For Scale

Operation Rolling Thunder was meant to be an act of persuasion. The US believed that a drawn-out bombardment would pressure the North to cease its aggression on the South — or, at least, encourage it to ease up. “I saw our bombs as my political resources for negotiating a peace,” President Lyndon Johnson claimed. His framing was belied by the words of Air Force Chief of Staff Gen. Curtis E. LeMay, who said, “We’re going to bomb them back into the Stone Age.”

Rolling Thunder was supposed to take eight weeks. Instead, it lasted more than three and a half years, with hundreds of thousands of sorties. It was longer than any bombing campaign during World War II or any other war that came before; it remains the longest bombing campaign in history. It cost the US $900 million, compared to an estimated $300 million in damage to the North Vietnamese. Given that the conflict continued for another seven years, it’s safe to say that Rolling Thunder was not very persuasive.

Still, Secretary of Defense Robert McNamara thought it could work. Before the war, McNamara had made the unusual choice of leaving his position as the president of Ford Motor Company — at the time, one of the highest-paying jobs in the world — to work for the White House. He was a numbers guy, who believed that everything could be solved through efficiency metrics. The method was called “scientific management.” That belief in quantification had boosted American corporations; certainly it could do the same for US foreign policy.

Rolling Thunder reflected McNamara’s ambitions and approach toward Vietnam. According to a biography by Deborah Shapley, he saw the bombing campaign “as a balance sheet, with the number of enemy targets hit in one column and measures of enemy activity in the South on the other.” Not coincidentally, many historians see Rolling Thunder as a microcosm for the

conflict itself — the hubris of the United States, its inability to understand what kind of war it was getting into. But even if one looked at the strategy on McNamara's terms, they would see that the numbers offer a glimpse into the size and scope of what true failure looks like.

During Rolling Thunder, between 1965 to 1968, the US dropped 864,000 tons of explosives over Vietnam. We know this precise measurement because the military keeps active and accurate records, which it did for allocations, accountability, and so McNamara could inform policy decisions. For scale, the RMS *Titanic* weighed about 58,587 tons. The munitions dropped during Rolling Thunder would be the equivalent of nearly 15 Titanics.

But it's a bit hard to imagine how big a *Titanic* is, let alone 15 of them. It's easier to conjure a modern Ford F-150 pickup truck, the country's most popular automobile, which weighs around 5,000 pounds on average. So imagine the bombs dropped during Rolling Thunder as nearly 344,000 pickup trucks — the kind you're most likely to see on the road, but hundreds of thousands of them. For context, your average Ikea parking lot has the space for 1,700 automobiles. So envision about 202 Ikea parking lots, completely filled with pickup trucks.

Though Rolling Thunder was primarily a bombing campaign, it was also an early opportunity for the US to flex its air combat superiority. The US deployed variations of an explosive projectile developed by Raytheon, known as the Sparrow, for plane-to-plane encounters. It is now infamous for being a terrible missile — accuracy is an efficiency metric, and the Sparrows were not accurate. Military studies conducted after the war found that only 9.2 percent of Sparrows fired during the war hit their targets. A whopping 66 percent of them malfunctioned; the remaining failures just missed. The batting average of one of the worst hitters of all time, dating back to the beginning of Major League Baseball, belonged to Bill Bergen. He played for the Brooklyn Dodgers around the turn of

the 20th century and batted about 0.170 — so about two times better than a Sparrow missile. There were plenty of excuses for the Sparrow's performance: poor training, poor production, poor maintenance. It didn't change the fact that each missile may have cost as much as $225,000, which, after inflation, would be $2.3 million a piece today.

But McNamara's favorite efficiency metric was "loss exchange ratio." It is the simple math of determining the quantitative relationship between how many you lost to how many they lost. That figure asks: *what is the value of a life?* You could determine the average price of saving a life to determine a human being's worth. Conversely, as the military does, you can calculate how much it costs to kill them. The formula is straightforward: how much you spent divided by the number of deaths. If this sounds blunt, it is exactly the equation the US used. Loss exchange ratio is better known as kill ratio.

Being a man of "cool efficiency," as he called himself, McNamara had an advantage in continuing to push through these doomed plans. One aide described him as being forceful and convincing. In meetings, McNamara arrived with "briefs, numbers, ratios, estimates, and projections." (The same aide also described him as "exhausting.") Gen. Maxwell Taylor, chairman of the joint chiefs of staff, described encounters with the defense secretary as being "bombarded."

It's why the explosives kept falling, even as the numbers didn't look great for Rolling Thunder. The most generous estimate of casualties claims that 21,000 enemy combatants were killed, meaning that, after spending $900 million, each one cost the US around $42,857. (Adjusted for inflation, that's $9.2 billion — so $438,095 per life. Again, not very efficient.) McNamara considered body count to be the most precise, objective metric for success, but at no point did that factor in the more than 182,000 civilians killed during Rolling Thunder.

That was just during the three-year span of Rolling Thunder. Over the course of the two decades the US military was in Vietnam, the US dropped an estimated 5 million tons of explosives. That’s twice as much as during the entirety of World War II, and it remains, to this day, the largest bombardment of any single country ever.

Five million tons of bombs, or if it’s easier to imagine, 85 Titanics.

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The Vietnam Veterans Memorial stretches for 400 feet. One built for non-Americans lost with the same density of names would stretch for nearly five miles

The best way to honor the dead was with a competition. The Vietnam Veterans Memorial Fund asked, w*ho could design the best war memorial?* The requirements were sparse: it must use the names of the lost soldiers; it must be "reflective" and "harmonious" while making "no political statement of the war." The competition opened in the fall of 1980, and submissions were blind judged. Every entry was given a number rather than a name. There were 1,421 proposals, and a jury of eight unanimously chose the winner: entry #1026.

Maya Lin was 21 years old and studying architecture as an undergraduate at Yale University. She'd already been thinking about death. Earlier, for a class, she'd designed a memorial for an imagined World War III; she turned in a drawing of an underground tomb, a concept that deeply upset her professor. For the Vietnam Veterans Memorial competition, she sketched a cut in the earth; a sunken, black stone listing the soldiers' names and nothing more. "□□The need for the names to be on the memorial would become the memorial; there was no need to embellish the design further," she said.

Lin was surprised to win the competition. She'd submitted it in a college class and received a B. (No matter, her professor had entered the competition and lost.) Being entry #1026 had obfuscated the fact that she was Chinese American from the judges, but once her proposal was announced to the public, there were concerns that the memorial should not be designed by someone of Asian descent. Lin spent several tortuous months in Washington, DC, overseeing the project, enduring criticism of her design from all sides. She recalls one *Washington Post* op-ed dubbing her work "an Asian memorial for an Asian war." (She was born in Ohio.)

As Lin's work moved through a bureaucratic approval process, other design choices were called into question. One crucial facet of Lin's idea was to list the names chronologically; veterans groups resisted the idea, saying it would be difficult for visitors to find the exact location of where a

soldier was honored. Wouldn't it be so much easier to list names alphabetically? But Lin fought hard to preserve the chronology, and she prevailed in the end: an honest accounting of death over a convenient one. The memorial would live firmly in time, rather than outside of it.

There was pushback on the color, as well. "One needs no artistic education to see this design for what it is: a black trench that scars the Mall. Black walls, the universal color of shame and sorrow and degradation," said veteran Tom Carhart. In an essay for the *New York Review of Books* many years later, Lin defended her choice. "I do not think I thought of the color black as a color, more as the idea of a dark mirror into a shadowed mirrored image of the space, a space we cannot enter and from which the names separate us, an interface between the world of the living and the world of the dead," she wrote. The prompt had asked for "reflective" – the black granite was quite literally reflective.

Unconvinced, Carhart and other critics suggested the wall be made white and adorned with a more conventional eight-foot-tall statue of wounded soldiers. Plus, they wanted a flag right in the center. Lin objected, claiming the additions violated the integrity of the work. The US Commission of Fine Arts, which had final say, heard arguments in favor of and against Lin's design, and eventually settled on a compromise: Lin's vision would remain intact, but a statue and a flag would be added – not in the center, but off to the side. No one informed Lin of the additions, and only after reading about it in the paper did she learn her vision would be undermined. ("They didn't have the stomach to tell me," she said.) The memorial was completed and dedicated in November 1982, but by that point, Lin had already left Washington.

In a city that is full of bright white neoclassical statues and monuments, the Vietnam Veterans Memorial is an unabashed piece of the land art movement, appearing almost like a dark gash carved into the ground. Lin even said she wanted it to

look like a “wound that is closed and healing,” but the fact remains that black granite is a static material, a hard rock that is as close to permanence as we have on this planet.

The names set in the stone are cast in the typeface Optima. (Decades later, John McCain would deploy the same type in his presidential campaign logo.) Every name on the memorial is the same size, giving equal weight to each life, regardless of military rank. There are 58,395 names in total, representing the soldiers that were killed or missing in action from 1956 to 1975. For scale, if you met an average of two new people a day, every day — an incredible social clip — you would encounter only 55,518 people, assuming you lived to the American average age of 76. More than a lifetime’s worth lost, now memorialized as a small name chiseled into a slab of granite.

That death toll has become a strange marker to convey magnitudes of loss: for traffic accidents, gun violence, and other wars. During the pandemic, several outlets noted when the number of people killed by COVID-19 surpassed the fatalities of US soldiers during the Vietnam War. This is perhaps the legacy of Robert McNamara: an emphasis on body count, the metrics-driven approach to understanding death.

But even just looking at the numbers, there is the erasure of a greater figure: the 3.8 million Vietnamese soldiers and civilians that were killed during the war. That’s roughly the current population of Berlin or Los Angeles.

McNamara used the kill ratio as the key metric for the war, guiding many of his policy recommendations. The 58,000 Americans killed compared to the 3.8 million Vietnamese killed brings the kill ratio to a staggering 1 to 65.

Maybe it’s easier to imagine that ratio in other terms: a double espresso shot compared to a gallon of milk; the Scoville difference between a common serrano chile and a ghost

pepper.

The Vietnam Veterans Memorial stretches for 400 feet. One built for non-Americans lost with the same density of names would stretch for nearly five miles.

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Being impact-free is not the same as a total absence of bombs: Vietnam will never be close to completely clear

The remnants of the war are scattered everywhere across Vietnam. This manifests, in the most literal sense, as unexploded ordnance. These leftover explosives are still littered across the entire country. The Boeing B-52 Stratofortress could carry up to 108 bombs, each of which

would then disperse as many as 600 tennis ball-sized “bomblets,” destroying everything in an area that was one mile long and half a mile wide. When one of McNamara’s deputies asked why the US deployed B-52s — a plane famous for its devastating power and lack of precision — Gen. William E. DePuy delivered the answer calmly and honestly: “because they’re there.”

This technique is called “carpet bombing” because it affects a large area, the way a carpet might cover a floor. The most famous ones were during World War II: Dresden, Hamburg, Tokyo. As recently as 2023, the US has controversially sold cluster bombs to Ukraine. But their usage was never more intense than they were over the 43 square miles of Quảng Trị, a rural province in Vietnam that was so thoroughly leveled that only 11 of its 3,500 villages were left alone by 1975. Quảng Trị has been dubbed “the most bombed place on Earth.”

While cluster bombs are an efficient way to annihilate large areas of land, the adorably named bomblets have a high failure rate as high as 30 percent. After the war, millions of dud cluster bomblets remain scattered across the country. Since the war ended in 1975, they have killed or injured more than 100,000 people. Estimates indicate that 17 percent of the entire country is still contaminated by leftover explosives — millions and millions of more bombs.

Several nonprofits, like Project Renew and the Mines Advisory Group (MAG), are dedicated to ordnance removal. They employ locals to survey large, often forested areas; teams of deminers locate explosives with off-the-shelf metal detectors. The work pays the equivalent of $500 a month, which is more than double Vietnam’s minimum wage. A team of 14 clears approximately 38,750 square feet a day — about half a professional soccer field. At that rate, it takes almost a year of sustained work to clear the area of a single cluster bomb. One of the hundred dropped from a B-52 would have taken about 30 seconds to reach the ground, and decades later, it

would require more than 40,000 hours of human labor to clean up.

While it may sound like a dangerous job, heavy training and stringent safety precautions have resulted in very few accidents or injuries. At the end of each day, the unexploded ordnance are gathered and safely exploded. Project Renew says it has detonated more than 815,000 of them so far, while MAG has detonated another 400,000. The work in Quảng Trị, where the problem is the worst, hopes to be entirely clear by 2035, 60 years after the end of the war.

Still, as of 2024, at least half a million hectares of land in Vietnam have been cleared. The remaining area that needs to be cleared is another 6.6 million hectares. That means after half a century, only 7.6 percent of the contaminated areas have been deemed safe and ordnance-free.

At least one estimate suggests that it will be another hundred years of sustained work before Vietnam, Laos, and Cambodia can be decontaminated of explosives; doing that math is hard, because it depends on so many variables, including the consistency of funding. The US has given $750 million for the cleanup effort, which seems like a large sum until you realize that the country spent $352 billion ($2.2 trillion after inflation) on the war effort. Earlier this year, the Trump administration suspended funding for bomb removal in Vietnam. Given the size of the issue, and how much progress has been made in five decades, it’s difficult to imagine a bomb-free Vietnam in the next 500 years — unless the current pace is significantly accelerated. The goal, according to a MAG representative, is to be “impact free” — that is, land safe enough to be developed, for communities and economies to flourish. Being impact-free is not the same as a total absence of bombs: Vietnam will never be close to completely clear.

When something is so big, it tends to become abstracted, simply so our minds can grasp them. This is normal. We

abstract many of the things that are important to us: money, time, life. We only imagine things — value and worth — in relation to other things. What is 7.6 percent? That would be equivalent to running a marathon and quitting after the second mile. Or starting a two-hour-long horror movie and deciding it’s too scary less than 10 minutes in. Or living to kindergarten age in an average human lifespan.

I say all this, of course, just for an idea of proportion, for a sense of scale.

https://www.theverge.com/cs/features/653517/vietnam-war-casualties-cost-bombs-impact-scale