indirect. Collectively, these visions of future war contributed to a belief within many of the world's air arms in the offensive potential of the bomber, and its ability to strike at the "soft underbelly" of an enemy nation. Such visions fit in nicely with most air forces' conceptions of themselves as being on the cutting edge of technology. These theories also found a measure of acceptance among civilian policymakers of the day, even as many recoiled from the implications. The air weapon seemed to offer an alternative to maintaining a massive and costly land force, a concept appealing to financially strapped governments of the Depression era.

In the military balance in Europe during the 1930s we also see a clear foreshadowing of a "deterrence regime." Dealing with minuscule interwar budgets and an uncertain national security environment, the RAF sought to create a bomber force that might

function, in concert with the Royal Navy, as a powerful deterrent to any potential adversary. This was a clear legacy of Trenchard's belief in the primacy of "attack as the best defense."²⁰ As many historians have noted, the interwar RAF favored building impressive numbers of aircraft, while the necessary technological supporting capabilities (target finding, long-range navigation, bad weather instrument flying, etc.) went begging. Trenchard's offensive orientation also caused a general neglect of homeland air defense. It was only the intervention of the Cabinet, aided by some farsighted officers within the Air Staff, who insisted on the creation of a workable air defense system. Their insistence was just in time for the Battle of Britain in 1940.

The German Luftwaffe also pursued a deterrent strategy, based upon an air force's putative capability to devastate enemy population centers in the first days of a war. Shortly after the Nazi seizure of power in January 1933, officers in the still-camouflaged Luftwaffe recommended the creation of a "Risk Air Force," a powerful deterrent fleet of strategic bombers. This force was intended to forestall attack on Germany while more extensive and broadly based armament proceeded apace. While the German aircraft industry proved unequal to the task of constructing the necessary strategic bombers in the mid-1930s, the medium-range, operationally oriented Luftwaffe functioned as a deterrent "shield" to Adolf Hitler's aggressive foreign policy in the late 1930s.²¹ Although official German air force doctrine maintained that terror attacks on enemy civilians were to be undertaken only as a last resort, or as reprisal for similar attacks on Germany, Nazi leaders were keenly aware of the fear inspired by the Luftwaffe's putative ability to strike European population centers. Studies of Anglo-French appeasement note that inflated perceptions of German air strength played a considerable role in Allied decisionmaking during the Sudeten crisis of 1938, when the Western allies shrank from the prospect of war over Czechoslovakia.²²

Although interwar air power theorists and practitioners did not have the experience of a full-scale war between the great industrialized air powers to validate their theorizing, there was plenty of air action, some of which seemed to confirm the beliefs of strategic airpower advocates. This included the bombing of

population centers in China and Spain, and the use of poison gas by Mussolini's *Regia Aeronautica* in Ethiopia. The effect of these experiences is difficult to assess. On one hand, horrific events, such as the Japanese terror bombing of Chinese cities or the promiscuous bombing of the Basque town of Guernica by the Condor Legion in 1937, sharpened public fears of the coming aerial apocalypse. The views of professional airmen, however, were less certain. Many pointed out that Spain, Ethiopia, and China lacked "modern" cities and fully developed air arms. This made it difficult for the RAF, Luftwaffe, or U.S. Army Air Corps to extract meaningful conclusions about the next general war from these "little wars" of the 1930s.

The U.S. Army Air Corps Tactical School at Maxwell Field, Alabama, took the general principles and assumptions of the early theorists and, through an analysis of the U.S. economy, developed a targeting philosophy that identified "key nodes" or "choke points" within modern industrial nations, known as the "Industrial Web." The idea was to develop the means (High Altitude Daylight Precision Bombing) to attack and neutralize these nodes, thereby causing cascading effects throughout the society. Attacks on civilian populations for their own sake were to be avoided, although ACTS left the door open to attacks on the "will" of an enemy populace as a last resort.²³

Although justifiably pilloried for their "mechanistic" thinking and rejection of Clausewitzian friction,²⁴ the ACTS thinkers did manage to formalize the nascent "science" of attacking cities from the air. Instead of a vague belief that cities served as vital centers of industrial, political, and moral power, ACTS faculty and students identified specific key industries to be targeted by air attack. The ACTS planners had a unique opportunity to directly translate this theory into practice in the summer of 1941. Asked to develop a "requirements plan" for the looming war against Germany, four ACTS faculty members devised an ambitious air strategy embodied in Air War Plans Division (AWPD)-1, that identified the 154 key industrial targets making up Germany's industrial web. Although the bulk of the plan addressed the likely effects of destroying these precision targets, there was at least an echo of Douhetian attitude embedded within it:

Morale. Timeliness of attack is most important in the conduct of air operations directly against civilian morale. If the morale of the people is already low because of sustained suffering and because the people are losing faith in the ability of the armed force to win a favorable decision, then heavy and sustained bombing of cities may crush that morale entirely. However, if these conditions do not exist, then area bombing of cities may actually stiffen the resistance of the population, especially if the attacks are weak and sporadic. Hence, no specific number of targets is set up for this task. Rather, it is believed that the entire bombing effort might be applied towards this purpose when it becomes apparent that the proper psychological conditions exist.²⁵

ACTS bombardment doctrine, then, emphasized systematic precision attacks against carefully selected industrial targets. The USAAF, by and large, adhered to this belief in precisely targeting the “industrial web” of an enemy nation during its campaign against Germany. Yet the theory left the door open for contemplating attacking cities to strike a “knock-out blow” against enemy morale. Both of these aspects would be evident in operations against Germany, and especially in the Pacific, in 1944-45. It is also worth noting that ACTS “industrial web” targeting principles drove the first generation of nuclear strike plans against the Union of Soviet Socialist Republics (USSR) in the post-World War II period.

THE TEST OF COMBAT: THE SECOND WORLD WAR, 1939-45

THE EARLY CAMPAIGNS

To the surprise of many military and political leaders, World War II did not begin with a series of devastating aerial attacks upon the capitals of Europe. Nevertheless, the early campaigns of the war quickly established that attacks on cities with attendant civilian casualties would be a part of it. Often air attacks were part of a combined-arms operation, and were accordingly dismissed by strategic bombing purists as mere “tactical bombing.” Yet the opening rounds of the conflict accelerated the blurring of the line between combatants and civilians.

The German blitzkrieg into Poland on September 1, 1939, saw the Luftwaffe operate in near textbook fashion. Its bomber and

fighter units struck at the Polish air force, removing it as a factor in the campaign in a few short days. The Luftwaffe then turned its attention to supporting the mechanized spearheads of the German army with close air support and interdiction strikes. Yet as Warsaw continued to resist, the Luftwaffe's commanders showed themselves quite capable of advocating direct attacks upon population centers. General Wolfram von Richthofen, commanding one of the air corps in that campaign, called for "exploitation of last opportunity for large scale experiment as devastation and terror raid . . . every effort will be made to completely eradicate Warsaw, especially since it will only be a customs office at the border in the future . . ." ²⁶ Heavy Luftwaffe raids on Warsaw, as well as artillery shelling and the advance of the German army, all helped precipitate the surrender of the Polish capital. In similar fashion, a heavy raid on Rotterdam, although part of "an attack on a defended part of the city within the front line area," ²⁷ killed 900 civilians, speeding the collapse of the Netherlands the following May.

In the air assault against Great Britain, the Luftwaffe was compelled to wage independent air warfare. For the first months of the Battle of Britain, the German air fleets concentrated on attacking coastal convoys, radar stations, and airfields supporting RAF Fighter Command. London and other population centers remained a prohibited zone. The battle against the RAF failed to produce decisive results, and, with good weather necessary for any invasion attempt receding, some Luftwaffe commanders argued for a massive attack against greater London as a means of drawing the remnants of the RAF up to fight. Small groups of German bombers, lost and low on fuel, had already inadvertently bombed central London, and the RAF had launched several raids against Berlin in response. Hitler lifted the prohibition against attacking London, and on September 7, 1940, the full weight of the Luftwaffe's bomber force pounded London's East End. The German success proved transitory. The shift to London removed the pressure on the RAF's airfields and the Germans now operated at a tactical disadvantage. By late September, the German assault slackened, and the Luftwaffe high command chose to execute a vague strategy of "continued military and economic pressure against Britain." While the German U-boat force increased raids on commerce, the Luftwaffe conducted

a series of night area raids against London and the industrial cities of south and central Britain, most notably Coventry, in November 1940. Although these raids were aimed at destroying military and economic targets writ large, the campaign, known to the British as the "Blitz," seemed aimed directly at civilian morale.

While the Battle of Britain and the "Blitz" of 1940-41 may justifiably be seen as a slow evolution from an air superiority strategy through "economic warfare" to a campaign of largely indiscriminate night bombing, the later German raids on Great Britain were clearly reprisal raids aimed directly at civilian morale. The 1942 "Baedeker Raids," named after the famous tourist guides, targeted British cultural centers in response to British attacks on quaint Hanseatic seaside towns in March and April of that year. Renewed and very costly attacks on London in 1943 and 1944 were a direct reply to the escalating RAF Bomber Command area attacks, in line with Hitler's policy that "Terror can only be smashed with counterterror."²⁸ And the V-weapons attacks of 1944 and 1945 were undoubtedly intended as pure reprisal or terror campaigns.

In the campaigns in the Balkans and the Soviet Union, the Luftwaffe was stretched thin supporting the German army, and attacks on major urban areas were few. A notable exception was the bombing of Belgrade in April 1941, aptly named "Operation PUNISHMENT," which killed 17,000 civilians. During the campaign against the USSR, the Luftwaffe diverted scarce resources from army support tasks to striking targets in greater Moscow. Although very few of the Luftwaffe's grandiose plans for strategic bombing of Soviet industry and population centers ever came to pass, proposals for "terror attacks" against Soviet cities were frequently made by Luftwaffe commanders. The air force leadership also acquiesced to a 1941 proposal to "level Moscow and Leningrad and make them uninhabitable, so as to relieve us of the necessity of having to feed the population through the winter."²⁹

The relative German lack of success in city destruction should not obscure a more fundamental point. As a recent German commentator on the Allied bombing of German cities concluded:

Scarcely anyone can now doubt that Air Marshal Göring would have wiped out London if his technical resources had allowed him to do so. Speer describes Hitler at a dinner in the Reich Chancellery in 1940

imagining the total destruction of the capital of the British Empire: "Have you ever seen a map of London? It is so densely built that one fire alone would be enough to destroy the whole city, just as it did over two hundred years ago. Göring will start fires all over London, fires everywhere, with countless incendiary bombs of an entirely new type. Thousands of fires. They will unite in one huge blaze over the whole area. Göring has the right idea: high explosives don't work, but we can do it with incendiaries; we can destroy London completely. What will their firemen be able to do once it's really burning?" This intoxicating vision of destruction coincides with the fact that the real pioneering achievements in bomb warfare—Guernica, Warsaw, Belgrade, Rotterdam—were the work of the Germans.³⁰

Lack of means, not lack of political will, was the limiting factor in the Luftwaffe's offensives in the early part of the war. The Allied bomber fleets of 1943-45 would not be so constrained.

THE STRATEGIC AIR OFFENSIVE AGAINST GERMANY

The most sustained "laboratory" for studying the practice and effects of air warfare against cities took place during the air war in Europe, 1939-45.³¹ Many historians maintain that only two "campaigns" lasted the entire duration of the war: the Battle of the Atlantic and the strategic air offensive. Both were indispensable contributors to Allied victory. The bombing war encompassed much more than attacks on cities—yet it was these attacks on the civilian populations of Germany (and later Japan) that have raised the strongest emotions and passions. The deaths of nearly one million enemy civilians, the wounding or displacement of millions more, and the devastation of cultural centers such as Nuremberg, Cologne, Dresden, and Tokyo have led many critics to question the bombing campaign's morality, while others debate its military effectiveness. This section of the chapter addresses the course, conduct, and impact of the war on the cities.

"THE BRITISH BY NIGHT . . ."

Often caricatured as a case of simple "terror bombing," in contrast to the more humane (and more effective) USAAF precision bombing effort, the Night Area Offensive of RAF Bomber Command stands

as one of the clear pre-nuclear antecedents of the concept of MAD. Recent analyses of the campaign reveal a far more complex story of political pressures, technical limitations, and increasing effectiveness and flexibility, as well as the more traditional explanations focusing on the desire to shatter the morale of German workers through a systematic “de-housing” campaign.³² Many accounts focus on the personality and motivations of Bomber Command’s controversial commander, Air Chief Marshal Sir Arthur “Bomber” Harris, although the essential elements of the “morale-busting” campaign predated his tenure.

As noted earlier, Bomber Command was built up during the 1930s as a deterrent force. It possessed a considerable number of aircraft, but soon proved ill-equipped to carry out a sustained air offensive against Germany. Although the Air Staff had produced a detailed series of contingency bombing plans aimed at attacking German industry, known as the “Western Air Plans,” the Command’s ability to carry them out proved meager. Bomber Command at the time was equipped with mediocre twin-engine medium bombers, described by one airman as “not the sort of vehicle in which to go pursue the King’s enemies.”³³ Unescorted daylight bombing resulted in prohibitive losses during the first months of the war, and the force was compelled to begin operating at night. Its forays into Germany proved woefully incapable of deterring or delaying the German blitzkrieg in Scandinavia and the West, and the commitment of bomber squadrons to desperate daylight attacks on the Meuse River crossings in May 1940 led to crippling losses.

The German conquest of France in June 1940, left Britain alone and virtually incapable of conducting offensive warfare against the Third Reich. Britain’s leadership had little choice but to look to the air weapon as the means of carrying on the war. Domestic political, diplomatic and military arguments all supported launching a powerful strategic air offensive. As early as July 1940, Winston Churchill wrote to Britain’s Minister of Aircraft Production:

We have no Continental Army which can defeat German military power. The blockade is broken, and Hitler has Asia and probably Africa to draw from . . . But there is one thing that will bring him back and bring him down, and that is an absolutely devastating, exterminating attack by

very heavy bombers from this country upon the Nazi homeland. We must be able to overwhelm him by this means; without it I do not see a way through.³⁴

Throughout late 1940 and 1941, Bomber Command gamely attempted to carry the war to the German heartland, attacking key industrial and military targets. But attacking at night also greatly limited bombing accuracy, and the failure of the Command to invest in target finding capabilities prior to the war was now making itself felt. Things came to a head with the release of the Butt Report in August 1941. This report was a statistical analysis of raids into Germany during June and July of that year. Of the crews who had claimed to have actually hit their targets, it concluded that only one in three got within five miles of the aiming point. In attacks against the vital Ruhr industrial region, the ratio was closer to one in ten.³⁵

Reaction within the government, the Air Staff, and Bomber Command itself was mixed. Some chose to disregard the gloomy tidings, while Churchill began to temper his earlier enthusiastic advocacy of aerial bombardment. Also evident was a gradual shift within the RAF leadership away from precision raids on specific objectives and towards more general “area” attacks on cities. In the process, there was a discernible return to Trenchardian formulas about the “morale” effect of bombing the civilian workforce. An Air Staff memorandum of September 1941 bluntly maintained,

The ultimate aim of the attack on a town area is to break the morale of the population which occupies it. To ensure this we must achieve two things; first, we must make the town physically uninhabitable and, secondly, we must make the people conscious of constant personal danger. The immediate aim, is therefore, twofold, namely, to produce (i) destruction, and (ii) the fear of death.³⁶

Other official memoranda, as well as analysis conducted by Churchill’s scientific advisor, reflected and fueled this shift from an industrial targeting campaign to an area “de-housing” strategy. There is little doubt that the Command was at low ebb in early 1942, although quantitative and qualitative improvements in its training and equipment were beginning to make themselves felt. In late February, the hard-driving Harris took over RAF Bomber Command.

Harris may not have devised the area offensive, but there is no doubt that he worked to make it a reality with singleminded persistence. He set about improving the status of his command by launching heavy attacks on several German targets—including Lübeck and Rostock—while building up his forces for the “Thousand Plan,” an attempt to put 1,000 heavy bombers over a target in a single night. He accomplished this over Cologne in May 1942 by stripping the training establishments of every operational aircraft. The prestige of his command rebuilt, Harris patiently modernized and built up his forces with large numbers of the new Halifax and Lancaster bombers (the latter capable of carrying some 10 tons of bombs). In March 1943, Harris launched the 4-month Battle of the Ruhr against Germany’s industrial heartland. His philosophy was consistent with that of the Air Staff and the civilian leadership. The Ruhr cities housed many industries vital to the Third Reich’s war effort. The attacks were aimed not at the specific factories, however, but at the city centers and workers’ housing.

Harris’s policy peaked in effectiveness with a 3-day series of attacks in Hamburg in July 1943. Operation GOMORRAH was unusually successful due to a combination of factors. The British neutralized the usually efficient German defenses by swamping their radar with tinfoil strips, largely blinding German night fighter and anti-aircraft batteries. A severe drought in the summer of 1943 lowered water levels and rendered the old city tinderbox-dry. The city was easy to locate and Harris’s bombers achieved unprecedented concentration over the target. The attacks culminated on July 27, 1943, when the already heavily damaged city endured the first “firestorm” in human history, with winds of over 150 miles per hour and temperatures of 1000 degrees Centigrade. Hamburg’s police chief offered this description of the effect:

In a built-up area the suction could not follow its shortest course, but the overhead air stormed through the streets with immense force taking with it not only sparks but burning timber and roof beams, so spreading the fire further and further, developing in a short time a fire typhoon such as was never before witnessed, against which every human resistance was quite useless.³⁷

Some 40-50,000 civilians perished, although accurately estimating the total proved difficult. Rescue personnel found concrete air raid shelters filled only with fine grey ash. A stunned Luftwaffe bomber commander, noting the effectiveness of the RAF's incendiaries, noted, "For half a year we bombed London, and still London is not in ruins. For 3 days they bombed Hamburg—and Hamburg is *kaputt!*"³⁸ German political leaders were equally grim. Armaments Minister Albert Speer later asserted, "Hamburg put the fear of God into me," and maintained that six additional raids on that scale would "bring Germany's armaments production to a total halt."³⁹ Other Nazi leaders referred to the event simply as "*die Katastrophe.*"

Fresh from his triumph in the Hamburg raids, Harris now turned his force against the Reich capital. He predicted, "We can wreck Berlin from end to end if the USAAF will come in on it. It will cost us between 400-500 aircraft. It will cost Germany the war." Throughout the winter of 1943-44, Bomber Command attempted to make Harris's prediction a reality. Yet the so-called "Battle of Berlin" proved a defeat for Harris and RAF Bomber Command. Berlin, although undoubtedly a vital target, proved difficult to damage sufficiently, and the rejuvenated German night defenses exacted a fearsome toll on Harris's squadrons.

Throughout it all, Harris's faith in the area offensive never wavered. Even as his command acquired the technical ability to hit precision targets, Harris refused to budge from his conviction that area attacks were the most effective means of breaking German powers of resistance. In October 1943, Harris, in a message to his superior, stated his position with absolute clarity:

The aim of the Combined Bomber Offensive . . . should be unambiguously and publicly stated. That aim is the destruction of German cities, the killing of German workers and the disruption of civilised community life throughout Germany.

It should be emphasized that the destruction of houses, public utilities, transport and lives, the creation of a refugee problem on an unprecedented scale, and the breakdown of morale both at home and at the battle fronts by fear of extended and intensified bombing, are accepted and intended aims of our bombing policy. They are not by-products of attempts to hit factories.⁴⁰

He even argued, somewhat disingenuously, that his bombers were incapable of hitting small targets, which he in any case derided as “panaceas.” Harris came perilously close to insubordination in his fixation on the area offensive, although it must be noted that his command did ably execute the 1944-45 campaigns against transportation and oil targets which supported the OVERLORD invasion and the Allied drive across western Europe. Yet, whenever possible, Harris continued to conduct area attacks against German cities, and would do so until the very last months of the war.

By that time Harris’s Bomber Command had evolved into a very effective instrument of war. Anxious both to assist the Red Army in its advance against the tottering German army on the eastern front and to speed the German collapse, Churchill pressed the Air Staff to strike major urban targets in eastern Germany, including Berlin, Leipzig, and Dresden.⁴¹ On the night of February 11-12, 1945, Dresden suffered one of the worst air attacks in history. Though often described as an “open” or “undefended” city, Dresden was neither. Its status, however, as an industrial target was minimal. The human cost of the raid was ghastly, and the fact that the city was filled with refugees fleeing the Red Army added to the horror. Particularly in hindsight, the raid seemed a case of promiscuous overkill, coming so close to the eventual German surrender less than three months later. It should be remembered, however, that the supposedly “finished” Germans had recently shocked the Allies by launching the Ardennes offensive, and that RAF Bomber Command lost hundreds of aircraft in action after the Dresden raid. Nevertheless, Dresden was a turning point in popular perceptions about the bombing offensive.

With considerable understatement, one of the RAF Official Historians noted, “At the end of the war public opinion turned away from bombing which, especially in Britain, it had once so strongly supported.”⁴² Churchill was already distancing himself from the attack on Dresden within days of the raid. Harris’s aircrews were denied a special campaign medal, although by most objective assessments, they certainly deserved one. Harris himself was conspicuously snubbed in the postwar Honours List. The postwar government preferred to view the area offensive as the product of an overzealous commander afflicted with tunnel vision, instead of a carefully considered, albeit harsh, wartime policy which had enjoyed broad support in government and public circles.

Assessing the effectiveness of the campaign remains a very complex task. Critics of the bombing campaign fall into two broad categories: those who believed it inefficient and ineffective, and those who saw it as immoral. It is certainly true that German morale did not “collapse” under the assault. The German civilian population suffered tremendous hardships, but “stuck stolidly to their lathes and benches.” The German war economy proved robust enough to absorb even the catastrophic damage to cities such as Hamburg, while Berlin, although battered, continued to function as a center of industry and government. The investment in the bomber offensive was staggering. Estimates range as high as one-third of the entire British war effort went, directly or indirectly, to Bomber Command. The campaign cost the lives of some 50,000 Bomber Command aircrew. Some wartime critics, mostly clerics and intellectuals, criticized the offensive as brutal and lawless. One military commentator called it “the most barbaric, and unskilled, way of winning a war that the modern world has seen.”⁴³ Max Hastings, one of the most eloquent critics of the bomber offensive, summed it up thusly: “The cost of the bomber offensive in life, treasure and moral superiority over the enemy tragically outstripped the results that it achieved.”⁴⁴

Recent analysis has focused on the tremendous indirect benefits of the bomber offensive to the Allied war effort. Dispersal of German industry sacrificed economies of scale, and millions of able-bodied Germans were engaged in air defense or rebuilding projects. By 1943-44, the combined bomber offensive seriously distorted German strategic planning, industrial production, and military force structure and deployments. For example, the need to defend German cities displaced desires to renew the offensive in the USSR or carry the fight to the enemy on the high seas.⁴⁵ The city-busting campaign sparked an almost irrational desire on the part of the Nazi leadership for revenge. The Luftwaffe squandered much of its bomber force in reprisal attacks against London, while German industrial production, scientific and technological resources were wastefully diverted to the V-weapons. The Germans manufactured an estimated 24,000 fighter aircraft. One historian concluded, “Thus, just in terms of V-weapons alone, ‘area’ bombing achieved an enormous dislocation of the German war effort of real consequence to the war’s outcome.”⁴⁶

The RAF’s bomber forces were built up in the 1930s in hopes

of deterring a future adversary. This they failed to do, and their subsequent attempt to win the ensuing war through air attacks on cities remains bedeviled by controversy.

“ . . . AND THE AMERICANS BY DAY ”

The U.S. Army Air Forces entered the European war with a strong belief in the efficacy of the strategic bombing concepts crafted at Maxwell Field and “operationalized” as AWPD-1, the so-called “Air Plan that Defeated Hitler.” As discussed earlier, this plan called for a force of four-engined bombers sufficient to destroy 154 key targets in the German war economy. The targets would not be the large urban areas, but specific factory complexes. The American air planners believed that, once the 8th Air Force was built up in Great Britain, it would exert a significant and perhaps decisive impact on the German ability to wage war.⁴⁷ Yet the necessity of diverting resources to the Mediterranean in the fall of 1942 slowed the buildup, and it was not until the January 1943 Casablanca conference that the guiding principles for undertaking a truly “combined” bomber offensive were formulated. The USAAF successfully resisted British pressure to join in the night area offensives, and the two Allies agreed to pursue a loosely coordinated policy of “bombing around the clock.”

By early 1943, General Ira Eaker’s 8th Air Force was able to begin deep daylight penetration against German targets. These targets were aircraft assembly plants, ball-bearing manufacturing centers, rail yards, and ports. All were consistent with the industrial web targeting philosophy developed at ACTS. Unescorted daylight bombing of these targets proved too costly to continue. Although German fighter and ball-bearing production was disrupted, the results did not justify the heavy losses incurred. In the wake of the “Fall Crisis” culminating in the disastrous October 14, 1943, raid on the ball-bearing factories at Schweinfurt, daylight penetrations into Germany were suspended until long range fighter escort became available.

With the arrival of P-51 Mustang long-range fighters in early 1944, the American daylight bombing effort entered its most important phase. Again, the targets were key industrial complexes.

In some cases, such as the March 4, 1944, daylight raid on Berlin, the objective was to force the Luftwaffe fighters into the air so they could be engaged and destroyed by the aggressive USAAF fighter escort. The practice of using the bombers as “bait” for German fighters was controversial, but undeniably effective. The German day fighter arm was shattered in the spring of 1944, greatly assisting both the continuation of the combined bomber offensive and the success of the Normandy invasion in June 1944.⁴⁸

The USAAF continued its precision campaign against the synthetic oil industry and transportation targets. The transportation offensive primarily targeted the important German marshalling yards. Some commentators have argued that the attacks on marshalling yards were little more than thinly-disguised area attacks.⁴⁹ Indeed, the “precise” nature of the USAAF effort in the fall of 1944 became a casualty of technical problems, European weather, and lack of current intelligence on the state of the German war economy. In short, USAAF “precision” attacks began to resemble RAF “area” attacks. And in the final months of the war, the Allied air leadership contemplated a series of raids on cities and transportation targets, known as THUNDERCLAP and CLARION respectively, that harkened back to the belief expressed in AWPD-1—that an overwhelming blow, at the right time, could shock an enemy nation into collapse.⁵⁰ THUNDERCLAP was never executed in toto, but the USAAF did participate in the Dresden raids and also launched a mass raid on Berlin on March 3, 1945.⁵¹ Yet on balance, the USAAF attempted to adhere to its prewar philosophy of precision targeting, even if the massive urban destruction inflicted by many of these raids seemed to belie that intent. Eaker, in voicing his reservations about the CLARION proposal, stated, “We should never allow the history of this war to convict us of throwing the strategic bomber at the man in the street.”⁵² Historian Conrad Crane concludes, “Although theory did exceed technology, American airmen in Europe did the best with what they had.”⁵³ Yet another historian’s verdict is somewhat less generous: the USAAF leaders “judged themselves by their motives rather than their results.”⁵⁴

THE USAAF IN THE PACIFIC

Along with the RAF night area offensive, the USAAF's incendiary campaign against the Japanese home islands in 1944-45 stands as the last "milestone" in the prehistory of MAD. This series of devastating raids on Japanese industrial and population centers was perhaps the ultimate in non-nuclear urban air attack. By most accounts, the March 1945 fire raid on Tokyo was more destructive and lethal than either the Hiroshima or Nagasaki atomic strikes. USAAF strategic bomber forces in the Pacific operated under the direct control of General Henry H. "Hap" Arnold instead of the theater commanders, foreshadowing the later organization of Strategic Air Command. And the campaign ended with the first use of atomic weapons against enemy targets.

By late 1944, the war in the Pacific had progressed to the point where the Japanese home islands could come under direct air attack. A bloody amphibious invasion of the Marianas secured bomber bases on the islands of Saipan, Tinian, and Guam. Large numbers of the still untested and temperamental B-29 "Superfortress" were available to conduct the assault. By this late point in the war, a U.S. Navy submarine blockade of Japan had virtually strangled the industries of the home islands, yet, as the Allied forces approached, Japanese resistance grew ever more determined and fanatical. Amid concerns about mounting war weariness at home, American planners prepared to execute the final phases of the strategy for defeating Japan; blockade, strategic air assault, and amphibious invasion.⁵⁵

The bombing of Japanese cities had been widely discussed by U.S. civilian and military policymakers even prior to Pearl Harbor. George C. Marshall noted in November 1941 that "if war with the Japanese does come, we'll fight mercilessly. Flying Fortresses will be dispatched immediately to set the paper cities of Japan on fire. There won't be any hesitation about bombing civilians—it will be all-out."⁵⁶ President Franklin Roosevelt was equally determined to bomb the Japanese home islands and even risked two of the U.S. Navy's precious aircraft carriers to launch the Doolittle Raid on Tokyo in April 1942.

Despite such high-level interest in carrying the war directly to the civilian population, it was not until 1944 that an actual strategic

campaign was underway. The early B-29 raids on Japan, from bases in China and, later, the Marianas, were conventional precision raids on industrial targets, primarily the aircraft industry. Yet for a variety of reasons, these attacks did not have the desired effect. The B-29 and its untested equipment and engines suffered from a host of teething troubles, and the jet stream above Japan played havoc with high altitude precision bombing.

The notoriously impatient Arnold fired several commanders, including General Haywood Hansell, one of the pioneers of daylight precision bombardment. After many failed attempts to improve precision bombing, Arnold ultimately turned to General Curtis E. LeMay. LeMay had proven to be a skilled leader and a tactical innovator during his time in the European theater and was not above jettisoning approved tactics and techniques in order to fulfill his boss's desires. Arnold and the senior AAF leadership had already concluded that area attacks would be more effective in destroying dispersed Japanese industry and killing Japanese workers.⁵⁷ LeMay decided to attack at low level at night, with a largely incendiary bombload. He eventually removed most of the guns from the B-29s so that they could carry more bombs. Adopting these tactics improved accuracy and reduced the strain on the B-29s fragile engines. Flying at night rendered Japanese air defenses less effective.

LeMay's policy proved terribly effective during Operation MEETINGHOUSE, a mass nighttime incendiary raid on Tokyo on March 9-10, 1945. LeMay's bombers stoked a conflagration that killed nearly 100,000 civilians. The B-29 wing commander leading the raid later recalled,

I watched block after block go up in flames until the holocaust had spread into a seething, swirling ocean of fire, engulfing the city below for miles in every direction. True, there is no room for emotions in war. But the destruction I witnessed that night over Tokyo was so overwhelming that it left a tremendous and lasting impression with me.⁵⁸

Superfortress crews never forgot the stench of burning human flesh that rose from the city below. Many resorted to wearing oxygen masks. Sixteen square miles of the city were completely burned out. Photographs taken shortly after the raid are virtually

indistinguishable from those taken at Hiroshima 5 months later. During the following months, the 20th Air Force marched methodically down its list of industrial targets in Japan, incinerating each in its turn. At the same time, B-29s augmented the submarine blockade by conducting an extensive aerial mining campaign in Japanese coastal waters, aptly code-named STARVATION.⁵⁹

While the main goal remained the destruction of Japanese industrial potential, area incendiary raids and the massive casualties among the civilian work force that accompanied them were viewed as the appropriate means to that end. A striking graphic contained in a 1945 report prepared by Arnold for the Secretary of War consisted of a map of Japan "showing the principal industrialized cities burned out by B-29 incendiary attacks. Figures indicate what part of the city was destroyed. For comparison, each city is paired with a U.S. city of approximately the same size."⁶⁰ The map contained a grim litany of major cities reduced to ashes: Yokohama, 57.6 percent (Cleveland); Tokyo, 39.9 percent (New York); Kobe, 55.7 percent (Baltimore); Toyama, 95.6 percent (Chattanooga).

LeMay explained after the fact,

We were going after military targets. No point in slaughtering civilians for the mere sake of slaughter. Of course, there is a pretty thin veneer in Japan, but the veneer was there. It was their system of dispersal of industry. All you had to do was visit one of those targets after we'd roasted it, and see the ruins of a multitude of tiny houses, with a drill press sticking up through the wreckage of every home. The entire population got into the act and worked to make those airplanes or munitions of war . . . men, women, children. We knew we were going to kill a lot of women and kids when we burned the town. Had to be done.⁶¹

So confident were the AAF leaders that this was a war-winning strategy that they believed that when the target list was finally exhausted, Japan would collapse without an invasion. Indeed, Arnold was one of the few senior commanders to oppose dropping the atomic bombs, believing a Japanese collapse was imminent.⁶² The postwar Strategic Bombing Survey concurred:

Based on a detailed investigation of all the facts, and supported by the testimony of surviving Japanese leaders, it is the Survey's opinion that certainly prior to 31 December 1945, and in all probability prior to 1

November 1945, Japan would have surrendered even if the atomic bombs had not been dropped, even if Russia had not entered the war, and even if no invasion had been planned or contemplated.⁶³

Debate continues regarding the impact of the firebombing of Japanese cities on Imperial Japan's surrender. In postwar testimony, former Premier Hideki Tojo downplayed the bombing campaign and instead cited the submarine blockade, the island-hopping campaign, and the operations of U.S. Navy carrier task forces as the key contributors to Japanese defeat.⁶⁴ Others have argued that the firebombing was an excessive and even racist policy carried out by a vengeful United States against a virtually defeated foe. Others point to the fanatical defense of Okinawa and the evidence of extensive Japanese preparations to meet the expected invasion of the home islands. One commentator noted that after Emperor Hirohito toured devastated Tokyo on March 18, 1945, "There is reason to believe that what the shaken, grim-faced monarch saw at firsthand intensified his determination to bring the war to an end as soon as possible."⁶⁵

Some things are clear. The Japanese government did surrender, no invasion was necessary, and Japanese industrial production had all but ceased by the summer of 1945. Strategic bombing of Japanese cities certainly contributed to all of these things. Yet so did the submarine campaign, the destruction of the Japanese fleet in sea and air battle, and the amphibious campaign that both destroyed Japanese military power and secured the bases from which to launch the air assault on the home islands. As was the case with Germany, the effect of city bombing could not be assessed in a vacuum because it had not taken place in one.

CONCLUSION

Any study of the "prehistory of MAD" must consider the postwar assessment of the bombing war. Did the targeting of cities, or of specific targets located in cities, hasten the collapse of Nazi Germany and Imperial Japan? The immediate investigations, most notably the massive United States Strategic Bombing Survey (USSBS), sought to interview captured enemy economic planners and military leaders, assess physical destruction, and determine the damage to enemy

industrial output, combat power, fighting spirit, and political will. The USSBS concluded that “[Allied air power] brought home to the German people the full impact of modern war with all its horror and suffering. Its imprint on the German nation will be lasting.”⁶⁶ Yet the Survey was a complex document with many parts, some of which suggested that strategic bombing in general, and attacks on civilian morale in particular, were not as effective as hoped. Needless to say, the surveys only began a debate that has continued, sometimes bitterly, to this day. Generations of postwar historians and military analysts have weighed in. Although it would be idle to suggest that a consensus has emerged, I would like to suggest some lessons from the pre-1945 experience of city busting that definitely nourished “the roots of MAD.”

The U.S. Army Air Forces (soon to be the U.S. Air Force [USAF]) emerged from the World War II convinced in the efficacy of independent strategic air power. While the USAF’s fixation on strategic attack has perhaps been exaggerated, there is little doubt that it was the primary concern of the newly independent service. As a result, the lessons of the World War II strategic air offensives loomed large. In the popular mind, a sharp distinction existed between USAAF “precision” bombing and RAF-style “area” bombing. The latter was seen as both morally inferior and militarily less effective than the former. Most airmen knew better than to accept this simplistic interpretation. While the targeting philosophy between RAF Bomber Command and the USAAF was different, the two air efforts could be very similar in practice. An RAF night raid in the fall of 1944, using the latest blind bombing aids, was sometimes capable of greater “precision” than a USAAF daylight raid in the bad weather conditions of central Europe during the same period. Yet even these de facto “area” attacks had devastating effects on the German war economy. As historian Alfred Mierzejewski has demonstrated, area attacks on the vital marshalling yards of the German National Railway (most of which were located in urban centers) were among the most effective of the entire war.⁶⁷ And the commanders of 20th Air Force in the Pacific clearly believed that their incendiary offensive had precipitated a Japanese surrender without a costly amphibious invasion. Even if the airmen conveniently ignored the strategic effects of other operations, they shared a general belief

in airpower's contribution to Allied victory in World War II. This belief was not unjustified.

It is ironic that the development of nuclear and thermonuclear warheads, which almost by definition were area attack weapons, essentially negated the gains in precision bombing that were made during World War II. Although first-generation Strategic Air Command planners continued to identify specific industrial targets in the USSR like the ACTS planers of old, the gap between intent and practice had widened tremendously, far beyond what Trenchard or LeMay had to contend with.

The challenge of the postwar period was to balance the perceived lessons of the late conflict, interservice rivalries, rapidly changing weapon and aviation technology, and the threat of an emerging cold war. The experience of the first half-century of powered flight contained the seeds of postwar "deterrence regimes" and the roots of MAD. The advent of nuclear weapons was seen initially as a quantitative, though not necessarily qualitative, change in the means of conducting aerial warfare. Many airmen saw no great difference between the great Tokyo fire raid of March 1945, the Dresden firestorm of February 1945, and Hiroshima/Nagasaki.

Fear of city bombing was one of the most striking cultural developments of the modern age. Industrialized nations continued to develop vast bomber and missile fleets of increasing sophistication, and at enormous cost, with the intend to deter or, if necessary, defeat, peer adversaries. Inseparable from the existence of these fleets was the specter of civilian casualties on a massive scale. The tools were new. The underlying issues predated powered flight.

ENDNOTES - CHAPTER 1

1. The literature on the development of strategic bombardment is vast. Among the most useful works include 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; Lee Kennett, *A History of Strategic Bombing*, New York: Scribner's, 1982; R. Cargill Hall, ed., *Case Studies in Strategic Bombardment*, Washington, DC: Air Force History and Museum's Program, 1998; and John Buckley, *Air Power in the Age of Total War*, Bloomington: Indiana University Press, 1999.

2. Carl von Clausewitz, *On War*, Princeton: Princeton University Press, 1976, pp. 595-596.

3. Peter Fritzsche, *A Nation of Fliers: German Aviation and the Popular Imagination*, Cambridge: Harvard University Press, 1992, chapter 1.
4. Lee Kennett, *The First Air War, 1914-1918*, New York: Free Press, 1991, p. 57.
5. Raymond H. Fredette, *The Sky on Fire: The First Battle of Britain, 1917-1918*, Washington, DC: Smithsonian Institution Press, 1991, p. 56.
6. Francis K. Mason, *Battle over Britain*, Bourne End: Aston Publications Ltd, 1990, p. 18.
7. Kennett, *History of Strategic Bombing*, p. 25.
8. Robin Higham, *Air Power: A Concise History*, New York: St Martin's Press, 1972, p. 57.
9. Biddle, *Rhetoric and Reality in Air Warfare*, p. 46.
10. Thomas H. Greer, *The Development of Doctrine in the Army Air Arm, 1917-1941*, Washington, DC: Office of Air Force History, 1985, p. 11.
11. Kennett, p. 67.
12. On Douhet, see Philip S. Meilinger, "Giulio Douhet and the Origins of Airpower Theory," in Philip S. Meilinger, ed., *The Paths of Heaven: The Evolution of Airpower Theory*, Maxwell AFB: Air University Press, 1997, pp. 1-40.
13. Giulio Douhet, *The Command of the Air*, Washington, DC: Office of Air Force History, 1983, p. 126.
14. *Ibid.*, p. 58.
15. Bernard Brodie, *Strategy in the Missile Age*, Princeton: Princeton University Press, 1959, p. 106.
16. Tami Davis Biddle, "British and American Approaches to Strategic Bombing: Their Origin and Implementation in the World War II Combined Bomber Offensive," in John Gooch, ed., *Airpower: Theory and Practice*, London: Frank Cass, 1995, p. 92.
17. Philip S. Meilinger, "Trenchard, Slessor and Royal Air Force Doctrine before World War II," in Meilinger, *Paths of Heaven*, p. 52.
18. Hugh Trenchard, "The War Object of an Air Force," in Gerard Chaliand, ed., *The Art of War in World History*, Berkeley: University of California Press, 1994, p. 909.
19. William Mitchell, *Skyways*, Philadelphia: Lippincott, 1930, p. 262.
20. R.J. Overy, "Air Power and the Origins of Deterrence Theory before 1939," *Journal of Strategic Studies*, Vol. 15, March 1992, pp. 73-101.
21. Edward L. Homze, *Arming the Luftwaffe: The Reich Air Ministry and the German Aircraft Industry, 1919-1939*, Lincoln: University of Nebraska Press, 1976, chapter 3.

22. Williamson Murray, *Luftwaffe*, Baltimore: Nautical and Aviation, 1985, pp. 19-20.
23. Peter R. Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," in Meilinger, ed., *The Paths of Heaven*, pp. 183-238.
24. Barry Watts, *The Foundations of US Air Doctrine: The Problem of Friction in War*, Maxwell AFB, AL; Air University Press, 1984.
25. Haywood S. Hansell, *The Air Plan that Defeated Hitler*, Atlanta: Higgins-MacArthur, 1972, pp. 304-305.
26. Horst Boog, ed., *The Conduct of the Air War in the Second World War: An International Comparison*, New York: Berg, 1992, p. 282.
27. *Ibid.*, p. 386.
28. Adolf Galland, *The First and the Last*, Mesa, AZ: Champlin Museum Press, 1986, p. 225.
29. Richard Muller, *The German Air War in Russia*, Baltimore: Nautical and Aviation, 1992, p. 234.
30. W.G. Sebald, *On the Natural History of Destruction*, New York: Random House, 2003, pp. 103-104.
31. Among the best general works on strategic bombing in World War II are Biddle, *Rhetoric and Reality in Air Warfare*; R. J. Overy, *The Air War, 1939-1945*, New York: Stein & Day, 1981; Alan J. Levine, *The Strategic Bombing of Germany, 1940-1945*, New York: Praeger, 1992.
32. The literature on RAF Bomber Command's offensive is considerable. The best starting point remains the Official History, Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany, 1939-1945*, London: HMSO, 1961. An excellent new short history is Mark Connelly, *Reaching for the Stars: A New History of Bomber Command in World War II*, London: I. B. Tauris, 2001. Max Hastings, *Bomber Command*, New York: The Dial Press/James Wade, 1979, is very critical of the campaign, while Denis Richards, *The Hardest Victory: RAF Bomber Command in the Second World War*, New York: Norton, 1995, is much more generous.
33. Alfred Price, *Battle over the Reich*, New York: Scribner's, 1973, p. 11.
34. Connelly, *Reaching for the Stars*, p. 39.
35. Hastings, *Bomber Command*, pp. 108-110.
36. Sir Arthur T. Harris, *Despatch on War Operations: 23rd February 1942 to 8th May 1945*, London: Frank Cass, 1995, p. 7.
37. Price, p. 61.
38. David Irving, *The Rise and Fall of the Luftwaffe*, Boston: Little, Brown, 1973, p. 234.

39. Albert Speer, *Inside the Third Reich: Memoirs*, New York: Macmillan, 1970, p. 284.
40. Connelly, *Reaching for the Stars*, p. 115.
41. Biddle, *Rhetoric and Reality*, p. 254.
42. Frankland, *Bomber Offensive: The Devastation of Europe*, New York: Ballantine, 1970.
43. Hastings, *Bomber Command*, p. 176.
44. *Ibid.*, p. 352.
45. A thoughtful defense of the bomber offensive is Richard Overy, *Why the Allies Won*, New York: Norton, 1995, chapter 4.
46. Williamson Murray, "Reflections on the Combined Bomber Offensive," *Militär-geschichtliche Mitteilungen*, Vol. 51, 1992, p. 90.
47. On the USAAF's strategic bombing effort against Germany, see Hansell, *Air Plan that Defeated Hitler*, note 25; Stephen L. MacFarland and Wesley P. Newton, *To Command the Sky: The Battle for Air Superiority over Germany, 1942-1944*, Washington, DC: Smithsonian, 1991; Ronald Schaffer, *Wings of Judgment: American Bombing in World War II*, Oxford: Oxford University Press, 1985, which argues that the U.S. bombing effort was qualitatively little different from the RAF's area assault on German urban areas, while Conrad Crane, *Bombs, Cities and Civilians*, Lawrence: University Press of Kansas, 1993, argues that American airmen adhered to the ideal of precision attacks against industrial targets. Kenneth P. Werrell, *Blankets of Fire: US Bombers over Japan during World War II*, Washington, DC: Smithsonian Institution Press, 1996, provides excellent background on the USAAF's bombing of Japan.
48. Stephen L. McFarland and Wesley P. Newton, "The American Strategic Air Offensive against Germany in World War II," in Hall, ed., *Case Studies in Strategic Bombardment*, pp. 216-218.
49. Buckley, *Air Power in the Age of Total War*, p. 164.
50. Biddle, *Rhetoric and Reality*, p. 239.
51. McFarland and Newton, "American Strategic Air Offensive," pp. 230-232.
52. Crane, *Bombs, Cities and Civilians*, p. 111.
53. *Ibid.*, p. 160.
54. Biddle, *Rhetoric and Reality*, p. 240.
55. Alvin Coox, "Strategic Bombing in the Pacific, 1942-1945," in Hall, ed., *Case Studies in Strategic Bombardment*, p. 266.
56. Thomas R. Searle, "'It Made a Lot of Sense to Kill Skilled Workers': The Firebombing of Tokyo in March 1945," *Journal of Military History*, Vol. 66, January 2002, pp. 115-116.

57. *Ibid.*, p. 114-115.
58. Coox, p. 319.
59. *Ibid.*, p. 344.
60. Jacob Vander Meulen, *Building the B-29*, Washington: Smithsonian Institution Press, 1995, p. 8.
61. Crane, *Bombs, Cities and Civilians*, p. 133.
62. Coox, p. 353.
63. *The United States Strategic Bombing Survey, European War, Pacific War*, Maxwell AFB: Air University Press, 1987, p. 107.
64. Samuel Elliot Morison, *The Two Ocean War: A Short History of the United States Navy in the Second World War*, Boston: Little, Brown and Co., 1963, p. 282.
65. Coox, p. 321.
66. *United States Strategic Bombing Survey*, p. 37.
67. Alfred J. Mierzejewski, *The Collapse of the German War Economy, 1944-1945: Allied Bombing and the German National Railway*, Chapel Hill: University of North Carolina Press, 1988, p. 183.