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### Total War

“What will the next war be like?” “Will it be anything like the last?” These are the questions that in the present state of apprehension or resigned curiosity, are almost daily hurled at anyone who is a student of the grim branch of knowledge which is sometimes called the science of war.

**BASIL LIDDELL HART**, *Europe in Arms*, 1937<sup>1</sup>

Unlike the period leading up to the First World War there was no wishful thinking about the nature of war in the years leading up to the Second. Memories of shuddering casualties mocked ideas of war as ennobling and character-forming. War had broken away from prior physical and normative constraints. The victors of 1918 had been left bruised and exhausted along with the vanquished. A future war would be more of the same, except even worse because there were new ways of killing and no evident protections for civilians. No longer appearing as the ‘non-combatant’ deserving of protection, civilians entered the strategic lexicon as a distinct category. They were central to the industrialised war machine and therefore targets, both ‘weak and critically important’. In 1923, in the context of concerns about aerial warfare, jurists began to replace the old combatant/non-combatant distinction with that between the military and the civilian.<sup>2</sup>

The prospectus shaped the expectations for future war, assuming that the worst innovations of the previous one, especially air raids, would

dominate the fighting from the start. After the attacks on Britain by airships in 1915 and aircraft over the summer of 1917, and despite the absence of panic, the government started to worry about popular reactions to future attacks. In the summer of 1918, the South African General Jan Christiaan Smuts wrote a report for the British cabinet that envisaged a day, not too far off,

when aerial operations with their devastation of enemy lands, and destruction of industrial and populous centres on a vast scale may become the principal operations of war, to which the older forms of military and naval operations may become secondary and subordinate.<sup>3</sup>

**WELLS'S VISION OF AIR POWER IN USE AGAINST DEFENCELESS** populations had been challenged before the war. One reviewer observed that 'we can be sure that although the air raid will have its uses in the strategy of the future, it will remain subsidiary to other methods.' Others worried that civilised nations would be less likely to resort to such terrible methods, worrying more about what anarchists might do with such weapons.<sup>4</sup> After 1918 concerns about air warfare crystallised ideas about the importance of civilians in a national war effort and the possibilities of a knockout blow if directed against them specifically. So while Wells doubted that war could be won from the air and warned of a crazed competition in destruction, until world government was embraced out of desperation, a more common view was that this could be a route to victory. As early as 1909 the journalist R. P. Hearne described a war starting with a 'smashing blow' against cities that would be sufficient for national morale to collapse.<sup>5</sup> Others worried about the 'paralysis' that would result from a 'single well-directed blow' against what would now be described as the 'critical infrastructure'. A growing awareness of the complex interdependence of modern societies raised the possibility that the disruption of one part of the system would lead to a wider collapse. During the First World War the Zeppelin raids encouraged the thought that a war conducted against the 'very nerve centres and vital arteries of any opponent who is ill-prepared' could be decisive. This suggested an answer to the conundrum posed by a long attritional struggle. If wars could no longer be 'won on points' using

traditional means, then air raids might be one way to bring a future conflict to a quick conclusion.<sup>6</sup>

After the war military planners evaluated the various forms of munitions that might be dropped, from incendiaries to poisoned gas, not so much according to their material effects and more by reference to the psychological. The most enthusiastic advocates of air power, such as Billy Mitchell in the United States and Giulio Douhet in Italy, sought to show how they could win wars with vigorous offensives that would bring the nation's enemies to their knees. They dismissed alternatives to mass raids against the enemy homelands just as earlier proponents of sea power had insisted that worrying about coastal defences or supporting land operations distracted from efforts best devoted to gaining command of the sea. Their claims were popularised by Douhet, whose book *The Command of the Air*, published in 1921, demonstrated how aircraft would render irrelevant the fighting underway on the ground by taking the battle straight to the heartland of the enemy, where stricken civilians would soon demand that their government capitulated.<sup>7</sup>

The likely impact on the popular mood of such attacks was based on little more than observation of the wartime raids on Britain, class prejudice, and the prevailing theories of crowd psychology, such as le Bon's, that stressed susceptibility to raw emotion. A close examination of the evidence would have encouraged a more nuanced view of popular reactions and provided little encouragement to the idea that people would be unable to cope. Absent such an analysis the idea that social chaos would be the inevitable result of a pounding from the air took hold. In 1926 for example the military strategist Basil Liddell Hart, who had observed the impact of Zeppelin raids in Hull, contemplated the potential destruction of a number of great cities, including London with 'the business localities and Fleet Street wrecked, Whitehall a heap of ruins, the slum districts maddened into the impulse to break loose and maraud, the railways cut, the factories destroyed.' In such circumstances, he asked: 'Would not the general will to resist vanish and what use would be the still determined fraction of the nation, without organization and central direction?'<sup>8</sup>

Holman has described how the 'theory of the knock-out blow solidified into a near-consensus among military intellectuals during the 1920s and

by the 1930s had become an orthodoxy, accepted and promoted by pacifists and militarists alike.’ The theory depended on the assumption that civilians were essential to the wartime economy but also its most vulnerable element, and also on a stereotyped script. This postulated a war starting with a surprise attack by Germany with a huge air raid leading to massive civilian casualties, certainly into thousands and possibly into the millions. In addition to the damage to the urban environment would be the disruption or loss of essential services and rural areas, which would provide little sanctuary because of the spread of famine and disease. ‘With its ability to wage war severely compromised the government would have little choice but to surrender after only weeks, days, or even hours.’<sup>9</sup>

In this way pre-war complacency about the impact of war was replaced by post-war alarmism. What had appeared as fantasies of air fleets pounding the hapless multitudes now appeared as inescapable reality, to be added to the memories of trenches and infantry being slaughtered on an industrial scale. No great leaps of either imagination or logic were required. If civilians kept the war going by providing fresh reserves for the front and workers for the factories then they were legitimate targets, and probably more worth attacking because they would be less able to cope than soldiers. Instead of war becoming more contained and limited, the opposite appeared more likely.

The man who oversaw Germany’s defeat in 1918, General Erich Ludendorff, concluded that the problem lay in a failure to understand that war must be recognised as a ‘total’ undertaking. In 1935 Ludendorff urged that in the next war the whole nation must be mobilised against the enemy nation. War was total, he observed, because it involved the entire territory and population of the state and not just its armed forces. This required early preparation, from before the start of hostilities, and the need to strengthen the morale of the population. In addition, total war was to be guided by one figure with supreme authority over all military actions, a role exemplified by Hitler. The pre-1914 concepts of offensive action in a war of annihilation were still present, only now it had to take in the enemy nation, because if it did not then the result would surely be the annihilation of one’s own; the requirements went well beyond military strength. ‘Victory is created by the spirit’.<sup>10</sup>

The prospect of a future war dominated by massive air raids, especially when combined with poisoned gas, provided the backdrop for the literature of the period. Clarke lists some of the titles, giving an idea of the bleakness of the theme and its ubiquity: *The Poison War*, *The Black Death*, *Menace*, *Empty Victory*, *Invasion from the Air*, *War upon Women*, *Chaos*, and *Air Reprisal*.<sup>11</sup> Little support was given to the idea of quick and easy victories; the scenarios pointed instead to the need for disarmament.

In 1922 Cicely Hamilton, a British feminist activist and writer, published *Theodore Savage*, later republished in the US as *Lest Ye Die*, in which a crisis in the Balkans led to an utterly destructive war. After London was struck ‘a wave of vagrant destitution rushed suddenly and blindly northward—anywhere away from the ruin of explosive, the flames and death by suffocation; while authority strove vainly to control and direct the torrent of overpowering misery.’ *The Gas War of 1940*, written in 1933 by Stephen Southwold, under the pseudonym Miles, was the reminiscence of a dictator who sent his son into orbit to spare him from an unsafe world. In Nevil Shute’s *What Happened to the Corbetts* the story was one of a world brought low by war and subsequent disease, and the need to survive and escape, although the political message was that civilisation was not doomed, as the barbarity of the air attack turned the world against the aggressor.<sup>12</sup> The best known was H. G. Wells’s 1933 novel *The Shape of Things to Come*, not least because a few years later it was made into a shocking movie of the same name, opening with a ‘war scare’ set in the Christmas of 1940. Wells stuck with his familiar message. Although at first brute force appeared to triumph, the war continued for decades, and eventually the world was saved by the intervention of the United Airmen who stood for law and sanity, and ushered in a new age of science and enlightenment.<sup>13</sup>

In the tradition of the war fiction of thirty years earlier, in June 1935 the London *Evening News* serialised as a ‘duty’ S. Fowler Wright’s *The War of 1938*.<sup>14</sup> This eventually became a trilogy of books, in which complex romances and adventures took place against a grim backdrop of war. Wright was deeply conservative, fearful of the impact of science and contemptuous of H. G. Wells’s view of progress. He had been to Nazi Germany in 1934, and his books reflected his dismay at what he had seen.

His first novel opened with Germany making demands of Czechoslovakia in 1938. Prague was destroyed in an air raid, and the Czechs were warned that there was worse to come unless they acceded to German demands. Germany, they were told, had become 'fit to enforce her will, as her great destiny required that she should be able to do.' Among the noxious inventions was a gas to freeze blood, and induce blindness and imbecility. The British did not become engaged until the second novel, although there had been a warning in the first of the country's failure to prepare for gas warfare, because of its stubborn and impatient resentment with 'the depredations with which military science was active to scourge mankind.' When Germany demanded that Britain handed over the Suez Canal, it refused only to discover how ill-disciplined and ill-prepared it was now that Germany had become 'an evil pitiless sword to subdue the world'. The Americans were even worse, hobbled by the 'deep-eating cancer of communism' and persuaded by propaganda that war must be avoided at all costs. By the third novel, Germany and Russia were in combination while the United States was totally preoccupied by the Pacific. The point about these novels, which were to warn of Germany and to encourage air-mindedness, was how intimidating the prospect of air raids had become. The Germans did not need to press forward with armoured columns because they had destructive weapons against which their enemies had no answer.

**ON 26 APRIL 1937 GERMAN AND ITALIAN AIRCRAFT, ACTING** on behalf of the rebel Spanish nationalists, bombed the Basque town of Guernica. Figures circulating afterwards suggested that over 1,600 people had been killed in the attack, out of a town with a population of some 7,000. Those were the numbers that informed the public debate on the meaning of Guernica, although the actual number was probably closer to 300. In retrospect the episode illustrates the murkiness of the distinction between attempts to terrorise the populace and to support military operations. The objective was to trap Republican forces and stop them retreating to support the defence of Bilbao. Republican resistance did crumble in the aftermath of the attack, thereby reinforcing the view that air raids were an efficient way of breaking the popular will. The most immediate effect, however, was

outrage at an atrocity. George Steer, a reporter for the *London Times* had a full and vivid account published within a couple of days:

In the form of its execution and the scale of the destruction it wrought, no less than in the selection of its objective, the raid on Guernica is unparalleled in military history. Guernica was not a military objective. A factory producing war material lay outside the town and was untouched. So were two barracks some distance from the town. The town lay far behind the lines. The object of the bombardment was seemingly the demoralization of the civil population and the destruction of the cradle of the Basque race. Every fact bears out this appreciation, beginning with the day when the deed was done.<sup>15</sup>

The artist Picasso used the event to inform a painting that had been commissioned for the Spanish pavilion at the Paris International Exposition. This conveyed the calamity in a dramatic, striking and original image that remains a powerful depiction of the horror of any war.

Not long after, a simmering conflict between China and Japan suddenly turned into a total war. The Chinese struggled against a Japanese advance, and were unable to protect their capital Nanking. In late December 1937 the Japanese entered the city. As they did so, all constraints were immediately abandoned. For some six weeks Japanese troops murdered, plundered, and raped. They claimed to be seeking out Chinese military personnel, but that could not explain, let alone justify, the atrocities. This time it was a *New York Times* reporter, F. Tillman Durdin, who described the horrors he had seen. He described the intense violence as strategic: ‘The Japanese appear to want the horrors to remain as long as possible to impress on the Chinese the terrible results of resisting Japan.’ The result was that Nanking was now ‘housing a terrorized population who, under alien domination, lie, in fear of death, torture, and robbery. The graveyards of tens of thousands of Chinese soldiers may also be the graveyard of all Chinese hopes of resisting conquest by Japan.’<sup>16</sup> If that was the objective it only worked to a degree. Japanese forces continued to make progress, but China was so vast and the population so large that they could never quite finish the conquest.

**THOUGH EXPECTATIONS HAD BEEN CREATED FOR A SECOND** World War, when it came initially the war was fought cautiously. In his *The Shape of Things to Come*, Wells had seen the war starting between Germany and Poland in 1940, and to last between the two ten years. That is how it began in September 1939 but then it was all over in six weeks. The French and British hoped that a way might be found to break German will without major offensives. The French army waited behind its defensive ‘Maginot Line’ while the Royal Navy prepared once again to impose a blockade that would over time cripple the German war economy. After Poland’s occupation there was relative calm, even talk of a ‘phoney war’. In the spring of 1940, which saw the fall of Holland and Belgium, and eventually France’s capitulation, warfare seemed to revert to the type anticipated in 1914. Germany conquered countries one-by-one through quick and efficient offensives in a matter of weeks. This was accomplished along classical lines, with regular armies fighting battles, and the political fate of nations decided accordingly.

The potential role of the tank in future warfare had been discussed avidly since the weapons first made their appearance during the First World War. All the major powers developed armoured vehicles while debating how they could best be used—for fast moves into enemy territory on their own, or to reinforce infantry in more orderly offensive, or to act as mobile firepower in a defence. The tank was always favoured by those who wrestled with the challenge of how to return to the classical ideal of war between professional armies. Instead of the pointless frontal assaults of the First World War they argued for fast-moving and enveloping manoeuvres. Now these had materialised with devastating effectiveness. Unlike the air power enthusiasts who were convinced that aircraft should only be used for a ‘strategic’, war-winning role, the Germans had seen how aircraft could support land operations.

The successful German offensives of 1939–40 had been made possible by a pact between Hitler and Josef Stalin, leader of the Communist Soviet Union. At the time this was seen as extraordinarily cynical. Both countries had been losers in the previous war and had become radicalised as a result. Both were totalitarian, with the ruling elite controlling every aspect of life. Ideologically they were polar opposites and wholly antagonistic. The



cartoonist David Low captured the cynicism of the pact as it was announced. The two dictators met in a setting of desolation. ‘The Scum of the Earth, I Believe’, says Hitler. ‘The Bloody Assassin of the Masses, I Presume’, says Stalin. If Hitler had been content to let Stalin have his own conquests the two men could have divided Europe between them, but he could never share the continent with an ideology he deplored and a people he despised. Hitler had always assumed that at some point he would move to the East to acquire ‘Lebensraum’ for the German people. In late 1940, with Britain stuck in a defensive mode and the United States not yet a belligerent, he concluded that the time was ripe. A Soviet defeat would convince the British of the hopelessness of their position, while achieving what had always been the driving objective of his whole ideology. On 18 December 1940 he set down his view: ‘The German Wehrmacht must be prepared to crush Soviet Russia in a quick campaign even before the end of the war against England.’<sup>17</sup>

As for method, Hitler intended to rely on the blitzkrieg that had served him so well in 1940. He did not believe that Soviet forces were in a fit state to cope with a sudden onslaught and expected them to crumble quickly. His was a strong nation, with an iron will, against a weak one. His generals were not so sure, but they had not been so sure prior to the invasion of France either and had been proved wrong. They understood that everything depended on speed. If Moscow managed to resist then the whole enterprise was probably doomed. A vast German army of four million was assembled, but should the Soviet army get a chance to regroup and recover it could draw on far greater numbers. As serious, if the war was not over quickly then German forces lacked the clothing and the kit for the harsh Russian winters.

When the moment came on 22 June 1941 to launch Operation Barbarossa the surprise was almost complete.<sup>18</sup> Stalin had been warned, but had chosen to ignore the warnings, seeing in them an attempt to disrupt a relationship that was proving to be satisfactory to both parties, allowing both to establish their own domineering sphere of influence. Initially he floundered but then regained his composure and the defence began. This became the Great Patriotic War, and for the defence of the motherland rather than for communism. Evidence of German brutality

meant that those with little love for their own regime fought hard against the invaders. The Germans got close to Moscow and Leningrad, where they instituted a terrible siege, but they did not get close enough.

The important feature of Hitler's strategy lay not in the supposed originality of his military concepts and tactics. Hitler had in fact not fully appreciated the improvised quality of the blitzkrieg in Western Europe and his good fortune in facing a France that was still geared to a defensive campaign along the lines of the trench warfare of the previous war. The strategy was far less suitable to the Russian steppes. His originality lay in war aims that involved not just conquering other people but seeking to enslave and annihilate them. The damage to the enemy's society was not a means to an end: it was what the war was all about. The persecution of Jews was an established part of Nazi ideology and practice in the territories it had occupied, but a policy of indiscriminate killing and then organised extermination was formally adopted as German forces moved into the Soviet Union. After top Nazis met in January 1942 at the Berlin suburb of Wannsee, the 'Final Solution to the Jewish Problem' was assumed to require not only the systematic elimination of those Jews to the East but also those already caught by the occupation of Western Europe.<sup>19</sup> It was a commitment that gave meaning to the war in the East but also ensured its failure. The determination to invade the Soviet Union was 'buried so deep within the Nazi DNA that it could not be stopped'. But the diversion of resources for purposes of extermination and a brutal occupation that alienated nationalities who might have been won over to an anti-Soviet fight served to further 'retard' any chance Hitler had of winning the war.<sup>20</sup>

**IF THE GERMAN DECISION TO ATTACK THE SOVIET UNION** represented a massive misjudgement then the Japanese attack on the American Pacific fleet at its Pearl Harbor base was if anything an even greater one. One explanation for this is that—as with Hitler's Barbarossa—the Japanese were confident in their ability to pull off a surprise attack. This had worked for them in the past in the first Sino-Japanese war of 1894, and then in February 1904 when they attacked the Russian Far East fleet anchored in Port Arthur having decided that war was the only way to

resolve a dispute over the status of Korea. This latter attack left Russian ships destroyed or stranded, unable to get out of port, and Japanese forces moved unopposed into Korea. To recover the situation the Tsar sent ships drawn from the Baltic fleet, but by the time they arrived Port Arthur had fallen and the Japanese Navy was ready for them. Their route through the Straits of Tsushima had been anticipated, and they were caught by surprise. In one of those rare battles that could truly be described as 'decisive', the Russian fleet lost two thirds of its ships and to avoid further catastrophe surrendered to the Japanese. Not long afterwards Russia agreed peace terms. The victory left the Japanese emboldened and other maritime powers looking to learn the lessons. Japan's success had been the result of the speed of its warships and their powerful guns, and its grasp of the potential of telegraphy.

One observer saw from early on how this success might tempt the Japanese into an attack on the US fleet. Hector Bywater combined naval journalism with occasional espionage for the UK Admiralty. After first setting out his thoughts in a 1921 book, *Sea-power in the Pacific: A Study of the American-Japanese Naval Problem*, in 1925 he expanded on his ideas with a novel, *The Great Pacific War*, which explored how a future US-Japanese war might occur and develop.<sup>21</sup> He noted, correctly, the importance of Japan's paucity of raw materials and the need to gain access to the Asian mainland to satisfy her needs, and that the 'enslavement' of the Chinese would be resisted by the United States. Bywater imagined that the US Navy would be caught off Manila Bay by a Japanese surprise attack, just as the Russians had been caught in the Straits of Tsushima. The greatest damage was done by naval gunnery.

On 7 December 1941, waves of Japanese aircraft from six aircraft carriers attacked the US Pacific fleet at Pearl Harbor, damaging or destroying eighteen ships, including five battleships, and destroying or damaging most American aircraft in Hawaii. Bywater, who had died the previous year, was rediscovered as something of a prophet.<sup>22</sup> The Japanese were certainly aware of him, as his books were translated into Japanese. But the key factor in developing plans for Pearl Harbor was the Japanese Navy's growing awareness of the possibilities of naval air power.<sup>23</sup> Bywater had seen a role for carrier-based aircraft, but he did not fully

appreciate their possible impact. As important, however, as Bywater's forecast that a war might start with a surprise attack was his view that Japan would still eventually lose this war. He anticipated the island hopping strategy across the Pacific that the Americans eventually adopted to push the Japanese back. In the novel, Japan surrendered after a 'demonstration' American air raid on Tokyo with 'bombs' containing leaflets urging surrender rather than 'waste more lives.' Japanese failure was essential to his purpose. He had chosen the 'medium of fiction', Bywater explained, to demonstrate that 'war is never a paying proposition from any national point of view'.

While the Japanese saw merit in Bywater's description of the first stages of the war, they were less impressed by his description of their ultimate failure (which an officer in his introduction to the book described as a 'slander'). Yet the reasons why an attack might fail were fully appreciated in Tokyo, even by the war faction. The earlier invasion of China might have served as warning enough of the dangers of aggressive action. This was why relations with the United States had deteriorated leading to Washington imposing economic sanctions. During the course of 1941 intermittent diplomatic conversations failed to resolve the impasse, even though Japan was struggling to pacify China. Should sanctions continue, their economy would eventually be crippled. But Japan refused to admit they had got it wrong in China, as that would mean dishonour and probably yet more unreasonable demands from Washington.

The logic of this position was to accept the inevitability of war without an obvious route to victory. No invasion or occupation of the continental United States was contemplated. The objective was to remove American opposition to Japanese hegemony over East Asia. The plot to attack Pearl Harbor was therefore hatched knowing that however successful there could be no military defeat of the United States and that if the United States did not decide to cut their losses and negotiate a peace on Japanese terms, superior American resources should lead to their victory. The Americans never had any doubt that they would win an eventual war and had explained clearly to the Japanese why this was so. This is why they kept on pushing the Japanese, and it was why they got caught by surprise when the Japanese decided they could take it no more.

A revealing conversation between the Emperor and the Chiefs of

Imperial Japanese Army and Navy (General Hajime Sugiyama and Admiral Nagano Osami respectively) took place at a crucial September 1941 conference about the probability of victory. The Emperor observed that the Army had told him when China was invaded ‘that we could achieve peace immediately after dealing them one blow with three divisions’. When Sugiyama made excuses (‘China is a continent with a vast hinterland with many ways in and many ways out, and we unexpectedly met big difficulties’), the Emperor was angry. ‘Didn’t I caution you each time about those matters? Sugiyama, are you lying to me? If you call the Chinese hinterland vast, would you not describe the Pacific as even more immense?’ With a stunned Sugiyama unable to reply, Osami stepped in. He acknowledged that there was no 100 per cent probability of victory. He then offered a metaphor:

Assume, however, there is a sick person and we leave him alone; he will definitely die. But if the doctor’s diagnosis offers a seventy percent chance of survival, provided the patient is operated on, then don’t you think we should try surgery? And, if after the surgery, the patient dies, one must say that was meant to be. This is indeed the situation we face today... If we waste time, let the days pass, and we are forced to fight after it is too late to fight, then we won’t be able to do a thing about it.

This satisfied the Emperor: ‘All right, I understand.... There is no need to change anything.’<sup>24</sup>

Admiral Yamamoto, responsible for planning the attack, believed that ‘Japan’s Navy must decide the fate of the war on the very first day’. The method was to ‘fiercely attack and destroy the US main fleet at the outset of the war, so that the morale of the US Navy and her people [will] sink to the extent that it cannot be recovered.’ The difficulty was that it was easier to sink ships than morale. Yamamoto considered the risks, including the ‘possibility that the enemy would dare to launch an attack upon our homeland to burn down our capital and other cities,’ but could see no other way out of Japan’s current strategic predicament. This was a bold plan, but ‘conceived in desperation’. In practice the best Japan could hope for was a resumption of negotiations and better terms than those available beforehand, but there was no reason to suppose that the Americans would have any interest. Prime Minister Tojo admitted that this was speculative:

‘With war, if you don’t try it, you can’t know how it will turn out.’<sup>25</sup>

**BARBAROSSA AND PEARL HARBOR REFLECTED THE SIMPLE** logic that a state determined on war with another would seek to maximise the military impact of the first move. Aggression and surprise attack went hand in hand. In both cases the aggressions reflected a sense of inevitability. War was bound to come, and therefore it should be started on the best possible terms. For Hitler a showdown with the Bolsheviks was historic destiny; for Tojo there was a fundamental incompatibility between the United States and Japan. Without this sense of inevitability the case for war was poor in both instances because it meant taking on countries with formidable resources. Hitler believed that the Soviet Union could be defeated; Tojo was not so sure about the United States. Also in both cases, the idea that a bold first move could ensure a quick victory, a legacy of earlier wars, had been contradicted by recent experience. Germany and Japan were adding new enemies before the established enemies had been defeated.

When it came to the attacks, one over the land and one over the sea, both were helped by the complacency of the victims. Stalin distrusted those warning that Hitler was about to attack more than he distrusted Hitler. The Americans, who knew that an early attack was quite probable, were looking to the Philippines as a target and had underestimated Japanese capabilities. They had assumed that the strength of the Pacific fleet would serve as a deterrent. Moscow and Washington miscalculated in their assessments of the risks they faced because they did not appreciate that others might miscalculate so badly in the risks they were prepared to take.<sup>26</sup> Lastly, in both cases the military momentum gained was insufficient to bring the war to a swift conclusion, and the greater strengths of the Soviet Union and the United States were asserted, and eventually proved to be overwhelming.

The Second World War, like the First, confirmed the classical model in that its conclusion depended on a clear military victory. The European and Pacific Wars ended with the formal surrenders of the defeated armed forces. Still, the classical model was being stretched to the breaking point. What made the difference was the enormous advantage of the Allies in their combined air and sea power as this enabled them to deplete the war-

making power of the enemy, eroding their ability to fight on land.<sup>27</sup> The blurred lines between the military and civilian spheres of war particularly challenged the classical model. The Germans took a merciless view when facing any partisan resistance in the occupied territories of Europe. This could still be accommodated within the classical model in terms of the risk that non-combatants had to accept when they took up arms or directly aided enemy forces. Once the Nazis decided to move against whole populations the model was abandoned. Attacks on civilians were not just a matter of maintaining law and order, or unfortunate consequential damage resulting from attacks on the main military-related objective, or desperate efforts to weaken the enemy will when all else had failed, but part of the whole rationale for the war, a means of asserting superiority over inferior races or of eliminating them altogether.

For the Nazis in Germany and the militarists in Japan, total war was not so much a matter of strategy as of world-view. The logic was totalitarian, not only in terms of the state controlling all aspects of the economy and social relationships but also in the presumption that all individuals must act in its service. When France folded in 1940 the right-wingers who took control under the Vichy regime saw the defeat as a consequence of the country having becoming 'pluralist, materialistic, and soft'. War was a test of a nation's health and France had failed. This logic, as it manifested itself in the Second World War, was the most 'insidious legacy' of the First.<sup>28</sup> Though the war had not begun as brutally as expected, at least in Europe, by its end it had become brutal in ways that few at the start could have imagined, with the attempted murder of a whole people, reckless violence against occupied populations, and single bombs able to destroy entire cities.

[7]

## The Balance of Terror

Such was the crowning triumph of military science, the ultimate explosive that was to give the “decisive touch” to war...

H. G. WELLS, *The World Set Free*, 1914<sup>1</sup>

At the start of the First World War H. G. Wells had seen the need to defeat Germany because its embrace of *realpolitik* challenged his vision of world government. His line in the Second World War was not so different. George Orwell observed that this was the ‘same gospel’ Wells had been ‘preaching almost without interruption for the past forty years, always with an air of angry surprise at the human beings who can fail to grasp anything so obvious.’ There was always the ‘supposed antithesis between the man of science who is working towards a planned World State and the reactionary who is trying to restore a disorderly past.’ This, Orwell warned, left Wells unable to grasp the nature of the threat and the task ahead, ‘quite incapable of understanding that nationalism, religious bigotry and feudal loyalty are far more powerful forces than what he himself would describe as sanity. Creatures out of the Dark Ages have come marching into the present, and if they are ghosts they are at any rate ghosts which need a strong magic to lay them.’<sup>2</sup> This was not a war that could be comprehended in terms of the calculations of statesmen or narrow judgements of national self-interest.

When it came to a possible Third World War, however, Wells turned



out to be more prophetic. One of his most impressive predictions was even more remarkable because he was instrumental in it coming true. Always on the lookout for scientific innovations to help the cause of political progress, he seized upon reports in the early 1900s of breakthroughs in the understanding of atomic structures. His guide was Frederick Soddy, a pioneering student of radioactivity who had gained his reputation while working with physicist Ernest Rutherford at McGill University in Canada. The two had shown that there were circumstances in which atoms might break up, in the process releasing large amounts of energy. Rutherford and Soddy understood how much potential energy might be stored in small amounts of material but could not see how this might be unleashed. Normally radioactivity was released over centuries or even millennia. If a weapon was to be developed using this knowledge, the process would have to be compressed into hours, perhaps less. Rutherford doubted that it would be possible, but Soddy was not so sure. Although later he played this down, he recognised immediately the hypothetical significance of such explosive power for warfare. In a 1904 lecture to the Corps of Royal Engineers, Soddy speculated that if the energy—‘latent and bound up with the structure of the atom’—found in heavy matter could be unlocked then ‘what an agent it would be in shaping the world’s destiny’. The ‘man who put his hand on the lever’ to gain access to this vast store of energy ‘would possess a weapon whereby he could destroy the world if he chose’. By way of reassurance, however, he trusted nature to guard its secret.<sup>3</sup>

He largely put aside this unpleasant prospect in a popular guide to the new science, *The Interpretation of Radium*, published in 1909.<sup>4</sup> Such a bountiful source of energy would mean the human race need not ‘earn its bread by the sweat of its brow’. The happier prospect was of being able to ‘transform a desert continent, thaw the frozen poles, and make the whole world one smiling Garden of Eden’.<sup>5</sup> Soddy did not mention any weapons, but the implication was there in an early paragraph comparing atoms as the building blocks of matter to bricks as the building blocks of houses. Imagine, Soddy asked, if one were to demonstrate to an architect that the bricks used for housing were ‘capable of entirely different uses—let us say, for illustration, that they could with effect be employed as an explosive incomparably more powerful in its activities than dynamite’.<sup>6</sup>

Wells was one of Soddy's most attentive readers. In 1914 he acknowledged the scientist as the inspiration for a new novel, *The World Set Free*. This was yet another homily on the merits of world government, and how these would come to be universally accepted as a result of an awesomely destructive weapon, named 'The Atomic Bomb'. He had a scientist named Professor Rufus giving lectures in Edinburgh in 1910, using Soddy's words. Wells then looked forward twenty years to 1933 when another scientist, Holsten, discovered how to master atomic energy through a combination of 'induction, intuition and luck'. It then took a further two decades before atomic weapons were used in a war between an alliance of Britain, France, and the US against Germany and Austria and almost spun out of control after an air attack destroyed the Paris headquarters of the Allied High Command. Rather than put an end to the fighting, it liberated a 'rather brutish young aviator' in charge of the French special scientific corps. No longer under control, he enthused how 'there's nothing on earth to stop us going to Berlin and giving them tit-for-tat.... Strategy and reasons of state—they're over.... Come along, my boy, and we'll just show these old women what we can do when they let us have our heads.' When they dropped their atomic bombs, large black spheres containing a heavy element 'carolinum', there was a volcanic effect—'a shuddering star of evil splendour spurted and poured up smoke and flame towards them like an accusation.'<sup>7</sup>

In Wells's account, two hundred major cities were lost in this way, with the residual radiation rendering them uninhabitable. He has his narrating historian observing that 'nothing could have been more obvious to the people of the early twentieth century than the rapidity with which war was becoming impossible. And as certainly they did not see it. They did not see it until the atomic bombs burst in their fumbling hands.' Thankfully, however, this dreadful experience shook men out of 'old-established habits of thought' and so led to the 'world set free.'

**RUTHERFORD, SODDY'S COLLABORATOR FROM 1902, REMAINED** sceptical. When Wells's novel was first published, he described the likelihood of mastering nuclear energy as not 'at all promising'.<sup>8</sup> By 1933 his view had not changed. In September of that year, speaking to the British

Association, he restated his position: transforming atoms would be a very 'poor and inefficient' way to release energy. The idea that it could be a source of power was dismissed as 'moonshine'. His remarks were duly reported in *The Times*, where Leo Szilard read them. Szilard, a brilliantly inventive Hungarian scientist who had moved to London from Germany because of the Nazis, was a fan of Wells, whom he had met. He had only recently read *The World Set Free*. With the book still in his mind, Szilard was bothered by Rutherford's sceptical remarks. By his own account, the explanation of how the energy might be released came to him as he crossed a London square. As he reached the curb, according to historian Richard Rhodes, 'time cracked open before him and he saw a way to the future, death into the world and all our woes, the shape of things to come'.<sup>9</sup> His insight was to recognise that there could be a chain reaction capable of releasing extraordinary amounts of energy if an element could be found that when bombarded with one neutron released two. Szilard, as with Wells's Holsten, the fictional and the real in 1933, were both suddenly seized with an insight that could result in both terrible and wonderful developments. In 1934 Szilard filed a patent which described a self-sustaining chain reaction but decided that the responsible thing to do was to keep it secret.

In December 1938 nuclear scientists Lise Meitner and her nephew Otto Frisch were together in Sweden. They realised that they could show that a uranium atom could split into two, a process they called fission. The community of nuclear scientists who heard the news could see at once that this could mean a new form of explosive. Whereas before Szilard might have hoped that the secret of an atomic bomb might be suppressed, now he began to fear that Nazi Germany might exploit it first. He persuaded his friend Albert Einstein to write to President Roosevelt urging him to authorise an exploration of the possibility of 'extremely powerful bombs'. It was some time before the United States joined the European war. By then Frisch was in Britain and with another émigré scientist, Rudolf Peierls, had demonstrated for the British government that an atomic bomb was feasible. In 1942 the British and American projects merged to form the Manhattan Project.

Atomic bombs were used for the first and only time in a military

campaign in August 1945 when they were dropped on the Japanese cities of Hiroshima and Nagasaki, obliterating both and most of their residents. This was immediately recognised to be a step change in warfare. It was not, however, necessarily seen to be a transformation. The flattening of these two cities could also be presented as the natural continuation of the merciless air raids of the Second World War when great centres of population had been attacked regularly and remorselessly, even though social structures and even productive capacity had proved to be remarkably resilient in the face of constant pounding. The levels of damage suffered by Japan in August 1945 could have been inflicted by other means—the March 1945 air raid on Tokyo had led to more deaths. Yet the means were spectacular and the consequences were immediate. The bombs' use was followed by Japan's surrender.

It took time before the full implications of what had taken place were appreciated. In 1946 the *New Yorker* devoted a whole issue to the journalist John Hersey's stark account of the impact of the atomic bombs, including the harrowing accounts of survivors.<sup>10</sup> He quoted a report written to the Holy See in Rome by one of the German Jesuit priests present on the moral dilemmas raised by the new weapons:

Some of us consider the bomb in the same category as poison gas and were against its use on a civilian population. Others were of the opinion that in total war, as carried on in Japan, there was no difference between civilians and soldiers, and that the bomb itself was an effective force tending to end the bloodshed, warning Japan to surrender and thus to avoid total destruction. It seems logical that he who supports total war in principle cannot complain of a war against civilians. The crux of the matter is whether total war in its present form is justifiable, even when it serves a just purpose. Does it not have material and spiritual evil as its consequences which far exceed whatever good might result? When will our moralists give us a clear answer to this question?

Over the next decade, with tests of new and even more powerful weapons, the likely character of a nuclear war became clear. Human beings within a large radius of an explosion would be killed by blast and fire. Those that were not would suffer severe burns, radiation sickness, and psychological trauma. The effects of radiation might be felt far away, depending on the nature of the detonation and the weather. Over time this

would result in higher incidence of leukaemia and cancer. Charting the longer-term social consequences was harder. Evidently health services would be left in a terrible condition and be hard-pressed to treat even a small proportion of the victims. Help from outside would be hampered by the damage to infrastructure. Agriculture and manufacturing would be set back and cultural heritage lost forever. If significant numbers of weapons were used then distant lands would be contaminated. There were soon speculations about whether human life could be sustained.

In August 1949, much earlier than the Americans and British expected, the Soviet Union tested an atomic device. In response, the Americans moved to the next stage of nuclear technology, from atomic weapons based on nuclear fission to hydrogen or thermonuclear weapons based on fusion. These threatened almost unlimited destructive capacity. In the 1940s there had been very few atomic bombs available for American use. Over the 1950s scarcity gave way to plenitude, with many weapons available to both superpowers. The assumption that the next war would start with devastating exchanges of city-busting weapons took hold. Even more alarming was the realisation that the consequences would not be confined to the belligerents. Anyone who happened to be in the path of nuclear fallout, the radioactive dust and ash taken by the wind away from the site of a detonation, could be caught. Fallout would not respect national boundaries, let alone personal culpability. To be released it was not even necessary for there to be a war, as radioactive fallout made an unwelcome appearance in the 1950s as a by-product of atmospheric nuclear tests by the United States, Britain, and the Soviet Union.<sup>11</sup> Its impact was brought home in March 1954 when the US detonated a bomb combining fusion with fission on Bikini Island (one of the Marshall Islands) equivalent to 15 million tons of TNT (megatons). This was some thousand times the yield of the bomb that had destroyed Hiroshima, which had a yield equivalent to some 15 thousand tons (kilotons). Because it was greater than anticipated, a Japanese fishing boat, the *Lucky Dragon*, though ninety miles away from Bikini, was caught in the path of the fallout as a result of which the crew developed radiation sickness, and one member died. The furore this created in Japan pushed awareness of fallout to the front pages.

**AFTER THE MOVE FROM THE ATOMIC TO THE HYDROGEN BOMB** the fear was that the scientists might next come up with something worse—the cobalt bomb. The key feature of the cobalt bomb was that its use would actually be truly suicidal. Leo Szilard had first mooted the idea in 1950 when he spoke during a radio discussion of how governments might deliberately construct weapons to maximise fallout by ‘salting’ them with cobalt. Whereas people might return after a couple of months to areas hit by fallout from most planned weapons, a cobalt bomb’s radiation would have a much longer half-life and so anywhere contaminated would be uninhabitable for up to a century. That was why it could be a doomsday device.

Szilard raised the idea not as an advocate but to warn about the possible consequences of an unrestricted arms race. In 1956 presidential candidate Adlai Stevenson spoke of ‘the millions who tremble on the sidelines of this mad arms race in terror’ and demanded that President Eisenhower reveal the government’s plans for the cobalt bomb. Officials pointed to its suicidal quality as refutation of the rumours that it was close to being designed, let alone constructed. They had little success. There was a growing presumption that whatever could be built would be built. In practice there were no plans, and cobalt bombs were never built. Even if they had been and then used this would not necessarily have led to a completely depopulated planet, although the life remaining would undoubtedly have been utterly miserable.<sup>12</sup>

Cobalt bombs were a gift to writers of doomsday fiction, and soon became a feature of the invariably dystopian literature that grew up around the possibility of a nuclear Armageddon. The drama often lay largely in exploring how people might cope with catastrophe as opposed to how they got there. As a result descriptions of the origins of the catastrophe tended to be sketchy, combining barely plausible conflicts with some stunning misunderstandings. This was the case with the apocalyptic bestseller *On the Beach* by Nevil Shute, a British engineer who had emigrated to Australia, and who had contributed to the pre-war literature about bombing campaigns with *What Happened to the Corbetts*.<sup>13</sup> The new novel was one of the bleakest stories ever told, for not only do the book’s main characters all die but so does all humanity, leaving behind a lifeless

irradiated planet. Shute had seen the potential of the topic when he read in December 1954 a report in *Time* magazine on 'The Cumulative Effects of Thermonuclear Explosions on the Surface of the Globe', which noted that the neutrons and atmospheric debris from bomb tests 'may upset the natural conditions to which life has become adapted'.<sup>14</sup> The narrative power of the book came from the modest, low-key way ordinary people faced the terrifying prospect of their certain death, from which there was no escape and against which there could be no resistance. Shute's people lapsed neither into panic nor barbarity. Shute prefaced the book with a line from the poet T. S. Eliot, somewhat ironic in the light of images of massive explosions, 'This is the way the world ends/Not with a bang but a whimper'.

The setting was Melbourne, the only place yet to be affected by fallout after a 'short, bewildering war' of thirty-seven days. The book began in Christmas 1962, already some fourteen months after the war. Shute did not explain the origins of the catastrophe by reference to a madman but instead to a combination of deliberate strategic malevolence compounded by miscalculation which led to a war in which 47,000 weapons were used. The first chapter referred to a 'Russian-Chinese war that had flared up out of the Russian-NATO war, that had in turn been born of the Israeli-Arab war, initiated by Albania.' Also cobalt bombs had been used by the Russians and the Chinese. In a later chapter some of the key figures tried to piece together what had happened, wondering whether it was worth writing a history of these events that no one would ever read. They are sitting on an American submarine tasked by the Australian prime minister to find out what happened around the country's coast. Challenging the general assumption at the time that China and the Soviet Union should be considered together as one giant Communist bloc, Shute had his original conflict as being between these two. Russia was after a warm water port, preferably Shanghai, and sought to cut down China's population by means of radiological warfare. For their part the Chinese wanted to use radiation to eliminate the industrial regions of Russia. As the discussion progressed on the submarine, the greatest revelation was that contrary to what had been supposed, the Russians had not attacked Washington and London, although Russia had received retaliation. This led to a thought so

‘horrible’ as to be ‘incredible’, that Russia had been bombed ‘by mistake’. The real culprits turned out to be Egypt (Shute was writing at the time of the 1956 Suez crisis), using long-range aircraft sold to them by Russia. Meanwhile a bomb that hit Naples came from Albania, and nobody was now sure who had launched the one that struck Tel Aviv.

What was remarkable about Shute’s political scenario was not its realism any more than his technical scenario, but his refusal to suggest that the predicament was the result of insane or even wholly unreasonable decisions. The participants in the discussion looked back at decisions that were rushed and taken blindly. (‘It’s mighty difficult to stop a war when all the statesmen have been killed.’) Sympathy was expressed for someone with ‘a war on his hands and plenty of weapons left to fight it with.’ When it was suggested to the American captain of the submarine that he would have tried to find a negotiated solution he demurred: ‘With an enemy knocking hell out of the United States and killing all our people? When I still had weapons in my hands? Just stop fighting and give in? I’d like to think that I was so high-minded but—well, I don’t know.’ The real blame was directed towards the small countries that had initiated the war. That they could do so was the result of the weapons becoming too cheap and too freely available. The scientist on board the submarine explained: ‘The original uranium bomb only cost about fifty thousand quid towards the end. Every little pipsqueak country like Albania could have a stockpile of them, and every little country that had that, thought it could defeat the major countries in a surprise attack. That was the real trouble.’ The scenario thus reflected a continuing belief in the possibility of a knockout blow. Its main effect was as a warning about fallout, which Shute helped to make a hot topic in 1957. But it was also a warning about the consequences of the spread of nuclear weapons.<sup>15</sup>

Two years later when the film of the book was made by Stanley Kramer, there was a greater readiness to blame human stupidity. Fred Astaire, as the scientist Julian Osborne, denied that there was a ‘simple answer’ to how the war started. It was the result of people accepting ‘the idiotic principle that peace can be maintained by arranging to defend themselves with weapons they couldn’t possibly use without committing suicide.’ The problem was still proliferation—‘Everybody had an atomic



bomb and counter-bombs and counter-counter bombs’—but this was combined with loss of control as ‘the devices outgrew us’.

‘Somewhere some poor bloke...

Probably looked at a radar screen and thought he saw something.

He knew that if he hesitated one thousandth of a second...

His own country would be wiped off the map, so—

So he pushed a button...

And... And...

The world went... Crazy...’<sup>16</sup>

**BY THIS TIME THE POSSIBILITY OF ACCIDENTAL WAR WAS** becoming prominent. The idea that great tragedy could be the result of a human error or mechanical malfunction was bound to make an impression on a creative imagination.<sup>17</sup> In a 1958 novel, *Red Alert*,<sup>18</sup> a delusional Air Force general launched an attack, using a war plan which assumed that the government was no longer functioning. Once this was discovered, the president was determined to work with the Soviet Union to prevent catastrophe, but the US aircraft countermeasures were too good for Soviet defences. The general killed himself before he could be forced to reveal the recall code for the bombers, but the code was found on a desktop pad. All aircraft were recalled, save one which had been damaged by air defences. Fearing the worst, the president offered up Atlantic City, New Jersey, by way of compensation, but this turned out to be unnecessary when just one hydrogen bomb partly detonated and fortunately only in open countryside.

Another novel, *Fail-Safe*, had a similar theme, so much so that *Red Alert*’s author sued for plagiarism. In this case a civilian airliner off-course triggered an alert as the intrusion into American air space of an unidentified aircraft. The alert was cancelled but a ‘go-code’ was sent in error to a group of bombers, an error exacerbated by a new Russian system successfully preventing communications between the aircraft and their headquarters. Even when the jamming ended, the aircraft crew decided that their protocols required them to continue with the mission. As in *Red Alert*, the president offered to trade one city for another, in this case New York for Moscow.<sup>19</sup> Somewhat chillingly the novel appeared as a three-part serial in the *Saturday Evening Post* in October 1962, coinciding with

the Cuban Missile Crisis, before being published the next year as a book. The authors introduced the book saying: ‘Men, machines, and mathematics being what they are, this is, unfortunately, a “true” story. The accident may not occur in the way we describe but the laws of probability assure us that ultimately it will occur.’ The implication was that a simple, apparently minor, mechanical failure could have unthinkable, catastrophic effects.<sup>20</sup>

Both novels were turned into well-regarded movies. The first and most memorable was *Red Alert*, except that director Stanley Kubrick turned it into a black comedy and renamed it *Dr. Strangelove*.<sup>21</sup> The deranged general responsible for the disaster became Jack D. Ripper, convinced that Russia was seeking to pollute the ‘precious bodily fluids’ of Americans. He was in command of a wing of nuclear-armed B-52 bombers, which he ordered to attack Russia. As the president brought in the Soviet ambassador to warn him of the danger to his country, and to help the Russians shoot down the planes if they could, it transpired that the Soviet Union had created a doomsday device consisting of many buried bombs, laced with cobalt, to be detonated automatically should any nuclear attack strike the country. As in *On the Beach*, the result would be to wipe out all human and animal life. The doomsday system might have had a deterrent effect had it been public knowledge. Unfortunately its existence was to have been revealed the next week. As with George’s ending in *Red Alert*, the recall code was seized from Ripper’s base, and most planes were successfully recalled, though one continued on its mission, damaged by Russian defences and without communications. This time, however, when the bomb was released it detonated and the Doomsday device was triggered.

Kubrick introduced Dr Strangelove, a civilian strategist with a Nazi past. There was no such character in *Red Alert*, although there was an equally sinister Professor Groeteschele in *Fail-Safe*. Both Groeteschele and Strangelove were modelled on Herman Kahn, who had written the bestselling account of nuclear strategy, *On Thermonuclear War*, published in 1960, and had become something of a celebrity as a result of his provocative analyses and an apparent tendency to playfulness when talking about mass death. Kahn was a favourite target of critics, and his humanity

had been questioned—‘no one could write like this; no one could think like this.’<sup>22</sup> He had written his book at the RAND Corporation, the most famous of the ‘think-tanks’ where the mysteries of nuclear strategy were explored, although he left soon after its publication to set up his own Hudson Institute, in part because his colleagues at RAND objected to his showmanship and because he felt they were becoming too bureaucratic.<sup>23</sup>

In both movies the Kahn character allows nuclear war to be discussed in terms of a cold rationality, detached from any human emotion. The role is to illuminate the perverse logic behind plans for mass murder and the continuing dilemma of extracting strategic benefit from these plans by demonstrating how they just might be implemented. Groeteschele explains coolly the reasoning behind a first strike, pointing out that from ‘their point of view’ the Japanese were ‘right’ to attack Pearl Harbor in December 1941 because the United States was their ‘mortal enemy’. ‘As long as we existed, we were a deadly threat to them. Their only mistake was that they failed to finish us at the start. And they paid for that mistake at Hiroshima.’ This is the importance of the knockout blow. If there was one thing worse than failing to take your chance, it was taking your chance and then failing. Groeteschele assumed that the risk of an American doomsday machine would persuade the Russians to stay their hand even if the unauthorised aircraft were allowed to continue with their mission. There would only be more loss if they retaliated. He saw the communists as mortal enemies and wanted to bring the Soviet Union down. ‘They are not motivated by human emotions, such as rage and pity. They are calculating machines; they will look at the balance sheet and they will see they cannot win.’

Kahn had explored the idea of a doomsday machine in *On Thernuclear War*, describing it as being

protected from enemy action (perhaps by being put thousands of feet underground) and then connected to a computer which is in turn connected, by a reliable communications system, to hundreds of sensory devices all over the United States. The computer would then be programmed so that if, say, five nuclear bombs exploded over the United States, the device would be triggered and the earth destroyed.

He did explain that such a device was never likely to be adopted by a

government, although this appears to be for reasons of expense as much as operational considerations.<sup>24</sup> In the movie, Dr Strangelove reported on a study he had commissioned from the 'Bland Corporation' on 'a doomsday machine' that would reinforce deterrence, which was the 'art of producing in the mind of the enemy the fear to attack'. The credibility of the doomsday machine derived from automaticity that 'rules out human meddling'. The trigger conditions would be programmed into a deep computer memory bank.<sup>25</sup>

The nuclear age was still young. A strategy of deterrence had been adopted as demonstrating resolve without provocation, a way to be firm but not suicidal. The weapons would not be allowed to support aggression, but they were there, available and on alert, to respond to aggression. So long as both sides understood the risks, and by the end of the 1950s they clearly did, then there could be an awkward but durable stalemate. The concerns raised by *Red Alert*, of a pre-programmed nuclear holocaust resulting from combinations of human and mechanical errors, independent of any political crisis, not only touched deep popular concerns but also pointed to a real weakness in the deterrent strategy. Kahn himself was well aware of George's novel, having used it for training courses, and praised 'the clever way the general negates the elaborate system set up to prevent unauthorized behaviour'.<sup>26</sup>

Thomas Schelling, who had also spent some time at RAND and eventually got a Nobel Prize for Economics, took the scenario seriously and advised Kubrick on the screenplay of *Dr. Strangelove*. After reading the novel he developed his ideas for a communications link between Moscow and Washington to reduce the dangers the book described.<sup>27</sup> In a 1960 article, which he passed on to Kubrick, Schelling observed that what might appear as accidents reflected past choices that then made possible the loss of control. 'The point is that accidents do not cause war. Decisions cause war.' He was urging people to think about the structure of a nuclear relationship to make these decisions less dangerous.<sup>28</sup> This was the point of nuclear strategy. We need deterrence, he explained, not only to get at the 'rational calculator in full control of his faculties' but also the 'nervous, hot-headed, frightened desperate decision that might be precipitated at the peak of a crisis, that might be the result of an accident or false alarm, that

might be engineered by an act of mischief'. To do that it was necessary to make it self-evident that starting war would be unattractive in all circumstances, even if an enemy attack was feared. In practice, policymakers were becoming all too aware of the dangers of escalation into nuclear war and were becoming more inhibited than reckless as a result. In 1961, at the height of the Berlin crisis, Schelling set up a crisis game that involved members of the government to see how matters might unfold. The 'single most striking result', according to one of his colleagues, was 'our inability to get a fight started'.<sup>29</sup>