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The Balance of Terror

> Such was the crowning triumph of military science, the ultimate explosive that was to give the "decisive touch" to war…
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> **H. G. WELLS,** *The World Set Free,* 1914[1]

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.'[2] 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.[3]

He largely put aside this unpleasant prospect in a popular guide to the new science, *The Interpretation of Radium*, published in 1909.[4] 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'.[5] 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'.[6]

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.'[7]

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'.[8] 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’.[9] 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.[10] 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.[11] 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.[12]

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 apocalyptical 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*.[13] 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'.[14] 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.[15]

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…'[16]

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.[17] In a 1958 novel, *Red Alert,*[18] 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.[19] 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.[20]

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*.[21] 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.'[22] 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.[23]

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 Thermonuclear 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.[24] 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.[25]

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'.[26]

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.[27] 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.[28] 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'.[29]