In Awe of the Atom

Proliferation, Threats, and Costs of Nuclear Management

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Small State Behavior in Strategic and Intelligence Studies: David's Sling by Patrick C. Coaty, Switzerland: Palgrave Macmillan, 2018, pp. xii + 173, INR 9,143

Pakistan's Nuclear Bomb: A Story of Defiance, Deterrence and Deviance by Hassan Abbas, London: C. Hurst & Co., 2018, pp. x + 342, £25.00

Brokering Peace in Nuclear Environments: U.S. Crisis Management in South Asia by Moeed Yusuf, Stanford, CA: Stanford University Press, 2018, pp. xii + 304, INR 4,195

Introduction

Since the time of their invention and the first-and-only use on 6 and 9 August 1945 on two Japanese cities, Hiroshima and Nagasaki respectively, nuclear weapons have been seen by the states that possess them, or the ones that seek them, as the ultimate guarantors of their security.[1] It is believed that these weapons are key to achieving victory in a war that otherwise may go on for a long time or may end in defeat if

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fought in conventional ways by a weaker country; in other words, nuclear weapons are believed to act as instruments of deterrence. The surrender of Imperial Japan to the Allies after the dropping of atom bomb is referred as the most important case. Some countries tend(ed) to follow the United States (US) path for having the 'winnable weapons' that made it to emerge as victorious and super power at the end of World War II.

The US initiated the Manhattan Project in 1939 and later expanded it by bringing together physicists and mathematicians from different countries to make the bomb to defeat the Axis Powers in World War II. American military and civilian leadership thought that the Germans were working on similar kind of weapons and before the Nazi Germany developed and used them, the US needed to acquire them.[2] The inputs might have been exaggerated, Patrick C. Coaty argues. It is in American strategic culture to react to what he calls 'pseudo-environment', borrowing it from Daniel Boorstin, in a way that has implications for real environment.[3]

The three books discussed here, that is, Patrick Coaty's *Small State Behavior in Strategic and Intelligence Studies*; Hassan Abbas' *Pakistan's Nuclear Bomb*; and Moeed Yusuf's *Brokering Peace in Nuclear Environments*, chart out the larger picture of invention of the nuclear weapons and the role of scientists in their invention and proliferation, and nuclear crisis management. The books provide a macroscopic perspective on the effects of nuclear states' policies on nuclear proliferation, decentred nature of the crisis from the superpowers to regional powers, and the role of third-party actor to manage such crisis from escalating. While Coaty and Abbas mainly focus on the proliferation and building of nuclear weapons and actors involved in it, Yusuf analyses and theorises the role of the US in mediating the crisis between two regional nuclear powers in South Asia in a unipolar world.

Each text provides a distinct picture of relations between scientists, proliferation, state security and nuclear crisis. Coaty emphasises on the American strategic culture being informed by the 'orient' in John Boyd's observe–orient–decide–act (OODA) loop, which pushed the US to develop the atom bomb and engage in ballistic missile race with the Soviet Union during the Cold War. Once recognised as the 'ultimate guarantors of security', developing or achieving nuclear weapons became a policy for some countries whose understanding of its use remained bilateral or regional rather than global, as the US perceived the policies of these countries and tried to restrain them. Abbas, on the other hand,

details the role of Pakistani state, its nuclear scientists, A.Q. Khan in particular, and the international network of nuclear material suppliers in the development of Pakistan's atom bomb. Yusuf, in his painstaking effort, tries to theorise the role of third party as mediator in de-escalating crises between nuclear countries and evaluates how, in a unipolar world, the US has played the role of a mediator between India and Pakistan; and it may have to do same in other similar such dyads.

Science, Scientists and Nuclear Weapons

In pursuit of an intellectual understanding of Mother Nature, that is, study of basic physical phenomena, the scientific community follows a universal code: their basic allegiance remains to science. They do not think in terms of their location, specifically where they come from. The scientific community is committed, as believed at least till the nineteenth century, 'to improve health, wealth and comfort of people' universally.[4] It was only with the invention of poisonous gas and its use in World War I that people started to cast doubt on science's contributions. This perception was strengthened by the invention and the use of nuclear weapons in World War II.

Small State Behavior in Strategic and Intelligence Studies is predicated on the argument that the US scientists—some of whom brought in from other places to be a part of the Manhattan Project—unleashed a precedent for other countries to follow by developing the atom bomb. Coaty argues that American strategic culture has been influenced by inputs from intelligence and other sources, which creates a 'pseudo-environment' in the country that then translates into actions in the real environment. The Manhattan Project was started on such an assumption. The Germans were said to be gaining the technology and this pushed the American scientists, not the politicians, to pursue the atom bomb. Coaty writes that '[i]t was the physicists who recruited [Albert] Einstein to write a letter to President Franklin Roosevelt, which was given to him by Alexander Sachs.'[5]

Norman W. Storer, evaluating the role of scientists in pursuing science as intellectual activity, has argued that '[t]he nationalistic perspective that glorifies "home", "family", "citizenship", and sometimes "race," not to mention languages and considerations of national power, is at odds with this perspective' of intellectual pursuit and understanding of science.[6] In the same vein, Coaty points out that he 'wants to bring back into the synthesis of strategy the human factor'.[7] Abbas too, in his book,

fleshes out the argument by discussing the role of scientists in developing nuclear bomb for Pakistan and leaking out secret details to other countries.[8] Coaty develops a model for the US by using, as mentioned earlier, John Boyd's OODA loop in which the most important and decisive remains the 'orient', where the inputs from domestic structure are received: ruling elite, tradition, genetic heritage, geography and new information.[9] Coaty further mentions that it was human agency that was proactively responsible for the start of the Manhattan Project as the friendship between the leader of the California Institute of Technology (Caltech), Robert Millikan, and the commander at March Air Force Base, General Henry H. Arnold, led the former to bring the most capable scientists—such as J. Robert Oppenheimer, Theodore von Karman and later, Albert Einstein, to mention a few—to Pasadena, California, and the latter financed the process.

By September 1942, General Leslie Groves was appointed as head of the Manhattan Project and the decision to make bomb had been taken. Most of the scientists had agreed to work on the project with the belief that they would be in position to decide whether to use it or not. According to Coaty, 'The United States' ruling elite was responding to the international environment's incentives/constraints in its decisions to develop atomic weapons and missile technology.'[10] It was unlikely that the civilian leadership, and the military in particular, would have allowed the scientists to take the decision about how to use nuclear weapons once they were developed: 'The political elite saw these men as brilliant in the ways of science, but too naïve in the ways of strategy.'[11] The military, on its part, was keen to achieve the bomb and control it. It bragged about starting the project and aimed to control it by bringing the scientists and industries together. Vincent Jones wrote that '[t]his triad—scientists, industrialists and engineers, and soldiers—was the product of a decision in early 1942 by America's wartime leaders to give to the Army the task of administering the atomic program.'[12] America wanted the bomb to retain its superpower status by 'defeat(ing) the threat posed by the Axis as a "different country"'.[13]

According to Coaty, 'pseudo-events', and therefore 'pseudo-environment', have a deep influence on American thinking, both in its foreign policy and in domestic politics. The American perception of itself as omnipotent has been shaped by the 'pseudo-events' which miss/distort facts most often;[14] like Germany finally not building the bomb and the US building the same. The American policy in Iraq, which failed,

and its policies vis-à-vis small powers are all based on the assumption of American omnipotence, which has been inculcated in the American people by 'these crafted events'.[15] The perception also forces the US to see policies of regional powers as a threat to the country, while, in fact, their intentions may be entirely regional. These countries face same strategic challenges and opportunities like the great powers.

All the same, given the internationality of science, it would have been difficult for the US to keep the nuclear technology secret, as was argued by scientists who worked on the project in the country, once it was developed. One of the committees set up to assess the nuclear weapons in the spring of 1945, the Franck Committee, stressed that 'it would be impossible to avoid a nuclear arms race by trying to keep the scientific facts of the bomb secret…'.[16] Patrick Coaty argues that the US had set a precedent for nuclear weapons as 'the seeds for today's attention to the issue of proliferation.'[17] Though states facilitate scientific developments and building nuclear weapons, scientists retain(ed) essential role in their proliferation, as shown by the case studies in Coaty's book and explained by Abbas in the case of Pakistan.

Proliferation and Deterrence

The Soviet Union did not take much time to build a bomb. It had penetrated into the Manhattan Project with numerous spy rings, which helped it achieve its 'first atomic bomb' in 1949 which 'would be a copy of the American version'.[18] Some other states were helped, through different means, by President Dwight D. Eisenhower. In his speech at the United Nations (UN) General Assembly in New York on 8 December 1953, Eisenhower advocated the use of atomic energy 'to pursue the peaceful pursuits of mankind'. For that purpose, 'Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine and other peaceful activities.'[19] With the promise to help and train scientists of other countries and with availability of suppliers of uranium, the countries got chance to morph the 'peaceful pursuits' into developing nuclear bombs.

Hassan Abbas argues that Pakistan emerged as a national security state, 'a state where military institutions dominate decision-making process in all major sectors of the government',[20] after its creation in 1947. It perceived India as an existential threat, which developed into a strategic culture that 'contributed to Pakistan's ambition to obtain nuclear capabilities.'[21] Apart from gaining status and domestic factors that some argue drove Pakistan to achieve nuclear weapons, according to

Feroz Hassan Khan, 'the most powerful driving factor was the motivation to construct a deterrent against India.'[22]

Abbas maintains that states go nuclear for four reasons: (i) because of security challenges; (ii) to seek prestige and power; (iii) technological imperatives; and (iv) domestic push and pull factors.[23] This is in tune with Coaty's argument that states necessarily do not seek nuclear weapons to challenge the great powers. Small states want great power status because of their strategic challenges, prestige and to gain domestic legitimacy. For instance, China got nuclear weapons 'to expand its capacities from a small state to a great power', which was supported by the institutions and scientists alike.[24] Tsien Hsue-shen, a scientist deported from the US in the wake of the McCarthyism movement, convinced the Chinese leadership 'to penetrate their society to extract resources and mobilize those resources to develop an independent nuclear and missile technology.'[25] Tsein recruited other scientists from the Caltech, under the call of 'come back home', and these US-trained scientists and experts helped China to develop the bomb in 1964.[26]

However, according to Abbas, it would not have been possible for Pakistan to build a bomb but with the announcement of Atoms for Peace agenda by President Eisenhower in 1953 providing an opportunity. Since the initiative offered help in development of nuclear technology and supply of materials to states, 'The US policy experts were seriously considering Pakistan in September 1954, alongside Japan, Korea, Brazil, and Israel, for further study into relevance of their potential nuclear development.'[27]Once there is information about how to develop bomb and experts to perform the job are present, the countries that receive 'higher levels of peaceful nuclear assistance are more likely to pursue and acquire the bomb'.[28] It is even more likely if a country suffers from a crisis, like Pakistan did in 1971.

With India's 'Smiling Buddha' peaceful nuclear tests in 1974, Pakistan, already concerned about India's superiority in conventional warfare, felt having nuclear weapons was a necessity to guarantee it security by deterring India.[29] Zulfikar Ali Bhutto took keen interest in making the country nuclear: he said the country could eat grass to spare money for the nuclear programme.[30] After becoming Prime Minister in 1972 immediately after the Bangladesh War, Bhutto put the country on track to achieving nuclear weapons. He took a few steps in that direction: (i) retained the charge of the Division of Nuclear Energy Affairs; (ii) brought the Pakistan Atomic Energy Commission (PAEC) under his

direct control; and (iii) convened a meeting of scientists of the country in Multan in January 1972 and told them, 'I want the bomb in three years time.'[31] He recruited A.Q. Khan, who had worked in the Netherland in a laboratory that was a subsidiary and linked to Ultra-Centrifuge Nederland (UCN). Khan was familiar with the international network of uranium suppliers and used it quite constructively. However, Khan soon developed differences with PAEC chairman, Munir Khan, and Bhutto had to open the Engineering Research Laboratories (ERL) in 1976; also, Bhutto gave A.Q. Khan full control of the laboratory. This helped as Khan could produce good results with substantial qualities of enriched uranium in the ERL.[32] Finally, Pakistan carried out its nuclear tests in May 1998 with then Prime Minister Nawaz Sharif announcing, 'Today we have settled the score with India.'[33] Whether the nuclear weapons of Pakistan and India have helped in deterrence and preventing the two countries from going to war, or using other sub-conventional ways of war, remains a topic of research for scholars of South Asian politics and deterrence theory.

Pakistan's development of nuclear bomb has a complicated trajectory. According to Abbas, the country had grown suspicious of the Western countries given their different attitude vis-à-vis Pakistan. France and Canada did not live up to their agreements with Pakistan. Islamabad thought the US was behind it and wanted to cripple Pakistan's effort to process uranium from the beginning. Since these countries had supported India, 'The perception that took root at the time was that the west was especially uncomfortable with a Muslim country developing nuclear capability.'[34] As there was no support from the West and Pakistan was also short of funds, the state gave a free hand to A.Q. Khan to procure the uranium on the one hand—for which he 'slowly expanded' his 'transnational business network' to export gas centrifuges and production capabilities, along with designs for nuclear weapons, to other countries to produce additional business for his international collaborators.[35] On the other hand, he was to raise funds and reduce reliance on the state funds, even if that entailed selling the expertise and technology.[36]

Many in Pakistan believed that 'there is nothing wrong with sharing nuclear technology with friendly countries',[37] as it had been done by many other states, like the US.[38] It was easy for A.Q. Khan to help those countries that had helped Pakistan in developing the bomb and with whom Pakistan shared good relations. Iran definitely fell in that category, though, as Abbas argues, it went against Pakistan's interests given the fact

that the policies of Tehran and Islamabad, which converged in the 1950s and 1960s, had taken different trajectories in the 1970s and 1980s. Two factors can explain the help from Pakistan to Iran in uranium enrichment, apart from Pakistan's fear of potential sanctions from the US on its pursuance of the nuclear programme. First, though Iran had initially decided against the nuclear programme started by Shah in the 1960s, the repeated chemical weapons attack by Iraq in the 1980s forced 'Iran to re-evaluate its security options and resurrect its nuclear programme'.[39] Quintessentially, it was security challenge and the regional threat that pushed Iran to resume its nuclear programme. The second important factor was A.Q. Khan's requirement of funds and personal ambitions; and Iran had helped to get funds for the programme and the country.[40] Later, when Saudi Arabia opposed helping Iran, 'Khan's second series of nuclear transactions with Iran (especially after Beg's retirement) were without any institutional support from the military.'[41] Most of the times, the civilian leadership was kept in the dark.

Coaty argues that the US opposition to the nuclear programmes of Iran and North Korea was because it had become vulnerable to the same kind of technology as other states.[42] However, the US was not being fair as it did not have much problem with Israel developing the bomb with the support of the US scientists. Pakistan's help to North Korea, according to Abbas, was only transactional in nature as Pakistan needed vehicles that could deliver the nuclear warheads and North Korea was able to supply them.[43] Pakistan was pushed towards North Korea because of the incentives/constraints of the environment, like India gaining superiority in air power and the US withdrawing from Afghanistan. Pakistan's help to Libya was not only because General Gaddafi had supported Pakistan's nuclear programme from the beginning by funding it, but his meetings with Bhutto in the 1970s were meant to discuss the nuclear cooperation in detail that could have been used by Libya once Pakistan had developed it.[44] A.Q. Khan's help to Libya, and other countries, exposed the 'network's nuclear specialists, middlemen, and supplier companies from the three continents.'[45]

Without the Atoms for Peace agenda and help from global suppliers of uranium and other materials to Pakistan—and other countries—Islamabad could not have developed the bomb. Gabrielle Hecht has aptly covered the role played by the companies in France and other European countries in supplying uranium as it became a trade: International Atomic Energy Agency (IAEA) emerged 'in order to *facilitate* the circulation of

nuclear things'.[46] Hecht argues that:

> The IAEA and the NPT may have framed technopolitical conditions of possibility for a trade in nuclear things, but the objects, organizations, and practices that performed 'the uranium market'—an entity whose very existence was perpetually in question—were distributed much more widely (and mundanely).[47]

In such an environment of incentives/constraints and personal ambitions of scientists, supported by the state, it is difficult to restrain the spread of nuclear technology and its development into weapons by the countries that face security challenges or due to other reasons.

Threats and Nuclear Crisis Management

In his speech to the UN General Assembly, US President Eisenhower had warned about the 'hideous damage' that the atomic weapons can cause if used. However, Eisenhower engaged in a massive build-up and during his presidency, from 1952 to 1960, nuclear weapons of the US grew from 841 to 18,638.[48] Coaty and Abbas maintain that the countries that achieve nuclear weapons are driven by some major security challenges. The main purpose remains deterrence. Deterrence theory—with its numerous variants of credible deterrence, extended deterrence and minimum deterrence—argues that given the potential of nuclear weapons, they will deter the countries from starting war as that may lead to use of the weapons, resulting in a disaster that neither country would want. This remained the policy of the US and Soviet Union during the Cold War. However, deterrence was not without issues and threats did exist during the Cold War which could have gone awry;[49] and the post-Cold War era has made it more questionable.[50] Not only has the nature of international environment changed with regional powers as potential states to resort to nuclear war but the nature of the weapons has also been altered, making them strategic weapons in terms of 'nuclear postures'.[51] The posturing of nuclear weapons has changed with the change in world politics and the vertical proliferation of the weapons.[52]

Regional, rival nuclear countries remain main threat for the use of nuclear weapons in the post-Cold War era. One such dyad is India–Pakistan, the countries that have fought four wars and have come close to few others. Some scholars like Michael Cohen, following the 'stability–instability paradox', argue that South Asia is like Europe of the Cold War, where the use of nuclear weapon is unlikely.[53] Such views are questioned

by scholars like S. Paul Kapur, who contend that if nuclear war would have been unlikely, India should have met with aggressive responses the attempts by Pakistan to revise territorial boundaries or sub-conventional warfare.[54] Kapur argues that both the countries tend to create crisis to use nuclear weapons.

Brokering Peace in Nuclear Environments aims to theorise the third party's role in de-escalating nuclear crisis between two rival countries. Moeed Yusuf argues that deterrence theory of the Cold War was used to explain use of nuclear weapons and their deterrent effect during the bipolar world where the superpowers were in control.[55] However, the environment of international politics has changed with the emergence of regional powers as nuclear states and the US as the lone power in the unipolar world. To retain its international status as the lone power and therefore to de-escalate nuclear crisis, the US has intervened a number of times and will continue to do so.[56] According to Yusuf, therefore, 'crisis between regional nuclear powers will be heavily influenced by overbearing interest of the unipole (and the strong powers) in preventing a nuclear catastrophe.'[57]

In Yusuf's brokering peace theory, in a nuclear crisis in the unipolar world, three actors are involved who share some common interests—security, economic or political. He sets out 10 propositions: five are for the third actor, that is, the unipolar power, as to why and how would it get involved; and five are for the regional rivals that shape their crisis behaviour.[58] Brokered bargaining, according to Yusuf, is 'a three-way bargaining framework where the regional rivals and the "third party" seek to influence each other to behave in line with their crisis objectives and so doing, affect each other's crisis choices.'[59] In this, the main parties in the conflict have to maximise their incentives during the crisis and not defy the third party with which they share some interests and which is acting as mediator; on its part, the third party also has to increase the actors' concerns involved in crisis for the former's preferences. Brokered bargaining 'envisages the regional rivals trying to lure the third party to act in certain ways toward them and their adversary while this intermediary attempts to find space to mediate between the rivals to ensure swift crisis de-escalation.'[60] All the three actors, thus, are equally partner to the crisis, but the reasons or driving factors may be different. Therefore, Moeed's theory implies that a bilateral crisis between two nuclear rival countries is defused and involves a third actor, mainly the lone superpower.

To explain this theoretical construct, Yusuf tests his theory on the three crises between India and Pakistan since they became nuclear powers: 1999 Kargil crisis; 2001 and 2002 Parliament and Kaluchak attack crises; and the 2008 Mumbai terror attack crisis. In all the three, the US was proactively involved to de-escalate the tension between India and Pakistan. The Kargil crisis was a venture by the Pakistan Army to internationalise the Kashmir dispute. They thought that they would grab some land and at the third party's intervention, the status quo would be maintained, in the case of the Siachen Glacier. However, India was keen to not let Pakistan have its way. It threatened to cross the Line of Control (LoC), which was directed to invite the US' intervention to de-escalate the crisis. Yusuf argues, 'Hardly any other measure can establish India's concern for third-party support as clearly as its decision to absorb additional casualties.'[61] The US was mindful of India's concerns and asked the G-8 countries to condemn Pakistan; it also refused Nawaz Sharif's request to intervene in the Kashmir dispute. It was backed by other countries, which blocked Pakistan's chances of lobbying with them.

At the time of 2001–02 crises, the US was at the forefront again to de-escalate the crisis by asking India to show restraint. The US also pushed General Pervez Musharraf to state in public, on 12 January 2002, that Pakistan would take action against the terror groups. The US was more concerned after it found that India had taken strike positions against Pakistan along the western border.[62] Similarly, in the May 2002 crisis, Musharraf was forced by the US to reconfirm his promise to take action against the culprits, with the US artfully playing up signalling of India against Pakistan. At the time of the Mumbai terror attack, India had started its Cold Start doctrine to meet the immediate threat by mobilising its army. Therefore, there was a possibility of swift action from the Indian side with international community on its side. However, instead of taking any major action, 'India employed aggressive and threatening rhetoric to gain concessions from Pakistan.'[63] While Pakistan signaled that it was ready to cooperate and took some actions against culprits, its 'principal preoccupation was to get the third party to prevent India from using force against it.'[64] Yusuf argues that the US played the role of a mediator well by manipulating certain information to force Pakistan to take some action, and simultaneously asking India to restrain from attacking Pakistan by referring to the latter's actions.[65]

In its role to mediate a crisis, like the nuclear one, the third party has to be careful to retain trust of both the rivals in the conflict, and

also has to see de-escalation as the main goal. Any wrong signal or miscommunication could be dangerous in such a situation,[66] as has happened on a few occasions. It is possibility in cases where Yusuf argues that his model of brokered peace by a third party will be useful: these dyads include Saudi Arabia–Israel, Israel–Iran, Sino-India and North Korea–South Korea. In these, the US as lone superpower would retain a role, as least its friendly countries would not like to lose its support, Yusuf argues.[67] However, there remains a possibility of the enemy country of the US perceiving its policies favouring the other country involved in the conflict.

Moeed Yusuf's attempt to come up with a theory to explore the role of third party is not without issues. The first and foremost challenge to it comes from the fact that India has been reluctant to accept or seek a third-party intervention in its bilateral issues, at least with Pakistan. Would it be willing to allow a third party to intervene, thereby increasing the latter's interests in the region, remains a serious question that cannot be ignored. Similarly, as Abbas maintains, many in Pakistan perceive that the US wants to target its nuclear weapons. In such a case, how much is Islamabad going to allow the US to meddle in its nuclear strategy is not clear either. This also makes the argument that India and Pakistan may deliberately create a crisis to seek US intervention, which Yusuf calls 'moral hazard problem', problematic. Additionally, if the number of actors involved in the conflict and externally increases, called *trilemma* by Gregory Koblentz,[68] the conflict can have a different trajectory and outcome. This remains a possibility, especially if the nature of unipole world changes or if interests of other countries are associated with one particular country in the conflict. Given the process of managing nuclear crisis is complicated and the two states—Pakistan in particular—throw nuclear threats against the other country continuously, it has the potential to go awry, especially to retain some credibility on which the deterrence theory is based. Better option remains that states come up with some bilateral mechanism to avoid any situation from escalating.

Conclusion

The books by Patrick Coaty, Hassan Abbas and Moeed Yusuf address crucial issues of nuclear weapons, the role of scientists and proliferation and management of nuclear crisis. Nuclear weapons do not evolve in a vacuum but are invented by humans, and this has impacted whole human politics. The three books, reviewed here, continue the debate over

nuclear weapons and their proliferation and management, discussing how and why they are developed (Coaty), and how Pakistan achieved and helped proliferation of nuclear weapons (Abbas), with Yusuf's providing a theoretical construct of nuclear crisis management by third party. The contexts of nuclear development and the role of scientist in their development, with increasing nationalist prestige, provide potential fruitful avenues for further research. Yusuf's theory requires more testing and broadening of the argument by incorporating few changing variables which the book aims to analyse.

Nuclear weapons and their proliferation and management will continue to be of scholarly interest. Not only have they a bearing on the use and role of science on the society but also their potential to unleash Armageddon makes their continuous watch and stocktaking necessary. There has been no progress on the disarming front, which was a long-standing position of India before going nuclear, despite that fact there is increasing scholarship questioning the costs, role and management of nuclear weapons. John Mueller, for instance, argues that most of the predictions about the weapons have turned out to be false and their significance is exaggerated. He further emphasises, 'Nuclear weapons were not necessary to deter a third world war. They have proved useless militarily; in fact, their primary use has been to stoke the national ego or to posture against real or imagined threats.'[69] Non-nuclear countries have not become vulnerable to threats, nuclear or otherwise. The books under review make a significant contribution on the role of states, scientists and dangers associated with nuclear weapons and provide a fruitful avenue for further research for policy options.

Notes

1. See Jacques Hymans, *The Psychology of Nuclear Proliferation: Identity, Emotions and Foreign Policy*, United Kingdom: Cambridge University Press, 2006, for the argument why only few states have shown interest to acquire nuclear weapons.
2. Vincent C. Jones, *Manhattan: The Army and the Bomb*, US: Library of Congress Cataloging Data, 1985, p. 35.
3. Patrick C. Coaty, *Small State Behavior in Strategic and Intelligence Studies: David's Sling*, Switzerland: Palgrave Macmillan, 2018, p. 11.
4. Lawrence Badash, 'American Physicists, Nuclear Weapons in World War II, and Social Responsibility', *Physics in Perspective*, Vol. 7, No. 2, 2005, p. 138.
5. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 60.

6. Norman W. Storer, 'The Internationality of Science and the Nationality of Scientists', *International Social Science Journal*, Vol. XXII, No. 1, 1970, pp. 83.
7. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 13.
8. Hassan Abbas, *Pakistan's Nuclear Bomb: A Story of Defiance, Deterrence and Deviance*, New Delhi: Penguin Random House, 2018.
9. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 40.
10. Ibid., p.64.
11. Ibid., p. 66.
12. Jones, *Manhattan: The Army and the Bomb*, n. 2, p. ix.
13. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 67.
14. Ibid., p. 52.
15. Ibid., p. 54.
16. Badash, 'American Physicists, Nuclear Weapons in World War II, and Social Responsibility', n. 4, pp. 144–5.
17. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 77.
18. Ibid., p. 61.
19. Available at https://www.iaea.org/about/history/atoms-for-peace-speech, last accessed 23 March 2019.
20. Abbas, *Pakistan's Nuclear Bomb*, n. 8, p. 22.
21. Ibid., p. 21.
22. Cited in ibid., p. 50.
23. Ibid., p. 45.
24. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 78.
25. Ibid., p. 83.
26. Ibid., p. 86.
27. Abbas, *Pakistan's Nuclear Bomb*, n. 8, p. 51.
28. Mathew Fuhrman, *Atomic Assistance: The Causes and Consequences of Peaceful Nuclear Cooperation*, New York: Cornell University Press, 2012, p. 181.
29. Abbas, *Pakistan's Nuclear Bomb*, n. 8, p. 48.
30. Feroz Hasan Khan, *Eating Grass: The Making of the Pakistani Bomb*, New Delhi: Foundation Books, 2013, p. 7.
31. Abbas, *Pakistan's Nuclear Bomb*, n. 8, p. 61.
32. Ibid., p. 72.
33. Ibid., p. 44.
34. Ibid., p. 67.
35. Ibid., p. 92.

36. Ibid., p. 153.
37. Ibid., p. 3.
38. John Krige, 'Atoms for Peace, Scientific Internationalism, and Scientific Intelligence', *Osiris*, Vol. 21, No. 1, 2006, pp. 161–81.
39. Abbas, *Pakistan's Nuclear Bomb*, n. 8, p. 97.
40. Ibid., p. 109.
41. Ibid., p. 118.
42. Coaty, *Small State Behavior in Strategic and Intelligence Studies*, n. 3, p. 109.
43. Abbas, *Pakistan's Nuclear Bomb*, n. 8, pp. 127–8.
44. Ibid., p. 139.
45. Ibid., p. 138.
46. Gabrielle Hecht, 'The Power of Nuclear Things', *Technology and Culture*, Vol. 51, No. 1, January 2010, p. 5.
47. Ibid., p. 13.
48. Krige, 'Atoms for Peace, Scientific Internationalism, and Scientific Intelligence', n. 38, p. 162.
49. Robert Jervis, Richard Ned Lebow and Janice Gross Stein, *Psychology and Deterrence*, John Hopkins University Press, 1989, discuss in detail nuances and challenges of deterrence and nuclear threats.
50. Vipin Narang argues that the regional powers use nuclear weapons as strategic weapons and make instrumental use of them. See Vipin Narang, *Nuclear Strategy in Modern Era: Regional Powers and Internal Conflict*, New Jersey: Princeton University Press, 2014.
51. Ibid., pp. 3–4. For the sources of such 'nuclear posturing', especially see Ibid., chapter 2.
52. Jalil Mehdi, 'Nuclear Strategy and Regional Stability in Southern Asia', *Journal of Asian Security and International Affairs*, Vol. 4, No. 1, 2017, pp. 123–37.
53. Michael D. Cohen, 'How Nuclear South Asia is Like Cold War Europe', *The Nonproliferation Review*, Vol. 20, No. 3, 2013, pp. 33–5.
54. S. Paul Kapur, 'India and Pakistan's Unstable Peace: Why Nuclear South Asia Is Not like Cold War Europe', *International Security*, Vol. 30, No. 2, 2005, pp. 127–52.
55. Moeed Yusuf, *Brokering Peace in Nuclear Environments: U.S. Crisis Management in South Asia*, Stanford, CA: Stanford University Press, 2018, p. 2.
56. Ibid., pp. 27–49.
57. Ibid., p. 3.
58. Ibid., pp. 28–40.

59. Ibid., p. 3.
60. Ibid., p. 40.
61. Ibid., p. 67.
62. Ibid., pp. 87–91.
63. Ibid., p. 126.
64. Ibid., p. 134.
65. Ibid., pp. 141–8.
66. See Robert Jervis, 'Deterrence and Perception', *International Security*, Vol. 7, No. 3, 1982–83, pp. 3–30.
67. Yusuf, *Brokering Peace in Nuclear Environments*, n. 55, pp. 182–8.
68. Gregory D. Koblentz, *Strategic Stability in Second Nuclear Age*, Council Special Report No. 71, New York: Council on Foreign Affairs, 2014.
69. John Mueller, 'Why Nuclear Weapons don't Matter', *Foreign Affairs*, November–December 2018, available at https://www.foreignaffairs.com/articles/2018-10-15/nuclear-weapons-dont-matter, last accessed on 22 March 2019.