

# Lecture 1: City Busting, the Nuclear Weapons Revolution, and Precision Guidance

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## QUESTIONS TO BE ADDRESSED:

- I. How was city busting viewed and done before and during WWII?
  - II. The nuclear weapons revolution: How was it first viewed? Why, initially, did developing ever larger nuclear weapons seem logical?
  - III. Precision guidance: How did its advent constitute a counter revolution and how has it affected nuclear weapons deployments?
  - IV. City busting: How is its morality still an issue today?
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## Why Bother with History?

The following chapter focuses extensively on the history of warfare, which raises a basic question: If we want to shape our future, why bother with our past? One take, offered by Mark Twain, is that history may not repeat, but it often rhymes. This, however, does not explain why we should care. Abraham Lincoln offered two answers. First, he argued, “The past is the cause of the present, and the present will be the cause of the future.”<sup>1</sup> Later, he added that “The best way to predict your future is to create it.”<sup>2</sup>

At this point, one might mistakenly conclude that history is irrelevant to our future as you can simply create your future *ex nihilo*. Perhaps that’s possible, in theory, but in the world of practical politics, it’s not. In this world, you can hardly persuade people where they are without first convincing them of where they have been, and how they arrived there. However, once you’ve done that, convincing them of where they should go is possible. The world’s greatest leaders, good and evil—Churchill, Hitler, Stalin, Mao—all were obsessed with how history should be read. They knew what we should know: How we view our past is tied to the futures we choose and let others lead us into.

This suggests what is needed to understand the nuclear revolution and the morality of nuclear weapons use: first, one must understand what proceeded and followed. Where did the idea of destroying city centers or city busting come from? How did nuclear weapons help perfect the achievement of this mission? What were the moral considerations of attacking innocents when

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1. Abraham Lincoln, as recollected by William H. Herndon, available in *Recollected Words of Abraham Lincoln*, compiled and edited by Don E. Fehrenbacher and Virginia Fehrenbacher, Stanford, CA: Stanford University Press, 1996, p. 245. Also see “Abraham Lincoln Quotes,” *American Civil War Story*, available at <http://www.americancivilwarstory.com/abraham-lincoln-quotes.html>.

2. See Good Reads, “Quotes by Abraham Lincoln,” available from <http://www.goodreads.com/quotes/328848-the-best-way-to-predict-your-future-is-to-create>.

nuclear weapons were first used; what are they today?

## I. How was city busting viewed and done before and during WWII?

### Pre-Modern Views

Until modernity, military theorists frowned upon the targeting and destruction of cities. Consider the guidance of one of the earliest and most profound military thinkers, the Chinese strategist Sun Tzu, who wrote *The Art of War* 500 years before the birth of Jesus. He wrote:

To subdue the enemy without fighting is the supreme excellence. Thus, what is of supreme importance in war is to attack the enemy's strategy. Next best is to disrupt his alliances by diplomacy. The next best is to attack his army. And **the worst policy is to attack cities.**<sup>3</sup>

Historically, cities were besieged and plundered as acts of, desperation, revenge, brutality or greed. Military scientists, though, rarely recommended it.

### City Busting as a Modern Military Science: Sherman's March to the Sea

The first significant modern example of targeting cities rationalized as something other than a tactic was Sherman's March to the Sea.



Figure 1: Sherman's March to the Sea

Sherman battled to seize Atlanta, Georgia from May through September of 1864. Before he left the city on his march to Savannah in November, he ordered residents to evacuate. He then had

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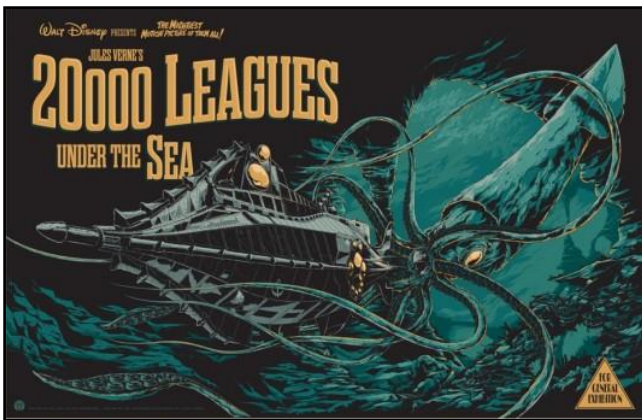
3. Sun Tzu, *The Art of War*, available at "The Internet Classics Archive," available from <http://classics.mit.edu/Tzu/artwar.html>.

his troops burn down 30 percent of the city. In this, Sherman took care to spare Atlanta's hospitals, churches, and most of Atlanta's residences. Instead, he focused his army's arson on manufacturing, rail systems, and stores that could assist the Confederate war effort. The aim was to demoralize Confederate military forces and to deprive them of the means to persist in their military operations—not to terrorize the general population by killing innocent civilians or destroying their homes or private possessions.

In his subsequent march from Atlanta to Savannah, Sherman's troops destroyed mills, crops, stores, and seized livestock and property that provided for his troops. Farmers' homes and capital stock, however, were protected if the owner did not resist. These actions frightened and demoralized the civilian population. However, Sherman's forces were under strict orders not to enter or burn houses or to kill innocents to achieve these goals. Sherman's ploy worked. Soon after he approached Savannah, Confederate forces retreated and Savannah's mayor surrendered without a fight.<sup>4</sup>

## The French Jeune École and the Military Science of Sea Denial to Starve the Enemy into Submission.

The further development of the idea of targeting the civil sector came in the latter half of the 19<sup>th</sup> century. At the time, the French still considered the United Kingdom (UK) as a potential adversary. The challenge France would face in any war against the UK was British naval superiority and France's lack of an amphibious force large enough to invade and occupy British homeland. This problem captivated a new French school of military thinkers, the Jeune Ecole. This school focused on how France might use its much smaller navy to defeat the British navy and vanquish the UK.



Towards this end, the French developed torpedo boats and submarines. The publication of French novelist Jules Verne's *20,000 Leagues Under the Sea* in 1870 helped guide them. Their new strategy was to use submarines and torpedo boats to block all sea commerce to and from the British Isles and starve the British population into submission.<sup>5</sup>

Figure 2: Submarine from *20,000 Leagues Under the Sea*

4. See Wikipedia entries, "Atlanta in the American Civil War," available from [https://en.wikipedia.org/wiki/Atlanta\\_in\\_the\\_American\\_Civil\\_War](https://en.wikipedia.org/wiki/Atlanta_in_the_American_Civil_War) and "Sherman's March to the Sea," available from [https://en.wikipedia.org/wiki/Sherman%27s\\_March\\_to\\_the\\_Sea](https://en.wikipedia.org/wiki/Sherman%27s_March_to_the_Sea)

5. See, Erik J. Dahl, "Net-Centric Before Its Time: The Jeune École and Its Lessons for Today." *Naval War College Review* 58, no. 4, Autumn 2005, pp. 109-125 available from <https://digital-commons.usnwc.edu/nwc-review/vol58/iss4/9/>



Figure 3: French submarine named the Narval

The French pursued this strategy with considerable energy. In 1896, France's Marine Ministry announced an international submarine construction competition. At least 29 designs were submitted for the competition. The winner of the competition was a breakthrough design, the NARVAL, built by a Frenchman named Maxime Laubeuf. The French then conducted exercises to

demonstrate what these new weapons might achieve. The first submarine to actually sink a modern battleship in 1898 was the French GUSTAVE ZEDE.



Figure 4: Gustave Zede submarine sinks a battleship

As a result of these efforts, most modern navies began deploying submarines. By the turn of the century, submarine warfare was the subject of international arms control. The Hague Conventions of 1899 and 1907 worried that submarines might be used against innocents and tried to restrict their operation so as to only target to military combatants. However, the use of civilian transports for

war in WWI encouraged the Germans to engage in unrestricted submarine warfare against merchant shipping. By 1917, German submarines nearly took the UK out of the war. The tide turned, however, with allied development of convoys, destroyers, depth charges, aircraft patrols, hydrophones, crude sonar systems, and extensive mining. As a result of these countermeasures, efforts to use submarines as "strategic weapons" failed.



## The Futility of Trench Warfare during WWI and Zeppelin and Gotha Aerial Attacks on London.

Meanwhile, from 1914 through 1917, both sides engaged in brutal trench warfare. The losses were staggering. A case in point was the four-month Battle of the Somme waged in 1916. It resulted in more than 300,000 dead and over a million wounded and missing, with the British advancing only seven miles along a 19-mile front, accomplishing little.<sup>6</sup>

As early as 1915, the German military tried to force an end to such bloodshed by “jumping over the front lines” with Zeppelin attacks against London. However, these



Figure 5: Battle of the Somme



Figure 6: German Zeppelin raid against Great Britain

strikes were notoriously inaccurate. Bombs missed by miles, and, in one case, the Zeppelins missed London entirely. The Zeppelins themselves were also quite vulnerable to fighter interceptions by the Royal Air Force (RAF). Fifty-one Zeppelin raids over three years killed only 557 British.

This discouraging record prompted the Germans to swap out airship raids with Gotha bomber strikes in 1917. These were more accurate. Eight



Figure 7: Gotha bomber

hundred and fifty-seven London residents were killed in just one year. The bomber raids also were far more difficult to deflect. Their success, in fact, helped perpetuate the idea that heavy bombers would always be able to hit their targets.<sup>7</sup> Although 90 British fighters were employed to fend off the first Gotha raid, the Germans suffered no losses at all. Subsequent raids did impose some German losses, forcing the Germans to shift to nighttime bombings, but it was only when the British knocked out Gotha bomber bases in counteroffensive operations that the raids ceased.<sup>8</sup>

6. The number of wounded and killed in the entire Somme campaign exceeded 1 million. See Wikipedia entry, “Battle of the Somme,” available from [https://en.wikipedia.org/wiki/Battle\\_of\\_the\\_Somme](https://en.wikipedia.org/wiki/Battle_of_the_Somme).

7. See Wikipedia entry “German Strategic Bombing during World War I,” [https://en.wikipedia.org/w/index.php?title=German\\_strategic\\_bombing\\_during\\_World\\_War\\_I&redirect=no](https://en.wikipedia.org/w/index.php?title=German_strategic_bombing_during_World_War_I&redirect=no)

8. International Affairs, “HC Deb 10,” vol. 270 cc525-641, November 1932, available from [http://hansard.millbanksystems.com/commons/1932/nov/10/international-affairs#S5CV0270P0\\_19321110\\_HOC\\_284](http://hansard.millbanksystems.com/commons/1932/nov/10/international-affairs#S5CV0270P0_19321110_HOC_284)

## WWI Experience Engendered a New Science of Aerial Warfare Developed by Giulio Douhet, Hugh Montague “Boom” Trenchard, and Billy Mitchell <sup>9</sup>



Figure 8: (from left to right) Giulio Douhet, Hugh Montague "Boom" Trenchard, and Billy Mitchell

In the Interwar period that ensued, strategic bombing was viewed as a way to win wars quickly: Instead of bleeding the enemy dry through exhausting trench warfare or starving its civilian population through time-consuming, expensive naval blockades, (which the British applied with devastating results against the Germans in WWI).<sup>10</sup> The thought was to use bombers to fly over the enemy's front lines and strike at enemy army formations, military industrial plants, capital fleets, and political centers to destroy the adversary's will to fight. These views were reflected in the writings of almost all of the world's leading air war theorists – Billy Mitchell (U.S.), Hugh Montague “Boom” Trenchard (UK), and Giulio Douhet (Italy). The aim in air warfare, these military analysts argued, was to strike at the “heartland of the enemy.” In all of this, it, again, was assumed that “the bomber will always get through.”<sup>11</sup>

In 1921, Billy Mitchell, America's most vocal airpower advocate, demonstrated that airplanes could sink large capital battleships. In his book, *Winged Defense*, Mitchell also discussed

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9. See, Giulio Douhet, *Command of the Air*, Translated by Dino Ferrari, Washington, DC: Air Force History and Museum Programs, 1998, available from [http://permanent.access.gpo.gov/airforcehistory/www.airforcehistory.hq.af.mil/Publications/fulltext/command\\_of\\_the\\_air.pdf](http://permanent.access.gpo.gov/airforcehistory/www.airforcehistory.hq.af.mil/Publications/fulltext/command_of_the_air.pdf); Hugh Trenchard, "The War Object of an Air Force," in *The Art of War in World History: From Antiquity to the Nuclear Age*, edited by Gérard Chaliand, Berkeley: University of California Press, 1994, pp. 905-910; and William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military*, New York: G.P. Putnam's Sons, 1925, available at <http://babel.hathitrust.org/cgi/pt?id=mdp.39015064459731;seq=12;view=1up;num=ii>.

10. Winston Churchill, then the First Lord of the Admiralty, was explicit about the aims of the naval blockade, stating that its aim was to “starve the whole population—men, women, and children, old and young, wounded and sound—into submission.” This aim was met with hundreds of thousands of Germans dying of starvation and disease as a result. See Patrick J. Buchanan, “The US-Saudi Starvation Blockade,” available from <http://buchanan.org/blog/us-saudi-starvation-blockade-127888>.

11. This phrase was made famous in a speech on the topic given by Stanley Baldwin, November 10, 1932, before the House of Commons, London, UK, available from [http://www.emersonkent.com/speeches/the\\_bomber\\_will\\_always\\_get\\_through.htm](http://www.emersonkent.com/speeches/the_bomber_will_always_get_through.htm).

targeting cities with chemical weapons as a way to end wars quickly. Winston Churchill did as well,<sup>12</sup> suggesting that the League of Nations create a bomber command that could terror bomb the cities of aggressor states with chemical weapons. Yet, all of these authors were unclear whether or not strategic bombing meant precision targeting of military targets (e.g., ships, army formations, military production plants) or area bombing of city centers.<sup>13</sup>



Figure 9: Men on camels shooting at a plane in Iraq

noncombatants.”<sup>15</sup> However, this proposal was never finalized due to the outbreak of the Second World War. As a result, former Prime Minister Stanley Baldwin famously declared that “the only defense is offense. You have to kill more women and children more quickly than the enemy if you want to save yourselves.”<sup>16</sup>

The few bombings during the Interwar period produced a mixed set of lessons for the future of air warfare. Britain’s use of air power on its colonies (e.g., daytime bombing in cloudless weather) against defenseless rebels in Northwestern India, Iraq, Kurdistan, and British Somaliland, as well as the Italian aerial bombing of Ethiopians prior to

Fearing the worst, Interwar arms control advocates tried to ban terror air attacks. In 1925, the Geneva Protocol prohibited the use of chemical weapons, including poison gas and bacteriological weapons. At the 1932 disarmament conference, the United States, with the support of several other countries, proposed abolishing bombings with chemical or bacterial weapons,<sup>14</sup> and “terrorizing the civilian

population, of destroying or damaging private property not of military character, or of injuring



Figure 10: 1937 German and Italian bombing of Guernica, Spain

12. See, Winston S. Churchill, *The World Crisis: The Aftermath*, London: Macmillan 1929, p. 27.

13. A notable exception to this confusion is the writing of General Walther Wever, Chief of Staff of the Luftwaffe, who authored Germany’s air doctrine in the 1930s. This doctrine insisted that terror bombing of innocent civilians was a distraction from the proper military targets of strategic bombing and self-defeating as it would only increase the population’s resistance. For a fuller discussion of Wever’s work and his German critics, see Phillip s. Meilinger, editor, *The Paths of Heaving: The Evolution of Airpower Theory* (originally published by the US Air War College’s School of Advance Airpower Studies and republished by Lancers Publishers and Distributors, New Delhi, India, 2000), pp. 170-75. Ultimately, Wever’s views did not prevail.

14. *Protection of Civilian Populations Against Bombing from the Air in Case of War*, League of Nations, September 30, 1938. <http://www.dannen.com/decision/int-law.html#c>

15. *Draft Rules of Aerial Warfare*, The Hague, February 1923. <http://www.dannen.com/decision/int-law.html#c>

16. See footnote 11



World War II,<sup>17</sup> suggested that limited bombing against enemy forces and cities was effective without having to bomb with chemical weapons.

Yet another prelude to city busting came with the Spanish Civil War in 1937, when German and Italian bombers raided the small town of Guernica; three quarters of the town was destroyed, along with roughly 300 residents. Although the Germans and Italians both denied that they intentionally targeted the town (a contention still in dispute today), the raid effectively terminated local Spanish Loyalist resistance, seemingly vindicating the theories of Giulio Douhet.<sup>18</sup>

In May of 1939, just months before the outbreak of World War II in Europe, though, a clear harbinger of aerial area bombing was provided with the Japanese air raids on Chongqing. Authorized by the Japanese High Command, bombers employed incendiaries to target residential districts. In just two days, the Japanese killed more than 5,000 residents.<sup>19</sup>



Figure 11: 1938 Japanese bombing of Chongqing, China

## The Impact of Interwar Experience and Theorizing on the Early Conduct of Air Operations in WWII Was Mixed.



Figure 12: Berlin, August 1940

Mutual Allied and Axis fear of aerial chemical weapons use against populations and of bombing reprisals deterred any serious planning for the bombing of cities in the lead up to WWII. Certainly, Britain's Bomber Command was too small in 1939 to carry off the original plans to bomb the German heartland. The French, moreover, worried that Germany would launch counterattacks against French cities if the British attacked Germany towns.

This fear of reprisals was fortified by a

17. See, Thomas M. Coffey, *Lion by the Tail: The Story of the Italian-Ethiopian War*, New York: Viking Press, 1974, pp. 262-282, available from [http://nuclearpolicy101.org/wp-content/uploads/Restricted/Coffey\\_Lion-by-the-Tail.pdf](http://nuclearpolicy101.org/wp-content/uploads/Restricted/Coffey_Lion-by-the-Tail.pdf) and A. J. Barker, *The Civilizing Mission: A History of the Italo-Ethiopian War of 1935-1936*, New York: The Dial Press, Inc., 1968, pp. 231-244, available from [http://nuclearpolicy101.org/wp-content/uploads/Restricted/Barker\\_Civilizing-Mission.pdf](http://nuclearpolicy101.org/wp-content/uploads/Restricted/Barker_Civilizing-Mission.pdf).

18. See Wikipedia, "Bombing of Guernica," available at [https://en.m.wikipedia.org/wiki/Bombing\\_of\\_Guernica](https://en.m.wikipedia.org/wiki/Bombing_of_Guernica).

19. See Wikipedia, "Bombing of Chongqing," available at [https://en.m.wikipedia.org/wiki/Bombing\\_of\\_Chongqing](https://en.m.wikipedia.org/wiki/Bombing_of_Chongqing).



mini-German aerial Blitz conducted against the Polish town of Wieluń September 1, 1939. Nearly 70 percent of the town's buildings were destroyed along with a hospital. Residents were strafed. Several hundred people were killed. Again, the Germans denied the attacks were planned.<sup>20</sup>

Months later, on May 14, 1940, the Germans threatened to bomb the city of Rotterdam if resistance to Germany's invasion of the city did not cease. However, when a ceasefire was reached, German bombers proceeded to attack the city's center anyway (the reasons why are still muddled), destroying the historical center of the city and killing 900 people. The Germans then threatened to bomb Utrecht if the Dutch Government did not surrender. With no other options, the Dutch capitulated early the next morning.

These city raids, awful though they were, did not yet reflect a clear German military doctrine to bust cities. In fact, Germany's Battle of Britain, initially was not focused on destroying city centers, but rather British military bases and industrial plants. Nor was it the British Royal Air Force's (RAF's) immediate aim to bomb German cities but rather to provide effective air defenses for the UK. Only when the Germans mistakenly released bombs on a London residential neighborhood in August of 1940, did the RAF retaliate with its own bombing of Berlin, which, in turn, prompted the Germans to bomb London and other key British cities with terrorizing results (i.e., killing more than 30,000 British). Despite Hitler's considerable efforts, Germany lost the Battle of Britain and failed to achieve the strategic results the Nazis sought.<sup>21</sup>

### **RAF Operations after the Battle of Britain Moved from Bombing Specific Military Targets to Bombing Cities, Largely Due to Aiming Inaccuracies.**

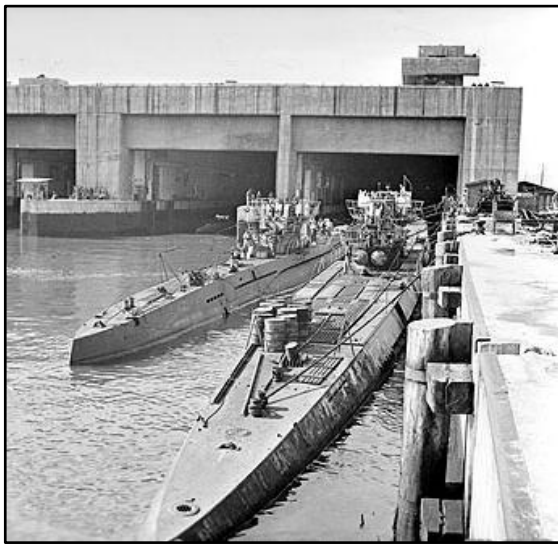


Figure 13: U-boat pen

The first planned RAF offensive strikes both before and after the Battle of Britain were against specific, Axis military targets such as U-boat pens, naval ports, and military-industrial targets in the Ruhr. These British offensive daytime strikes, however, ran into heavy German air defenses, forcing the RAF to switch to night-time bombing to reduce losses.

Initially, the UK's Bomber Command relied on their air crews' upbeat claims of how much damage these bombing runs inflicted. RAF night time bombings of German military-industrial targets, however, were tragically inaccurate. The British Air Ministry suspected as much and, in early 1941, had infrared cameras attached to the bombers to take

aerial photographs of the targets being bombed.

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20. See Wikipedia, "The Bombing of Wielun," available at [https://en.m.wikipedia.org/wiki/Bombing\\_of\\_Wielu%C5%84](https://en.m.wikipedia.org/wiki/Bombing_of_Wielu%C5%84).

21. For more on the Battle of Britain, see Wikipedia, "Battle of Britain," available at [https://en.wikipedia.org/wiki/Battle\\_of\\_Britain](https://en.wikipedia.org/wiki/Battle_of_Britain).

Lord Cherwell, Churchill's science advisor, instructed D.M. Butt of the British War Department Secretariat to study RAF German bombing runs using these cameras. Butt compared the damage reported by the bomber crews with what night-time aerial photos of 633 targets in June and July of 1941 showed. Butt's report revealed that only 10 percent of the bombers flying



Figure 14: Stray bombs around a rail yard

against night-time Ruhr industrial sites dropped their bombs within 75 square miles of their intended targets, (let alone the 1,000 yards that pilots claimed). Butt measured this aiming accuracy using the circle of error probable, or CEP. CEP is the radius drawn from the

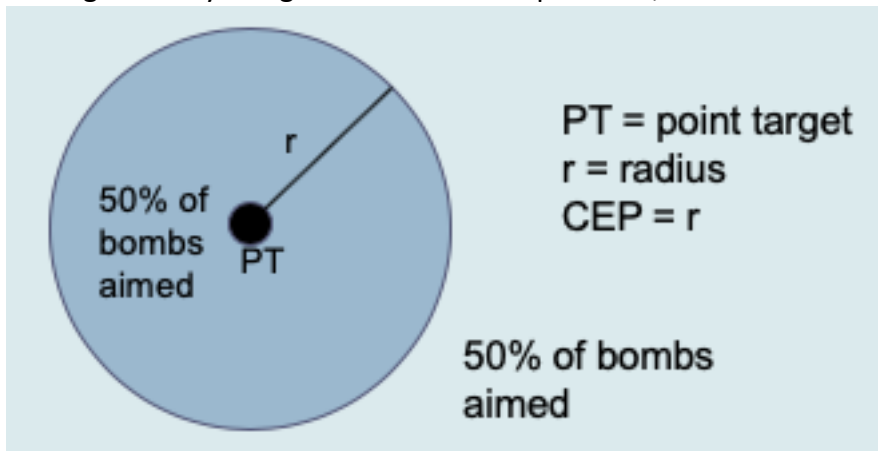


Figure 15: Circle of error probable

intended aim point that defines the circle within which half of the weapons aimed at that target fall (CEP=r) closest to it. Of all the bombing operations Butt's study examined, only five percent of the bombers got to within 75 square miles of their targets.

The Butt Report immediately sparked a

debate: If Bomber Command's efforts were so feckless, wouldn't it make more sense to transfer its resources over to the Army and Navy? This controversial proposal prompted Churchill to ask Cherwell to produce yet another study, the "Dehousing Paper." This report argued that given the RAF's limited success in destroying precise targets, the most effective use of British bombers would be to destroy German housing because it would damage German morale. The Dehousing Paper estimated that if the UK dedicated 5,000 bombers to the task, it could put one-third of Germany's population "out of house and home" by mid-1943.<sup>22</sup>

Churchill endorsed the report and shifted British bombing from military targets to striking civilian homes in night-time raids. The attack on Cologne, a 1,000-bomber raid, was the first of such "dehousing" attacks. It destroyed a good portion of Cologne, but only killed 500 residents. Incendiaries were used, but alert German fire-fighters prevented massive firestorms from developing.<sup>23</sup> A year later, however, British Bomber Command launched Operation Gomorrah

22. See B. H. Liddel Hart, "The Crescendo of Bombing: The Strategic Air Offensive against Germany," in *History of the Second World War*, New York: GP Putnam's Sons, 1970, pp. 589-612.

23. For more on the Cologne raid, see Wikipedia, "Bombing of Cologne in World War II," available at [https://en.wikipedia.org/wiki/Bombing\\_of\\_Cologne\\_in\\_World\\_War\\_II](https://en.wikipedia.org/wiki/Bombing_of_Cologne_in_World_War_II). ed. Henry Sokolski, Carlisle, PA: Strategic

against Hamburg, using the same type of incendiaries. A firestorm ensued, killing more than 40,000 people and leaving one million residents homeless.



Figure 16: Cologne raid



Figure 17: Operation Gomorrah

These dehousing bombings clearly were designed to destroy more than homes. The firebombing of Dresden first employed special bombs to blow off building roofs. Incendiary bombs were then employed to burn the homes. These also were designed to produce firestorms that would remove oxygen from wide areas, killing most, if not all, occupants. Finally, these incendiaries were followed with delayed-explosion bombs so that the few who might survive would be killed once they attempted to flee the scene.<sup>24</sup> Not surprisingly, the firebombing of Dresden became a poster child for indiscriminate slaughter of innocent civilians.<sup>25</sup>

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Studies Institute, 2004, pp. 32-39, available from <http://www.npolicy.org/userfiles/file/Getting%20Mad-The%20Origins%20of%20MAD.pdf>.

24. See Alexander McKee, *Dresden 1945: The Devil's Tinderbox*, New York: E.P. Dutton, Inc., 1984, pp. 46-68, available from [http://nuclearpolicy101.org/wp-content/uploads/Restricted/McKee\\_Dresden\\_Ideas-of-Airpower-with-notes.pdf](http://nuclearpolicy101.org/wp-content/uploads/Restricted/McKee_Dresden_Ideas-of-Airpower-with-notes.pdf).

25. Kurt Vonnegut, *Slaughterhouse-Five, or, the Children's Crusade: A Duty-Dance with Death*, New York: Delacorte, 1969; and Alexander McKee, *Dresden 1945: The Devil's Tinderbox*, New York: E.P. Dutton, 1984, pp. 46-68; Tami Davis Biddle, "Dresden 1945: Reality, History, and Memory," *Journal of Military History* 72, April 2008, pp. 413-449; and the Wikipedia entry "Bombing of Dresden in World War II," available from [https://en.wikipedia.org/wiki/Bombing\\_of\\_Dresden\\_in\\_World\\_War\\_II](https://en.wikipedia.org/wiki/Bombing_of_Dresden_in_World_War_II).



Figure 18: Raid on Dresden



Figure 19: Some of the 25,000 killed

Many German cities were destroyed in such allied air raids, but initially morale hardly weakened nor did German military production, which actually was mobilized in 1942-44 *after* the RAF bombing of German cities began.<sup>26</sup> That said, as the bombing continued, Nazi war production had to be moved out of the cities and would have been much greater had there been no city raids. This reduced production helped seal the Nazis' fate.<sup>27</sup>

### USAAF Precision Bombings Were Less Effective than Hoped.

American bombers (e.g. the B-17s, B-24s, and B-25s) had longer ranges, more accurate targeting systems (the Norden bombsight), and better and more armor and escorts than the RAF. Even with limited, daytime, and escorted bombing runs in 1943, though, U.S. bomber losses were high (from 10 percent to as high as 30 percent per run).<sup>28</sup> The United States, after suffering heavy losses, began to follow the British model of area bombing cities at night.<sup>29</sup> Germany tried to

26. U.S. Department of War, *U.S. Strategic Bombing Survey: European War*, Washington, DC: United States Government Printing Office, September 30, 1945, available from

<http://babel.hathitrust.org/cgi/pt?id=mdp.39015049492716;seq=7;view=1up>.

27. See Richard Muller, "The Origins of MAD: A Short History of City-Busting," in *Getting MAD: Nuclear Mutual Assured Destruction, Its Origins and Practice*, [http://www.npolicy.org/books/Getting\\_MAD/Ch1\\_Muller.pdf](http://www.npolicy.org/books/Getting_MAD/Ch1_Muller.pdf)

28. To curtail Axis oil production, the USAAF bombed Ploiesti, the largest oil production facility in Romania. Known as Operation *Tidal Wave*, only 88 out of 177 bombers would return. 53 of these bombers were destroyed, another 55 damaged, and over 500 airmen killed or captured. A later [report](#) by the Enemy Oil Committee indicated that the raid led to "no curtailment of overall product output." Throughout 1943 and 1944, 1,706 pilots were killed, 1,123 taken prisoner, and a total of 325 aircraft destroyed during the "oil campaign" against Ploiesti until Romania's surrender in August

1944. [https://books.google.com/books?id=4PgWCKQQP1gC&pg=PA174&dq=223+Anglo-american+bombers&hl=en&sa=X&ved=0ahUKEwj7jp\\_Gv7jcAhVBZlAKHbPADnEQ6AEIKDAA#v=onepage&q=223%20Anglo-american%20bombers&f=false](https://books.google.com/books?id=4PgWCKQQP1gC&pg=PA174&dq=223+Anglo-american+bombers&hl=en&sa=X&ved=0ahUKEwj7jp_Gv7jcAhVBZlAKHbPADnEQ6AEIKDAA#v=onepage&q=223%20Anglo-american%20bombers&f=false)

29. See, for example, Ronald Schaffer, "American Military Ethics in World War II: The Bombing of German Civilians," *The Journal of American History* 67, no. 2, September 1980, pp. 318-24, available from [http://nuclearpolicy101.org/wp-content/uploads/Restricted/Schaffer\\_Military-Ethics-in-WWII.pdf](http://nuclearpolicy101.org/wp-content/uploads/Restricted/Schaffer_Military-Ethics-in-WWII.pdf).



relocate industry to caves and forests as much as they could through the end of the war. As the war continued, though, allied air losses continued to fall nearly to zero because of the lack of enemy air interceptors and well-trained anti-aircraft crews. Also, bombing inaccuracies would fall from five miles to a 1/8<sup>th</sup> of a mile, which led to new bomber formations and techniques that minimized collateral damage. Still, lacking precision targets to hit, US military planners continued to target German cities. This bombing was conducted more out of necessity than choice.

## German Morale Did Suffer and This Was the Target in US Air Raids against Japan

That said, morale did suffer in Germany as allied bombing of German cities picked up.<sup>30</sup> The Germans who were bombed, also saw first-hand that the Nazi government could do little to prevent these attacks. Later this made it easier for Germans to accept defeat (unlike WWI where the German army and public felt the government had “stabbed them in the back” by surrendering).

This brings us to America’s decision to firebomb Tokyo. These fire bombings killed more people



Figure 20: U.S. Firebombing of Tokyo



Figure 21: Nuclear bombing of Hiroshima

promptly than the bombings of Hiroshima or Nagasaki. The war in the Pacific (particularly at Iwo Jima and Okinawa) was horrific (Japanese soldiers not only fought until their death and committed suicide, but demanded local Japanese civilians to commit suicide as well). Most Americans, including American military planners, feared that invading Japan would take more than a year and cost **500,000 American lives**.<sup>31</sup> 5-10 m japanese

As a result, American bombers began targeting cities hoping to force the Japanese government to capitulate without having to invade the Japanese home islands. These cities were ripe for firebombing, as most homes were made of paper and wood. The bombings of Hiroshima and Nagasaki were hardly that different from the firebombings in Japan and previously in Europe—

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30. See for example, the diaries of Albert Speer, who wrote that the Nazis on the Eastern front were very demoralized because they knew their loved ones were being killed back home. Albert Speer, *Spandau: The Secret Diaries*, New York: Ishi Press, 2010.

31. See Daniel Gelernter, “Was Dropping the Atomic Bomb Necessary?” *Washington Examiner*, August 27, 2015. <https://www.washingtonexaminer.com/weekly-standard/was-dropping-the-atomic-bomb-necessary>

they were intended to maximize shock.<sup>32</sup> With city busting as the objective, nuclear weapons seemed like the perfect tool.

## II. The nuclear weapons revolution: How militarily significant was it? Why, initially, did developing ever larger nuclear weapons seem logical?



Figure 22: (from left to right) the destruction of Atlanta which took 6 months, the destruction of Tokyo which took 3 hours, and the destruction of Hiroshima which took 1 second

### Bombing Warfare Theorizing:

Japan's surrender after the nuclear raids on Hiroshima and Nagasaki seemed to vindicate the Interwar aerial warfare theorists' most optimistic views. Only one bomber needed to get through. Against this, there seemed no defense. The destructiveness of the bombing was unmistakable and shocking: The effect on the enemy's will to fight seemed instantaneous. Finally, the efficiency of nuclear city busting over previous methods (from Sherman's March to the Sea to the Tokyo firebombings) was both quantifiable and clear.

### Targeting Civilians and Cities: An Early Cold War Objective

After Hiroshima and Nagasaki, how willing might the United States be to use nuclear weapons against civilians again? With the Cold War, the answer was clear -- quite willing. In fact, throughout the late 1940s, the U.S. military developed nuclear bombing plans that explicitly targeted Soviet cities. The first of these, HALFMOON, was exercised in 1948. To avoid

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32. Counting both prompt and delayed deaths, which occurred a few months later due to radiation and burn injuries, though, the nuclear bombing of Hiroshima resulted in 90,000 to 146,000 deaths; Nagasaki in 39,000 to 80,000. Roughly half of the total number of deaths occurred the day of the bombings. See Lawrence Freedman, "The Strategy of Hiroshima," *The Journal of Strategic Studies* 1, issue 1, May 1978, pp. 76-97; John Hersey, "Hiroshima," *The New Yorker*, 1946, available from <https://www.newyorker.com/magazine/1946/08/31/hiroshima>; Patrick Blackett, *Fear, War and the Bomb: Military and Political Consequences of Atomic Energy*, New York: Whittlesey House, 1949, pp. 39-73; and Keiji Nakazawa, *Barefoot Gen*, Directed by Mori Masaki, July 21, 1983, 85 min. See esp. the clip "Hiroshima Destroyed," available from [http://www.liveleak.com/view?i=46b\\_1311794023](http://www.liveleak.com/view?i=46b_1311794023).

conventional losses in Europe, the United States would launch an “atomic blitz” targeting 133 nuclear bombs against 70 Soviet cities. The objective would be to “kill” the Soviet nation. Similar plans—FLEETWOOD, DOUBLESTAR, and OFFTACKLE—were also played out. Yet another war plan, TROJAN, was designed to reduce Soviet industrial production by 40%, kill 2.7 million civilians, and cause an additional 4 million casualties.

Navy officers, who staged the Admiral’s revolt of 1949, opposed cutting spending on aircraft carriers. They condemned the Air Force’s “atomic blitz” plans as both futile and immoral; futile because after any nuclear strike against Russia, the Soviets could still use their conventional forces to take over Europe, and immoral because such nuclear plans threatened the “random mass slaughter of men, women, and children.” When asked about his position, Chairman of the Joint Chiefs of Staff Omar Bradley replied, “as far as I’m concerned war itself is immoral” and made it clear he had no qualms about targeting innocents. Truman, also, rejected the Admirals’ complaints; formally adopting the “atomic blitz” plans in 1949.<sup>33</sup>



Figure 23: U.S. bombs being dropped on North Korean towns

The American military’s willingness to attack civilians was no bluff. In its war against North Korea, the United States dropped more bombs—667,577 tons—on North Korea than it had on all of the Pacific Theater during WWII. These raids killed 10-20 percent of the population (i.e., more than one million North Koreans). Nor was this targeting accidental: General Curtis LeMay, SAC commander, made no apologies for killing North Korean civilians. For him there were “no innocent civilians.”<sup>34</sup>

This hardened view carried over to U.S. nuclear policies more generally. Eisenhower for example, threatened to use “tactical” nuclear weapons, which he believed should be used “exactly as you would a bullet or anything else.”<sup>35</sup> As for striking innocents, in the early 1960s, McNamara, Secretary of Defense for President Kennedy justified the size of America’s nuclear force in terms of being able to deter the Soviets by having an assured capability to destroy 25 percent or 55 million of Russia’s population.<sup>36</sup>

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33. See Eric Schlosser, *Command and Control: Nuclear Weapons, the Damascus Accident and the Illusion of Safety*, New York: Penguin Press, 2013, pp. 93-88, 119-144.

34. From “LeMay’s interview with Sherry, Interview “After the War,” p. 408 n. 108 in Michael Sherry, *The Rise of American Air Power: The Creation of Armageddon*, New Haven, CT: Yale University Press, 1987, p. 287.

35. President Eisenhower, News Conference, March 16, 1954, available at <https://www.nps.gov/features/eise/jranger/quotes2.htm>.

36. Defense Secretary McNamara, Memo to President Kennedy, November 21, 1962.

It wasn't until the mid-1950s that America's "atomic blitz" plans to attack Soviet cities was adjusted to focus on knocking out the USSR's strategic nuclear forces. Given the inaccuracies of American missiles and the sheer number of targets to be destroyed, though, such counterforce strikes still would have killed millions of civilians.

## Initially the Nuclear Revolution Was Reflected by Increases in Yield

Because the nuclear revolution used increased lethal (blast) area to compensate for persistently poor aiming accuracies, then, it was a revolution that initially was measured in terms of explosive yield.

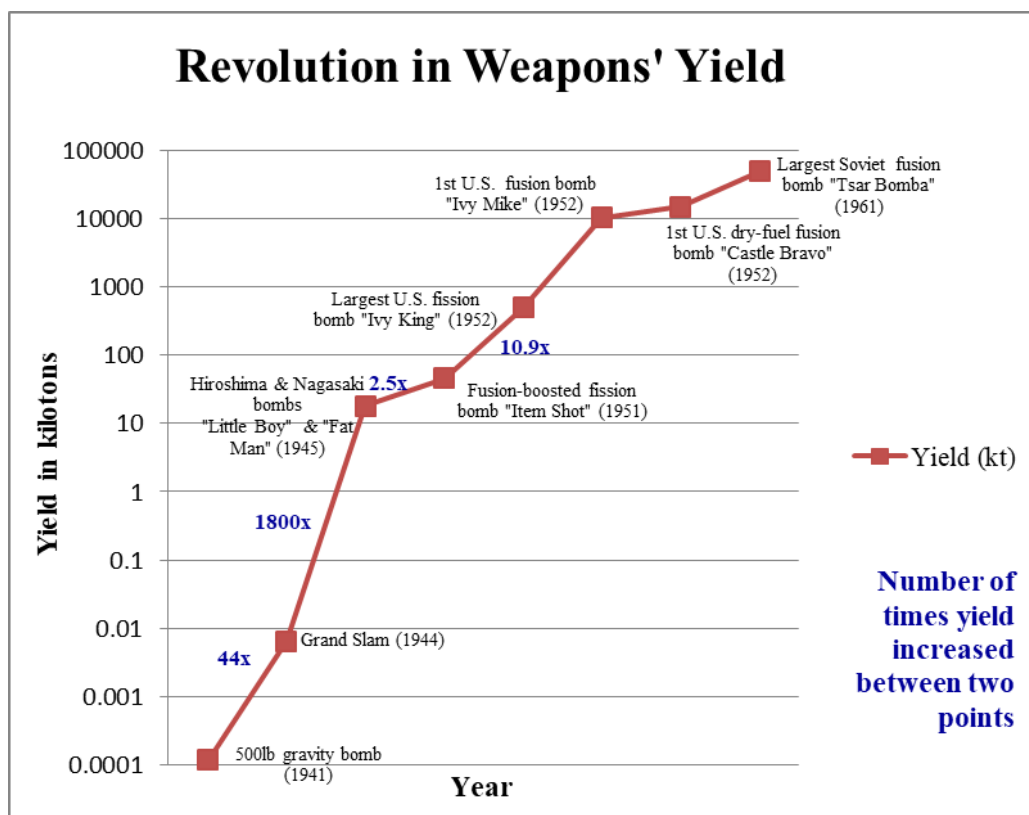


Figure 24: Logarithmic portrayal of increasing yields: 1941-1961

The units used to describe these yields in kilograms or metric tons of high explosive equivalents are given below:

2.2 pounds	1 kilogram
1000 kg	1 metric ton
1000 metric tons	1 kiloton (kt)
1000 kt	1 megaton (mt)



## Increases in Major Conventional and Nuclear Bomb Yields: 1941-1961.

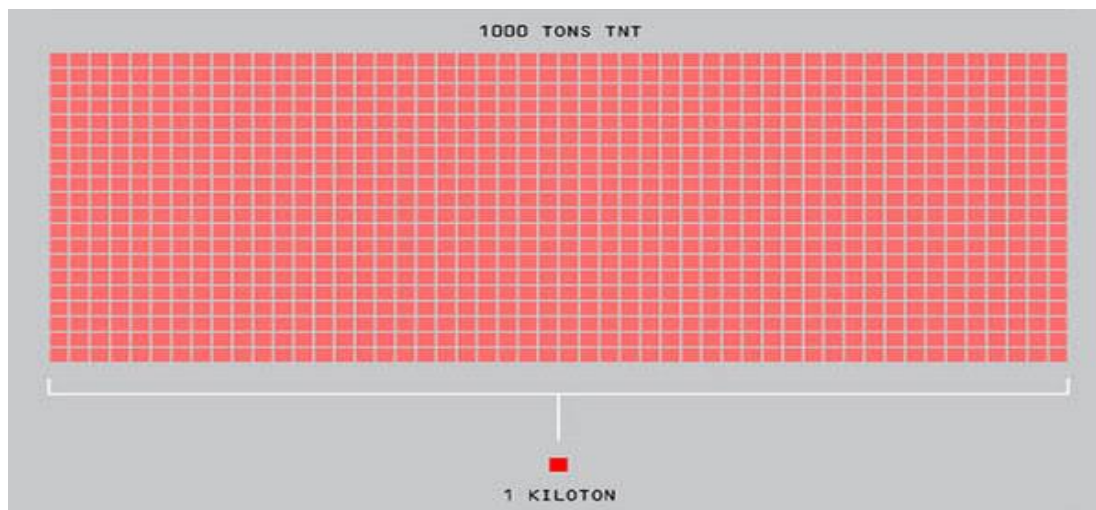


Figure 25: Visualizing a kiloton

Here are some yields of nonnuclear high explosive and volumetric bombs:

- 500-lb nominal WWII bomb (which carried about 113 kilograms of high explosive)
- Grand Slam—the largest conventional bomb used in WWII. It weighed 10 metric tons (10,000 kilograms) and carried 4,090 kilograms of high explosive (0.004 kt)
- MOAB (US volumetric bomb named Massive Ordnance Air Blast) and FOAB (Russian conventional bomb, named The Father of All Bombs, also a volumetric fuel/air explosive)—roughly 11 and 44 tons of high explosive respectively (0.011 and .044 kt)<sup>37</sup>

Now to compare them to nuclear weapons yields:

- Little Boy (Hiroshima)—uranium gun-barrel bomb, 15 kt.
- Item Shot (boosted device)—45.5 kt
- Ivy Mike (first thermonuclear weapons test)—10.4 mt
- the B53 — 9 mt.
- Tsar Bomba (nonoperational thermonuclear weapon)—50 mt.

These constituted exponential increases in weapons yields (from the Grand Slam to Tsar Bomba). Prior to the appearance of nuclear weapons, the explosive yields of all bombs had been measured with either pounds or tons whereas nuclear bomb yields were measured in kilotons and megatons. This more than a one million-fold increase in explosive yields was made to increase lethal area.

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37. The U.S. Massive Ordnance Air-burst Bomb (MOAB), tested on March 11, 2003, was considered the most powerful non-nuclear weapon in existence until the development of an even larger weapon by the Russians. With a yield of approximately 44 tons (0.044 kt), the Russian-designed weapon, called the "Father of All Bombs" or FOAB, is four times more powerful than the MOAB. It was tested on September 11, 2007.

## Understanding the Nuclear Yield Revolution: Lethal Area

Lethal Area is the amount of damage caused by a weapon's blast within a circle whose center is the aim point.

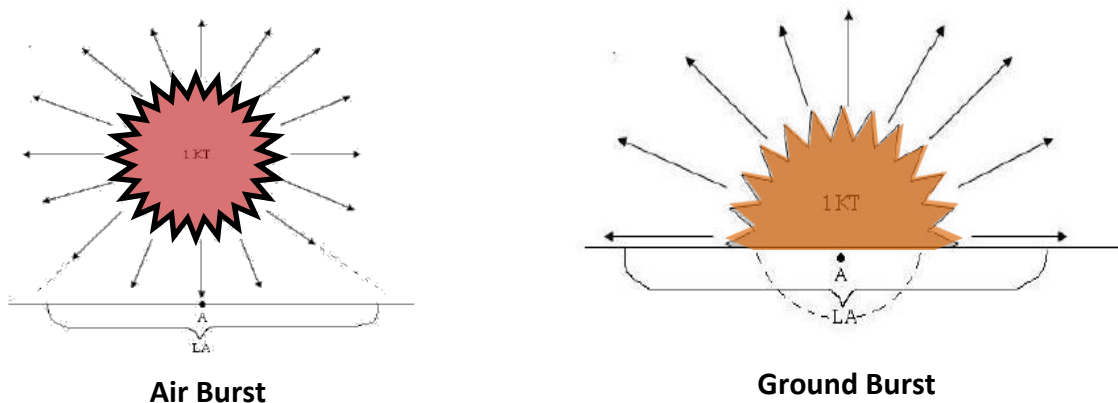


Figure 26: Air burst vs ground burst

Because energy from a large explosive is released as a sphere, not all the energy from a nuclear weapon is released toward the ground; much of it is directed away from the target. In addition, much of the energy that is directed against the target exceeds many times what is needed to destroy the target.

When it comes to nuclear detonations, then, the lethal area, or LA, is not identical to yield but instead is directly proportional to the cube root of the weapon's yield (lethal radius or LR = constant  $\times y^{1/3}$ ). If you increase the yield of a nuclear weapon with a 1-mile lethal radius 1,000-fold (say from 1 kiloton to 1 megaton), then, you increase its lethal radius not 1,000-fold (that would be nearly 1,000 miles -- the distance from Washington DC to Chicago), but only 10-fold (i.e., 10 miles -- the distance from the Capitol to Bethesda or University Park).

P.M.S. Blackett—a Nobel Prize-winning physicist who applied operations research techniques to improve the effectiveness of RAF WWII airstrikes and defenses—used this point to argue that nuclear weapons were not all that revolutionary. Nonnuclear states, he argued, could destroy as much area with much less yield by using many smaller conventional bombs that do not obey the  $y$  to the  $1/3$  power rule rather than by “inefficient,” large yield nuclear weapons that do. He noted that if you explode a 20-kiloton bomb at optimal height it would not do as much damage as two kilotons worth of high explosive dropped on the target in a large number of much smaller conventional bomb packages.

Blackett spotlighted this point to discredit the nuclear weapons revolution.<sup>38</sup> However, if you are dropping many more conventional weapons, you need many more bombers to deliver them and these must survive active air defenses. This requirement for a large bomber fleet increases the cost of delivery significantly. As a result, any “inefficiencies” in using large nuclear explosives to destroy a surface target are more than made up for by how few bombers are needed to deliver them and how much more survivable and cheaper this smaller bomber force will be.

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38. See, Patrick Maynard Stuart Blackett, *Fear, War and the Bomb: Military and Political Consequences of Atomic Energy* (New York: Whittlesey House, 1949), 39-7.

Of course, Blackett's key argument downplaying the destructiveness of nuclear weapons was sound and was actually picked up by the U.S. civil defense effort to calm citizens' fears of nuclear attacks and to get them to adopt passive defense measures. Unwittingly, though, this only further validated how revolutionary nuclear weapons were: Before the advent of nuclear weapons, the U.S. never had a serious national civil defense program. Also, as one of the U.S. civil defense handouts made clear, "Should you happen to be one of the unlucky people right under the bomb, there is practically no hope of living through it."<sup>39</sup>

The superior efficiency of using fewer nuclear bombers to hold targets at risk was also reflected in America's military force structure. By the mid to late 1950s, the U.S. Air Force (USAF) devoted nearly all of its bombers to delivering nuclear weapons. Few, if any, had conventional bomb racks. This remained the case until President Kennedy expanded America's role in the Vietnam War and the Joint Chiefs of Staff decided conventional bombing was needed again.

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39. Quote from National Security Resources Board, Civil Defense Office, *Survival Under Atomic Attack*, NSRB Doc. 130, Washington, D.C.: U.S. Government Printing Office, 1950, available at <http://www.plosin.com/beatbegins/archive/SurvivalBooklet.htm>. Also see, National Military Establishment. Office of the Secretary of Defense, *A Study of Civil Defense*, [Bull Board Report], Washington, D.C., February 1948, available at <http://babel.hathitrust.org/cgi/pt?id=mdp.39015039752897;view=1up;seq=5>; and National Security Resources Board, *United States Civil Defense*, NSRB Doc. 128, Washington, D.C.: U.S. Government Printing Office, 1950, available at [https://www.governmentattic.org/21docs/USCivilDefense\\_NSRB\\_Doc.128\\_1950.pdf](https://www.governmentattic.org/21docs/USCivilDefense_NSRB_Doc.128_1950.pdf).

### III. Precision guidance: How it constituted a counter revolution that dramatically changed nuclear weapons deployments

The revolution in increasing aiming accuracies was much slower and quieter than the revolution in increasing nuclear yields, but militarily it was as, if not more, significant.

The optimal aiming CEP of the weapons dropped in 1941 was 10,000 times worse (i.e., larger) than the optimal CEPs of precision-guided bombs and missiles today (26,400 ft in 1941 vs roughly 2-3 ft or less today). What difference does that make?

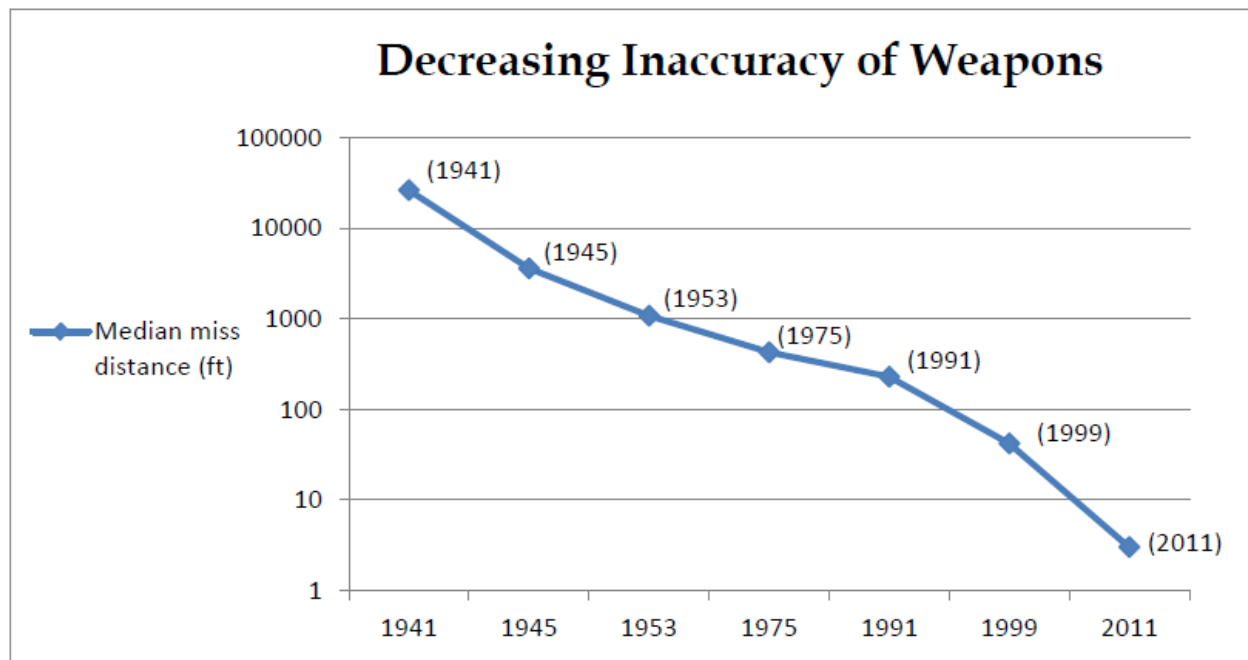


Figure 27: Aiming inaccuracies, 1941-2011: A thousand-fold reduction

First, with such increased aiming accuracies, the yield needed to destroy a point target declined exponentially. By decreasing the aiming inaccuracies, i.e., decreasing the CEP 10,000-fold, it is now possible to destroy most point targets with a probability of kill greater than 90 percent. Sometimes, these targets can be destroyed with zero-explosive yield weapons, i.e., with just the kinetic energy of the projectile itself.

Second, the same reduction in aiming inaccuracies dramatically reduced the number of large yield weapons needed to destroy a point target. For example, to destroy a point target with at least a 90 percent probability of kill using 1-kt yield nuclear weapons with a 1 km lethal radius and a 10 km CEP, you need 333 weapons. However, in the same scenario, using delivery accuracies of .5 km, you only need to use one weapon. With CEPs of a few meters or less, the weapon can use a relatively small amount of high explosive or be merely kinetic.



## Real World Results

In the Vietnam War, the Thanh Hoa Railroad and Highway Bridge was a critical target. The United States attempted over **800** conventional bombing runs to bring the bridge down without success. Finally, the United States was able to destroy the bridge using eight high-accurate laser-guided bombs delivered by only eight bombers.



Figure 28: Thanh Hoa Bridge

Increased aiming accuracies also made it possible to use smaller yield nuclear weapons in place of larger ones—e.g., 9 mt Titan vs. 5 kt Pershing II warhead. As aiming accuracies increased, U.S. and USSR nuclear arsenal mega-tonnages also plummeted, as did the number of deployed nuclear weapons in each country's arsenal. Military planners didn't need so many nuclear weapons (or any) to hit and destroy most point targets. This, not arms control agreements, explains much of the nuclear arms reductions that occurred during the last decades of the Cold War.<sup>40</sup>

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40. For more on the real-world implications of precision guidance, see James Digby, "Precision Guided Weapons." Adelphi Paper no. 118, London: International Institute for Strategic Studies, 1975, pp. 1-13. For a detailed description of how the dramatic increases in yield and precision interact, see Henry Sokolski and Greg Jones, "Two Modern Military Revolutions: Dramatic Increases in Explosive Yields and Aiming Accuracies," *Nonproliferation Policy Education Center*, last modified August 1, 2017, available from <http://nuclearpolicy101.org/wp-content/uploads/PDF/Two-Modern-Military-Revolutions.pdf?csspreview=true>.

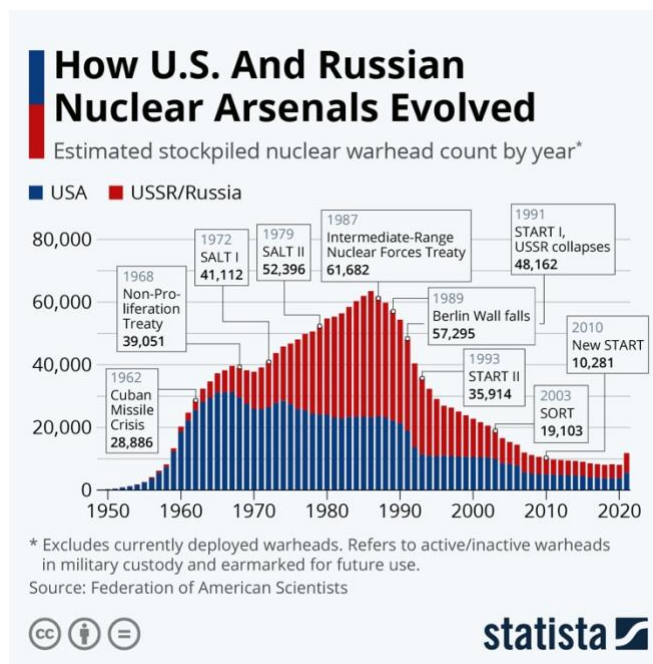


Figure 29: Number of warheads the U.S. has compared to Russia

#### IV. City busting: How is its morality still an issue today?

It is worth noting that the morality of the Allied bombing of Dresden and other cities during World War II is still debated today. In any such debate, the “Just War” concept of proportionality is frequently the point of departure.<sup>41</sup> By this theory, an attack on a military target cannot be viewed as legitimate if the commander knows that civilian casualties will be in excess of the anticipated military benefits that might be gained.

An application of this rule helps explain the debate over the allied refusal to bomb the German concentration camps. In this case, the justification for not bombing the railheads to the camps is an example of what might be viewed as comparative proportionality.<sup>42</sup> Allied officials judged that the military benefits of disrupting the extermination of Jews were not as great as the perceived military benefits of continuing to conduct strategic bombing raids on German cities. The latter was viewed as being critical to win the war, the former was not. Instead, bombing concentration camp railheads was seen as a *harmful* diversion of resources from the main military effort of the time—city busting.

This call, though, is rebuttable. After all, the benefits of city busting during World War II were hardly as great as hoped for. Yes, both German morale and war production were reduced by the raids, but the latter was not hit all that hard until late 1944. In the case of the Air Force’s

41. For a discussion of the morality of striking German cities that uses a variant of the proportionality principle see, Michael Walzer, “Supreme Emergency,” in *Just and Unjust Wars: A Moral Argument with Historical Illustrations*, 4th ed., New York: Basic Books, 1977, pp. 251-268, available at [http://nuclearpolicy101.org/wp-content/uploads/Restricted/Walzer\\_Just-and-Unjust-Wars.pdf](http://nuclearpolicy101.org/wp-content/uploads/Restricted/Walzer_Just-and-Unjust-Wars.pdf).

42. See Alexander B. Downes, *Targeting Civilians in War*, Cornell Studies in Security Affairs, Ithaca, NY; Cornell University Press, 2008.

reluctance to bomb the concentration camp railheads, the theory of proportionality could be faulted for giving insufficient emphasis to the moral benefits of saving innocents lives. In fact, as a war drags on, there is a natural tendency for the combatants to become ever more brutal in their moral calculations. The ultimate victors, as a consequence, can be counted upon to calculate “proportionality” (which is subjective) in disproportionate ways. As a result, cases where innocents are killed in military operations are viewed by the victors as being “proportionate” in more cases than might otherwise be warranted.

As for U.S. bombings of major Japanese cities, several government studies done immediately after the war found that the continued aerial anti-ship attacks and naval mining and blockade of Japan might have been as, or more, effective in bringing the war to an end.<sup>43</sup> On the other hand, the shock of the nuclear bombings did help bring home just how hopeless further resistance would be. This was a major, albeit a mostly unspoken, factor in our military’s decision to bomb Hiroshima and Nagasaki. The Japanese military leadership was fanatical (it even attempted to overthrow the emperor when it learned he wanted to surrender after the nuclear bombings). The Japanese government’s over-reliance on the religious cult of warrior spirit, or *bushido*, was responsible for the severe casualties suffered in retaking the Pacific islands.<sup>44</sup> This, in turn, dramatically increased allied projections of the number of troops required and of the number of casualties it would take to conquer Japan. In this context, dropping the bomb is defended as not only being proportionate, but necessary and justified.

Still, the bombings are debated.<sup>45</sup>

Making moral judgments about city busting during the Second World War, of course, is complicated by how terribly difficult it was to locate the exact targets, destroy them without excessive collateral damage, and to assess what the impact was if they were hit.<sup>46</sup> As such, there is a persistent “grayness” to the morality of World War II area bombing that respected historians and ethicists still struggle with.<sup>47</sup> We should do the same.

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43. See U.S. Department of War, *US Strategic Bombing Survey: Pacific War*, Washington, DC: GPO, July 1, 1946.

44. See, e.g., Max Hastings, *Retribution: The battle for Japan, 1944-45* (New York City, NY: Alfred Knopf, 2008).

45. Cf. Ward Wilson, “The Bomb Didn’t Best Japan...Stalin Did,” *Foreign Policy*, May 29, 2013, available at <http://foreignpolicy.com/2013/05/30/the-bomb-didnt-beat-japan-stalin-did/> and Daniel Gelenter, “Was Dropping the Atomic Bomb Necessary?” *The Weekly Standard*, August 27, 2015, available at <http://www.weeklystandard.com/was-dropping-the-atomic-bomb-necessary/article/1020243>. Also see Zachary Keck, “How Hiroshima and Nagasaki Saved Millions of Lives,” *The Diplomat*, August 7, 2014 available at <https://thediplomat.com/2014/08/how-hiroshima-and-nagasaki-saved-millions-of-lives/> and Ward Wilson, “Did bombing Hiroshima and Nagasaki save lives?” *Beyond Nuclear International*, August 13, 2018, available at <https://beyondnuclearinternational.org/2018/08/13/did-bombing-hiroshima-and-nagasaki-save-lives/>.

46. See U.S. Department of War, *U.S. Strategic Bombing Survey: European War*, Washington, DC: United States Government Printing Office, September 30, 1945, available at <http://babel.hathitrust.org/cgi/pt?id=mdp.39015049492716;seq=7;view=1up>; and U.S. Department of War, *U.S. Strategic Bombing Survey: Pacific War*, Washington, DC: United States Government Printing Office, July 1, 1946, Summary available at <http://www.anesi.com/ussbs01.htm>.

47. Because of the controversy surrounding the tactics used by the RAF Bomber Command, the British did not create a memorial for the sacrifices made by members of the command until 2012; see *Wikipedia*, “RAF Bomber Command Memorial,” available at [https://en.m.wikipedia.org/wiki/RAF\\_Bomber\\_Command\\_Memorial](https://en.m.wikipedia.org/wiki/RAF_Bomber_Command_Memorial). For a strong case that the Allied bombing of cities was morally bankrupt, see A. C. Grayling, *Among the Dead Cities: The History and Moral Legacy of the WWII Bombing of Civilians in Germany and Japan*, New York: Walker and Company,

Things, however, are different today. Certainly, increased aiming accuracies have restrained the likely use and destructiveness of nuclear arms. Now, there are more discriminate ways to knock out military point targets than there were in 1945.

We can hit most point targets with precisely aimed conventional weapons. We also have better intelligence and surveillance systems to find military targets and can conduct bomb damage assessments in a timely way. As a result, the need to rely on the threatened use of large numbers of nuclear weapons, high-yield or not, has declined significantly.

Now, instead of city busters, U.S. military targeters see nuclear weapons as silo and bunker busters (i.e., weapons needed to threaten very hard, deeply buried military assets and command centers), or possibly as electromagnetic pulse (EMP) weapons that would not directly kill anyone. This observation, however, is not necessarily dispositive. Major wars usually become increasingly destructive the longer they drag on. As this occurs, there is a natural attraction for each side to increase the levels of violence and to use what weapons they have in ever more indiscriminate ways (think revenge, desire to “shock”, weapons of last resort etc.). It is an open question whether during a prolonged war between nuclear-armed powers the two sides will restrain themselves from using nuclear weapons against military or civilian targets.

A recent poll found that in order to save the lives of 20,000 U.S. soldiers, most Americans would, in fact, support a decision to drop a nuclear bomb against an Iranian city (Iran is a non-nuclear armed state), even if dropping the bomb killed two million Iranian civilians. A slightly larger percentage of Americans would be willing to kill 100,000 Iranians with conventional bombs or nuclear bombs in an effort to intimidate Tehran into surrendering without risking U.S. lives.<sup>48</sup> This suggests that politically we are fully capable of bombing cities today even though we have precision guidance munitions we lacked in 1945.

With increased numbers of accurate weapons, some experts believe that major powers will run out of military targets early on in the next major war. According to these experts, the question is whether it would be necessary or desirable to target innocent civilians in cities to force an end to the conflict.

Then, there is the matter of nuclear arms control. For all of these major advances in military science, the U.S. nuclear weapons requirement review in 2010 actually considered going down to 500 nuclear weapons for arms control purposes, and using this smaller arsenal as a “deterrence only” force, targeting cities rather than weapons or military bases. The Joint Chiefs of Staff rejected this option as being inappropriate. Yet, President Obama refused to rule it out. This would suggest that, in the name of nuclear weapons reductions and simplified deterrence, we may well come around full circle to explicitly targeting cities again.<sup>49</sup>

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2006, pp. 209-281, available at [http://nuclearpolicy101.org/wp-content/uploads/Restricted/Grayling\\_Among-the-Dead-Cities.pdf](http://nuclearpolicy101.org/wp-content/uploads/Restricted/Grayling_Among-the-Dead-Cities.pdf). Compare with Robert Pape, *Bombing to Win*, Cornell University Press, 1996.

48. Scott Sagan and Benjamin Valentino, “Revisiting Hiroshima in Iran,” *International Security* 42, no. 1, summer 2017, pp. 41-79, available from [http://www.mitpressjournals.org/doi/pdf/10.1162/ISEC\\_a\\_00284](http://www.mitpressjournals.org/doi/pdf/10.1162/ISEC_a_00284).

49. See R. Jeffrey Smith, “Obama Administration Embraces Major Nuclear Weapons Cuts,” Center for Public Integrity, February 8, 2013, available at <https://www.publicintegrity.org/2013/02/08/12156/obama-administration-embraces-major-new-nuclear-weapons-cut>.



This brings us to an image to ponder. Consider two photos. One is of a pyre of dead civilians killed in the Dresden firebombings (the bodies had to be burned for public health reasons). Another photo is of a pyre of bodies killed in a German concentration camp. The action in one photo is viewed as being a war crime. The other, in contrast, is still justified today as being a “proportionate” act of military necessity. Yet, viewing these two photos, it is difficult, if not impossible, to tell which is which. This raises the question: Is it still militarily necessary or “proportionate” to do this today? Or should it constitute a war crime? These are still relevant questions as we and our adversaries continue to threaten use nuclear arms to deter each other today.



**Figure 30: Pyre of dead bodies from Dresden firebombings**



**Figure 31: Pyre of dead bodies from German concentration camp**