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Sputnik and 'skill thinking' revisited: technological determinism in American responses to the Soviet missile threat

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Revisiting popular, political and academic reactions 50 years after the launch of Sputnik*, this article seeks to highlight the substantial fear of technological development evident in these reactions. The nature of responses to* Sputnik *is especially notable, it is argued, in light of the tendency to assume an American love affair with technology across all areas of social and political life. The article examines the manner in which both contemporaneous and subsequent accounts of the launch of* Sputnik *incorporate a strand of technological determinism that inverts the primary features of the seemingly utopian, 'skill thinking' approach to technology assumed to be characteristic of the American outlook during the Cold War and beyond.*

Introduction

Technological achievement and advancement are routinely taken to be a major underpinning of American national prestige and power historically. Walter LaFeber, for instance, has recounted the entirety of American history in microcosm through this theme:

> Columbus depended on … calculations that indicated the world was round, not flat. He proved those calculations correct by using the latest compasses, astrolabe, and elaborate tables that measured longitude. From these first voyages of discovery through the Yankee clipper ship that conquered world trade, the Colt .44 revolver that conquered the West, the airplane that conquered distance, the atomic bomb, and the multistage rocket that conquered space, American foreign policy cannot be

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> understood apart from the technology that transformed the world and made diplomacy ever more complex.[1]

Indeed, American foreign policy makers have frequently been faulted for their supposed over-reliance on technological solutions to political problems. LaFeber argues that the characteristically American association of technology with improvement and progress has, paradoxically, made American diplomacy 'more complex – and dangerous. Those technological conquests also help us to understand why Americans have too often believed that a crisis in foreign affairs might well be solved through new scientific breakthroughs'.[2] Similarly, during the latter days of the Cold War, Nicholas Wheeler and Ken Booth criticized what they termed as the 'engineering approach' of American strategic planning:

> Since we have grown up in a world in which technology shapes so much of what we do, as individuals and groups, we almost intuitively come to invest it with a significance in international security that is not justified by the historical record. US strategists in particular have been prone to this. They have tended to believe that since technological change throws up the problems, it can also provide the solutions. Out of the fact of technological innovation has been born a faith in the technological fix.[3]

This they link in turn to a broader disposition: 'that "can do" attitude which runs so strongly through U.S. life'.[4]

Booth and Wheeler draw explicitly here on ideas first developed by the political scientist Stanley Hoffman regarding the conduct of American foreign policy in the 1960s. Hoffman coined the term 'engineering approach' to denote 'a pragmatism that is a way of acting, not a mode of thought – a *praxis*, not a philosophy, unless one describes it as an *implicit* philosophy, a pattern of behaviour resting on submerged assumptions all of which correspond, once more, to the American experience writ large and projected upon the outside world'.[5] These implicit, taken-for-granted assumptions derived from 'a society in which achievement has meant industrialization, mechanization, the triumph of technology'; the American experience, Hoffman claimed, had 'been primarily one of mastering nature', right through 'from the Puritans to the space age'.[6]

In American foreign policy this is manifested in what Hoffman terms as 'skill thinking' – the 'substitution of instruments for policies'.[7] Writing in the 1960s, Hoffman regarded American foreign policy as beholden to this assumption that the 'triumph of technology' lay at the core of American national greatness. Since America's success as a nation is attributed to its engineering culture, he argues, there has been a tendency for American foreign policy makers to model themselves on the conduct of engineers: that is, a tendency to seek technical solutions to the problems they face. In consequence, American foreign policy has been marked, particularly in the military realm, by a 'built-in fondness for technology'. This fondness for technological solutions to political problems is what Hoffman consequently terms as skill thinking: the tendency to reduce political issues to 'a set of technical problems that will be handled by instruments which are equipped to deal with material obstacles'.[8]

It is a label that Hoffman developed principally to describe (and critique) Robert McNamara's tenure as Secretary of Defense. 'The engineering or instrumental outlook has always been characteristic of *homo oeconomics* and *homo militaris*', Hoffman asserted with McNamara in mind; hence the growth of the 'military–industrial complex' in the 1960s was, for Hoffman, less a driver of defence policy than a result of a 'commitment to a certain way of thinking', encouraged as it was by McNamara's own in belief in technical, engineered solutions to issues such as the arms race and the Vietnam War.[9]

This concept of skill thinking has persisted as a way of describing the US 'National Style' of foreign policy.[10] Witness Wheeler and Booth's contention that 'Hoffman's words were written over 20 years before President Reagan's Star Wars speech, but they could have been written the day after'.[11] Although Hoffman deployed the term to critique McNamara's foreign policy style – particularly the latter's perceived over-reliance on technology in the doctrine of 'flexible response' – manifestations of skill thinking can arguably be detected in a variety of concrete instances prior and subsequent to the McNamara era.[12] Michael Armacost, for example, argues that Eisenhower's 'New Look' policy was similarly marked by its 'faith in novel technology, the "long haul" perspective, the reliance upon nuclear weapons, the depreciation of manpower and conventional capabilities'. In keeping with Hoffman's assessment, Armacost asserts that this resulted in programmes 'induced by haste, *boldness in technology*'.[13]

Others, such as Williamson Murray and Macgregor Knox, also point to 'the deeply and quaintly American belief that all human problems have engineering solutions' which, they argue, has only become more prominent in what they term as the 'post-Vietnam search for technological silver bullets that will permit U.S. forces to wage war without suffering'.[14] They contend that this engineering, problem-solving outlook is a driving force behind the US led 'Revolution in Military Affairs' (RMA) and the policies of 'defense transformation' espoused under the Clinton and George W. Bush administrations, and cite the views Admiral William A. Owens, the chief proponent of the RMA under Clinton, as representative of the belief that technological innovation by the US would render war 'an essentially frictionless engineering exercise'.[15] Many commentators also see this emphasis on technology as having come to dominate a contemporary, risk-averse 'Western way of war' championed by the US and here several further examples spring to mind.[16] American emphasis on air superiority as means of intervening militarily during the 1990s, exemplified by the case of the Kosovo war, has been cited (and critiqued) by several analysts as characteristic of an effort to engineer a form of 'bloodless warfare'.[17] The case for intervention and regime change in both Afghanistan and Iraq were also similarly predicated on a belief that American technological innovation would allow the US to 'redefine how war is fought', as Deputy Secretary of Defense Paul Wolfowitz put it in reflections on the war in Afghanistan in 2002.[18]

The influence of skill thinking – the tendency to seek technological solutions to policy problems – therefore seems to be a pervasive feature of the military dimension of US foreign policy. In terms of the broad appeal and cultural resonance of such

thinking, Matthew Evangelista argues that this American emphasis on technology 'contributes some understanding of how new weapons are promoted to a broader public', citing General Omar Bradley's reference to 'the permanent American desire to substitute machines for men and magic weapons for conventional armaments'.[19] Nor are Wheeler and Booth alone in alluding to strategic defence in its past and present incarnations as characteristic of this desire to solve the problem of war with magic weapons.[20] One prominent commentator on contemporary nuclear proliferation has likewise argued that American persistence with the concept of missile defence is driven by 'faith in finding a technological solution to American vulnerabilities'.[21]

There are, however, necessary subtleties to be added to this portrayal of American strategic culture. Prior to his collaboration with Wheeler, Ken Booth had on other occasions been much more critical of this characterization: 'In war, as in other aspects of life, it has always been tempting … to relegate Americans to the fashionably inferior category of "doers" rather than "thinkers". The evidence from strategic history is much more mixed than this cliché about the great "Can Do" society might suggest.'[22] Booth went on to assert that

> the argument that Americans 'seek refuge' in technology away from the hard problems of strategy is scarcely supportable in the light of the extensive debating of strategic issues in the last twenty years. The image of *American Strategic Man* as being nine-tenths technology and one-tenth brain never has been valid, and is certainly not valid in the contemporary period.[23]

Though Booth does not pursue this line himself, it is possible to identify a view of technology within and beyond American strategic thought that is substantially different to that suggested by the persistent characterization of US policy makers as 'skill thinkers': an alternative view in which, periodically at least, technology comes to be seen primarily as a constraint rather than a catalyst of American power. One such instance of this, it is argued here, can be found in the immediate response to the Soviet breakthrough in missile technology in the 1950s. By revisiting popular, political and academic reactions to the launch of *Sputnik* and the response to it, this article seeks to highlight the substantial fear of technological development in these reactions, which are all the more notable in light of the tendency to assume an American love affair with technology across all areas of social and political life. The article examines the manner in which both contemporaneous and subsequent accounts of the launch of *Sputnik* evince a fear of a technologically determined future that inverts the primary features of the seemingly utopian, skill-thinking approach during the Cold War and beyond.

Sputnik and the crisis of technological optimism

The technological emphasis of the 'American Way of War' during World War II and the nuclear revolution are frequently seen as encouraging American technophilia in the immediate post-war decades.[24] Initially at least, the United States' status as the world's first nuclear-armed power seemed both to reinforce and increase American faith in technology

and further embed the notion of technology as a key instrument of US power – an instrument that could, given time, also assuage fears about the emergence of nuclear rivals.

The idea of an American defence against nuclear weapons emerged almost immediately after the world's introduction to the atomic bomb. On 23 October 1945, just weeks after Hiroshima and Nagasaki, President Truman assured Congress that 'Every new weapon will eventually bring some counter defense to it'.[25] Public confidence in the potential to develop a defence against nuclear weapons also remained high immediately after World War II.[26] A 1947 Social Science Research Council poll which indicated widespread public optimism that the United States would eventually find a way to build defensive systems against nuclear attack based, primarily, on the fact that American scientists had themselves already taken the lead in the development of atomic weapons. The author of the poll found that most respondents thought that 'since the scientists were able to invent the bomb, they can invent a defense ... The United States "always keeps ahead"' and she concluded that such views represented 'immense faith in American science, American ingenuity, and American resources'.[27] The presupposition here was that a technological solution to the problem of nuclear war was a feasible, desirable and characteristically American approach.

During the post-war decades, however, Soviet advances in the same technology gave cause to rethink the assumption that technology could and would render the US impervious to attack. In August 1949 came the news that the Soviets now possessed atomic weapons too, and developments in the 1950s caused a further crisis of confidence in the strength of American technology. Chief among these was, of course, the Soviet launch of *Sputnik I* – the world's first artificial earth satellite – on 4 October 1957. 'No event focused popular attention on America's vulnerabilities to attack more', Lawrence Freedman claims.[28] As well as denting the commonly held American self-perception as the world's leading technological power,[29] the Soviet Union's demonstration of its potential reach, as well as its perceived display of technological superiority, struck at the heart of the assumption of technology as the guarantor of US security. Indeed, in Freedman's opinion, *Sputnik* even challenged the conventional wisdom that technological advancement in nuclear weapons had enhanced US security. As he notes: 'The U.S. had embarked on a nuclear strategy to ensure an upper hand over the Soviet Union; now the position might be fundamentally reversed.'[30] Hence, insofar as 'Sputnik demonstrated that the Soviet Union could operate as a modern industrial power in its ability to mobilize and exploit scientific and engineering talent', it serves as 'a watershed in American attitudes on technology and the strategic balance'.[31]

Evidence of this 'watershed' in attitudes can be found both in the declarations of the time and in subsequent recollections of the *Sputnik* launch. President Eisenhower's bleak interpretation some months after in his 'Introductory Note' to NSC 5814/1, "U.S. Policy on Outer Space" of 20 June 1958 was that:

> Perhaps the starkest facts which confront the United States in the immediate and foreseeable future are (1) the USSR has surpassed the United States and the free

> world in scientific and technological accomplishments in outer space, which have captured the imagination and admiration of the world; (2) the USSR, if it maintains its present superiority in the exploration of outer space, will be able to use that superiority as a means of undermining the prestige and leadership of the United States; and (3) the USSR, if it should be the first to achieve a significantly superior military capability in outer space, could create an imbalance of power in favour of the Sino-Soviet Bloc and pose a direct military threat to U.S. security.[32]

Although Eisenhower followed this by immediately adding that 'The Security of the United States requires that we meet the challenges with resourcefulness and vigor', there is a clear indication in this passage not simply of the unexpected nature of the Soviet launch and its blow to American confidence, but also a real sense that the US could become subject to the demands, even if only temporarily, of Soviet technological superiority. Here the heroic vision of technology as America's strong-suit is replaced by the fear that new technology could become the very means by which American power would be constricted as a resultant after effect, ironically, of a chain of technological development initiated by the United States with the development of the atomic bomb.

Of course the pessimistic note struck by the introductory note to 5814/1 belies the fact that, as Robert Divine and Saki Dockrill have pointed out, Eisenhower continued to be relatively sanguine about America's military technological capability even in the wake of the *Sputnik* launch.[33] In part this was due to the fact that intelligence reports for some months previous had indicated an increased Soviet capability of 'initiating ICBM flight testing' thanks to photographs provided by the U-2 spy plane.[34] The 'shock of Sputnik' was consequently somewhat less for the administration than it was for an unsuspecting American public. Neither was the confidence of the Eisenhower administration in America's military–technological base obviously dented by the *Sputnik* launch. As Dockrill notes, 'American scientists claimed, and Eisenhower agreed, that Moscow's success with its *Sputniks* stemmed largely from the fact that the United States had started "much later" in this field than the Soviets, and not because the Americans were currently falling behind in the race to develop missile technology'.[35] Indeed, Divine goes so far as to argue that though the Eisenhower administration was obviously concerned by the implication that the Soviet Union now possessed missile technology capable of reaching American cities, the *Sputnik* launch was also viewed as an opportunity to extend US technological superiority in other areas. Most notably, the launch of the Soviet satellite into space assuaged concerns over the legality of the Defense Department's own proposed satellites, such as the highly classified WS-117L spy satellite, which would in turn surpass the reconnaissance abilities of the U-2.[36]

Yet Eisenhower was limited in the extent to which he could convey this confidence to the public by virtue of the fact that much of this self-assurance was based on clandestine reconnaissance, and the existence and purpose of the WS-117L had to be kept highly classified. As a result there was a serious gap between the President's

'low-key' response to *Sputnik* and the 'fears of the American people that *Sputnik* represented a fundamental shift in military power and scientific achievement from the United States to the Soviet Union', which Eisenhower largely failed to quell.[37] As Paul B. Stares points out, these fears were manifested both as concerns over the capacity for attack allowed by missiles of intercontinental reach and in the less tangible fear that the US would come to be 'blackmailed' or 'dominated' from space.[38] Nowhere are they more concisely expressed than in the recollections of Eisenhower's own Chief Science Adviser, James Killian:

> As it beeped in the sky, *Sputnik I* created a crisis of confidence that swept the country like a windblown forest fire. Overnight there developed a widespread fear that the country lay *at the mercy of the Russian military machine* and that our own government and its military arm had abruptly lost the power to defend the mainland itself, much less to maintain U.S. prestige and leadership in the international arena itself. *Confidence in American science, technology, and education suddenly evaporated*.[39]

Killian's interpretation exemplifies the opposition of a previously assumed technological optimism with a new dimension of technophobia, or at the very least uncertainty, as a means to comprehend *Sputnik* and its significance. Gone are the hallmarks that LaFeber, Hoffman and others associate with the American experience of technology: a heroic sense of invention, and faith in an increased capacity to act through technology leading ultimately to greater control over national destiny. In its place are fear, foreboding and a sense of crisis that American capacity for action could well be beyond its own control. In short, American confidence in its technology and the infrastructure entrusted to produce it is replaced by a vision of enslavement to a foreign power itself almost 'machine'-like in quality.

Several historians attest that *Sputnik* had a similar, if not more profound, effect on the American public. Against the heady American technological optimism of the 1950s embodied by 'futuristic' everyday technologies such as the fins of the Cadillac, the sleek modern lines of the Fender Stratocaster guitar, labour-saving devices within the home, and in utopian science fiction of the time,[40] *Sputnik* registered as a major shock to the US popular consciousness. In many ways this shock was itself parasitic upon prior expectations of technological advance, particularly with regard to space. Rip Bulkeley and Graham Spinardi note the widespread public fascination with the possibility of futuristic space weapons in the early 1950s fostered, for example, by the dissemination of plans and blueprints for nuclear armed space stations by Wernher Von Braun in *Collier's* magazine; a 'direct result', they argue, was that Americans 'now viewed the Russian achievement with growing apprehension'. *Sputnik* had 'brought the nuclear threat directly and inescapably to every Main Street for the very first time'.[41] Paul Stares likewise notes this widespread sense of panic in the American popular press; Paul Roman concurs that Soviet boasts of intercontinental ballistic missile (ICBM) tests months prior 'now took on a grave new light',[42] as does Freedman: '*Sputnik* pushed ... dark thoughts to the fore. This achievement in space captured the

popular imagination in a way that sparse and subdued reports of monitored ICBM tests could not.'[43] As Andreas Wenger concludes, 'the shock of *Sputnik* was profound: the United States had been challenged in the one field – science and technology – in which almost everybody had taken American pre-eminence for granted. *Sputnik* led to a wave of near-hysteria.'[44]

Technological determinism and the political response to the missile threat

This 'near hysteria' forced Eisenhower reluctantly into a range of actions that would have significant implications for the shape of US strategic and defence policy in the coming decade. Post-*Sputnik* the 'missile gap' constituted a reality in the public perception, and *Sputnik* transformed US efforts on space 'overnight into a national obsession to wrest the lead from the Soviet Union', one which would not end until the moon landing and which, in the intervening period, created pressures for a vastly expanded civil space effort – against the better judgement of the Eisenhower administration which had envisaged the development of satellites primarily for reconnaissance purposes, and was concerned about exposing its own missile capabilities to the Soviets.[45]

A further facet of this enforced expansion included increased funding and research into a range of space weapon and missile defence – or anti-ballistic missile (ABM) – proposals. In practical terms, as Stares notes, construing *Sputnik* as a challenge to be met ensured that 'The services and aerospace companies both sensed that "rich pickings" would be available in the post-Sputnik budgets'.[46] As well as inspiring schemes such as the *Argus* project, an ill-fated scheme intended to create an atmospheric shield against ICBMs through exploding nuclear warheads in space, the perceived need to monitor and track Soviet efforts in space led to the formation of the Ballistic Missile Early-Warning System (BMEWs) – a new system of tracking radars deployed in Greenland (Thule), Alaska (Clear) and Britain (Fylingdales) – which would become central components in subsequent missile defence initiatives. The sense of crisis, Bulkeley and Spinardi contend, led to the consolidation of tentative missile defence initiatives, previously the subject of heated inter-service rivalries, exclusively within the US army by January 1958. Early missile defence advocates, such as House Majority leader John McCormack, were keen to promote the army's *Nike-Zeus* ABM project – and American engineering in general – as up to the challenge posed by the Soviets. McCormack admonished the administration to 'close the gap in our missile posture, muzzle the mad-dog missile threat of the Soviet Union, loose the Zeus through America's magnificent production line'.[47]

At this point, however, no consensus existed that missile defences were a feasible or realistic response to the newly illustrated Soviet missile capability. Nowhere was this spilt better epitomized than in two key reports of the 1950s, the Killian report of 1955 and the Gaither report of 1957.[48] The Killian panel, centred around the aforementioned James Killian, foresaw decades of mutual US–Soviet expansion of nuclear forces which, if left to continue uncontrolled, would proceed to a perilous

stalemate. In this the Killian panel saw little future for anti-missile technology, a view reinforced in Killian's own later reflections on *Sputnik*. The Gaither report, compiled during the months immediately before and after the launch of *Sputnik*, likewise depicted a 'period of extremely unstable equilibrium' caused by the expansion of offensive arsenals, but placed greater emphasis on a 'temporary technical advance' (such as represented by *Sputnik* or, pertinently, in ABM technology) that 'could give either nation the ability to come near to annihilating the other'.[49]

Though obviously dependent on technological optimism in one sense, early rationales for missile defence rested at least as heavily on a pessimistic reading of the implication of technological development in the offensive realm. Indeed, if anything proponents of expanded research and investment into ABM technology tended to go further in their assessments of the possible negative consequences of future technological developments. ABM enthusiast Edward Teller, for instance, famously claimed that the significance of *Sputnik* was 'more important and greater than Pearl Harbor'.[50] Likewise a December 1957 report of the SAB (Scientific Advisory Board), chaired by Teller, evinces a similar mix of panic and urgency on the prospect of future technological development. '*Sputnik* and the Russian ICBM capability' had, the SAB noted, 'created a national emergency'. It recommended as a consequent national priority that the Air Force 'pursue an active research program on anti-ICBM problems'.[51] Such views were directly incorporated in the findings of the previously noted Gaither report, which predicted a race in technology in which 'There will be no end to the technical moves and countermoves'. Consequently the report urged that 'the importance of providing active defense of cities or other critical areas demands the development and installation of the basic elements of a [missile defence] system at an early date'.[52]

What is interesting here is that although the Killian and Gaither reports were diametrically opposed on the issue of missile defence, both relied in common on overt technological determinism in so far as they both envisaged a reciprocal technological arms race that would determine the future international system.[53] Both can in this sense be said to indicate the gradual adoption of determinist thinking into American policy making, and constitute influential instances of the formal incorporation of the sense of 'alarm and urgency' and the feared loss of control over national destiny common in popular and media reactions to *Sputnik* in the policy debate.[54] The point is not that a pessimistic technological determinism entirely revoked or replaced the search for a 'silver bullet' solution to the problem of the Soviet missile threat. The Gaither report, as noted above, was highly optimistic that missile defence provided an entirely feasible means to offset Soviet advances in missile technology. What we end up with, then, is neither pure optimism nor absolute determinism, but a confluence or hybrid of technological optimism and technological fears. Even the Killian panel qualified its prediction of a strategic stalemate with the recommendation of an emphasis on technological innovation. Its report predicted that the 1960s would be 'So fraught with danger to the U.S.' that little option remained except that 'we should push all promising technological developments'.[55] Although the Killian report was highly pessimistic in its expectations for decisive technological breakthroughs ('We see no

certainty', it declared, 'that the condition of stalemate can be changed through science and technology'), it still maintained that: 'This does not mean that some new unimagined weapon or development, far afield from any present weapon system, might not provide an advantage to one side or the other.'[56] Escape from the arms race purely on the basis of technological innovation was therefore expected to be unlikely, but not impossible.

A similar confluence of fixes and fears can be found in the thinking of Secretary of Defense Robert McNamara. Initially part of Kennedy's team that came to power on the back of campaigning on the issue of the 'missile gap', McNamara's defence policy arguably represents the political instantiation of the hedged form of technological determinism found in the Killian report. To some extent this might come as a surprise. Superficially, McNamara represents the arch-instrumentalist or 'skill thinker'. In symbolic terms, McNamara could be said to be a true representative of America's technological legacy, the literal inheritor (and saviour) of Fordism during his tenure as president of the same motor company in the post-war years. Simultaneously, the adoption of the same managerial techniques employed at Ford into the Pentagon are a primary reason that Hoffman famously identified the McNamara as the prime exponent of 'skill thinking' in American foreign policy – the 'engineering or instrumental outlook' that every political problem could have a technological solution.[57]

Contrasting with this are McNamara's own reflections on the nature of the arms race and his frequent reference to the negative consequences of technological advancement. McNamara accepted key precepts epitomized in the Killian report, particularly the principle that advances in offensive missile technology would always outpace innovation in defensive technology, which was reinforced in his view once the MIRV-ing of nuclear warheads (referring to the development of the 'Multiple Independently-Targeted Reentry Vehicle') became possible. He took this vision of the development of an (offensive) arms race and embellished it with descriptions remarkably resonant not with the supposedly characteristic American engineering outlook, but with the theme of technology-out-of-control often found in dystopian philosophy and literature – from Mary Shelley's *Frankenstein* and Huxley's *Brave New World* to the pessimistic reflections on humanity's subjugation to technology associated variously with Martin Heidegger, Jacques Ellul and the Frankfurt School of social theory.[58]

This is not to claim that McNamara was an avid student of such works or consciously attempted to incorporate the technology-out-of-control motif into his rhetoric. But certain aspects of his thinking do seem to exhibit strong homologies with the negative assessments of technological development to be found in such literature. In his reluctant approval of plans for a 'thin' anti-ballistic missile system in September 1967, for example, the Secretary of Defense warned: 'There is a kind of mad momentum intrinsic to the development of all new nuclear weaponry. If a weapons system works – and works well – there is a strong pressure from many directions to procure and deploy the weapon out of all proportion to the prudent level required.'[59] Even more explicit in this sense is McNamara's *Essence of Security: Reflections in Office*.[60] Pre-empting the pessimistic tone of the social theorist Theodor Adorno,

McNamara argues that the 'road leading from the Stone Age to the ICBM, though it may have been more than a million years in the building, seems to have run in a single direction'.[61] McNamara shows an acute awareness of the fear that 'somehow society, all society – East and West – had fallen victim to bureaucratic tyranny of technology that is gradually depersonalizing and alienating modern man himself'.[62] This, he argued, is a concomitant after-effect of technological progress.[63] Indeed McNamara even reckoned this to be a specifically American fate: 'It has been the American practice from the beginning to take the work loads off the backs of men and put them on the backs of machines.'[64] Here too he references the innately 'Jeffersonian' nature of the American desire to use technology as a means to assert and protect American independence.[65] However in the process, in McNamara's view, 'it is also true that we are becoming tools'.[66] In other words, McNamara's reflections allow for the possibility that a loss, rather than enhancement, of personal and national power can follow from the characteristically American substitution of machines for manpower.

In his own considerations of such issues McNamara advises us not become bound either to technological fixes or to the rejection of modern technology in its entirety:

> It is too simple an answer to reply that technology itself is morally neutral and that man must simply take care to retain his human control. The more profound question is whether or not complex technology narrows or widens the alternatives available for human control. It is clear enough that man conditions his technology; what is less clear is the extent to which technology conditions man. The degree and moral quality of that conditioning is a dilemma we must face, but we must face it and solve it and not merely fall into an escapist and emotional romanticism.[67]

Elsewhere, however, he notes that 'it is unlikely that today Jefferson would fret much about being folded, bent or mutilated by the computer. It is somewhat more likely that he would invent a better one'.[68] Hence McNamara seems to reject unconditional technological optimism, but at the same time he refuses to completely endorse the dystopian view of technology in the 'escapist and emotional romanticism' he associated with anti-nuclear sentiment. As Bulkeley and Spinardi put it: 'McNamara himself embodied the *contradiction between*, firstly, a public acceptance of mutual vulnerability and mutual deterrence, and, secondly, a constant striving to discover the "technological fix" that might get deterrence back to its bygone one-way form.'[69] In practical terms, the first of these impulses came to prominence in the widespread dissemination of the 'action–reaction' thesis – an almost mechanical process of spiralling weapons production – as a 'virtual law of strategic relations'.[70] In seeming contradiction, the second impulse saw an increase in efforts at attaining US nuclear superiority through increase and innovation in offensive missile technology, itself a kind of technological fix envisaged by the policy of assured destruction.

Technological determinism and American Cold War culture

In short, McNamara does not completely represent the type of unreconstructed 'skill thinker' that Hoffman would have us believe. At the very least, his reflections and

speeches indicate, and perhaps reflect, a growing apprehension in the 1960s that conflated a seemingly out-of-control arms race with the nature of technology itself.

Certainly this theme extended to the level of Cold War culture. Once again, this is not to say that Americans had entirely lost their faith in technological ingenuity. In 1969, Carroll Pursell could still boldly write:

> Technology holds a special place in both the hearts and history of Americans. Although tools have always played an important role in the history of man, it is commonly admitted that they have played a special and magnified role in the New World. Whether we [Americans] are envied for our refrigerators, despised for our transistor radios, or feared for our nuclear weapons, the American way of life is viewed throughout the world as one in which gadgets, tools, and machines play a dominant part.[71]

Indeed, American success in the space race, culminating in the moon landing of July 1969, effectively brought closure to the panic inspired by *Sputnik* and (re)assured US status as the world's leading technological power.

Earlier in the 1960s, however, fears of a technologically determined future found broad expression at the popular level. As Allan M. Winkler notes, fiction and film provide a window on contemporary perspectives of the nuclear arms race, and here we find several additions to the literary canon on technological determinism. Eugene Burdick and Harvey Wheeler's popular 1962 novel *Fail-Safe* imagined a scenario in which technical malfunction launched a US nuclear attack. Although fictional, the authors stipulated a 'problem that is already upon us … the erosion of human accountability … It's as if human beings had evaporated and their places were taken by computers'.[72] A similar premise appeared in Stanley Kubrick's even more familiar and acclaimed *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb*, which portrays, as Winkler puts it, 'a more vivid and absurd, even if more pessimistic tale of a mad world become prisoner to its monstrous machines' and 'carried the logic of the nuclear age to its ludicrous extreme'.[73] The theme was picked up in social critique too. J.K. Galbraith spoke of a 'technological imperative' emanating from the structure of a new 'industrial system', and Herbert Marcuse's declaration that 'Auschwitz continues to haunt, not the memory but the accomplishments of man – the space flights; the rockets and missiles; the electronic plants' neatly captured the feeling that the technological 'progress' of the post-war years had a darker side.[74]

Such thinking was not merely restricted to Kubrick's parody, or to the New Left of the 1960s. At what cost, George Kennan likewise wondered, had the US started down the path of the nuclear revolution in weapons technology?

> The technological realities of this competition are constantly changing from month to month and from year to year. Are we to flee like haunted creatures from one defensive device to another, each more costly and humiliating than the one before, cowering underground one day, breaking up our cities the next, attempting to surround ourselves with elaborate shields on the third, concerned only to prolong the length of our lives while sacrificing all the values for which it might be worth while to live at all.[75]

Even scientists involved in government policy on nuclear weapons seemed to adopt the technology-out-of-control motif. Herbert York, physicist on the Manhattan Project, asserted that the 'technological side of the arms race has a life of its own, almost independent of policy and politics', echoing the pessimistic view of human agency characteristic of technological determinism.[76] York became increasingly cynical about the possibilities of harnessing military technology as the Pentagon further institutionalized the seemingly relentless pursuit of an improved nuclear arsenal.[77]

Ralph Lapp, another physicist who had worked on both the A-bomb and the H-bomb, provides an even more thoroughgoing and pessimistic account centred on the technology-out-of-control idea of a 'runaway arms race'.

> Somewhere along this road to destruction [he lamented] man has lost his way and let his steps be guided by the compass of technology. Whenever a new weapons possibility beckoned, society meekly moved in this direction, without questioning the consequences. The natural sciences, for so long supreme in the grandeur of their isolation, became the dictators of weapons events.[78]

President John F. Kennedy's exhortation in his inaugural address of 21 January, 1961 to close the 'missile gap' ('We dare not tempt them with weakness. For only when our arms are sufficient beyond doubt can we be certain they will never be employed')[79] may have been an elegant rhetorical move, but, in Lapp's view, the implications of this stance had locked the US into an unwinnable race. In doing so, technology had taken on a life of its own as an apocalyptic but irresistible force that had rendered America a subservient 'garrison state' in the process:

> The control of a dictatorial weapons technology has become the nation's most urgent problem. Already it encompasses our lives. Its hidden fruit lies deeply buried in thousand prairie sites. It would ring our decaying cities with a chain of killer-missiles to fend off an attack that would usher in 'mankind's final war.' It would seduce to its temple the minds of our society. America would in the process become a fortress with ramparts stretched from shore to shore, bracketing a garrison state.[80]

In these visions the nuclear juggernaut seemed unstoppable, and attempts to shield against it were merely prisoner to the same way of thinking.

Questioning the technological imperative

All this is not to say that such deterministic assessments enjoyed universal acceptance or appeal in the post-war or even post-*Sputnik* years, and not all practitioners shared Lapp's characterization. Exponents of the deterministic view of technology often argued that the nuclear arms race was in large part resultant from the existence and institutionalization of a 'technological imperative' – technology for its own sake, the sort of inherent and intrinsic 'mad momentum' identified by McNamara. This concept can be traced to J. Robert Oppenheimer's well known reflection in the wake of the atomic bomb that: 'When you see something that is technically sweet, you go ahead and do it and you argue about what to do about it only after you have had your technical success'; and as the US–Soviet arms race seemed to be spiralling out

of control in the 1960s, Lapp described the technological imperative as the view that 'if a weapons system *could* be made, then it *would* be made'.[81]

This type of thinking engendered a direct counter-reaction. Jack Ruina, a director of ARPA (the Pentagon's 'Advanced Research Projects Agency') in the 1960s, cautioned against overstating the prevalence of any 'technological imperative' in weapons development:

> Some writers refer to a 'technological imperative' at work – that is, if a weapon can be made it will be made. There is no doubt some truth to this, but the concept is overly simplistic. There are restraints to the temptation to develop and deploy, without discrimination, the technologically possible ... we did restrain ourselves from developing shipborne nuclear ballistic missiles, bombs in orbit, 100-megaton bombs, and many other technically feasible systems.[82]

Similarly, in the early 1960s Albert Wohlstetter described what he viewed to be the 'narrowly technological component' of such decisions as the development of the atomic bomb and hydrogen bomb, implicitly rejecting the weight attributed by some to the technological imperative in strategic policy. 'Technology', he asserted, 'is an important part, but very far from the whole of strategy.'[83]

More recent accounts argue that the seeming self-evidence of a technological imperative had more prosaic political–bureaucratic origins.[84] Weapons R&D had become institutionalized within the Defense Department in the late 1950s; added to this was McNamara's penchant for long-range technological planning (usually five years) which he himself admitted forced speculation as to decisions on deployments 'which our opponents, themselves, may not have made'.[85] As a result, Ernest Yanarella argues, 'technological developments in the areas of offensive and defensive weaponry more and more took on the image of rational systems evolving in complete detachment from human control and intervention – even, and especially, to the defense planners whose assumptions, decisions, and actions fueled and perpetuated the pace and course of technological change.'[86]

Less sympathetic critics of the McNamara era argue that very often the Secretary of Defense and Pentagon officials simply used arguments based on the existence of a 'technological imperative', and its attendant connotations of technological determined policy choices, in order to justify policy decisions. For Jonathan B. Stein 'McNamara spoke of "technological exuberance" as the driving force in the arms race, a theme that predates McNamara in both the scholarly and the popular literature and one that has been echoed since time and again', but adds 'It is a theme, however, that is overdrawn'.[87] To John Erickson, reference to a technologically driven arms race was also simply a scapegoat for policy makers employed to avoid responsibility for an arms spiral:

> The villain of the piece in more than one case has been made weapons technology along with *Homo technicus*: the creation of the nuclear mystique, which is rubbing off so disastrously throughout the tiers of the international power structure, was a political act, which technology in its various forms was called to undo or unmask. The political determinants remain of primary importance.[88]

Conclusion

As Robert Johnson noted some time ago, fears of a technologically determined future, such as those evident in the wake of *Sputnik*, seem 'sometimes to have emerged, in part, out of efforts to rationalize the undertakings of particular defense programs desired for other reasons', such as personal or political gain, bureaucratic or economic interests.[89] Hawkish physicist Dr. John S. Foster Jr.'s characterization of the twin forces driving America's Research and Development procedures during the Cold War certainly seems to fit this characterization:

> Either we see from the field of science and technology some new possibilities, which we think we ought to exploit, or we see threats on the horizon, possible threats, usually not something the enemy has done but something we have thought ourselves that he might do, we must therefore be prepared for.[90]

It would be premature, however, simply to dismiss the presence of determinist logics in the political responses to *Sputnik* simply as an artifice designed to disguise ulterior motives. Regardless of whether such reactions were or were not guided by considerations of political and economic gain, the way these reactions invoked broader technological fears is indicative of how US policy makers sought to 'justify their sense of alarm and make intelligible and tangible to others'.[91] The need to do so, Johnson argues, becomes particularly pressing during what he terms 'periods of peril' – political crises caused by unexpected, potentially decisive shifts in the strategic balance. The launch of *Sputnik*, or rather the reaction to it, is a classic case in point. As we saw previously, this perceived technological advance was widely taken to portend ominous consequences for the US at both the political and the popular level. The nature of the development was itself taken as confirmation of the 'aggressive and adventuresome' nature of Soviet intentions.[92]

Johnson argues that the instrumental use of the language of technological determinism during such periods of peril need not preclude our awareness that the use of such language creates a sense of crisis that goes beyond individual motivations. Indeed, 'like other myths that have their origins in some more concrete human need, the period of peril myth, once articulated, has taken on a life of its own with an independent influence on thinking and behaviour'.[93] In terms of the American Cold War mindset this was manifested in a general tendency to 'explain Soviet behavior on the basis of a combination of broad principles – such as a Soviet goal of world domination or the Soviet view of the correlation of forces – and Soviet advances in military technology, *with the effective emphasis upon the latter*'.[94] Johnson even argues that 'Such thinking involves an assumption of technological determinism, in the sense that it postulates that the broad aggressive purposes of the Soviets are made operative and given specific content and direction by the Soviet acquisition of new military technologies. *Means, in effect, determines goals*'.[95]

In this sense the crisis created by *Sputnik* appears to have been accompanied by a parallel crisis in American's supposed 'engineering outlook'. The tangible challenge posed by *Sputnik*'s feat of engineering seemed to put this American self-image

in question, even if it did not revoke it entirely. In fact the biggest concern was arguably not that 'skill thinking' had been made redundant by *Sputnik*, but the fear that this engineering outlook could no longer be considered as an exclusively American trait. As Johnson and others note, a key factor in the period-of-peril idea is the transposition of this self-characterization onto the Soviet character, or 'mirror-imaging', particularly in relation to nuclear and space technologies.[96] So, in other words, the American 'national style', and its assumed emphasis on technological innovation and superiority, was mapped onto the character of Soviet strategic planners.

For some, as we have seen, *Sputnik* therefore portended a future that would be determined by an endless and reciprocal cycle of technological innovations by virtue of the dominance of 'skill thinking' on both sides of the Cold War divide. But such determinism was more than either a simple rationalization of perceived vulnerabilities or an exploitation of such perceptions for the benefit of parochial interests. Nor did it necessarily negate the problem-solving, 'skill-thinking' approach to foreign policy:

> In a curious way, pessimistic predictions ... may be almost as reassuring – and possibly even more reassuring – than optimistic predictions. By suggesting the need for action, they respond to the culturally rooted American compulsions toward activism and toward believing that all problems have solutions. It is reassuring to think that by 'doing something' we can eliminate the threats to our survival posed by the existence of nuclear weapons.[97]

So technological determinism and the engineering outlook associated with 'skill thinking' may have actually served to reinforce each other with the former becoming the perfect foil for the latter's appeal to America's activist, instrumentalist heritage. Certainly there was no lack of efforts on the American part to 'do' something about the crisis created by *Sputnik*. Temporary panic and paralysis quickly gave way to investment in space technologies, nuclear weapons innovations and (up until the 1970s at least) proposals for missile defence. We might do well, however, to bear in mind the strand of technological determinism that can be traced back to *Sputnik* before we characterize American foreign policy makers, or indeed Americans in general, as problem solvers permanently in search of a 'technological fix'. In the case of the reaction to *Sputnik*, the interpretation of technology's role in constituting the problem is at least as interesting.

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Notes

[1] LaFeber, *The American Age*, 8.
[2] Ibid.

[3] Wheeler and Booth, "Beyond the Security Dilemma," 314.
[4] Ibid.
[5] Hoffman, *Gulliver's Troubles*, 144. Emphasis original.
[6] Ibid., 147.
[7] Ibid., 150.
[8] Ibid., 148.
[9] Ibid., 148–9.
[10] Gray, *Nuclear Strategy and National Style*.
[11] Wheeler and Booth, "Beyond the Security Dilemma," 314.
[12] McNamara's use of skill thinking, Hoffman argues, gave the 'nightmarish realities of deterrence in the nuclear age the cool, aseptic air of science, removed from the impurities of politics'. Hoffman, *Gulliver's Troubles*, 149.
[13] Armacost, *The Politics of Weapons Innovation*, 267. Emphasis added.
[14] Murray and Knox, *The Dynamics of Military Revolution*, 178–9.
[15] Murray and Knox, *The Dynamics of Military Revolution*, 178. Cf. O'Hanlon, "Rumsfeld's Defence Vision."
[16] Coker, *Waging War without Warriors?*; Shaw, *The New Western Way of War*.
[17] Cohen, "The Mystique of U.S. Air Power"; Cf. Shaw, *The New Western Way of War*, 12–42.
[18] Wolfowitz, "Testimony on Defence Transformation."
[19] Evangelista, *Innovation and the Arms Race*, 222.
[20] Cf. Franklin, *War Stars*.
[21] Joseph Cirincione, director of the Non-Proliferation Project at the Carnegie Endowment for International Peace, interview for PBS Frontline "Missile Wars" [13 May 2002].
[22] Booth, "American Strategy," 22.
[23] Ibid., 22. Emphasis original.
[24] Cf, Wiegley, *The American Way of War*.
[25] Quoted in Freedman, *Evolution of Nuclear Strategy*, 29.
[26] Linenthal, *Symbolic Defence*, 2.
[27] Ibid., 2, 4; Eberhart, "How American People Feel about the Atomic Bomb". See also Boyer, *By the Bomb's Early Light*, 2.
[28] Freedman, *Evolution of Nuclear Strategy*, 131.
[29] *Sputnik* was quickly recognized as the standout event in the "International Geophysical Year" period of July 1957–December 1958.
[30] Freedman, *Evolution of Nuclear Strategy*, 131.
[31] Ibid.
[32] President Dwight D. Eisenhower, as quoted in Stares, *Space Weapons and US Strategy*, 38.
[33] Divine, *The Sputnik Challenge*; Dockrill, *Eisenhower's New-Look National Security Policy*.
[34] As quoted in Dockrill, *Eisenhower's New-Look National Security Policy*, 210.
[35] Ibid., 212–13.
[36] Divine, *The Sputnik Challenge*, 11–12.
[37] Ibid., 8, 205; see also McDougall, "President Fails As National Shrink," 700–701.
[38] Stares, *Space Weapons and U.S. Strategy*, 19.
[39] Killian, *Sputnik, Scientists and Eisenhower*, 7. Emphasis added.
[40] Segal, *Technological Utopianism in American Culture*; Chant, *Technology and Everyday Life*; Disch, *The New Improved Sun*.
[41] Bulkeley and Spinardi, *Space Weapons*, 12, 16. See also Neufeld, '"Space Superiority."'
[42] Stares, *Space Weapons and US Strategy*; Roman, *Eisenhower and the Missile Gap*, 31.
[43] Freedman, *Evolution of Nuclear Strategy*, 131.
[44] Wenger, *Living with Peril*, 154.

[45] Stares, *Space Weapons and US Strategy*, 39. See also Dockrill, *Eisenhower's New-Look National Security Policy*, 212–13.
[46] Ibid., 48.
[47] Quoted in Bulkeley and Spinardi, *Space Weapons*, 33.
[48] On the importance of the Killian and Gaither reports in shaping the American strategic debate of the 1950's see Freedman, *Evolution of Nuclear Strategy*, 150–55.
[49] As quoted in Wenger, *Living With Peril*, 8.
[50] Quoted in Kaplan, *The Wizards of Armageddon*, 135.
[51] Stern, *The USAF Scientific Advisory Board*, 82–3.
[52] The Gaither report, quoted in Freedman, *Evolution of Nuclear Strategy*, 152.
[53] Freedman, *Evolution of Nuclear Strategy*, 146–62.
[54] For further expansion on this see Johnson, *Improbable Dangers*, 42.
[55] Quoted in Wenger, *Living With Peril*, 148.
[56] Quoted in Freedman, *Evolution of Nuclear Strategy*, 150.
[57] Hoffman, *Gulliver's Troubles*.
[58] Cf. Leiss, *Under Technology's Thumb*.
[59] From McNamara's speech to the Editors of United Press International in San Francisco, 18 September 1967, reprinted in Humphrey and Douglas *Anti-Ballistic Missile*.
[60] McNamara, *Essence of Security*.
[61] Ibid., 31. Adorno: 'No universal history leads from savagery to humanitarianism but there is one leading from the slingshot to the megaton bomb' – *Negative Dialectics*, 320.
[62] McNamara, Essence of Security, 114.
[63] Ibid.
[64] Ibid., 115.
[65] Ibid., 117.
[66] Ibid., 116.
[67] Ibid., 116.
[68] Ibid., 117.
[69] Bulkeley and Spinardi, *Space Weapons*, 57. Emphasis added.
[70] Freedman, *Evolution of Nuclear Strategy*, 241.
[71] Pursell Jr., *Readings in Technology and American Life*, 3.
[72] Quoted in Winkler, *Life Under a Cloud*, 177.
[73] Ibid., 177–8.
[74] Galbraith, *The New Industrial State*; Marcuse, *One-Dimensional Man*, 247.
[75] Kennan, *Russia, the Atom and the West*, 54; quoted in Freedman, *Evolution of Nuclear Strategy*, 153.
[76] York, *Race to Oblivion*, 180.
[77] Yanarella, *The Missile Defence Controversy*, 165.
[78] Lapp, *Arms Beyond Doubt*, 3.
[79] Quoted in Ibid., 8.
[80] Ibid., 191.
[81] Ibid., p.31. Emphasis original.
[82] Ruina, "Aborted Military Systems," 320.
[83] Wohlstetter, "Strategy and the Natural Scientists," 178
[84] Yanarella, *The Missile Defence Controversy*, 16; Goldfischer, *The Best Defence*, 116–46.
[85] McNamara, quoted in Yanarella, *The Missile Defence Controversy*, 101.
[86] Yanarella, *The Missile Defence Controversy*, 100.
[87] Stein, *From H-Bomb to Star Wars*, 3.
[88] Erickson, *The Military Technical Revolution*, 18.
[89] Johnson, "Periods of Peril," 969.
[90] Quoted in Pratt, *Selling Strategic Defence*, 3.

[91] Johnson, "Periods of Peril," 969.
[92] Ibid.
[93] Ibid.
[94] Ibid., 955. Emphasis added.
[95] Ibid., 950–51. Emphasis added.
[96] Johnson, "Periods of Peril"; Bulkeley and Spinardi, *Space Weapons*, 20.
[97] Johnson, "Periods of Peril," 967.

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