



HAL
open science

How dawn turned into dusk: Scoping and closing possible nuclear futures after the Cold War

Benoît Pelopidas, Hebatalla Taha, Tom Vaughan

► **To cite this version:**

Benoît Pelopidas, Hebatalla Taha, Tom Vaughan. How dawn turned into dusk: Scoping and closing possible nuclear futures after the Cold War. *Journal of Strategic Studies*, 2024, pp.1-23. 10.1080/01402390.2023.2290441 . hal-04409809

HAL Id: hal-04409809

<https://sciencespo.hal.science/hal-04409809>

Submitted on 22 Jan 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

How dawn turned into dusk: Scoping and closing possible nuclear futures after the Cold War

Benoît Pelopidas, Hebatalla Taha & Tom Vaughan

To cite this article: Benoît Pelopidas, Hebatalla Taha & Tom Vaughan (03 Jan 2024): How dawn turned into dusk: Scoping and closing possible nuclear futures after the Cold War, Journal of Strategic Studies, DOI: [10.1080/01402390.2023.2290441](https://doi.org/10.1080/01402390.2023.2290441)

To link to this article: <https://doi.org/10.1080/01402390.2023.2290441>



© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 03 Jan 2024.



Submit your article to this journal [↗](#)



Article views: 376



View related articles [↗](#)



View Crossmark data [↗](#)

How dawn turned into dusk: Scoping and closing possible nuclear futures after the Cold War

Benoît Pelopidas ^a, Hebatalla Taha ^{a,b} and Tom Vaughan ^c

^aSciences Po (CERI)/Nuclear Knowledges, Paris, France; ^bDepartment of Political Science, Lund University, Lund, Sweden; ^cDepartment of International Politics, Aberystwyth University, Aberystwyth, UK

ABSTRACT

How was the scope of nuclear weapons policy change immediately after the Cold War determined? Nuclear learning and worst-case thinking are common but not satisfactory answers. On the basis of primary sources in multiple languages, we posit that a particular temporalization of nuclear events in the beginning of the 1990s took place: nonproliferation timescaping. The Iraqi case of opaque proliferation was treated as the harbinger of future nuclear danger, while the breakup of the nuclear-armed USSR was depicted as not repeatable or not to worry about, and South African nuclear disarmament was reframed as a non-proliferation success.

ARTICLE HISTORY Received 5 May 2023; Accepted 29 November 2023

KEYWORDS Nuclear disarmament; nuclear proliferation; South Africa; Iraq; futures

The period immediately following the end of the Cold War was seen by diplomats from many countries as a window of opportunity for new possibilities, including nuclear disarmament or new forms of cooperation and development based on ‘peace dividends’.¹ However, radical change did not follow. While the global number of nuclear warheads was considerably reduced from its peak in 1986 to the end of the 1990s, this number still far exceeds civilization-ending possibilities, even without taking into account the climate effects of limited nuclear wars.² Indeed, this numerical decrease overlapped with an increase in the destructive capabilities of existing weapons; if one considers the US

CONTACT Benoît Pelopidas  benoit.pelopidas@sciencespo.fr  Sciences Po (CERI)/Nuclear Knowledges

¹Kjolv Egeland, ‘Who Stole Disarmament: History and Nostalgia in Nuclear Abolition Discourse’, *International Affairs* 96/5 (2020), 7–8; Hebatalla Taha, ‘Misremembering the ACRS: Economic Imaginations and Nuclear Negotiations in the Middle East’, *Global Affairs* 7/3 (2021), 327–42.

²The total number of nuclear warheads in the world decreased from 58,336 in 1989 to 26,095 in 1998, a more than 55% reduction over a decade. Hans Kristensen and Robert S. Norris, ‘Global Nuclear Weapons Inventories, 1945–2013’, *Bulletin of the Atomic Scientists*, 69/5 (2013), 78.

arsenal, the reduction of the number of warheads from the late 1980s to the late 1990s coincided with an escalation in aggregated lethality.³ Meanwhile, the legally recognised nuclear weapons states (NWS) relegitimised their stockpiles as ‘hedges against future uncertainties’,⁴ while the ‘real’ problem with nuclear weapons was defined as preventing ‘horizontal proliferation’.⁵ In those fundamental respects, the change that happened was less than radical. This paper scopes the possibilities of change, arguing that the dawn of an era of nuclear policy change turned into dusk in less than a decade.⁶

De-entrenchment of nuclear weapons is only possible if it is regarded as conceivable, so that actors can invest in the space of political contestation they imagine. In other words, not conceiving of alternative futures is enough to perpetuate entrenched policies. We therefore investigate the imagined futures that emerged and were made actionable during this period, looking at the press, reports from international organizations and intelligence services. International organizations and intelligence services do not only shape state policy but also influence discussions on what is conceived as possible, while the press is a source of information and activation for citizens’ movements – which have been important drivers of nuclear arms control policies historically.⁷

We lay out three possible explanations for why different futures were considered or ignored, then assess their validity by comparing them to the historical record, consisting of written or oral primary sources in multiple languages. All three are characterized by a process of selection and treatment of available information to shape the future in which action will be designed. The first one, ‘nuclear learning’, consists of processing all available information from the past to define possible futures among which decisionmakers can choose; this includes information about vulnerabilities. The second one, ‘worst-case thinking’, considers that prudence demands that one assumes the worst about potential enemies’ intentions and capabilities, regardless of available

³From 1989 to 1998, the number of US nuclear warheads decreased from 22,217 to 10,732, an approximately 30% decrease in the size of nuclear arsenals worldwide, but it resulted in a slight increase of the aggregated lethality of the US nuclear arsenal. Lynn Eden, ‘The U. S. Nuclear Arsenal and Zero: Sizing and Planning for Use – Past, Present, and Future’, in Catherine McArdle Kelleher and Judith Reppy (eds.), *Getting to Zero: The Path to Nuclear Disarmament* (Palo Alto: Stanford UP 2011), 69–89, at 72.

⁴Brian C. Taylor, ‘“A Hedge Against the Future”: the Post-cold War Rhetoric of Nuclear Weapons Modernization’, *Quarterly Journal of Speech* 96/1 (2010), 1–24; Joseph Masco, ‘Nuclear Past, Nuclear Futures; or, Disarming Through Rebuilding’, *Critical Studies on Security* 3/3 (2015), 308–12.

⁵Nick Ritchie, *US Nuclear Weapons Policy After the Cold War: Russians, ‘Rogues’ and Domestic Division* (London: Routledge 2008); David Mutimer, *The Weapon State: Proliferation and the Framing of Security* (Boulder: Lynne Rienner 2000).

⁶We use nuclear policy to mean nuclear weapons policy throughout.

⁷Jeffrey W. Knopf, *Domestic Society and International Cooperation: The Impact of Protest on U.S. Arms Control Policy* (Cambridge: Cambridge UP 1998).

information. We show that neither of these common explanations match the imagined futures that were presented at the time. The learning and selection process of which possible futures are treated as plausible was not determined by an 'objective' assessment of available information. Instead, it is substantively shaped by an ideological process of timescaping, the third possible explanation, which connected specific pasts, presents and conceivable futures to build an imagined future of non-proliferation which closes political possibilities.⁸

While the importance of the framework of proliferation in the shaping of P5's nuclear policy in the 1990s has been established, the temporal and ideological dimensions of the non-proliferation framing have not. This is our contribution to the debates on US grand strategy, the drivers of non-proliferation policy and the study of the constitutive role of imagined futures in policy.⁹

Empirically, we use three case studies to demonstrate our argument. This is not intended as a comprehensive study of *all* the possible (non-)nuclear futures that were conceivable during the early 1990s. However, the three selected case studies – South African disarmament, USSR state breakup, and Iraqi undetected pursuit – each offered a concrete and high-profile precedent for different nuclear futures. All three were discussed extensively by policy-makers and in policy-adjacent spaces during the 1990s, yet only the latter of these precedents was internalized into mainstream policy timescaping. This required a specific temporalization of these three nuclear events that unfolded in the immediate post-Cold War: further instances of proliferation were temporalized as belonging to the future, while the other two cases were temporalized as one-off events belonging to the past.

To prove our hypothesis that non-proliferation timescaping overrode other modes of futuremaking, we investigated policy and journalistic discussions of each case in exhaustive depth. We found a near-total absence of any discussion that located either repeated episodes of unilateral disarmament (the South Africa case) or nuclear state breakup (the USSR case) in any conceivable future. This absence does not prove our point on its own, but we show, through the Iraqi case study, how the fear of 'horizontal proliferation' became the hegemonic framing of future nuclear threats in a world where nuclear weapons are assumed to be eternally present.

In analysing the composition of these timescapes, the post-Cold War environment is pertinent because these three poorly predicted events happened at that time, which should have considerably widened the scope of possibilities in nuclear weapons policy. But the Iraqi case only

⁸Barbara Adam, *Timescapes of Modernity: The Environment and Invisible Hazards* (London: Routledge 1998).

⁹*Inter alia* Francis J. Gavin, 'Strategies of Inhibition: US Grand Strategy, the Nuclear Revolution and Nonproliferation', *International Security* 40/1, (2015).

was considered as possibly repeatable in the future and more than that, was treated as the harbinger of things to come.

We focus on the period from 1990 to 1998, treating the Indian and Pakistani tests as the end of this political sequence. This period of nine years offers enough time to assess the possibility of a lesson-learning process. Furthermore, the Indian and Pakistani tests of May 1998 opened a new political and strategic moment as they shifted the debate about future nuclear possibilities.¹⁰

The article proceeds in three steps. We first outline three common explanations for the scope of conceivable futures and show how different the nuclear weapons policy debate could have been in a timescape in which all three of the possibilities that materialised in the post-Cold War world were taken seriously, not just one. In the three following empirical sections, we identify how the three nuclear surprises of the time get assigned to different temporal validity. We conclude with implications for explaining nuclear weapons policy.

Explaining the scope of nuclear weapons policy possibilities after the end of the Cold War

This section lays out three possible explanations for the scoping of possible nuclear futures in the 1990s: imagining possible futures based on nuclear learning; worst-case thinking as a manifestation of prudence; and nonproliferation timescaping.¹¹

The post-Cold War moment demonstrated that opaque nuclear proliferation, unilateral nuclear disarmament and the breakup of a nuclear-armed state could happen; after all, they just did. Therefore, nuclear learning should have identified all three of these possibilities as repeatable in the future. Since they did occur, the question is whether they *will* be repeated, but they certainly cannot be treated as inconceivable.

Another common explanation is that the scoping of possible futures is shaped by worst-case thinking,¹² such as the accidental explosion of a nuclear warhead,¹³ or, for the earliest generation of strategists, nuclear

¹⁰William Walker, *A Perpetual Menace: Nuclear Weapons and International Order* (London: Routledge 2011), 149–55.

¹¹On nuclear learning, Jeffrey W. Knopf, 'The Concept of Nuclear Learning', *Nonproliferation Review* 19/1 (2012), 79–93; Mark S. Bell and Nicholas L. Miller, 'The Limits of Nuclear Learning in the New Nuclear Age', in Vipin Narang and Scott D. Sagan (eds.), *The Fragile Balance of Terror: Deterrence in the New Nuclear Age* (Ithaca: Cornell UP 2023). On worst-case thinking as an imperative of prudence in offensive realism, see Ken Booth and Nicholas J. Wheeler, *Security Dilemma. Fear, Cooperation and Trust in World Politics* (Basingstoke: Palgrave 2008), 34–38 and John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: W. W. Norton 2001), 31–36.

¹²As expressed by Michael Quinlan, 'The Future of Nuclear Weapons: Policy for Western Possessors', *International Affairs* 69/3 (1993), 485–96.

¹³The absence of unwanted explosions of nuclear weapons so far cannot be explained by perfect control. Benoit Pelopidas, *Repenser les choix nucléaires* (Paris, Presses de Sciences Po 2022), 208–13, 283–91; Martin J. Sherwin, *Gambling with Armageddon. Nuclear Roulette from Hiroshima to the Cuban Missile*

attacks ‘out of the blue’. Such eventualities demand the retention of nuclear arsenals as an ‘insurance policy’. The breakup of a nuclear armed state is another potential worst-case scenario. However, while the policymaking community, press, and intelligence analysts worldwide agreed that this was a non-desirable outcome, it happened with the Soviet Union, which is not only a nuclear-armed state but the largest one. An approach of worst-case thinking should therefore include it among conceivable future possibilities but does not.

We propose a third possible explanation: non-proliferation timescaping. In this approach, conceivable and actionable futures are selected independently from what has happened. It can therefore ignore one or more of the events that have materialised as possible components of the future – without even having to explain why they will not be repeated. Non-proliferation timescaping is a component of the overarching ‘ideology of nuclear order’ which holds that limiting ‘horizontal proliferation’ in the short-term is the only way to nuclear disarmament in the long-term.¹⁴ This pervasive and powerful ideology took on ‘common sense’ status during the Cold War. Influential policy elites have interpreted the end of the Cold War as a ‘lesson’ that NATO and the US specifically needed to maintain the nuclear dominance which had kept European peace and ultimately defeated Soviet communism – ostensibly only until such time as the world was safe for disarmament.¹⁵ As Egeland shows, maintenance of US nuclear weapons is a central tenet of the ideology of nuclear order,¹⁶ so the futures envisaged by non-proliferation timescaping entail US nuclear dominance. Similarly deliberate, overt attempts to shape the post-Cold War nuclear timescape around non-proliferation as opposed to disarmament were on show at the 1995 NPT Review Conference, where the US pressured delegates who were wavering on the question of indefinite NPT extension.¹⁷

In the following three sections, we confront these three possible explanations for the scoping of nuclear futures in the 1990s. We examine the value attributed to three nuclear weapons policy possibilities which have materialised: unilateral nuclear disarmament from a state with a small nuclear arsenal, the breakup of a nuclear-armed state, and opaque nuclear proliferation.

Crisis (New York: Knopf 2020), 4–6, 25, 77, 466; Len Scott, ‘The Essential Inevitability of Worrying about the Bomb: New Writing on the Cuban Missile Crisis’, *Intelligence and National Security* 37/3 (2022), 458–60.

¹⁴Kjølv Egeland, ‘The Ideology of Nuclear Order’, *New Political Science* 43/2 (2021), 208–30; Pelopidas, *Repenser les choix nucléaires*, chap. 1 and 6.

¹⁵We thank Reviewer 1 for drawing this point to our attention. See George P. Shultz, William J. Perry, and Henry A. Kissinger, ‘Deterrence in the Age of Nuclear Proliferation’, *Wall Street Journal*, 7 Mar. 2011; also Quinlan, ‘The Future’.

¹⁶Egeland, ‘Ideology’, 215.

¹⁷Julia Preston and R. Jeffrey Smith, ‘The Nuclear Treaty: Product of Global Full-Court Press by U.S.’, *Washington Post*, 14 May 1995; Susan B. Welsh, ‘Delegate Perspectives on the 1995 NPT Review and Extension Conference’, *Nonproliferation Review* 2/3 (1995), 1–24.

How South Africa's nuclear disarmament was rendered 'unrepeatable' and turned into a non-proliferation success

The idea that its nuclear programme was 'unique' and immanent to apartheid underpinned the idea that South Africa's disarmament was unrepeatable and made it compatible with a narrative of non-proliferation. A process of learning from available information cannot account for this timescaping. Similarly, neo-realist worst-case thinking cannot account for South African disarmament. It would have directed post-apartheid South Africa to hedge against future uncertainties by reviving its nuclear weapons programme. While South Africa retained fuel cycle capabilities, nuclear weapons expertise, and a stockpile of highly enriched uranium, South Africa has shown no interest in rearmament.

Under apartheid, a techno-nationalist myth propagated regarding the 'indigeneity' of the programme, made possible by Afrikaner resourcefulness,¹⁸ under conditions of unprecedented international 'isolation'. This posited that the bomb was unique in its autochthony, removed from the usual transnational exchanges of expertise and material which facilitate nuclearization.¹⁹ This falsehood persisted in part because non-proliferation advocates in the US and Europe have been keen to distance themselves from the assistance given to apartheid South Africa.²⁰ During the early 1990s, scholarship accepted and reproduced claims about 'indigenous'²¹ technological capabilities and the 'unique' nature of the South African case.²² The practically unanimous conclusion

¹⁸Saul Dubow, *A Commonwealth of Knowledge: Science, Sensibility, and White South Africa* (Oxford: Oxford UP 2006).

¹⁹Tom Vaughan, 'South Africa and Nuclear Order: Between "Local" Technopolitics and "Global" Hegemony', doctoral dissertation, Aberystwyth Univ., 2021.

²⁰Rob Gillette, 'Uranium Enrichment: With Help, South Africa Is Progressing', *Science* 188/4193 (1975), 1090–92; Anti-Apartheid Movement, 'Nuclear Collaboration with South Africa: Britain's Profile', Working Paper (London: United Nations Seminar on Nuclear Collaboration with South Africa 24 Feb. 1979), MSS AAM 1499, Archive of the Anti-Apartheid Movement, 1956–1998, Bodleian Library, University of Oxford; Sasha Polakow-Suransky, *The Unspoken Alliance: Israel's Secret Relationship with Apartheid South Africa* (New York: Pantheon 2009); Or Rabinowitz and Nicholas L. Miller, 'Keeping the Bombs in the Basement: U.S. Nonproliferation Policy toward Israel, South Africa, and Pakistan', *International Security* 40/1 (2015), 4; Anna Konieczna, 'Nuclear Twins: French-South African Strategic Cooperation (1964–79)', *Cold War History* 21/3 (2021), 283–300.

²¹David Albright and Mark Hibbs, 'South Africa: The ANC and the Atom Bomb', *Bulletin of the Atomic Scientists* 49/3 (1993), 39–40; Frank V. Pabian, 'South Africa's Nuclear Weapon Program: Lessons for U.S. Nonproliferation Policy', *Nonproliferation Review* 3/1 (1995), 1–19.

²²Darryl Howlett and John Simpson, 'Nuclearisation and Denuclearisation in South Africa', *Survival* 35/3 (1993), 164; Waldo Stumpf, 'South Africa's Nuclear Weapons Program: From Deterrence to Dismantlement', *Arms Control Today* 25/10 (1995), 3. A related claim by apartheid-era scientists held that Pretoria's nuclear doctrine was uniquely irrational. This has also been refuted, but it further encouraged the conclusion that South Africa's armament and disarmament could not be understood through existing theoretical frameworks and bore no applicable lessons to future cases. Noel Anderson and Mark S. Bell, 'The Limits of Regional Power: South Africa's Security Strategy, 1975–1989', *Journal of Strategic Studies* 46/2 (23 Feb. 2023), 419. Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton: Princeton University Press 2014), 232–43. We thank Reviewer 1 for this insight.

was that there were, therefore, no lessons to be learned regarding disarmament.²³

By contrast, surveying 'repentant nuclear proliferants', Spector drew explicit connections to Iraq and the extent to which the South African case highlighted the need to prevent proliferation by Iraq and other similar regimes.²⁴ South Africa's disarmament was actually a cause for concern. It highlighted the urgent need for new 'far-reaching' non-proliferation measures and 'a significant realignment of existing international non-proliferation practices'.²⁵ Albright and Hibbs worried that former South African personnel would join foreign nuclear programmes, or that undeclared South African nuclear inventory could be exported.²⁶ Albright noted the '*natural* concern that a dangerous technology will pass into new, untested hands'.²⁷ Pabian discussed several 'lessons for US non-proliferation policy', ignoring disarmament.²⁸ Quinlan saw South African disarmament as a 'cautionary reminder' of the importance of non-proliferation and continued US nuclear armament.²⁹

Such claims reappeared in South African and US policy circles. In 1994 the African National Congress (ANC) held a conference in Cape Town to assess the lessons of the South African nuclear programme. Activist Renfrew Christie noted: '[T]he criminal Apartheid State [sic] [. . .] was so scared [. . .] that it felt it needed the possibility of instant death for millions'.³⁰ The implication is that South Africa's armament and disarmament was an aberration because its nuclear weapons were an outgrowth of apartheid. Albright stated that 'South Africa is unique in that it is the only country that had nuclear weapons and decided to give them up', but spoke on future ANC non-proliferation obligations rather than more disarmament. Energy analysts and nuclear personnel also repeated former apartheid-era claims that South Africa's uranium enrichment process was globally 'unique'.³¹ This process was developed in secret co-operation with West Germany.³² Though the conference

²³Kostenko briefly discusses how Ukrainian officials looked to South Africa for technical lessons on the process of disarmament, but concludes that the Ukrainian situation was so different that these did not apply. Yuri Kostenko, *Ukraine's Nuclear Disarmament: A History* (Cambridge, MA: Harvard University Press 2021), 77–78.

²⁴Leonard S. Spector, 'Repentant Nuclear Proliferants', *Foreign Policy* 88 (1992), 21–37; Pabian, 'South Africa's Nuclear Weapon Program'.

²⁵*Ibid.*, 36.

²⁶Albright and Hibbs, 'South Africa', 37.

²⁷Albright and Hibbs, 37.

²⁸Pabian, 'South Africa's Nuclear Weapon Program'.

²⁹Quinlan, 'The Future', 487.

³⁰Renfrew Christie, 'The Military Dimensions of Nuclear Development in South Africa', in *Proceedings of the Conference on Nuclear Policy for a Democratic South Africa* (Western Cape: The Nuclear Debate: Policy for a Democratic South Africa, Cape Town: The Environmental Monitoring Group 1994), 157–62.

³¹Anton Eberhard, 'Options for Energy Policy and Planning in South Africa: Where Does the Nuclear Industry Fit In?', in *Proceedings* (1994), 41–42.

³²Carlo Patti, 'The Forbidden Cooperation: South Africa – Brazil Nuclear Relations at the Turn of the 1970s', *Revista Brasileira de Política Internacional* 61/2 (2018), 1–17.

recommendations affirmed a notionally pro-disarmament position,³³ there was no discussion on how learning from the South African case might assist in this end, against a general acceptance of its uniqueness. Instead, the importance of preventing future proliferation was affirmed.³⁴

US policy and media highlighted this uniqueness. A 1991 *Washington Post* interview broadcast a claim by the head of the South African Atomic Energy Commission that 'there [had] been no co-operation with Israel, Iraq, or any other country', and the *Post* noted that 'no Western intelligence service has established for certain whether South Africa ever [produced nuclear weapons]'.³⁵ This was inaccurate.³⁶ The *New York Times* highlighted 'doubts about whether South Africa has fully accounted for its bomb-grade uranium' and threats regarding the proliferation of missile technology.³⁷ The *Times* elsewhere concluded that the primary significance of 'South Africa's renunciation of the Bomb [sic]' was that it gave 'impetus to global efforts to stop the spread of nuclear arms'.³⁸

Pilat, in a report for Los Alamos National Laboratory, noted that the South African case was 'intriguing' because of its 'unique and extraordinary' process of dismantling a 'national-indigenous' nuclear weapons programme.³⁹ 'Lessons' concerned preventing and 'rolling back proliferation' of future emergent nuclear states, rather than the wider question of future disarmament.⁴⁰ A report for the US Air Force similarly accepted the diagnosis of uniqueness and limited the lessons to be learned to non-proliferation.⁴¹ These lessons were internalised by the International Atomic Energy Agency and global non-proliferation apparatus too.⁴²

The most authoritative statement that disarmament was the past (and non-proliferation was the future) came during the NPT Review Conference in 1995, when Pretoria secured the indefinite extension of the treaty without

³³ANC/Environmental Monitoring Group, 'Recommendations to the ANC Science & Technology Policy Division Arising from the ANC & Alliance Delegates', in *Proceedings* (1994), 233–37.

³⁴Denis Goldberg, 'A Nuclear Policy for a New, Democratic South Africa', in *Proceedings* (1994), 215–30.

³⁵David B. Ottaway, 'South Africa Said to Abandon Pursuit of Nuclear Weapons', *Washington Post*, 18 Oct. 1991.

³⁶See Jeffrey T. Richelson, 'U.S. Intelligence and the South African Bomb', The National Security Archive, 13 Jun. 2006, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB181/index.htm>; Jeffrey T. Richelson, 'The Vela Incident: Nuclear Test or Meteorite?' National Security Archive, 5 May 2006, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB190/>.

³⁷Bill Keller, 'South Africa Says It Built 6 Atom Bombs', *New York Times*, 25 Mar. 1993.

³⁸*New York Times*, 'Opinion: South Africa's Unexploded Bombs', 27 Mar. 1993.

³⁹Joseph F. Pilat, 'Virtual Nuclear Weapons' (California: Los Alamos National Laboratory 1997), 6–9.

⁴⁰*Ibid.*

⁴¹Roy E. Horton, 'Out of (South) Africa: Pretoria's Nuclear Weapons Experience', Counterproliferation Series (Colorado: USAF Institute for National Security Studies, Aug. 1999), 33, 36.

⁴²Robin Möser, "'The Major Prize": Apartheid South Africa's Accession to the Treaty on the Non-Proliferation of Nuclear Weapons, 1988–91', *The Nonproliferation Review* 26/5–6 (2020), 559–73; Andre Buys, 'Proliferation Risk Assessment of Former Nuclear Explosives/Weapons Program Personnel: The South African Case Study' (Pretoria: University of Pretoria 2007), <http://nautilus.org/wp-content/uploads/2012/01/Buys-research-report-final.pdf>.

time-limited commitments on the nuclear weapons states to disarm.⁴³ Diplomat Jean DuPreez recalled ‘a can-do feeling if you think about what was accomplished from South Africa [disarmament],’⁴⁴ but believes South Africa ‘gave away’ the only leverage on disarmament that anti-nuclear states held: Pretoria’s original demand that further extensions would be periodic, rolling, and ‘green lit’ by a future Review Conference vote. ‘Did we take the right decision? [...] You can look back on it and you can shoot it down, as I have.’⁴⁵ This outcome demonstrated that South Africa itself saw the ‘lessons’ to be learned from the nuclear programme concerned non-proliferation, rather than using the experience to identify possibilities for disarmament.⁴⁶ Howlett and Simpson are exceptions when they note, only in passing that: ‘South Africa has created a precedent for other states that might be inclined to disarm.’⁴⁷ Together, these processes represent a foreclosure of nuclear futures and an extension of ‘nuclear eternity’⁴⁸ which is not accounted for by either nuclear learning or worst-case thinking. They manifest non-proliferation timescaping at work.

How the possibility of a break-down of a nuclear-armed state became inconceivable

The Soviet Union was the largest nuclear-weapons state of the history of the nuclear age. But in 1991 it broke up into fifteen states, four of which inherited at least a part of its arsenal: Ukraine, Belarus, Kazakhstan and Russia. The possibility of the breakup of a nuclear-armed state then became undeniable. At the same time, Islamabad was completing its nuclear weapons programme. Pakistan had experienced five military coup attempts and three successful ones in the previous four decades.⁴⁹ In the UK, such a scenario was particularly possible because of the rise of the Scottish National Party (SNP) which is in favour of independence and opposed to nuclear weapons and because, since 1998 and the cancellation of the programme of tactical weapons, the only leg of the UK nuclear arsenal has been based in Scotland.⁵⁰ Therefore, worst-case thinking as well as unbiased consideration

⁴³Michal Onderco and Anna-Mart van Wyk, ‘Birth of a Norm Champion: How South Africa Came to Support the NPT’s Indefinite Extension’, *Nonproliferation Review* 26/1–2 (2019), 23–41.

⁴⁴Michal Onderco, ‘Oral History Interview with Jean DuPreez’, Wilson Center, 4 Apr. 2018, 26, <https://digitalarchive.wilsoncenter.org/document/177446>.

⁴⁵Onderco, ‘Oral History Interview with Jean DuPreez’, 26–29.

⁴⁶Egeland, ‘A Theory of Nuclear Disarmament’.

⁴⁷Howlett and Simpson, ‘Nuclearisation and Denuclearisation in South Africa’, 171–72.

⁴⁸Benoît Pelopidas, ‘The Birth of Nuclear Eternity’, in Sandra Kemp and Jenny Andersson (eds.), *Futures* (Oxford: Oxford UP 2021), 484–500.

⁴⁹Vipin Narang, ‘Strategies of Nuclear Proliferation: How States Pursue the Bomb’, *International Security* 41/3 (2017), 135; Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (Palo Alto: Stanford UP 2012), 189–90; 232–33.

⁵⁰Nick Ritchie, ‘Nuclear Identities and Scottish Independence’, *Nonproliferation Review* 23/5–6 (2016), 653–75.

of all available information from all past nuclear vulnerabilities would have led anyone to worry about this possibility and plan for it, not just for 'loose nukes'. This did not happen.

Proponents of nuclear learning may suggest that the Cooperative Threat Reduction programme and the transfer of the Soviet arsenal to Russia were successful, indicating that one would be able to handle future such events and therefore not include them in the set of worst-cases.⁵¹ This is not convincing given that the 'success' was known and established only in the second half of the decade since the process of restitution of the Soviet nuclear arsenal remaining on Ukrainian soil lasted four years. We are taking the Ukrainian case as yardstick because it was the longest and the most convoluted of the three processes of restitution of the Soviet arsenal to the Russian Federation.⁵² We have found no sign of such worry or contingency planning for the repetition of such cases.

In academia, in spite of the rise of a literature on the challenges of command and control over as well as safety of nuclear weapons,⁵³ the 'community was uninterested' in fleshing out the scenario of breakup of a nuclear-armed state post-Cold War which is now most often considered: that of the UK.⁵⁴ This possibility was not conceived as significant.⁵⁵ The leading pessimist regarding the consequences of proliferation, Scott Sagan, contemplates the repetition of the types of nuclear-related events that occurred in the USSR in 1991 but only when it comes to 'accidents if nuclear weapons have to be moved out of states in haste'. He also considers overreaction by the Pakistani military, preventive war or even a civil war within a nuclear-armed state but not the breakup of the state.⁵⁶ The other main book of the 1990s about the limits of control over nuclear weapons, Bruce Blair's *Logic of accidental nuclear war*, only includes one sentence stating that

⁵¹Interview with a former UK Defense official at the time, 9 Dec. 2021.

⁵²William Potter, 'The Politics of Nuclear Renunciation: The Cases of Belarus, Kazakhstan and Ukraine', Occasional Paper (Henry L. Stimson Center), 22, Apr. 1995, 17; Nikolai Sokov, 'Ukraine: A Post-Nuclear Country', in William Potter and Gaukhar Mukhatzhanova (eds.), *Forecasting Nuclear Proliferation in the 21st Century* (Stanford: Stanford UP 2010), 265.

⁵³On the challenges of command and control and safety, Bruce G. Blair, *Strategic Command and Control: Redefining the Nuclear Threat* (Washington DC: Brookings Institution Press 1985); *The Logic of Accidental Nuclear War* (Washington: Brookings Institution Press 1993); Scott D. Sagan, *The Limits of Safety: Organizations, Accidents and Nuclear Weapons* (Princeton: Princeton UP 1993); Peter D. Feaver, *Guarding the Guardians: Civilian Control of Nuclear Weapons in the United States* (Ithaca: Cornell UP 1992); Bradley A. Thayer, 'The Risk of Nuclear Inadvertance: A Review Essay', *Security Studies* 3/3 (1994), 428–93.

⁵⁴Interview with William Walker, 22 Nov. 2021.

⁵⁵We found one article at the very end of the decade, which is never cited in the field: Ameen Jan, 'Pakistan on A Precipice', *Asian Survey* 39/5 (1999) 699–719.

⁵⁶Scott D. Sagan, 'The Perils of Proliferation: Organization Theory, Deterrence Theory, and the Spread of Nuclear Weapons', *International Security* 18/4 (1994), 66–107; Sagan, 'More will be worse', 84–85. On the other side of the debate, Kenneth Waltz dismisses the possibility of breakup of a nuclear-armed state entirely on page 10.

‘a collapse of responsibility at the highest level cannot be dismissed’, but it is not quite the breakup of nuclear-armed state, and this consideration only applies to Russia.⁵⁷

The landmark study on this issue in the UK, *Uncharted Waters*, by William Walker and Malcolm Chalmers, was published after the end of our period of study but the research for it started well within it, as one of the two authors told us.⁵⁸ Following from a 1992 article on the consequences of the breakup of the Soviet nuclear arsenal published in *International Affairs*,⁵⁹ Walker moved to Scotland and the University of Saint Andrews in 1996. After twenty years away from Scotland, he observed that the nationalist movement had transformed from a cultural movement into a political one. Even if the ongoing process of devolution was meant to make it impossible for the SNP to govern, he observed that ‘it might happen and no one had thought about it’. However, he observed that people in the government and the military, on the contrary, were interested, but ended up suppressing the possibility and the argument. The process of discussion between 1996 and 2001 leads him to conclude that: ‘No one had thought about it before’.⁶⁰

US, UK and Israeli government circles do not seem to have considered that possibility either or to have treated it as worthy of serious planning.⁶¹

Serious concern about the breakup occurred mainly later, especially after May 2007 when the SNP became the largest party in the Scottish Government to general surprise (the proportional-representation electoral system imposed on Scotland by the 1998 Scotland Act was supposed to make this impossible). That happened [...] shortly after the UK Parliament’s vote in March 2007 to renew the Trident system (4 new subs) which would operate out of the Scottish bases, as before. In the debate prior to the Trident decision [...] vulnerability to Scottish independence was largely ignored.⁶²

Long-time scholar of the Soviet nuclear legacy William Potter told us that: ‘most scholars (and US policy makers) regarded the case of the breakup of the Soviet Union as *sui generis*’ and therefore as unrepeatable.⁶³ This is consistent with the experience of William J. Perry, who was deputy US secretary of defense and then secretary of defense from 1993 to 1997. He told us that he ‘is not aware of anyone seriously thinking of [the breakup of a nuclear-armed state or unilateral nuclear disarmament in the future]’.⁶⁴ There may be very rare mentions such as Joe Pilat’s (1997) report on Virtual nuclear

⁵⁷Blair, *The Logic of Accidental Nuclear War*, 86

⁵⁸Interview with William Walker, 22 Nov. 2021.

⁵⁹William Walker, ‘Nuclear Weapons and the Former Soviet Republics’, *International Affairs* 68/2 (1992), 255–277.

⁶⁰Interview with William Walker, 22 Nov. 2021.

⁶¹For the UK, interview with a former UK Defence official at the time, 9 Dec. 2021, who described a low level of concern. For Israel, email correspondence with Ariel Levite, 15 Dec. 2022.

⁶²Correspondence with William Walker, 26 Nov. 2021.

⁶³Correspondence with William Potter, 28 Nov. 2021.

⁶⁴Correspondence with William J. Perry, 29 Aug. 2022.

weapons in which he notes that: 'The cases of Belarus, Kazakhstan, and Ukraine are in many respects unique, but they represent a development that may reappear in the future – the collapse of a nuclear-weapon state – and are important from that perspective'.⁶⁵ But no institutional planning or expert advice seems to have taken that into consideration.

As a result, the possibility of breakup of a nuclear-armed state was not part of the lessons learned by the Western policy and intelligence community after it happened to the largest and supposedly strongest state. This event was simply categorised as belonging to the past, which facilitated the perpetuation of nuclear arsenals and a prime focus on their non-proliferation. Indeed, as Mariana Budjeryn eloquently shows, key US officials, in public and in private regardless of whether they were in favour of an increase of the number of nuclear weapons-states, treated the post-Soviet nuclear legacy problem as a problem of 'proliferation'.⁶⁶ Contrary to what nuclear learning or worst-case thinking would have expected, this possibility was simply made invisible and reduced to something compatible with the hegemonic time-scape of the time: non-proliferation.

How Iraqi 'opaque proliferation' became the harbinger of the future nuclear threat

Unlike the previous two examples, the Iraqi case was temporalized as the form of future nuclear threats. Nuclear analysts singled out features of the Iraqi case to discuss the dangers of proliferation. Iraq was discussed in reference to a clandestine nuclear programme that will not be detected in time. This imagined future is discernible through sources from the 1990s, including reports by governments, militaries, intelligence agencies, and international organizations, seeking to extract policy lessons regarding the failure of intelligence on Iraq. We focus on key international actors, namely the US, Israel, France, and the IAEA, whose security discourses are echoed in the press and in academic literature.

Iraq is not the first case of secret nuclear proliferation. Avner Cohen and Benjamin Frankel highlight the Israeli case of nuclear opacity as a model that was being replicated in the 1990s, including by Iraq, described as an ambiguous case.⁶⁷ They suggest that, unlike the first generation of proliferators, the second do not publicly explode a nuclear device or openly integrate nuclear forces in the military doctrine, although this cannot be proven

⁶⁵Pilat, 'Virtual Nuclear Weapons', 12. The author told us that he was not aware of other studies on that topic. Correspondence with Joseph F. Pilat, 19 Sep. 2022.

⁶⁶Budjeryn, 'Non-Proliferation and State Succession'.

⁶⁷Avner Cohen and Benjamin Frenkel, 'Opaque Nuclear Proliferation', *Journal of Strategic Studies* 13/3 (1990), 14–44.

empirically given that Iraqi proliferation was not complete (and North Korea did not pursue nuclear opacity).

Iraq differs significantly from the cases that preceded it, particularly Israel, in terms of how it was dealt with, particularly how it became an iconic example of proliferation. US officials, for example, seem to have been reluctant to confront Israel about the nuclear project, opting not to engage in active efforts to prevent Israeli proliferation, and they have generally continued to shield Israel from international critique surrounding its nuclear programme.⁶⁸ The Iraqi case, in contrast, became *the* example for the international community about the dangers of proliferation in the 1990s.⁶⁹ Writing in 1990, prior to the Gulf War, Frankel suggested that changes in the international system are likely to encourage proliferation, as actors are no longer able to align themselves to or depend on a superpower for their security.⁷⁰ The structural changes of the end of the Cold War and the supposed decline in vertical proliferation, he argues, are the driving force behind a new *distinct* threat of opaque proliferation, and while there were anxieties about proliferation in previous decades, the 1990s marked an escalation and intensification with regard to this threat.

For many analysts and policymakers, the Iraqi case became proof that the nonproliferation regime can never be completely assured.⁷¹ The future they imagined was one in which states, especially in the Third World, would pursue nuclear weapons programmes. Participation in nonproliferation structures is not a guarantee; signers cannot be trusted, and there are no means of enforcement. Nonproliferation was broken, and Iraq is seen as the case that exposed this.⁷² The Iraqi case alone, argued Albright and Hibbs, warrants 'modifications to the body of international norms, rules, and agreements which constitute the nuclear nonproliferation regime'.⁷³ Policy communities invoked 'Iraqi deception', concluding that the international community had been delusional regarding the country's intentions.⁷⁴ This narrative of naiveté reflected a need to adopt a more vigilant stance in the

⁶⁸Michael J. Engelhardt, 'A Nonproliferation Failure: America and Israel's Nuclear Program, 1960–1968', *The Nonproliferation Review* 1/3 (2004), 56–69.

⁶⁹Zachary S. Davis, 'The Realist Nuclear Regime', *Security Studies* 2/3–4 (1993), 79–99.

⁷⁰Benjamin Frankel, 'An Anxious Decade: Nuclear Proliferation in the 1990s', *Journal of Strategic Studies* 13/3 (1990), 1–13.

⁷¹Tim Trevan, 'UNSCOM Faces Entirely New Verification Challenges in Iraq', *Arms Control Today* 3 (1993), 11–15; Peter Zimmerman, 'Iraq's Nuclear Achievements: Components, Sources, and Stature', Washington, Congressional Research Service, 1993; Leonard S. Spector, 'Deterring Regional Threats from Nuclear Proliferation', Strategic Studies Institute, US Army War College, Feb. 1992.

⁷²Allison L. C. De Cerreno, 'Iraqi Proliferation', *New York Times*, 22 Nov. 1997; Gary Mihollin and Gerard White, 'Proliferation in Disguise', *New York Times*, 18 Jul. 1994.

⁷³David Albright and Mark Hibbs, 'Iraq's Quest for the Nuclear Grail: What Can We Learn?' *Arms Control Today* 6 (1992), 3–11.

⁷⁴John M. Deutch, 'The New Nuclear Threat', *Foreign Affairs* 7/4 (1992), 120–34.

future – when future cases of opaque horizontal proliferation would undoubtedly be uncovered. Academic scholarship similarly adopted the language of ‘rogue states’ and ‘deviants’ to describe the threat of proliferation.⁷⁵

In addition to being projected forward, the Iraqi threat was projected backward, which further demonstrates the ideological dimension of this timescaping. Scholars, experts, and policymakers justified Israel’s bombing of the Iraqi reactor in 1981 as a successful strategy that resulted in buying time.⁷⁶ The attack is depicted as prescient, able to predict Iraqi nuclearization all along, even if it drove the programme underground.⁷⁷ This continues until the present day, in both academic literature and Israeli military reports, which refer to this notion of delay.⁷⁸ Since Israel’s military action against Iraq was criticised heavily, including by the United States,⁷⁹ Iraq’s subsequent proliferation attempt in the 1990s was thus seen as vindicating the strike.⁸⁰

Like in South Africa, the concern was that even after the dismantlement of the Iraqi programme, ‘human assets’ would live on as an imminent proliferation risk. This was mentioned explicitly in French and US national security discussions in 1993.⁸¹ Meanwhile, the mere existence of nuclear expertise was thus made into a threat – what is described by Pelopidas as ‘capacity determinism’.⁸² According to this logic, nonproliferation efforts must address both capability and possibility.

Deriving similar lessons, international agencies and actors called for the establishment of a more robust non-proliferation regime. The head of the IAEA at the time, Hans Blix, called for an expansion of IAEA powers and authority, including internal IAEA reforms vis-à-vis the Third World specifically, where

⁷⁵Deborah Yarsike Ball and Theodore P. Gerber, ‘Russian Scientists and Rogue States: Does Western Assistance Reduce the Proliferation Threat?’ *International Security* 29/4 (2005), 50–79; Glenn Chafetz, ‘The End of the Cold War and the Future of Nuclear Proliferation: An Alternative to the Neorealist Perspective’, *Security Studies* 2/3–4 (1993), 146; Michael Mandelbaum, ‘Lessons of the Next Nuclear War’, *Foreign Affairs* (1995), 22–37. Scholars still invoke this typology of certain states as rogue, radical, pariah, outcast, etc.

⁷⁶Efraim Karsh and Martin Navias, ‘Iraqi Military Power and its Threat to Regional Stability’, *Harvard International Review* (1991), 14–60.

⁷⁷Begin Center, ‘Operation Opera’. The website contains letters of thanks to Israeli military leaders for the attack, such as Dick Cheney’s. Regarding the claim about the strike’s paradoxical effect, see Mälfrid Braut-Hegghammer, *Unclear Physics: Why Iraq and Libya Failed to Build Nuclear Weapons* (Ithaca: Cornell UP 2016), chapter 3.

⁷⁸Uri Sadot, ‘The Campaign Against Osirak: Findings from Saddam’s Palace’, 21 Aug. 2013, Ma’acharot 450, Israeli Defense Forces; Steven E. Lobell, ‘Preventive Military Strike or Preventive War? The Fungibility of Power Resources’ *Cambridge Review of International Affairs*, published online 11 Mar. 2021; Uri Sadot, ‘Osirak and the Counter-Proliferation Puzzle’, *Security Studies* 35/4 (2016), 646–76; Oren Shahor, *Outside the Box* (Tel Aviv: Netanel Semrik Publishing House 2017), 202.

⁷⁹UN Security Council Resolution 487, 19 Jun. 1981.

⁸⁰27th session of the twelfth Knesset, 20 Feb. 1991, Jerusalem, https://fs.knesset.gov.il/12/Plenum/12_ptm_531716.PDF, 2351.

⁸¹US Congress Senate Committee on Governmental Affairs, ‘Proliferation Threats of the 1990s: Hearing Before the Committee on Governmental Affairs, 103rd Congress, First Session, 24 Feb. 1993’, 134; Pelopidas, *Repenser les choix nucléaires*, 43.

⁸²Pelopidas, *Repenser les choix nucléaires*, chapter 2.

proliferation was deemed an acute problem. He even called for changing the NPT, but only to address this concern of horizontal proliferation, leaving intact dynamics that enable vertical proliferation.⁸³ To uncover clandestine nuclear activities, the IAEA insisted on the importance of human information and the limits of technology.⁸⁴ The 93 + 2 programme – implemented immediately after the events in Iraq – sought to enhance the agency's ability to uncover concealed proliferation.⁸⁵ The press reiterated these statements on the importance of strict measures for credibility,⁸⁶ and the emphasis that warnings previously described as alarmist turned out to be true.⁸⁷ Themes of 'nuclear eternity' also permeate the press – with common expressions such as not being able to put the genie back in the bottle.⁸⁸ While potential Iraqi proliferation is described as a unique threat, it is also treated as a precedent that may alter the rules and norms surrounding nuclear weapons in international politics.⁸⁹

In the 1987 US National Security Strategy, which was 41 pages-long, there were three references to the spread or proliferation of nuclear weapons and WMDs. On threats to the US, proliferation is mentioned in the final paragraph, alongside many other threats. In the 1991 US National Security Strategy, which was 34 pages-long, there were 31 references to the spread of nuclear weapons, and a whole separate section dedicated to stemming proliferation, which outlines lessons from the Gulf crisis. Iraq is mentioned several times throughout this section as a violator of global norms against WMDs.

The presence of a secret nuclear weapons programme in Iraq is itself not unprecedented. But the timing of the discovery, after the end of the Cold War, structured how the Iraqi case was dealt with and ultimately projected it into the future. Despite the other unprecedented events that took place during this time, the Iraq case became the ultimate example of worst-case thinking around horizontal proliferation.

⁸³Hans Blix, 'Verification of Nuclear Nonproliferation: The Lesson of Iraq', *Washington Quarterly* 14/4 (1992), 57–65; Hans Blix, 'Verification of Nuclear Non-proliferation: Securing the Future', *IAEA Bulletin* 36/4 (1994), 2–5; Hans Blix, Statement to the 35th Session of the General Conference of the IAEA, 16 Sep. 1991; Hans Blix, Statement to the 46th Session of the United Nations General Assembly, 21 Oct. 1991; R. Jeffrey Smith, 'Iraq's Secret A-Arms Effort', *Washington Post*, 11 Aug. 1991.

⁸⁴J. Jennekens, R. Parsick, and A. von Baeckmann, 'Strengthening the International Safeguards System', *IAEA Bulletin*, 1, 1992, 6–10.

⁸⁵David A. Fischer, 'New Directions and Tools for Strengthening IAEA Safeguards', *Nonproliferation Review* 3/2 (1996), 69–76; Mark H. Killinger, 'Improving IAEA Safeguards Through Enhanced Information Analysis', *Nonproliferation Review* 3/1 (1995), 43–48; Diamond Howard, 'IAEA Approves '93 + 2' protocol; Awaits Adoption by Member States', *Arms Control Today* 27/3 (1997), 27 + 30.

⁸⁶Judith Miller, 'Gingrich Questions Clinton's Policy on Iraqi Arms Inspection', *New York Times*, 29 Aug. 1998.

⁸⁷William J. Broad, 'Warning on Iraq and Bomb Bid Silenced in '89', *New York Times*, 20 Apr. 1992.

⁸⁸William J. Broad, 'Iraqi Atom Effort Exposes Weakness in World Controls, Success Shocks Experts, Baghdad's Gains Cast Doubt on Feasibility of Halting Nuclear Arms' Spread', *New York Times*, 15 Jul. 1991.

⁸⁹Barry R Posen, 'US Security Policy in a Nuclear-Armed World or: What if Iraq had had Nuclear Weapons?' *Security Studies* 6/3 (1998), 7.

Conclusion

The post-Cold war period was marked by three poorly anticipated types of nuclear events: opaque proliferation (Iraq), the breakup of a nuclear-armed state (the Soviet-Union) and the dismantlement of an existing nuclear arsenal (South Africa). Focusing on 1989 to 1998, this paper discussed how these three possibilities were dealt with in the policy-making and intelligence communities, the press, and by international organizations.

Normatively, we are not making a claim about whether lessons should be learned from history and are fully aware of tragic understandings of history, suggesting that no lesson can and should be learned.⁹⁰ We are simply observing that the activity of strategic planning requires making choices about conceivable futures, which in turn requires deciding whether particular types of events may happen again or not. Similarly, justifying nuclear weapons policies in the public sphere requires references to future horizons, based on what is deemed conceivable and what is not.

We have shown that the post-Cold war timescape of perpetuation of nuclear weapons and reframing of them as hedges against the future was the result of particular gestures of temporalization of the above-mentioned three events. While the Iraqi case of opaque proliferation was treated as the harbinger of future nuclear danger, the breakup of a nuclear-armed state was treated as belonging to the past and either not repeatable or not to worry about, and South African nuclear disarmament was treated as belonging to the past and reframed as a non-proliferation success. These choices cannot be characterized as nuclear learning from all available information about the nuclear past or clever predictions, given that none of those events was repeated in the last three decades. They cannot be treated as worst-case thinking either since they exclude multiple possibilities which could have been labelled as such. Instead, these imagined futures are compatible with a specific ideology around nuclear ordering and proliferation. They enabled arguments and possibilities and closed others or made them invisible by assigning temporal value to them. We are certainly not claiming that the gesture of temporalisation we described exhausted the hegemonic timescape of the 1990s. This timescape also required that the new knowledge about the limits of control and safety over nuclear weapons and the role of 'luck' in the outcome of the 1962 Cuban Missile crisis⁹¹ be treated as either irrelevant or belonging to the past and that an acute sense of nuclear

⁹⁰William Bain, 'Are there any Lessons of History? The English School and the Activity of Being a Historian', *International Politics* 44 (2007), 513–30.

⁹¹James G. Blight, Bruce J. Allyn, and David A. Welch, with David Lewis, *Cuba on the Brink: Castro, the Missile Crisis, and the Soviet Collapse* (New York: Pantheon 1993); Sagan, *Limits of Safety*; James G. Blight and David Welch, *On the Brink: Americans and Soviets Reexamine the Cuban Missile Crisis* (New York: Hill & Wang 1989); Raymond Garthoff, *Reflections on the Cuban Missile Crisis* (Washington: Brookings Institution Press 1989).

vulnerability remain elusive to the leaders. Those aspects should be addressed as well.⁹² Until then, we would maintain that it is crucial to include temporal choices regarding nuclear weapons policy possibilities in the assessment of the strategic and military consequences of the immediate post–Cold War period.⁹³ And that the act of deciding which possible futures are deemed worthy of consideration based on which lessons from the past is the ultimate act of power.

Acknowledgments

We thank the editors of the special issue Paul Lenormand and Flavia Gasbarri for their feedback and insights. We presented a draft of this paper at the conference “The strategic and military consequences of the end of the Cold War” at Sciences Po December 2021, organised by The Service Historique de la Défense, the Centre d’Histoire de Sciences Po, Paris, and the Sir Michael Howard Centre for the History of War, King’s College London. We owe special thanks to Mario del Pero, Joe Maiolo and Robin Möser. A later version of the paper benefitted from comments from the *Nuclear Knowledges* community at a workshop on October 25, 2022. Kjølvs Egeland gave us extremely detailed and fruitful comments which helped us improve the piece. William Walker was available and supportive throughout the research and writing process. We are grateful to him. Finally, the two anonymous reviewers appointed by the *Journal of Strategic Studies* and the editors helped us improve the piece.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This article has been made possible by funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation program [grant agreement no. 759707], NUCLEAR.

Notes on contributors

Benoît Pelopidas is the founding director of the Nuclear Knowledges program at Sciences Po (CERI) and an affiliate of the Center for International Security and Cooperation (CISAC) at Stanford University. He is the PI of the ERC-funded project NUCLEAR.

⁹²Other research demonstrates policymakers’ disbelief in the possibility of unwanted nuclear explosions and how popular culture helped overcome it. Benoît Pelopidas, ‘Imaginer la possibilité de la guerre nucléaire pour y faire face. Le rôle de la culture populaire de 1950 à 2019’, *Cultures & Conflits* 123–4 (2021), 173–212.

⁹³On temporal choices as constitutive of present nuclear policy spaces, see Egeland, ‘Who Stole Disarmament’; Taha, ‘Misremembering the ACRS’; Pelopidas, ‘The Birth of Nuclear Eternity’ and ‘Nuclear Weapons Scholarship as a Case of Self-Censorship in Security Studies’, *Journal of Global Security Studies* 1–4 (2016), 326–36.

Hebatalla Taha is an Associate Senior Lecturer at the Department of Political Science and the Centre for Advanced Middle Eastern Studies at Lund University. She is also an Affiliated Scholar with the Nuclear Knowledges research collective at Sciences Po Paris. Her research deals with intersections of economy, technology, and security in the Middle East.

Tom Vaughan is a Lecturer in Strategy and Intelligence in the Department of International Politics, Aberystwyth University. He researches the politics of nuclear futures and African interventions into global nuclear politics. He co-convenes the Theories of Change and Nuclear Disarmament research network.

ORCID

Benoit Pelopidas  <http://orcid.org/0000-0002-0987-5570>

Hebatalla Taha  <http://orcid.org/0000-0001-9960-3108>

Tom Vaughan  <http://orcid.org/0000-0001-9552-9801>

Bibliography

- Adam, Barbara, *Timescapes of Modernity: The Environment and Invisible Hazards* (London: Routledge 1998).
- Albright, David and Mark Hibbs, 'Iraq's Quest for the Nuclear Grail: What Can We Learn?', *Arms Control Today* 6 (1992), 3–11.
- Albright, David and Mark Hibbs, 'South Africa: The ANC and the Atom Bomb', *Bulletin of the Atomic Scientists* 49/3 (1993), 32–37. doi:10.1080/00963402.1993.11456330.
- ANC/Environmental Monitoring Group, 'Recommendations to the ANC Science & Technology Policy Division Arising from the ANC & Alliance Delegates', in *Proceedings of the Conference on Nuclear Policy for a Democratic South Africa* (Western Cape: The Nuclear Debate: Policy for a Democratic South Africa, Cape Town: The Environmental Monitoring Group 1994), 233–37.
- Anderson, Noel and Mark S. Bell, 'The Limits of Regional Power: South Africa's Security Strategy, 1975–1989', *Journal of Strategic Studies* 46/2 (2023), 404–26. doi:10.1080/01402390.2019.1695123.
- Anti-Apartheid Movement, 'Nuclear Collaboration with South Africa: Britain's Profile', Working Paper (London: United Nations Seminar on Nuclear Collaboration with South Africa 24 Feb. 1979), MSS AAM 1499, Archive of the Anti-Apartheid Movement, 1956–1998, Bodleian Library, University of Oxford.
- Bain, William, 'Are There Any Lessons of History? The English School and the Activity of Being a Historian', *International Politics* 44/5 (2007), 513–30. doi:10.1057/palgrave.ip.8800204.
- Ball, Deborah Yarsike and Theodore P. Gerber, 'Russian Scientists and Rogue States: Does Western Assistance Reduce the Proliferation Threat?', *International Security* 29/4 (2005), 50–79. doi:10.1162/isec.2005.29.4.50.
- Begin Center, 'Operation Opera', https://db.begincenter.org.il/managed_query/-מבצע-באיראק (Hebrew).
- Bell, Mark S. and Nicholas L. Miller, 'The Limits of Nuclear Learning in the New Nuclear Age', in Vipin Narang and Scott D. Sagan (eds.), *The Fragile Balance of Terror: Deterrence in the New Nuclear Age* (Ithaca: Cornell UP 2023), 209–229.

- Betts, Richard K., 'A Diplomatic Bomb for South Africa?' *International Security* 4/2 (1979), 91–115. doi:10.2307/2626745.
- Blair, Bruce G., *Strategic Command and Control: Redefining the Nuclear Threat* (Washington DC: Brookings Institution Press 1985).
- Blair, Bruce G., *The Logic of Accidental Nuclear War* (Washington DC: Brookings Institution Press 1993).
- Blight, James G., Bruce J. Allyn, and David A. Welch with David Lewis, *Cuba on the Brink: Castro, the Missile Crisis, and the Soviet Collapse* (New York: Pantheon 1993).
- Blight, James G. and David Welch, *On the Brink: Americans and Soviets Reexamine the Cuban Missile Crisis* (New York: Hill & Wang 1989).
- Blix, Hans, Statement to the 35th Session of the General Conference of the International Atomic Energy Agency, Vienna, 16 Sep. 1991a.
- Blix, Hans, Statement to the 46th Session of the United Nations General Assembly, New York, 21 Oct. 1991b.
- Blix, Hans., 'Verification of Nuclear Non-Proliferation: Securing the Future', *IAEA Bulletin* 36/4 (2–5 Dec 1992), 2–5. <https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull34-1/34103580205.pdf>.
- Blix, Hans, 'Verification of Nuclear Nonproliferation: The Lesson of Iraq', *Washington Quarterly* 14/4 (1992), 57–65. doi:10.1080/01636609209550118.
- Booth, Ken and Nicholas J. Wheeler, *Security Dilemma. Fear, Cooperation and Trust in World Politics* (Basingstoke: Palgrave 2008).
- Braut-Hegghammer, Målfrid, *Unclear Physics: Why Iraq and Libya Failed to Build Nuclear Weapons* (Ithaca: Cornell UP 2016).
- Broad, William J., 'Iraqi Atom Effort Exposes Weakness in World Controls, Success Shocks Experts, Baghdad's Gains Cast Doubt on Feasibility of Halting Nuclear arms' Spread', *New York Times*, 15 July 1991.
- Broad, William J., 'Warning on Iraq and Bomb Bid Silenced in '89', *New York Times*, 20 Apr. 1992.
- Budjeryn, Mariana, 'Non-Proliferation and State Succession: The Demise of the USSR and the Nuclear Aftermath in Belarus, Kazakhstan, and Ukraine', *Journal of Cold War Studies* 24/2 (2022), 49–52. doi:10.1162/jcws_a_01077.
- Buys, Andre, *Proliferation Risk Assessment of Former Nuclear Explosives/Weapons Program Personnel: The South African Case Study* (Pretoria: University of Pretoria 2007).
- Chafetz, Glen, 'The End of the Cold War and the Future of Nuclear Proliferation: An Alternative to the Neorealist Perspective', *Security Studies* 2/3–4 (1993), 125–58. doi:10.1080/09636419309347522.
- Christie, Renfrew, 'The Military Dimensions of Nuclear Development in South Africa', in *Proceedings of the Conference on Nuclear Policy for a Democratic South Africa* (Western Cape: Cape Town: The Environmental Monitoring Group 1994).
- Cohen, Avner and Benjamin Frenkel, 'Opaque nuclear proliferation', *Journal of Strategic Studies* 13/3 (1990), 14–44. doi:10.1080/01402399008437417.
- Davis, Zachary S., 'The Realist Nuclear Regime', *Security Studies* 2/3–4 (1993), 79–99. doi:10.1080/09636419309347520.
- De Cerreno, Allison L. C., 'Iraqi Proliferation', *New York Times*, 22 Nov. 1997.
- Deutch, John M., 'The New Nuclear Threat', *Foreign Affairs* 71/4 (1992), 120–34. doi:10.2307/20045313.
- Dubow, Saul, *A Commonwealth of Knowledge: Science, Sensibility, and White South Africa* (Oxford: Oxford UP 2006).

- Eberhard, Anton, 'Options for Energy Policy and Planning in South Africa: Where Does the Nuclear Industry Fit In?', in *Proceedings of the Conference on Nuclear Policy for a Democratic South Africa* (Western Cape: The Nuclear Debate: Policy for a Democratic South Africa, Cape Town: The Environmental Monitoring Group 1994).
- Eden, Lynn, 'The U. S. Nuclear Arsenal and Zero: Sizing and Planning for Use – Past, Present, and Future', in Catherine McArdle Kelleher, and Judith Reppy (eds.), *Getting to Zero: The Path to Nuclear Disarmament* (Palo Alto: Stanford UP 2011), 69–89.
- Egeland, Kjøl, 'Who Stole Disarmament? History and Nostalgia in Nuclear Abolition Discourse', *International Affairs* 96/5 (2020), 1387–403. doi:[10.1093/ia/iaa096](https://doi.org/10.1093/ia/iaa096).
- Egeland, Kjøl, 'The Ideology of Nuclear Order', *New Political Science* 43/2 (2021), 208–30. doi:[10.1080/07393148.2021.1886772](https://doi.org/10.1080/07393148.2021.1886772).
- Egeland, Kjøl, 'A Theory of Nuclear Disarmament: Cases, Analogies, and the Role of the Non-Proliferation Regime', *Contemporary Security Policy* 43/1 (2022), 106–33. doi:[10.1080/13523260.2021.1978159](https://doi.org/10.1080/13523260.2021.1978159).
- Feaver, Peter D., *Guarding the Guardians. Civilian Control of Nuclear Weapons in the United States* (Ithaca: Cornell UP 1992).
- Fischer, David A., 'New Directions and Tools for Strengthening IAEA Safeguards', *The Nonproliferation Review* 3/2 (1996), 69–76. doi:[10.1080/10736709608436626](https://doi.org/10.1080/10736709608436626).
- Frankel, Benjamin, 'An Anxious Decade: Nuclear Proliferation in the 1990s', *Journal of Strategic Studies* 13/3 (1990), 1–13. doi:[10.1080/01402399008437416](https://doi.org/10.1080/01402399008437416).
- Garthoff, Raymond, *Reflections on the Cuban Missile Crisis* (Washington: Brookings Institution Press 1989).
- Gavin, Francis J., 'Strategies of Inhibition: US Grand Strategy, the Nuclear Revolution and Nonproliferation', *International Security* 40/1 (2015), 9–46. doi:[10.1162/ISEC_a_00205](https://doi.org/10.1162/ISEC_a_00205).
- Gillette, Rob, 'Uranium Enrichment: With Help, South Africa is Progressing', *Science* 188/4193 (1975), 1090–92. doi:[10.1126/science.188.4193.1090](https://doi.org/10.1126/science.188.4193.1090).
- Goldberg, Denis, 'A Nuclear Policy for a New, Democratic South Africa', in *Proceedings of the Conference on Nuclear Policy for a Democratic South Africa* (Western Cape: The Nuclear Debate: Policy for a Democratic South Africa, Cape Town: The Environmental Monitoring Group 1994).
- Horton, Roy E., *Out of (South) Africa: Pretoria's Nuclear Weapons Experience* (Colorado: USAF Institute for National Security Studies 1999).
- Howard, Diamond, 'IAEA approves '93+2' protocol; Awaits Adoption by Member States', *Arms Control Today* 27/3 (1997), 27+30.
- Howlett, Darryl and John Simpson, 'Nuclearisation and Denuclearisation in South Africa', *Survival* 35/3 (1993), 154–73. doi:[10.1080/00396339308442704](https://doi.org/10.1080/00396339308442704).
- Hymans, Jacques, *Achieving Nuclear Weapons Ambitions* (Cambridge: Cambridge UP 2012).
- Jan, Ameen, 'Pakistan on a Precipice', *Asian Survey* 39/5 (1999), 699–719. doi:[10.2307/3021163](https://doi.org/10.2307/3021163).
- Jennekens, J., R. Parsick, and A. von Baeckmann, 'Strengthening the International Safeguards System', *IAEA Bulletin* 1 (1992), 6–10.
- Kaplan, Fred, *The Bomb. Presidents, Generals and the Secret History of Nuclear War* (New York: Simon & Schuster 2020).
- Karsh, Ephraim and Martin Navias, 'Iraqi Military Power and Its Threat to Regional Stability', *Harvard International Review* (January 1991), 14–60.
- Keller, Bill, 'South Africa Says it Built 6 Atom Bombs', *New York Times*, 25 Mar. 1993.
- Khan, Feroz Hassan, *Eating Grass. The Making of the Pakistani Bomb* (Palo Alto: Stanford UP 2012).

- Killinger, Mark H., 'Improving IAEA Safeguards Through Enhanced Information Analysis', *The Nonproliferation Review* 3/1 (1995), 43–48. doi:[10.1080/10736709508436605](https://doi.org/10.1080/10736709508436605).
- Knesset, 'Twenty-Seventh Session of the Twelfth Knesset', 20 Feb. 1991.
- Knopf, Jeffrey W., *Domestic Society and International Cooperation: The Impact of Protest on U.S. Arms Control Policy* (Cambridge: Cambridge UP 1998).
- Knopf, Jeffrey W., 'The Concept of Nuclear Learning', *The Nonproliferation Review* 19/1 (2012), 79–93. doi:[10.1080/10736700.2012.655088](https://doi.org/10.1080/10736700.2012.655088).
- Konieczna, Anna, 'Nuclear Twins: French-South African Strategic Cooperation (1964–79)', *Cold War History* 21/3 (2021), 283–300. doi:[10.1080/14682745.2020.1823968](https://doi.org/10.1080/14682745.2020.1823968).
- Kostenko, Yuri, *Ukraine's Nuclear Disarmament: A History* (Cambridge, MA: Harvard UP 2021).
- Kristensen, Hans and Robert S. Norris, 'Global nuclear weapons inventories, 1945–2013', *Bulletin of the Atomic Scientists* 69/5 (2013), 75–81. doi:[10.1177/0096340213501363](https://doi.org/10.1177/0096340213501363).
- Lobell, Steven E., 'Preventive Military Strike or Preventive War? The Fungibility of Power Resources', *Cambridge Review of International Affairs* 36/5 (published online 11 Mar. 2021), 607–624. doi:[10.1080/09557571.2021.1879731](https://doi.org/10.1080/09557571.2021.1879731).
- Mandelbaum, Michael, 'Lessons of the Next Nuclear War', *Foreign Affairs* 74/2 (Mar./Apr. 1995), 22–37. doi:[10.2307/20047040](https://doi.org/10.2307/20047040).
- Masco, Joseph, 'Nuclear pasts, nuclear futures; or, disarming through rebuilding', *Critical Studies on Security* 3/3 (2015), 308–12. doi:[10.1080/21624887.2015.1123960](https://doi.org/10.1080/21624887.2015.1123960).
- Mearsheimer, John J., *The Tragedy of Great Power Politics* (New York: W. W. Norton 2001).
- Mihollin, Gary and Gerard White, 'Proliferation in Disguise', *New York Times*, 18 July 1994.
- Miller, Judith, 'Gingrich questions Clinton's policy on Iraqi arms inspection', *New York Times*, 29 Aug. 1998.
- Möser, Robin, "'The Major Prize": Apartheid South Africa's Accession to the Treaty on the Non-Proliferation of Nuclear Weapons, 1988–91', *The Nonproliferation Review* 26/5–6 (2020), 559–73. doi:[10.1080/10736700.2019.1696543](https://doi.org/10.1080/10736700.2019.1696543).
- Mutimer, David, *The Weapon State: Proliferation and the Framing of Security* (Boulder: Lynne Rienner 2000).
- Narang, Vipin., *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton: Princeton UP 2014).
- Narang, Vipin, 'Strategies of Nuclear Proliferation: How States Pursue the Bomb', *International Security* 41/3 (2017), 110–50. doi:[10.1162/ISEC_a_00268](https://doi.org/10.1162/ISEC_a_00268).
- New York Times*, 'Opinion: South Africa's Unexploded Bombs', 27 March 1993.
- Onderco, Michal, 'Oral History Interview with Jean DuPreez' (Wilson Center 4 Apr. 2018), 26, History and Public Policy Program Digital Archive, <https://digitalarchive.wilsoncenter.org/document/177446>.
- Onderco, Michal and Anna-Mart van Wyk, 'Birth of a Norm Champion: How South Africa Came to Support the Npt's Indefinite Extension', *The Nonproliferation Review* 26/1–2 (2019), 23–41. doi:[10.1080/10736700.2019.1591771](https://doi.org/10.1080/10736700.2019.1591771).
- Ottaway, David B, 'South Africa said to abandon pursuit of nuclear weapons', *Washington Post*, 18 Oct. 1991.
- Pabian, Frank V., 'South Africa's Nuclear Weapon Program: Lessons for U.S. Nonproliferation Policy', *The Nonproliferation Review* 3/1 (1991), 1–19. doi:[10.1080/10736709508436602](https://doi.org/10.1080/10736709508436602).

- Patti, Carlo, 'The Forbidden Cooperation: South Africa–Brazil Nuclear Relations at the Turn of the 1970s', *Revista Brasileira de Política Internacional* 61/2 (2018), 1–17. doi:[10.1590/0034-7329201800206](https://doi.org/10.1590/0034-7329201800206).
- Pelopidas, Benoît, 'Nuclear Weapons Scholarship as a Case of Self-Censorship in Security Studies', *Journal of Global Security Studies* 1/4 (2016), 326–336. doi:[10.1093/jogss/ogw017](https://doi.org/10.1093/jogss/ogw017).
- Pelopidas, Benoît, 'The Birth of Nuclear Eternity', in Sandra Kemp and Jenny Andersson (eds.), *Futures* (Oxford: Oxford UP 2021a), 484–500.
- Pelopidas, Benoît, 'Imaginer la possibilité de la guerre nucléaire pour y faire face. Le rôle de la culture populaire de 1950 à 2019', *Cultures & Conflits* 123–124 (2021b), 173–213. doi:[10.4000/conflits.22798](https://doi.org/10.4000/conflits.22798).
- Pelopidas, Benoît, *Repenser les choix nucléaires* (Paris: Presses de Sciences Po 2022).
- Pilat, Joseph F., *Virtual Nuclear Weapons* (California: Los Alamos National Laboratory 1997), 6–9.
- Polakow-Suransky, Sasha, *The Unspoken Alliance: Israel's Secret Relationship with Apartheid South Africa* (New York: Pantheon 2009).
- Posen, Barry R., 'U.S. Security Policy in a Nuclear-Armed World Or: What if Iraq Had Had Nuclear Weapons?', *Security Studies* 6/3 (1997), 1–31. doi:[10.1080/09636419708429313](https://doi.org/10.1080/09636419708429313).
- Potter, William, 'The Politics of Nuclear Renunciation: The Cases of Belarus, Kazakhstan and Ukraine', Occasional Paper (Henry L. Stimson Center), 22 Apr. 1995.
- Preston, Julia and R. Jeffrey Smith, 'The nuclear treaty: Product of global full-court press by US', *Washington Post*, 14 May 1995.
- Quinlan, Michael, 'The Future of Nuclear Weapons: Policy for Western Possessors', *International Affairs* 69/3 (1993), 485–96. doi:[10.2307/2622311](https://doi.org/10.2307/2622311).
- Rabinowitz, Or and Nicholas L. Miller, 'Keeping the Bombs in the Basement: U.S. Nonproliferation Policy Toward Israel, South Africa, and Pakistan', *International Security* 40/1 (2015), 47–86. doi:[10.1162/ISEC_a_00207](https://doi.org/10.1162/ISEC_a_00207).
- Richelson, Jeffrey T., 'U.S. Intelligence and the South African Bomb', *The National Security Archive*, 13 June 2006a, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB181/index.htm>.
- Richelson, Jeffrey T., 'The Vela Incident: Nuclear Test or Meteorite?' *National Security Archive*, 5 May 2006b, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB190/>.
- Ritchie, Nick, *US Nuclear Weapons Policy After the Cold War: Russians, 'Rogues' and Domestic Division* (London: Routledge 2008).
- Ritchie, Nick, 'Nuclear Identities and Scottish Independence', *The Nonproliferation Review* 23/5–6 (2016), 653–75. doi:[10.1080/10736700.2017.1345517](https://doi.org/10.1080/10736700.2017.1345517).
- Sadot, Uri, 'The Campaign Against Osirak: Findings from Saddam's Palace', 21 Aug. 2013, Ma'acharot 450, Israeli Defense Forces.
- Sadot, Uri, 'Osirak and the Counter-Proliferation Puzzle', *Security Studies* 35/4 (2016), 646–676. doi:[10.1080/09636412.2016.1220206](https://doi.org/10.1080/09636412.2016.1220206).
- Sagan, Scott D., *The Limits of Safety. Organizations, Accidents and Nuclear Weapons* (Princeton: Princeton UP 1993).
- Sagan, Scott D., 'The Perils of Proliferation: Organization Theory, Deterrence Theory, and the Spread of Nuclear Weapons', *International Security* 18/4 (1994), 66–107. doi:[10.2307/2539178](https://doi.org/10.2307/2539178).
- Sagan, Scott D. and K. N. Waltz, *The Spread of Nuclear Weapons: A Debate* (New York: W. W. Norton 1995).

- Scott, Len, 'The Essential Inevitability of Worrying About the Bomb: New Writing on the Cuban Missile Crisis', *Intelligence & National Security* 37/3 (2022), 458–60. doi:10.1080/02684527.2021.1996041.
- Selth, Andrew, 'Burma and Nuclear Proliferation', in James J. Wirtz and Peter R. Lavoy (eds.), *Over the Horizon Proliferation Threats* (Palo Alto: Stanford UP 2012), 124–135.
- Shahor, Oren, *Outside the Box* (Tel Aviv: Netanel Semrik Publishing House 2017).
- Sherwin, Martin J., *Gambling with Armageddon. Nuclear Roulette from Hiroshima to the Cuban Missile Crisis* (New York: Knopf 2020).
- Smith, R Jeffrey, 'Iraq's secret A-Arms effort: Grim lessons for the world', *Washington Post*, 11 Aug. 1991.
- Sokov, Nikolai, 'Ukraine: A Post-Nuclear Country', in William Potter and Gaukhar Mukhatzhanova (eds.), *Forecasting Nuclear Proliferation in the 21st Century* (Palo Alto: Stanford UP 2010), 255–284.
- Spector, Leonard S., 'Deterring Regional Threats from Nuclear Proliferation', in *Strategic Studies Institute, US Army War College, Third Annual Conference on Strategy*, Carlisle Barracks, PA, Feb. 1992a.
- Spector, Leonard S., 'Repentant Nuclear Proliferants', *Foreign Policy* 88/88 (1992b), 21–37. doi:10.2307/1149316.
- Stumpf, Waldo, 'South Africa's Nuclear Weapons Program: From Deterrence to Dismantlement', *Arms Control Today* 25/10 (1995), 67–74.
- Taha, Hebatalla, 'Misremembering the ACRS: Economic Imaginations and Nuclear Negotiations in the Middle East', *Global Affairs* 7/3 (2021), 327–42. doi:10.1080/23340460.2021.1955622.
- Taylor, Brian C., "'A Hedge Against the future": The Post-Cold War Rhetoric of Nuclear Weapons Modernization', *Quarterly Journal of Speech* 96/1 (2010), 1–24. doi:10.1080/00335630903512721.
- Thayer, Bradley A., 'The Risk of Nuclear Inadvertence: A Review Essay', *Security Studies* 3/3 (1994), 428–93. doi:10.1080/09636419409347557.
- Trevan, Tim, 'UNSCOM Faces Entirely New Verification Challenges in Iraq', *Arms Control Today* 3 (1993), 11–5.
- US Congress Senate Committee on Governmental Affairs, *Proliferation threats of the 1990s: Hearing Before the Committee on Governmental Affairs, United States Senate, One Hundred Third Congress, First Session, 24 Feb. 1993.*
- Vaughan, Tom, 'South Africa and Nuclear Order: Between "Local" Technopolitics and "Global" Hegemony', doctoral dissertation, Aberystwyth Univ., 2021.
- Walker, William, 'Nuclear Weapons and the Former Soviet Republics', *International Affairs* 68/2 (1992), 255–77. doi:10.2307/2623214.
- Walker, William, *A Perpetual Menace: Nuclear Weapons and International Order* (London: Routledge 2011).
- Welsh, Susan B., 'Delegate Perspectives on the 1995 NPT Review and Extension Conference', *The Nonproliferation Review* 2/3 (1995), 1–24. doi:10.1080/10736709508436589.
- Zimmerman, Peter, *Iraq's Nuclear Achievements: Components, Sources, and Stature* (Washington DC: Congressional Research Service 1993).