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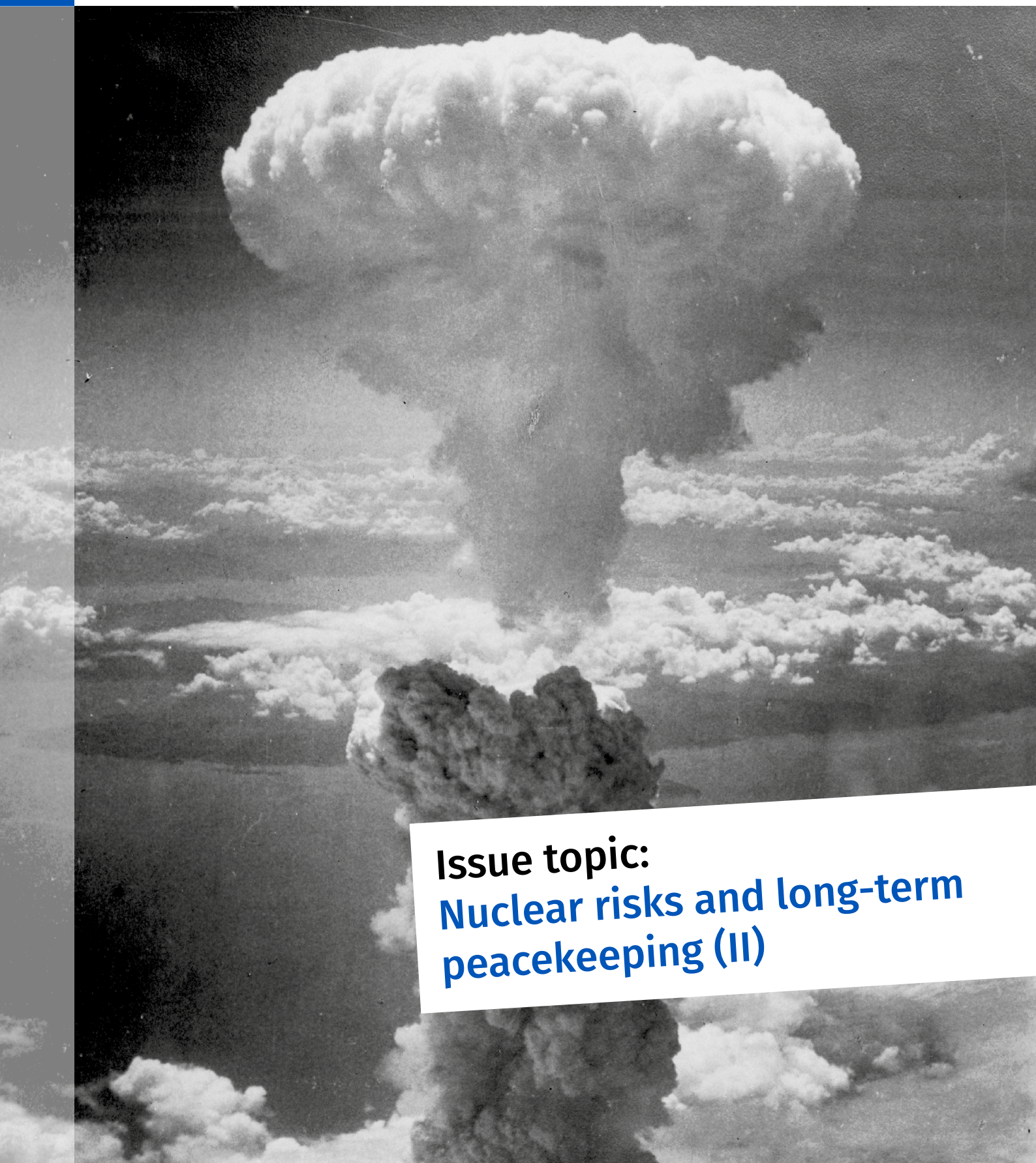

Issue topic:
Nuclear risks and long-term peacekeeping (II)

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The peer-reviewed journal *Intergenerational Justice Review* (IGJR) aims to improve our understanding of intergenerational justice and sustainable development through pure and applied research. The IGJR (ISSN 2190-6335) is an open-access journal that is published on a professional level with an extensive international readership. The editorial board comprises over 50 international experts from ten countries, representing eight disciplines. Published contributions do not reflect the opinions of the Foundation for the Rights of Future Generations (FRFG) or the Intergenerational Foundation (IF).

Editors of the IGJR

Editorial

Every generation inherits not only the achievements of those before it but also their unfinished dangers. Among these, none weigh more heavily on the moral conscience of humanity than the development and unrelenting pursuit of advanced nuclear weapons. Their creation carries consequences that transcend time and choice. Nearly eight decades after the bombing of Hiroshima and Nagasaki, the survivors' legacy and the destruction they witnessed continue to challenge the very foundations of intergenerational justice. Holding on to nuclear stockpiles exposes future generations to risks they did not consent to and cannot easily escape. Consequently, the moral question at the heart of this dilemma is: What kind of world do we intend to leave behind – one sustained by deterrence and fear, or one guided by cooperation and restraint?

This question becomes even more urgent as we enter what scholars (e.g. Andrew Futter, Ludovica Castelli, Admiral Pierre Vandier, and Lawrence Freedman) refer to as the 'Third Nuclear Age'. While the First Nuclear Age (≈1945–1991) was defined by the bipolar rivalry between the United States and the Soviet Union, and the Second Nuclear Age (≈1991–2020s) by the start of nuclear dynamics in a multipolar and regionalised system, the Third Nuclear Age is defined by an ever more complex, competitive, and multipolar international security environment, marked by the rapid advancement of both nuclear and conventional technologies and the erosion of traditional arms control agreements.

The implications of these transformations are evident in Russia's war of aggression against Ukraine. During the war, an unprecedented level of nuclear signalling and shifts in Moscow's nuclear rhetoric have reinstated deterrence as a central instrument of statecraft. NATO's provision of conventional weapons to Ukraine and North Korea's strategic interventions in this war amplified the stakes of escalation across the broader strategic landscape.

Beyond this war in Europe, China's expanding nuclear arsenal, North Korea's ongoing provocations, Iran's contested nuclear ambitions, and the India-Pakistan nuclear stand-off have created new deterrence dynamics across multiple regions. But deterrence is not a safe state of affairs. The risk of miscalculation is higher than ever, making unintended escalation spirals and accidents an immediate concern. A particularly vivid indicator of this renewed tension is President Donald Trump's October 2025 instructions to the U.S. Department of War to resume testing of nuclear weapons on an "equal basis" with Russia and China. U.S. Energy Secretary Chris Wright clarified one day later that the planned tests would not involve nuclear explosions but rather "system tests" or "non-critical explosions" of nuclear-weapon subsystems. Nonetheless, President Vladimir Putin called for an "appropriate and proportionate response," and instructed his ministries to submit proposals for a possible "commencement to prepare nuclear weapon testing." This episode not only exemplifies the potential erosion of the nuclear test ban norm but also represents an example of an action-reaction cycle.

As the 'Third Nuclear Age' is even more dangerous than its two predecessors, urgent moral questions arise. Can it be justified for nine leaders of nuclear-armed states to make choices that place future generations at risk, only to assert strategic advantages and, in the case of non-democracies, their political survival? The question is not only whether these leaders will show the same level of restraint as previous leaders of nuclear-armed states, but also whether nine people can generally be as calculable as two people were, in the 'First Nuclear Age'.

Addressing this dilemma requires more than strategy alone – it demands dialogue, transparency and cooperative approaches that place shared responsibility and humanity's long-term survival above unilateral gains. Practical steps towards achieving this vision include renewing and expanding arms control agreements, establishing credible no-first-use and no-threat-commitments, strengthening communication channels among nuclear-armed states, and subjecting nuclear doctrines to rigorous scrutiny. Beyond strategic considerations, societal engagement is also a key, as illustrated by the humanitarian initiative that led to the Treaty on the Prohibition of Nuclear Weapons. Education and public discourse can cultivate a moral awareness of the long-term consequences of nuclear decision-making.

This issue examines two forms of societal engagement through distinct yet related lenses. The first article by Franco Escobar examines the role of education in shaping youth attitudes toward nuclear weapons. Drawing on twenty-four interviews with young Japanese anti-nuclear activists, Escobar examines why these young people joined antinuclear movements. Many of the interviewees argue that while Japan's peace education sustains unique levels of youth engagement with atomic bomb materials and historical events, it is perceived as insufficient to motivate political action or participation in movements. This underscores the challenge of translating knowledge and moral awareness into concrete actions. The second article by Susi Snyder shifts the focus to the institutional level, investigating the role of the corporate sector in the production and maintenance of nuclear arsenals, with a particular emphasis on how these companies secure political influence through lobbying and financial support of think tanks. Snyder concludes that the undue influence of corporations in the nuclear weapons debate provides a regular incentive for the continued existence of nuclear weapons and hinders disarmament efforts.

The issue concludes with two book reviews that engage with these broader questions of moral and strategic responsibility in the nuclear realm. Firstly, Jason Adolph reviews the anthology *Non-Nuclear Peace: Beyond the Nuclear Ban Treaty* (2020), edited by Tom Sauer, Jorg Kustermans and Barbara Segaert, which engages in an interdisciplinary dialogue about imagining a world free from nuclear weapons – the measures taken and the institutions created to achieve it. Turning to a different perspective, Ayesha Zafar reviews the monograph *Deterrence in the Third Nuclear Age* (2025) by Admiral Pierre Vandier, who contends that nuclear deterrence must evolve to remain credible in the 'Third Nuclear Age'. Together, these reviews underscore the persistent tension between the pursuit of disarmament and the maintenance of credible deterrence, which continues to shape contemporary nuclear debates.

Jörg Tremmel, Permanent Editor
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Youth antinuclear socialisation in Japan: early encounters with the concept of nuclear weapons

By Fernando Franco Castro Escobar

As living memory of the use of nuclear weapons dies out, lessons from the horrors of Hiroshima and Nagasaki could become unlearned. Thus, the voices of youth antinuclear activists have never been more important. Drawing from 24 oral history interviews conducted in Japan, this article discusses the 'greying effect' of the antinuclear movement. First, it outlines a background and theoretical framework of youth political socialisation. Second, it discusses oral history as a method. Third, it traces young people's early encounters with the concept of 'nuclear weapons', discussing forces that foster and prevent meaningful youth participation in the antinuclear movement. It argues that while Japan's peace education sustains unique levels of youth engagement with atomic bomb materials and historical events, it is perceived as insufficient to motivate political action, movement participation, and can at times prevent it.

Keywords: social movements; nuclear disarmament; peace education; political socialisation; youth activism

Introduction

Why do young people join antinuclear groups in the twenty-first century? This article traces early encounters with the concept of 'nuclear weapons', drawing from 24 oral history interviews conducted with youth who became antinuclear organisers in Japan. It explores Japan's peace education's influence and limitations in socialising youth with antinuclear values, information, and aspirations for a world without nuclear weapons.

In the twentieth century, the antinuclear movement experienced three waves of global activity wherein contentious knowledge about nuclear weapons was substantially produced and circulated. The mass mobilisation of concerned citizens around the world during those years is credited with having significantly contributed to preventing nuclear conflict by pushing states to adopt arms control and non-proliferation treaties that deterrence-based policies alone do not incentivise (Wittner 2003; 1997; 1993).[1] When the Cold War ended, public perceptions of nuclear perils subsided, and movement participation significantly declined (Rosendorf et al. 2021). In the twenty-first century, the movement has operated under constrained budgets and shrinking memberships (Acheson 2021), leaving behind a (likely misperceived) 'golden age' for nuclear disarmament (Egeland 2020), and undergoing a 'greying effect' characterised by fewer youth joining antinuclear groups (Wittner 2009a: 217). Some argue the movement did not just stall but is receding "at an historic ebb" (Desai 2022: 350).

We recently entered a 'third nuclear age' – a period marked by unprecedented nuclear risks, heightened state competition and escalation options, a weakening nuclear taboo, and the erosion of arms control treaties (Braut-Hegghammer 2023; Castelli et al. 2025; Crilley 2023; Mecklin 2025; Tannenwald 2018). However, the nuclear threat's renewed salience has failed to revitalise mass grassroots mobilisation and widespread youth participation in antinuclear activism. Instead, contemporary youth grew up in a global environment where "only a small minority [of people] take part in activism that raises awareness about the dangers of nuclear weapons, lobbies for arms control, or contributes to the goal of abolition" (Tannenwald 2020: 217). The importance of this situation lies in the fact that while existential dangers have been growing, public pressures on states to exercise nuclear restraint and pursue disarmament have not.

Contemporary youth grew up in a global environment where "only a small minority [of people] take part in activism that raises awareness about the dangers of nuclear weapons, lobbies for arms control, or contributes to the goal of abolition."

In Japan, peace education is deeply tied to nuclear disarmament efforts. The term 'peace education' was first used by the Japan Teachers Union in 1951 and began to focus on "passing on the A-bomb experience" in the 1960s (Murakami 1992: 45).[2] Today, Japan's peace education is seen as a global pioneer and it involves a dense network of individuals and organisations who aim to cultivate antiwar attitudes in youth primarily by preserving '*hibakusha*' (atomic bomb survivor) testimonies across generations and, more recently, by interlacing disarmament with intergenerational justice, sustainability, social justice, and a wider culture of positive peace (Kim et al. 2024; Romano / Werblow / Williams 2022). In Japan, peace education initiatives sustain extraordinary levels of youth engagement with A-bomb-related curricula, offering its students unique opportunities to meet hibakusha in person, visit A-bombed sites, and develop a historical consciousness about the role of nuclear weapons in the world.

Beyond its empirical contributions, this article gleans insights into what forces facilitate and hinder youth participation in contemporary nuclear politics and the antinuclear movement. First, it outlines a theoretical framework of youth political socialisation. Second, it discusses oral history as a method. Third, it traces early encounters with the concept of 'nuclear weapons' as narrated by youth antinuclear organisers. It argues that while Japan's peace education sustains unique levels of youth engagement with atomic bomb materials and historical events, it is perceived as insufficient to motivate political action, movement participation, and can at times prevent it. In a country whose population is ageing faster than any other nation's (Takao 2022), and as the living memory of the use of nuclear weapons dies out (Starr 2022), the voices of youth antinuclear activists have never been more important.

Theoretical framework

Until recently, young people's involvement in social movements had remained significantly undertheorised despite their significant presence (Bessant 2020; Pickard 2019; Rodgers 2020; Taft 2015; 2010). Generally, the social movement actor has been assumed to be an adult or college-aged youth,[3] leaving behind "a notable silence in the sociological literature" (Gordon 2007: 635).

As recently as 2019, authoritative references such as the Wiley Blackwell Companion to Social Movements (Snow et al. 2019) and the Oxford Handbook of Social Movements (della Porta / Diani 2015) lacked dedicated sections on the role of age, but contained sections on class, gender, race, and religion. In September 2022, the former added a section titled "student/youth movements," which does not discuss antinuclear activism. Although youth movements are becoming an increasing feature of global history (Braungart / Braungart 2023), scant scholarly work exists on the connections between young people's politics and nuclear disarmament in the post-Cold-War context (i.e. the second and third nuclear ages) (Egeland / Pelopidas 2020; Pelopidas 2017a; Buuren / Pelopidas / Sorg 2025).

Factors likely contributing to the lack of more widespread youth participation include the fading of collective memories of nuclear harm, decreasing emotional connections to the bombings, and the lack of humanitarian perspectives in educational institutions.

Some scholars highlight factors likely contributing to the *lack* of more widespread youth participation, such as the fading of collective memories of nuclear harm, decreasing emotional connections to the bombings, and the lack of humanitarian perspectives in educational institutions (Berrigan 2024; Carson 2018; Samler / Ciobanu 2020; Buuren / Pelopidas / Sorg 2025). However, such work mostly neglects theoretical frameworks from social movements and youth studies literature, and does not answer questions about why young people *have joined* 'youth-based' antinuclear groups under the existing political environment of the twenty-first century – despite the movement's global greying effect, limited organisational capacity, and overall social neglect.[4] To help fill this gap, this article offers a theoretical contribution by operationalising the concept of political socialisation and producing a snapshot view of the process whereby participants came to join antinuclear groups.

As a broader theoretical framework, the concept of 'political socialisation' can help account for why and how youth participate in politics and social movements, looking into a developmental sequence by which individuals acquire political knowledge, values, identities, and behaviours, as views of the political world and social norms are gradually formed and internalised (Fillieule 2022). The following sections explore elements of political knowledge acquisition by investigating whether early encounters with the concept of 'nuclear weapons' were conducive to a 'cognitive liberation' – subjective interpretations of the political environment which warrant movement participation (McAdam / Tarrow 2018). As such, an analysis of these encounters reveals factors that foster and prevent more widespread and meaningful participation in nuclear politics.

Methods

Twenty-four semi-structured oral history interviews were conducted with youth antinuclear organisers between June and September 2024 in Hiroshima, Nagasaki, and Tokyo. The study employed three inclusion criteria. *(1) Affiliation:* participants hold membership in antinuclear groups that partnered with the International Campaign to Abolish Nuclear Weapons (ICAN) or the United Nations Office for Disarmament Affairs (UNODA); *(2) Youth Identity*: groups self-identify as 'youth-based' or 'youth-led' in the organisation's name or its vision-mission statements; (3) *Physical location*: individuals are physically present in Japan. After the interview, a snowball sampling procedure was employed, encouraging participants to nominate eligible peers for participation in this research. The study eschewed age brackets and nationality as participation requirements to avoid monocultural definitions of 'youth.'

Through these criteria, the study samples from a universe of organisations that are (a) antinuclear, (b) youth-based, and (c) physically active in Japan. The study does not aim to sample or represent the views and experiences of all young people in Japan. Instead, claims made in this article about interviewed youth speak to a broader universe of organisations that are 'antinuclear' insofar as their initiatives align with ICAN's and UNODA's efforts for nuclear disarmament, while representing a narrower case of groups that make 'youth' a central component of their organisational identity in Japan. The analysis and conclusions concern the experiences of youth who *have joined* those networks, and not why others have failed to do so – it is harder to explain non-events. Individually, participants may hold different attitudes towards issues regarding the desirability of 'nuclear energy', 'arms control', and may (not) view themselves as members of a wider 'peace movement'. All participants provided informed consent and were assigned pseudonyms in accordance with ethical, legal, and academic research standards.

Snowball sampling resulted in participation from eighteen female and six male narrators, aged between 11–33 (average 22.9) years old. (...) The study does not aim to sample or represent the views and experiences of all young people in Japan.

Snowball sampling resulted in participation from eighteen female and six male narrators, aged between 11–33 (average 22.9) years old. This age range corresponds with a wider trend of research on youth activism, which typically covers people between 12–35 years old (Conner 2024). Sixteen interviews were conducted in English and eight were supported by volunteer interpreters (Japanese – English), lasting between one-to-five hours. Twenty-three interviews were conducted in-person in Hiroshima and in rented offices in Nagasaki and Tokyo to provide a safe, quiet, and comfortable environment. One interview was rescheduled and conducted online over Microsoft Teams. About a third of all transcription was done manually, and the rest using an offline and locally-run *Whisper* model, following the British Oral History Society's guidelines as of spring of 2025.[5] Rather than aspiring to being 'correct', the transcribed text aims to historically represent the speaker's narration, rhythm, intonation, and intended meaning as close as possible, with grammar and word order "left as spoken" (Thompson / Bornat 2017: 343). An ellipsis (…) is used to mark when content is omitted for redundancy or other reasons. Square brackets [ ] are used to preserve grammatical correctness where possible.

Oral histories are recordings of personal testimony delivered in oral form and situated in the narrators' broader economic, social, historical, cultural, and political contexts (Yow 2005). While historians are in a "perpetual dialogue with the dead" (Smith 2010: 9), oral historians engage with the living to understand the significance of subjectivity, memory, social processes and narratives across cultures and generations. Oral history was selected as a method due to its capacity to access "subjugated voices, excluded from the historic records for reasons of political, geographic, class, gender, or ethnic affiliation" (della Porta 2014: 130). It

often reaches people who are less likely to leave documentation that survives the passage of time and overabundance of written historical records (Thompson / Bornat 2017).

Youth are rarely considered significant political or historical agents (Gordon 2010; Taft 2010), and nuclear weapons' history is no exception. Historians in the field have mostly focused on the lives of prominent scientists who made them (e.g. the Oppenheimers, Tellers, and Fermis) and politicians who made decisions about them (e.g. Roosevelt, Khrushchev, Obama). Few studies document the lives of non-elite local workers and their descendants affected by them (see Gómez 2022). Historians documenting opposition to nuclear weapons have similarly focused on "prominent individuals (e.g. people like Albert Einstein, Bertrand Russell, Petra Kelly, and Andrei Sakharov)", and not so much on the "rank and file", or "the many unsung heroes of the movement" (Wittner 2011: 286). This research contributes to the historical record with 24 oral histories that feature 'ordinary' youth antinuclear organisers in Japan.

This study has several limitations. Some stem from my positionality as a researcher born and raised outside Japan, who does not speak Japanese. Participants may have viewed me as an outsider – part visiting researcher, part tourist – and potentially as someone shaped by Western assumptions about activism. To mitigate this, participants were invited to interview only if they self-identified with the eligibility criteria outlined above. Additionally, this study relied on volunteer interpreters who, although possessed prior experience, may have failed to convey nuances lost in translation. To mitigate this, original audio will be kept for future archival deposit. Furthermore, due to funding constraints, the study relied on consecutive (rather than simultaneous) interpretation. As a result, natural flow of conversation was often slowed down by the interpretation process. This may have limited participant spontaneity and stream of thought. Moreover, the study draws on a small sample and does not claim to represent the views of all youth across Japan. Instead, the study captures a snapshot view of how members of a small network of youth-led antinuclear organisations viewed themselves at that moment in time. All interviews were conducted prior to the announcement that Nihon Hidankyo would receive the Nobel Peace Prize in 2024, which has resulted in some degree of renewed interest in disarmament. Lastly, it is impossible to know how participants' views might have changed since then, or had the interviews taken place later in life.

The following sections discuss patterns in participant responses to questions such as "When did you first hear about the concept of nuclear weapons?" and subsequent open-ended follow-up questions (e.g. "can you say more about that?"). Responses were coded in NVivo14 to identify prominent patterns under the category of 'early encounters', which then served as the basis for the narrative analysis in this article, presented as preliminary findings focused on Japan, but stemming from a broader study on antinuclear political socialisation.

Peace education, "to be frank, it is not enough."

Japan's national education began to systematically include materials about the atomic bomb in the late 1960s due to growing concerns that young people had little knowledge, no interest, or even positive views of nuclear weapons (Yuasa 2024). Since then, children have been consistently included in numerous peace activities and commemorative events, which are particularly salient in Hiroshima and Nagasaki (see Figures 1–3), and include, but are not limited to: school trips to museums, listening to hibakusha testimonies, reading comic books, touring atomic bombed cities, observing memorial ceremonies on TV, folding paper cranes, singing songs, watching films, performing in plays that re-enact surviving or dying from the atomic bomb, and (more recently) experiencing virtual reality simulations of the events of 1945.[6] Growing up in the only nation bombed with wartime nuclear weapons, "every child in Japan is taught at school that Japan became a peaceful and democratic country after World War II" (Yuasa 2024: 3).

Figure 1. A boy wears a T-shirt that reads *"No More Hiroshima. Mitama Children's Dispatch."* Photo taken by author
5 August 2024.

Figure 2. A flyer advertising the Creative Drama/Musical "I PRAY" featuring young actors. Photo taken by author
12 July 2024.

Figure 3. High School students gather around Nagasaki's hypocentre on Memorial Day. Photo taken by author
9 August 2024.

Hiroshima and Nagasaki, peace education programmes aim to comprehensively cover facts of the atomic bombings in relation to the self, one's family, society, and the world (Henriquez 2020; Nogami 2006; Yamana 2023). Parents are encouraged to begin the task of peace education "the moment the seed in the mother's womb is fertilized" (Shōji 1991: 25-26), and to describe to their children the cruelties of war "precisely because they are young" (Shōji 1991: 39).[7] By impressing "the misery of war and the atomic bombing on the generations of younger people who will be tomorrow's leaders" (Mayor Takashi Hiraoka, as cited in Kawano 2018: 8-9), peace educators intend to pass down hibakusha memories and their will for 'no more Hiroshimas', to make Nagasaki 'the last city' to suffer nuclear devastation, for 'we shall not repeat the evil', and one day achieve 'a world free from nuclear weapons'.[8] Therefore, a key goal of peace education in these two atomic bombed cities is to socialise youth against war and nuclear weapons, and in favour of peace and nuclear disarmament.

All youth interviewed in this study referred to their peace education as having been generally unrelated to the present, uninteresting, biased, and insufficient to motivate political action.

However, all youth interviewed in this study referred to their peace education as having been generally unrelated to the present, uninteresting, biased, and insufficient to motivate political action. None of the 24 interviewed participants described peace education as a key reason why they joined antinuclear groups, which suggests that youth joining antinuclear networks may be motivated by other factors or undervaluing peace education's influence socialising them. Their early encounters with the concept of 'nuclear weapons' were usually conceptualised through past-tense narratives about the atomic bomb that fixated in 1945 and had no relation to contemporary nuclear politics. As one participant explained:

"we didn't learn what is the situation today. How many nuclear weapons around the world now? Who have these nuclear weapons? I don't think I learned about these things. So, that's the difference. . . Atomic bomb in Hiroshima, for example, is something [that] happened 79 years ago. Nuclear weapons, it's about today's society, politics, and our life".[9]

Other participants voiced the same distinction – "rather than the concept of nuclear weapons, I understood the concept of A-bomb"[10] – noting that most educational programmes, including the more comprehensive curricula provided by peace educators in Hiroshima and Nagasaki, were overfocused on the past. One participant explained the limitations of the iconic Hiroshima Peace Notebook, a resource which offers specialised peace education materials on the atomic bomb from elementary school to high school:

"while I believe that this booklet, this Hiroshima Peace Notebook, is very important uhm there are some points that I'm a bit critical towards. One of them is that, to be frank, it's not enough. And one of the reasons I feel this way is that, you know, how we live today, how we face social issues, these are the things that should be at the root of peace studies. And with this notebook, of course, we can learn, but it's rooted in history. It's about the past. I think there should be more emphasis on how we view today and how we view society, you know, at this moment."[11]

Bored with Peace: "I was sleeping in front of the survivors."

Early encounters with the concept of nuclear weapons typically take place in elementary school in Japan. Children are often prompted by parents or teachers to conduct interviews at home to find out if they have hibakusha relatives. While such homework can relate atomic bomb history with current family background, it often fails to convey a sense of contemporary relevance or urgency. For some youth, realising that their (great) grandparents survived the atomic bomb imbues fresh meaning to previously uninteresting materials. One participant said he felt no relationship with atomic bomb history until he heard his grandfather's memories of removing maggots from the burned, melted skin of his relatives after surviving the atomic bomb. Listening to these accounts, the young participant expected to hear stronger emotions like anger or madness, but his grandfather remained calm, narrating a history "without feelings. . . bullet point by bullet point." Despite the lack of strong emotions, his grandfather's story sparked a novel interest in peace education materials that previously seemed to have no familial or personal connection to him. But while such accounts were "horrible" and "should not be repeated," atomic bomb history was conceived as unlikely to reoccur. He "couldn't find any immediate threats" and did not feel that "actually it could happen to me."[12] Other participants echoed perceptions that atomic bomb educational materials were "just [a] historical thing" – and not "my own business."[13]

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Conversely, other participants did not become interested in peace education even after learning that their ancestors were A-bomb survivors, partly because hibakusha testimony "doesn't mean anything at the time."[14] During fieldwork for this study, several hibakusha testimonies and university lectures on the atomic bomb were attended, where one could spot a few drowsy youth and students nodding off, suggesting that they were, if not 'bored with peace,'[15] tired or uninterested. One participant recalled hibakusha testimonies in elementary school as follows: "some of the time I was sleeping in front of the survivors. I really regret of it, but I did that."[16] Some youth explained their initial lack of interest was due to testimonial standardisation: "whenever I listen to the A-bomb survivors at school, it seems to be the same every time."[17] Others referred to overexposure as the likely cause: "probably some Nagasaki students are a bit tired of receiving an education based on, on the atomic bomb because they, they continuously do."[18]

Overall, early encounters with the concept of 'nuclear weapons' – including survivor testimonies delivered in person – were recalled as having been unrelated to the present and repetitive. Overexposure to peace-related materials made its contents seem monotonous, rather than concerning, engaging, or meaningful. Combined, these factors were recalled as hindering a more genuine interest in nuclear weapons.

Raised outside A-bombed cities: "not my stuff at the time."

Youth who grew up outside Hiroshima and Nagasaki similarly recalled struggling to understand why atomic bomb history mattered when they first encountered the concept of 'nuclear weapons'. However, they felt their understanding was overall more superficial and, in some cases, had the opposite of the intended

effect, discouraging them from seeking further information on the topic.

From Okayama, one participant recalled visiting Hiroshima's Peace Memorial Museum on an elementary school trip and thinking, "okay the bomb was dropped here [in] 1945, but it's not anymore. So, why do I have to care about this history?" Entering the museum, its contents "just traumatised me. I don't want to learn more about this." Exiting the museum, it was "easy to forget" what he had seen, finding himself under a nice blue sky, with convenience stores and shopping malls nearby. He explained that in contrast to climate change where "we feel the temperature differences every single year, that's very urgent," atomic bomb history made it "hard for me to draw the connection for the current foreign affairs."[19]

Several participants similarly described being 'traumatised' by the museum contents they saw as children, sometimes developing enduring nightmares that continue to this day. Hiroshima's Peace Memorial Museum had a permanent exhibit since 1974, which displayed wax dolls with charred and burned bodies depicting 'real' hibakusha experiences. Since 2013, however, the mannequins are no longer part of the public exhibit that was seen by most participants as children (Zwigenberg 2017). In retrospect, participants believed that the shocking images they saw were an important and necessary negative impression of nuclear weapons, which influenced their political views today. Many referred to the shock as a reality that needed to be confronted. Therefore, some participants lamented the decreasing presence of these shocking images in schools and museums.

Not all out-of-prefecture youth have scheduled visits in A-bombed cities and museums as children. Many are enrolled in schools that offer minimal, if any, peace education, and are only able to learn about nuclear weapons through national commemorative activities.

Not all out-of-prefecture youth have scheduled visits in A-bombed cities and museums as children. Many are enrolled in schools that offer minimal, if any, peace education, and are only able to learn about nuclear weapons through national commemorative activities. One participant from Fukuoka recalled she derived a very limited understanding from TV livestreams of Memorial Days of 6th and 9th of August, "just a few words: Hiroshima, nuclear weapons, Nagasaki, or something like that," but did not learn much in-depth about nuclear politics, opportunities, historical controversies, technical definitions, and so forth. Instead, she developed a perception that antinuclear activities were spaces reserved for older generations:

"when I saw news or something for working for nuclear abolition, they're old [laughs]. Like, my grandmother, grandfather's generation people working for it. And the hibakusha is also those age, right? … from my recognition, it's a movement for people who experienced [the bomb] or people who are around those ages." [20]

Notably, for some interviewed youth raised outside A-bombed cities, more embodied commemorative activities can nonetheless be meaningful introduction to nuclear concepts and subjects. A participant from Saga recalled learning to sing a song about folding paper cranes as a child, which made her want to learn more:

"in the lyrics, there is a word term of Hiroshima and Nagasaki, I didn't know about what exactly happened there, but since I repeatedly sang the song, I feel like I want to go to Hiroshima and Nagasaki one day to know what happened there and to sing the song." [21]

For others, the same commemorative activities were perfunctory tasks performed annually with little reflection. One participant from Fukuyama City said, "we folded some paper cranes, but that was really the extent of my public-school education and learning about the atomic bombing... to be entirely honest, I don't remember anything."[22] In many cases, the extent to which teachers cared about peace activities was seen as a proxy to how much they, as students, came to care and understand about nuclear weapons. In other words, youth perceived their teachers as a central component to their antinuclear socialisation (or lack thereof). When teachers lacked either the ability or the commitment to make the relevance of these activities clear to students, the impact was seen as much less likely. As another participant explained:

"[teachers] forced us to sing a song about the August 9th, and also we just fold a paper crane but without telling us what's the purpose… so as an average stupid student, I couldn't get the linkage of the holding paper crane, singing song, and touch upon the atomic bombing of history in the atomic bomb museum, and listen to the voices of hibakusha." [23]

Due to the greying effect of the antinuclear movement, peace and nuclear disarmament spaces risk becoming gerontocratic – dominated by older generations whose authority and visibility shape the norms, expectations, and narratives regarding young people's involvement. As noted by Bidadanure (2021), uneven distribution of goods at a given moment in time across age groups can result in discrepancies that, in turn, reproduce false perceptions of people. Young people may be perceived as politically apathetic when they, instead, lack appropriate distribution of knowledge, resources, visibility, and access to spaces to become politically active. Moreover, pre-assigned roles based on age may reinforce young people's marginalisation into narrow spaces for social action. In the context of nuclear disarmament, younger generations are frequently expected to 'pass down' survivor memories precisely because youth are assumed to lack the lived experience of nuclear violence, techno-scientific literacy, nuanced historical perspectives, and institutional access to resources and decision-makers. While younger generations are unlikely ever to be treated as equal to hibakusha, whose atomic bomb experience has made them the ultimate source of moral authority on nuclear disarmament (Yuasa 2024; Zwigenberg 2014), some educational models position young people differently.

Due to the greying effect of the antinuclear movement, peace and nuclear disarmament spaces risk becoming gerontocratic – dominated by older generations whose authority and visibility shape the norms, expectations, and narratives regarding young people's involvement.

In Japan, some local organisations train young people as *Kataribe* ('storytellers'), entrusting them with the task of publicly recounting hibakusha testimonies to audiences of all ages. A ten-year-old recently became the youngest *Kataribe,* conveying testimonies from an 83-year-old hibakusha (Takashi 2025). Internationally, there are initiatives preparing young people "to participate expertly in social debates" on issues related to peace and nuclear

disarmament (e.g. Foundation for the Rights of Future Generations 2025: 4), recognising their value despite lacking lived experience of nuclear harm or official *hibakusha* status.[24] Educational models like those cast young people as visible producers of knowledge, political action, and valued members of their communities, rather than passive recipients of information whose political participation is to be deferred.

Without memories of the atomic bomb, residence in atomic-bombed cities, or blood ancestry from hibakusha in one's family tree, young people can feel disconnected from nuclear subjects.

In addition to references to not being appropriately provisioned with knowledge, interviewed participants in this study referred to an absence of youth visibility in disarmament spaces, such as the lack of young tour guides in A-bombed cities. As one participant explained, "all the volunteers I met were elderly people."[25] While many hibakusha offer guided tours and give lectures to children on school trips around A-bombed cities, aiming to engage younger people, many participants felt these spaces and activities were not for them. Even participants who were raised in Hiroshima and Nagasaki agreed with this perception. As one of them expressed, "the younger generation thinks that [the antinuclear] community is elder people and people who have connection to the uh, blood connection with the survivors."[26] Without memories of the atomic bomb, residence in atomic-bombed cities, or blood ancestry from hibakusha in one's family tree, young people can feel disconnected from nuclear subjects. In Japan, while youth are encouraged to think about the importance of peace and the atomic bomb, participants in this study felt that nuclear politics were far removed. As one participant put it, nuclear disarmament was "not my stuff at the time."[27]

Bias in education

Decisions regarding what the Japanese Ministry of Education includes or excludes from children's education have been subject to several controversies. Some critics posit that "the entire Japanese education system suffers from selective amnesia" (Chang 2014: 205), arguing that the "ugliest aspects of Japanese military behavior during the Sino-Japanese War…" remains hidden under a "carefully cultivated myth that Japanese were the victims, not the instigators, of World War II" (Chang 2025: 15).[28] Other scholars point out that schools, museums, and government institutions have preferred 'non-political' *hibakusha* storytellers over those who are more emotional, critical of the United States' act of dropping the atomic bomb, nuanced upon Japan's colonial past, and those who ask students how they feel (Yuasa 2024; Zwigenberg 2014). Therefore, youth disengagement with nuclear disarmament may, in part, be attributed to how educational programmes are deliberately designed as an instrument of 'mind engineering' whereby the government produces collective ignorance over issues that do not benefit its most urgent nation-building interests, "selectively instilling certain typified knowledge about the non-immediate world" (Tada 2024: 389). In other words, young people may not learn about aspects of the atomic bomb that do not currently benefit Japan's political, economic, and security goals. Conversely, youth disengagement from mass grassroots antinuclear activism reflects a global trend of widespread complacency that took hold after the end of the Cold War and branched over the realms of education, funding, popular culture, diplomacy, and others (Acheson 2021). The lack of mass youth mobilisation in Japan is thus part of a broader shift in perceptions of nuclear risk as non-immediate.

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One common element of today's youth early encounters with the concept of nuclear weapons was the manga *Barefoot Gen.* For many young people, this comic series was a meaningful introduction to the nuances of Japan's wartime past in relation to nuclear weapons. The manga was positively regarded as it employed autobiographical images drawn by hibakusha Keiji Nakazawa. Recently, some authorities requested moving the manga to 'closed shelves,' questioning its accuracy, age appropriateness, and educational value (Norihito 2015).[29] Participants generally believed the manga should be kept in open shelves, as it had taught them about the humanitarian consequences of nuclear weapons use, survivor discrimination, access to medical care, in addition to contested issues of wartime nationalism, poverty, class, race, crime and others. Many participants first read this manga following recommendations from their parents. However, interviewed participants remained critical of their textbooks, including the manga *Barefoot Gen* itself. As one participant pointed out, "[as the] manga is monochrome, the shock [is] transmitted as a monochrome."[30] The fact that the comic series' images were in black and white made its accounts feel less real and historically inaccurate, as recalled by some participants.

Other participants believed, "the government was trying to control the education that we received,"[31] and therefore claimed that bias in their peace education was evidenced by the absence of critical perspectives on Japan's discourse of atomic victimhood. Some described this as a "peaceful brainwash."[32] And many felt they could not learn about controversial aspects of Japan's wartime past and colonial history unless they travelled overseas, given that the dropping of the atomic bombs is seen as a symbol of liberation from Japan's colonial rule in other East Asian countries, and that related teaching materials contain no single 'shared view of the past' across nations (Szczepanska 2017).

Nuclear allergy or antinuclear minority

In Japan, decades of national polling across demographics indicate that most citizens oppose nuclear weapons and would support a ban treaty, reflecting the country's 'nuclear allergy' (Baron et al. 2020; Tanaka 1970).[33] According to a 2015 survey nationwide, 80% of respondents think the use or possession of nuclear weapons is unacceptable. However, the same survey finds that 77% are pessimistic about the likelihood of nuclear disarmament; 78% say they 'never' or 'seldom' discuss atomic-bomb-related-subjects with family, work colleagues, neighbours or friends; and only 30% could correctly date the atomic bombings (Masaki 2016).[34] The survey shows that Japan's 'nuclear allergy' did not necessarily entail favourable attitudes towards disarmament nor widespread circulation of knowledge about the nuclear world at a time when interviewed youth were likely still forming their initial understanding of nuclear weapons.

Despite Japan's 'nuclear allergy', some youth in this study struggled to publicly express antinuclear views comfortably. As they gained an interest in nuclear-related subjects, many felt they had to be careful about what they said because "the nuclear problem is strongly associated with the political aspect."[35] For some, being publicly antinuclear seemed to entail a stigma, potentially detrimental to their career prospects. Upon receiving my invitation for interview, one participant replied explaining that they were not 'out' as 'antinuclear activists' yet, letting me know they wanted to be careful when discussing their stance at such an early point in their career.[36]

Another participant recalled being nine years old when her parents took her to her first and last antinuclear protest. Her parents belonged to activist circles where slogans like 'no nukes', 'no more Hiroshima,' 'no more Nagasaki' were common. However, she recalls never having heard about possible paths to achieve nuclear abolition, technical definitions of radiation, or critical perspectives on why the atomic bomb was dropped. Rather than feeling empowered, attending the protest made her feel part of a minority that was subject to discrimination:

"I felt so embarrassed, screaming on the street. People looked at us as kind of weird person and I didn't know why we were saying against nuclear power plants, or no power plants, or something. So, I got some negative image against the kind of demonstrations. Like I don't feel comfortable to be there. But I had to be there because my parents took me… I could feel that our activity is not majority. So, if it's really important, and people really agree, we should have more people who join this activity. But what I saw is people who ignore what my fathers are doing. People who never showed any interest on our activities. And me, myself, could not share what my parents are doing to my friends because I was afraid of being criticised. Because when I go to the other friend's house, I never saw any political books or historical books or something. Their parents are just a doctor, officer, just a company employees, mothers are just home, house workers. But my parents were different. So, I couldn't share that much with my friends…"[37]

These accounts show that despite Japan's nuclear allergy, being active in nuclear politics, displaying antinuclear values, was deemed culturally inappropriate or not socially sanctioned by a nine-year-old. Fears of discrimination for being publicly antinuclear stem from a continuum where antinuclear activism has been prohibited or otherwise qualified as socially undesirable, too radical, or violent. In Japan, opposition to nuclear weapons began in 1945 with *hibakusha* writing, painting, and speaking about their survivor experiences (Minear 1990), but public criticism of the atomic bomb was heavily censored and suppressed by the U.S. occupation authorities. In 1954, the first ban-the-bomb mass grassroots movement emerged when middle-class Tokyo housewives, concerned about feeding radioactive tuna to their families, mobilised approximately a third of the nation's population in protest to nuclear tests being carried in the Pacific, responding to one of the first global environmental crises (Higuchi 2008). Subsequent youth participation in antinuclear groups peaked in the late 1950s, when student activist groups such as the *Zengakuren* rallied hundreds of thousands in protests and direct action over the next two decades (Wittner 2009; 2003; 1997; 1993). After this peak of activity, employers began to deny or withdraw job offers to candidates who were found to have had membership in antinuclear groups: "being a student activist meant automatic exclusion from full-time recruitment rounds for major corporations" (Andrews 2016: 69).[38] This might be one reason why the movement fractioned, dwindled and greyed, despite significant efforts to mobilise across generations (Acheson 2021).

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Concerns about negative repercussions for expressing antinuclear views that seem old-fashioned are not exclusive to Japan. Globally, after the Cold War ended, public opposition to nuclear weapons began to be described as a mental no-fly zone resulting from mass self-censorship. For instance, some diplomats feared risking their careers if expressing antinuclear opinions, while the peace movement seemed to attract mostly "an older crowd" (Acheson 2021: 138). This study suggests that youth who grow up in Japan may hesitate before voicing antinuclear sentiments openly, concerned about potential backlash or marginalisation despite the country's so-called 'nuclear allergy'. While participants were taught to adopt a national discourse of atomic victimhood that favours the desirability for a world without nuclear weapons, some felt they had to walk on eggshells when expressing opinions against nuclear weapons publicly that may be harmful to their social standing or their professional prospects.

Contemporary stereotypes often characterise Japanese citizens as innately prone to homogeneity and social harmony, assuming citizens to be more prone to group-think, and ignoring a long history of rebellion, dissent, and activism (Andrews 2016). While stereotypes about Japanese youth suggest they are politically apathetic or unconcerned with social change, recent youth activism led by SEALDs (Students Emergency Action for Liberal Democracy) mobilised large numbers of young people between 2015–2016 by appealing to youth normality, rather than subversiveness, in efforts to differentiate themselves from the stigma associated with student antinuclear activism from the 1950–60s and to simultaneously challenge perceptions of youth political apathy (Gonon / Galan 2023). But rather than seeking social change, SEALDs aimed to restore the status quo before the Abe administration sought reinterpretations of Japan's peace constitution's Article 9 to expand the role of the country's self-defence forces. SEALDs succeeded in making participation in politics and protest more palatable and attractive to ordinary young people. However, the fact that many members came from private universities in Tokyo made SEALDs seem elitist, "a bourgeois movement, a bunch of rich kids playing at politics" (O'Day 2015: 6). The movement was short-lived, lasting a little over a year, and it remained mostly based in Tokyo, likely due to the strong student presence in the capital.

Youth are rarely considered significant political or historical agents, and nuclear weapons' history is no exception. Historians in the field have mostly focused on the lives of prominent scientists who made them and politicians who made decisions about them. Few studies document the lives of non-elite local workers and their descendants affected by them.

In addition, the 2011 Fukushima disaster is said to have politicised a new generation of young people, who now fear seeing a world organised where nuclear energy is increasingly deemed

essential to its development in response to climate change (Gonon 2018). None of the participants interviewed in this study participated in SEALDs. For some, SEALDs seemed to be 'cool', but too far from the geographical and social realities of Hiroshima, Nagasaki, or the other cities where they grew up. As we enter a post-hibakusha world (Starr 2022), such dynamics raise critical questions about the durability and effectiveness of disarmament activism, and about how responsibility for nuclear justice and disarmament can be best distributed, and not deferred (Bidadanure 2021), across geographical and temporal lines.

Conclusion

According to interviewed youth who became antinuclear organisers in Japan, their early encounters failed to instil a sense of existential urgency, collective efficacy, or subjective interpretations of the political environment which would warrant political action such as movement participation. While Japan's peace education explicitly aims to contribute to a world free from nuclear weapons by socialising young people with information, values, and tools for peace and disarmament, none of the youth interviewed in this study reported it as a reason why they joined antinuclear groups, which brings about important contradictions.

Firstly, although participants felt their early encounters were decoupled from today's social realities, Japan's peace education successfully involves a dense network of parents, hibakusha, government officials, civil society, and teachers who collectively produce and mobilise an extraordinary variety of tangible and intangible resources (e.g. peace curricula, museum exhibits, urban design, school trips, survivor testimonies, a national discourse of atomic victimhood, etc.). Although few antinuclear protesters are taking onto the streets, survivor memory is being preserved and kept alive across generations, providing a humanitarian perspective in early encounters with the concept of 'nuclear weapons', even if these encounters seem repetitive or uncritical to some (albeit certainly not all) young students in Japan.

Secondly, even if the atomic bomb was taught with a fixation on the past, perceived by students as a historical event that was unlikely to reoccur, early encounters took place through narratives that favoured values of peace and disarmament. At a minimum, the youth in this study were encouraged to oppose war, aspire toward nuclear disarmament, and cultivate a culture of peace. They met atomic bomb survivors, explored preserved buildings and artifacts from Hiroshima and Nagasaki, and reflected on the limits of their own education in relation to the nuclear world as taught in other countries. In contrast, youth raised in other countries (not discussed in this study) may be socialised to normalise nuclear risk, where preparing for nuclear war is seen as more desirable than pursuing disarmament, never meeting survivors, or never seeing the 'scars of war' left by 'nuclear weapons' use.[39]

These observed divergences offer relevant insights for policy makers, activists, and educators aiming to engage young people in response to renewed nuclear perils. While education should address historic events in curricula across nations, this study cautions against a 'pure' fixation on the past. To reverse the 'greying effect' in antinuclear groups, practitioners may need to move beyond commemoration and seek ways to connect disarmament education with forms of political participation (e.g. equipping students with tools to demand accountability, seek representation, assess responsibility, and monitor competent governance of nuclear technologies in light of contemporary global risks associated with climate change and accidents). In addition, practitioners may need to address social stigmas associated with being publicly antinuclear in the workplace and in relation to one's social standing, as well as perceptions of legitimacy to participate in nuclear politics when lacking hibakusha's bloodline ancestry, Japanese nationality, residence in Hiroshima/Nagasaki, a certain age, and so forth.

Given that youth antinuclear activism has received limited scholarly attention since the end of the Cold War, future research could explore avenues that foster more meaningful youth participation in nuclear abolition, arms control, disarmament, and non-proliferation. The ways in which youth see the nuclear world in the twenty-first century – as they receive, reinterpret, preserve, and transmit the meaning of the nuclear past – remain largely uncharted in scholarly literature.

To the best of my knowledge, no other study has assessed why young people join youth-based antinuclear groups since the end of the Cold War. Approaching the themes and questions identified in this study may yield valuable insights for scholars and practitioners concerned with nuclear memory, long-term thinking, and intergenerational relationships between the nuclear ages.

Endnotes

1 Other scholars highlight the role of luck in preventing nuclear war (Pelopidas 2017b). For more widespread and conventional explanations, see Sauer (2015).

2 Other scholars point to 1973 as a key moment, following the Peace Studies Association of Japan's establishment, which aimed "to institutionalize universal peace studies from the standpoint of the victims of the atomic bombings" (Takemoto 2023: 63).

3 Any human below the age of eighteen years is considered a child under various international conventions, such as the 1989 Convention on the Rights of the Child, currently signed and ratified by 196 countries.

4 Carson (2018) is an exception insofar as youth-based antinuclear organisations are discussed 'in practice', but the study does not engage with theoretical frameworks from social movements and youth studies.

5 Whisper is an artificial intelligence model which is used for voice recognition and transcription. The model can be used offline and locally. Data provided as input (both audio and text) is not used to train further models of artificial intelligence. The author took part in several Oral History Society training workshops before starting the transcription process. For more guidelines, see: http://ohs.org.uk/general-interest/how-intelligent-is-artificial-intelligence-oral-history-and-ai/ (viewed 21 September 2025).

6 Artificial Intelligence chatbots trained on hibakusha testimonies are also being considered (see Hoskins 2024).

7 Emphasis in italics is quoted as it appears in original book.

8 Quoted from inscriptions at Hiroshima's Memorial Cenotaph for the A-bomb Victims, the Flame of Peace, and Hiroshima and Nagasaki Peace Memorial museums.

9 Participant 05.

10 Participant 21.

11 Participant 24.

12 Participant 02.

13 Participant 13.

14 Participant 08.

15 Quoted from Italian journalist Tiziano Terzanis' statement that, "In Hiroshima... even the doves are bored with peace" (Buruma 1990).

16 Participant 23.

17 Participant 14.

18 Participant 17.

19 Participant 01. Although nuclear war and global warming are often treated as separate existential threats by both scholars and activists leading collective action, a growing body of literature understands the 'climate-nuclear nexus' as an expression of the same socio-technological and political problems (see Egeland 2025; Maurer 2024). A discussion of this nexus is not within the scope of this article.

20 Participant 06.

21 Participant 07. The song described is Umehara Shihei's Orizuru.

22 Participant 24.

23 Participant 17.

24 Like younger generations, many in-utero hibakusha lack memories of nuclear violence and do not remember having survived the atomic bomb. Their experiences and knowledge draw heavily from family accounts and available records.

25 Participant 12.

26 Participant 23.

27 Participant 06.

28 Chang (2014) notes that, unlike the German experience, Japan's education has yet to acknowledge the role of its wartime militaristic ideologies.

29 The first request for its removal was initiated by the Board of Education of the City of Matsue on 16 August 2013.

30 Participant 10.

31 Participant 24.

32 Participant 22.

33 Estimates show a baseline support of a nuclear ban treaty of approximately 75% of the Japanese public across demographic groups (age, gender, region of the country, income, or political party identification), with only 17.7% of the population is opposed, and 7.3% is undecided.

34 The survey's sample does not include respondents under 20 years old.

35 Participant 08.

36 This account remains unreferenced in all my documentation to protect the anonymity of this person.

37 Participant 07.

38 Zengakuren stands for All-Japan Leage of Student Self-Governments (in Japanese, Zen Nihon Gakusei Jichikai So Rengo). 'ANPO' was a common term referring to the U.S.-Japan Security Treaty.

39 For example, in the United States during the Cold War (Jacobs 2010). Another example is the perception of nukes as a national symbol in UK media (Crilley 2025).

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Defence Contractors and Nuclear Modernisation: Corporate Roles in Sustaining Nuclear Weapons Programs in the U.S., U.K. and France

By Susi Snyder

Abstract
Behind every modern nuclear arsenal lies a robust industrial ecosystem that quietly sustains it. While existing literature has primarily focused on the state's strategic motivations behind nuclear development, far less attention has been paid to the role of defence contractors in sustaining these arsenals. Their role in the production, maintenance and modernisation of the nuclear weapons programme remains largely understudied. This article, while examining the corporate-state nexus, undertakes case studies of the U.S., U.K. and France to explain how the deterrence architecture of these countries relies on industrial partnerships. It argues that companies, including Airbus, Safran, BAE Systems, Babcock International, Boeing, and General Dynamics, not only provide technical expertise but also exert influence through lobbying and financing of policy-oriented think tanks. Instead of suggesting direct causation, this article highlights how these mechanisms could be the factors shaping the broader nuclear policy debates.

Keywords: *Nuclear modernisation, nuclear weapons, defence contractors; lobbying; industrial partnerships*

Introduction
Nearly eight decades after the bombing of Hiroshima and Nagasaki, which resulted in between 110,000 and 210,000 casualties (Messmer / Cole 2025; Herre et al. 2024), the world is witnessing a renewed surge in nuclear danger. This risk is driven by overlapping factors, including Moscow's repeated nuclear threats since its invasion of Ukraine in 2022. The war has revived the possibility of nuclear confrontation in Europe, prompting renewed debates about whether states require nuclear deterrence as their ultimate security guarantee. This is reflected in the behaviour of nine nuclear-armed states – the U.S., Russia, U.K., France, China, India, Pakistan, the Democratic People's Republic of Korea and Israel – which continue to modernise their nuclear arsenals. ICAN's 2025 report *Hidden Costs: Nuclear Weapons Spending in 2024*, shows that nine nuclear-armed states collectively spent a total of $100.2 billion on nuclear weapons in 2024 (Sanders-Zakre / Snyder 2025: 4). Defence companies involved in the production of these weapons earned approximately $43.5 billion and held roughly $463 billion in outstanding contracts (Sanders-Zakre / Snyder 2025: 4).
These patterns raise a fundamental question: Does this enormous spending on nuclear arms enhance human security in any meaningful way? Intergenerational justice demands that we weigh not only the needs and rights of current generations but also of future generations when evaluating the costs and risks of nuclear modernisation. Ignoring this responsibility risks leaving a legacy of insecurity and imbalance for those who come after us. Thus, understanding the forces that likely sustain the nuclear weapons programme is essential. While traditional analysis emphasises state-centric motivations, it neglects the plausible role of corporate defence infrastructure that underpins the nuclear enterprise. Through production, maintenance, and modernisation, private firms have woven themselves into the fabric of national security, creating a self-perpetuating cycle in which public defence imperatives and corporate profit motives converge.

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Lobbying further reinforces this dynamic by providing opportunities for major defence contractors to potentially secure economic incentives, often evident in the form of long-term government contracts signed by these companies. In addition, financial support by these companies to policy-oriented think tanks can indirectly shape debates on nuclear modernisation by amplifying particular narratives within policy circles. However, these interactions do not indicate a direct causal relationship; rather, they illustrate how defence contractors potentially operate within, and contribute to, a wider ecosystem of influence. In all of this, weak enforcement mechanisms in international law further enable firms to expand their activities with limited external oversight.
Uncovering these concerns, this article undertakes the case studies of the U.S., U.K. and France to highlight the probable role of defence contractors in the production and sustenance of nuclear weapon programmes in these countries. These three countries are selected due to relatively high transparency, data availability, and the clear visibility of corporate-state networks. The study focuses on six companies – Airbus and Safran in France, BAE Systems and Babcock International in the U.K., and Boeing and General Dynamics in the U.S. – and traces their involvement through defence contracts and lobbying.
The primary research question guiding this article is: How do private defence contractors potentially influence the modernisation of nuclear weapons programmes in the U.S., U.K. and France? In answering this question, the following secondary questions are also explored: How do state motivations, i.e. national security and technological advancement, interact with corporate interests to drive nuclear weapons acquisition? What mechanisms, including lobbying and think-tank funding, do defence contractors use to potentially influence debates and decisions surrounding nuclear weapons programmes?

States' motivations for nuclear weapons acquisition
Understanding contemporary nuclear armament, modernisation, and proliferation requires situating corporate and political dynamics within the broader strategic environment in which

nuclear weapons continue to operate. Although President John F. Kennedy's 1960s prediction of 15 to 20 additional nuclear-armed states by the end of the decade (Carnegie Endowment for International Peace 2003) did not materialise, the end of the Cold War certainly intensified global arms competition. At present, all nine nuclear-weapon states are deploying new nuclear-capable or nuclear-armed systems, heightening the risk of escalation. From approximately 12,241 warheads in the global inventory as of January 2025, around 9,614 were "in military stockpiles and available for potential use," and an estimated 2,100 were kept on "high operation alert" (Kristensen / Korda 2025: 177). This widespread modernisation and nuclear deployment, beyond its technical dimensions, prompts important questions about the motivations driving states to maintain and expand their nuclear arsenals.

According to Peter R. Lavoy (1993), states pursue nuclear weapons largely because they have the capability to do so. He argues, "the decision to develop nuclear weapons is not a fluke of certain governments, but a general technological imperative," implying that things which are technically possible had to be done (Lavoy 1993: 194). This perspective frames acquisition of nuclear weapons as a deterministic process, suggesting that states respond to what is technically possible. It implicitly assumes a linear relationship between capability and decision making, and overlooks how political and strategic forces might play a role. Addressing this gap, Harsh V. Pant (2012: 3) presents a political-instrumental perspective, arguing that states view nuclear weapons as "political instruments, whereby the threat of nuclear war could be used to attain political ends." This perspective underscores the inherently political dimension of nuclear programmes, suggesting that pursuit and modernisation of nuclear arsenals cannot be fully understood through technical consideration alone. It reinforces the idea that state behaviour is influenced by strategic calculations, threat perceptions, and geopolitical reasoning. Even if states have the technical ability to develop nuclear weapons, political and strategic imperatives often determine whether or not, when, and how they might pursue them.

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Building on these perspectives, Sanem Topal (2023: 11-21) integrates the technological and political dimensions, emphasising "technological advances can make nuclear weapons more sophisticated, precise, and lethal." However, it is also the evolving security environment which encourages states to acquire weapons, thereby leading to a situation of an arms race. Advanced capabilities may create pressure for states to develop and modernise nuclear weapons, but decisions are also influenced by the broader strategic context. Thus, Topal illustrates that state's acquisition of nuclear weapons is contingent on how technical capabilities interact with strategic contexts. Beyond state-driven factors, he further highlights the potential role of private defence contractors in shaping nuclear modernisation. Leveraging their relationship with policymakers, these companies may shape the "priorities and preferences within the defence establishment, potentially favouring the adoption of newer missile technologies" (Topal 2023: 22). By positioning themselves strategically in defence market, these contractors advance corporate interests while indirectly shaping state nuclear policies. This suggests that contemporary nuclear proliferation and state's motivation to acquire advanced weapons is not only driven by technology and political motives but also by economic and corporate incentives. Building on this idea, the next section examines how private-sector companies engage in lobbying and think tank funding to potentially gain economic incentives in the form of defence contracts, while indirectly influencing policy debates regarding nuclear advancements.

Corporate power behind the bomb

Nuclear-armed states maintain dedicated facilities for the production, testing and stockpiling of nuclear weapons, many of which are "managed and operated by the private sector" (Muñoz et al. 2022: 12). In 2020, these private defence companies received nuclear-weapons-related contracts worth $332 billion (Muñoz / Snyder 2021: 18). While outsourcing primarily provides technical expertise, it may also position these companies as influential actors in indirectly influencing the broader nuclear policy environment. Because of the long-term economic stakes, these companies could potentially expand their engagement beyond technical production into the policy environment surrounding nuclear weapons. This includes funding think tanks, sponsoring research, and conducting lobbying activities. Such activities are not accidental add-ons; rather, they reflect attempts by firms to maintain visibility and relevance in the strategic debate.

Because of the long-term economic stakes, companies involved in the production, testing and stockpiling of nuclear weapons could potentially expand their engagement beyond technical production into the policy environment surrounding nuclear weapons.

Lobbying, in this context, is an essential tool to secure economic benefits, as reflected in the billions of dollars in government contracts signed by these companies in case of the U.S., U.K. and France (discussed in detail in the later section). Similarly, support for think-tank research can help foreground particular research agendas or policy analysis. They may contribute narratives that emphasise technical necessity, strategic imperatives, or modernisation benefits of nuclear weapons, subtly shaping how the nuclear issues are discussed and perceived.

Lobbying and corporate influence

Gaining profit through weapon sales, defence companies aim to "keep their businesses on track and alive through lobbying" (Topal 2023: 68). Since these companies rely on long-term procurement cycles and predictable state demand, they remain closely connected to policy discussion that may shape future market conditions and their revenue generation. Through lobbying networks, these companies gain tax breaks, non-competitive contracts, and "favourable treatment from elected government to stifle market competition" (Parvin 2022: 240-242; Mitchell 2012). Being customers of the defence industrial sector, "governments frequently play a sponsorship role, helping firms to survive and prosper" (Heidenkamp et al. 2013: 5). This creates an ecosystem in which corporate profit and national security policy may mutually reinforce one another.

For instance, Boeing, involved in the development of the U.S. Minuteman III Intercontinental ballistic missiles, spent around $22 million on lobbying in 2015, while General Dynamics spent approximately $10 million annually on lobbying (Topal 2023:

54-55). While these figures alone do not provide direct causation, they suggest that lobbying provide companies with opportunities to engage with policymakers, committees, and regulatory bodies in a way that could potentially shape how modernisation programmes and procurement decisions are considered. Such engagement can indirectly support their economic interests by increasing the likelihood of them being considered for future contracts as exemplified in the case studies below.

Think tanks funding and policy narratives

Private companies involved in nuclear weapons production often provide funding to think tanks and research centres. This support likely influences, even if subtly, the types of research agendas and policy perspectives that gain visibility. By selectively funding projects and publications, private companies encourage work on technical advancements, nuclear modernisation, and deterrence capability, while potentially limiting attention to ethical concerns and humanitarian consequences of such actions. One example is the 2021 article published by the Heritage Foundation outlining the reasons why the U.S. needed Long Range Standoff Weapon (LRSO) and the importance of having robust nuclear deterrence against Russia and China (Geller 2021). Notably, Raytheon, which held the contract for LRSO, was listed among the organisation's significant donors. Although this funding should not be read as evidence of direct causation; the convergence between donor interests and policy proposals offers a useful point of reflection on the broader environment in which such analyses are produced.

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Kjølv Egeland and Benoît Pelopidas (2022) argued that nuclear policy analysis often faces constraints that limit the range of ideas considered. According to them, certain perspectives are promoted not because of their intrinsic merit but because they are backed by actors with significant resources or institutional connections. Analysts working in this field potentially receive funding from donors who have a vested interest in maintaining the existing nuclear order. Think tanks due to their "leading role in framing the terms of political debate" offers a platform to promote such ideas (Silverstein 2014: 5). According to the ICAN 2024 report *At Great Cost: The Companies Building Nuclear Weapons and their Financiers*, around 260 banks, insurance companies, and asset managers, either invested or funded the nuclear weapons producing companies, with a total value of $36.7 billion (Muñoz et al. 2025: 4). Historical data also indicates growing corporate engagement with policy institutions: between 2003 and 2013, corporate share of Brooking's donation went from 7 to 25 percent, while Atlantic Council received funding from 25 different government in 2014 alone (Drezner 2015: 641).

These financial relationships offer benefits to both sides. For companies, supporting respected research centres and think tank provides opportunities to enhance corporate legitimacy. Since many of these companies are involved in "morally questionable practices," including nuclear production, associating themselves with think tanks considered to possess "liberal values" can improve their reputation (Egeland / Pelopidas 2022: 133-134). On the other hand, think tanks receive the funding they need to operate effectively and engage in research programmes. Thus, funding alone does not determine their conclusions, the reliance on external support can subtly shape the institutional environment in which research agendas are set and in which certain policy priorities become more prominent than others.

Case studies: role of private defence contractors in the U.S., U.K. and France[1]

The influence of private defence contractors becomes more visible when examined within specific national contexts. Although all nine nuclear-armed states rely on private industry to sustain their arsenals, the transparency of these relationships varies widely. In countries such as China, Russia, India, and Pakistan, there is limited public information available about funding flows or the role of private contractors within their nuclear enterprises. By contrast, the U.S., U.K. and France maintain relatively more transparency about the role of private defence contractors and their lobbying. These three countries are therefore selected as case studies to examine how industry shapes nuclear policy.

United States

The U.S. maintains around 5,277 nuclear weapons, which it can launch from submarines, aircrafts, and land-based missiles (Sanders-Zakre / Snyder 2025: 32). According to Congressional Budget Office, modernisation of the U.S. nuclear weapons would cost roughly $634 billion between 2021 and 2030 (Congressional Budget Office 2021). Currently, the U.S. possesses the most extensive and technologically advanced nuclear arsenal. Its LGM-30 G Minuteman III ICBM is one leg of the triad, providing a "quick-reacting and highly survivable response capability" (U.S. Department of War n.d.). By 2030, the U.S. aims to introduce Columbia-class SSBN programme and 480 new B61-12 nuclear weapons (Topal 2023: 48). Private defence contractors, including Boeing and General Dynamics, play a key role in designing, manufacturing and maintaining these components of the U.S. nuclear triad as discussed below.

First case study in the U.S.: Boeing

Boeing has long been a central contractor within the U.S. nuclear enterprise, contributing to key delivery systems and dual-use aerospace technologies. It is involved in the production, maintenance, repair, and navigation system for the Trident II (D5) missiles. In 2018 the U.S. Air Force Nuclear Weapons Center at Tinker Air Force Base, Oklahoma contracted Boeing to produce 266 fuse assemblies for the air launched missiles, with a potential value of $29.4 million (Muñoz et al. 2022). The company also signed an indefinite-delivery/indefinite-quantity contract with the U.S. government to produce B61 bomber Tail Assembly (U.S. Department of Defence 2021). In April 2024, Boeing was further awarded a five-year contract of value $559 million to run the U.S. "nuclear missile test facility," at Hill Air Force Base, Utah, including its operation, maintenance, and performance testing (Aerospace Testing International 2024). In July 2025, it contacted by the U.S. Space Force to build two satellites, which will be used for "nuclear weapons coordination to ensure that the U.S. can use its nukes if and when the time comes," with the first satellite expected to be delivered by 2031 (Axios 2025).

Beyond manufacturing, Boeing is actively engaged in lobbying efforts to potentially advance its strategic and commercial interests. In 2023, it spent $17.7 million lobbying in the U.S., and hired

firms, including Shank Public Policy, Ballard Partners, Monument Advocacy, etc. to lobby on its behalf in the U.S. (Sanders-Zakre / Snyder 2024: 31). Boeing also funded think tanks that published work on nuclear weapons, including the Carnegie Endowment for International Peace ($25,000-100,000), the Center for New American Security (CNAS) ($50,000-99,999), the Center for Strategic and International Studies (CSIS) ($100,000-249,999), the Hudson Institute ($50,000-99,999), and the Stimson Center ($10,975) (Sanders-Zakre / Snyder 2024: 31). These lobbying efforts and contributions to think tanks do not imply Boeing has direct influence on the policy outcomes in the U.S. However, they illustrate how these defence contractors potentially position themselves within the discursive and policy conversation surrounding nuclear modernisation to gain economic advantages in the form of defence contracts.

Second case study in the U.S.: General Dynamics

For the past seventy years, General Dynamics has been a key participant in U.S. nuclear weapons systems, focusing on missile guidance, weapons command and control, and communications systems (General Dynamics Mission Systems n.d). In January 2024, it was awarded a $335,071,035 cost-plus-incentive-fee and cost-plus-fixed-fee follow-on contract as the prime integrator for the Trident II Fire Control System (FCS) (General Dynamics Mission Systems 2024). Under this contract, the company will continue to "provide full life cycle and operational support for all deployed Ohio-class ballistic missile submarine" alongside the development, production and installation for all new Columbia-class SSBN FCSs through 2028 (General Dynamics Mission Systems 2024). In June 2025, the company was tasked to modernise the U.S. underwater combat fleet, including the production of Virginia-class nuclear-powered attack submarines and Gerald R. Ford Class nuclear-powered aircraft carriers (Manuel 2025; Reuters 2025).

Apart from manufacturing, General Dynamics spent over $12 million on lobbying in 2023 and funded think tanks that published works on nuclear weapons, including the Centre for New American Security (CNAS) ($25,000-49,999), the Centre for Strategic and International Studies (CSIS) ($100,000-249,999), and the Hudson Institute ($20,000-49,999) (Sanders-Zakre / Snyder 2024: 35). Much like Boeing, this lobbying expenditure and think tank funding does not imply a direct-causation, instead it shows how General Dynamics funds research institutes working on nuclear weapons potentially shaping the discourse.

United Kingdom

The U.K. has approximately 225 nuclear warheads, which can be used from submarine-launched ballistic missiles (Sanders-Zakre / Snyder 2025: 28). Its Defence and Security Industrial Strategy (DSIS), adopted by the Ministry of Defence in 2021, introduced a revised procurement model that replaces the outdated policy of "global competition by default" with a commitment to apply competition "where appropriate" (Williams 2025: 60). At present, HM Naval Base Clyde – home to the U.K.'s Trident programme – functions as the central operating base for the Royal Navy's ballistic missile submarines and is the core of the nation's continuous at-sea deterrent. Its submarine fleet is composed of four nuclear-armed Vanguard-class and five conventionally-armed Astute submarines, all of which are manufactured by BAE Systems in Barrow. Plans are underway to replace the Vanguard Class with four new Dreadnought Class submarines, which feature advanced sensors and electronic systems (Ministry of Defence 2025). For this purpose, the role of BAE Systems and Babcock International is crucial to examine.

First case study in the U.K.: BAE Systems

British Aerospace (BAE), founded in 1999, is a U.K.-based defence company operating in the air, maritime, land and cyber domains. It is the only U.K. producer of nuclear-powered submarines, including the nuclear-armed Dreadnought-class and Astute class submarines (Perlo-Freeman 2024: 9). For Dreadnought programme, the U.K.'s Ministry of Defence (MOD), in May 2022, awarded a contract of over £2 billion to BAE systems together with Rolls-Royce (Muñoz et al. 2025: 33). Likewise, the fifth Astute class submarine, which was designed and built by the BAE systems for Royal Navy also headed to open sea for the first time in 2023 (BAE Systems 2023). In 2018, BAE benefited from the U.K.'s MOD investment of £2.5 billion into developing nuclear submarines (Campaign Against Arms Trade 2025).

Apart from the production of Britain's nuclear weapons, BAE provided between $200,000 and $300,000 to several think tanks working on nuclear weapons issues (ICAN 2024: 26-27). These included Chatham House, Centre for New American Security ($50,000-99,999), Centre for Strategic and International Studies ($50,000-99,999), and the Hudson Institute ($100,000+) (Sanders-Zakre / Snyder 2024: 27). Furthermore, financial institutions in London played a significant role in funding BAE Systems. According to the campaign report *Perilous Profiteering*, Schroders U.K. held "investments worth $125.3 million (£93.97m) in BAE Systems in 2020," supporting the development of "new Dreadnought submarines that will be armed with nuclear missiles" (Briggs 2021). Schroders' chair, Lord Geidt, a former advisor to BAE Systems, was also an advisor to former Prime Minister Boris Johnson.

Emma Cockburn, Scotland coordinator for Campaign Against Arms Trade (CAAT), criticised these investments, stating "the endless billions available for nuclear and arms manufacturers" highlight "the cosy relationship between the arms industry and the U.K. government" (Briggs 2021). Taken together, these activities illustrate how BAE participates not only in technical production but also in activities sustaining such activities. In this regard, the support from financial institutions further strengthens the company's capacity to pursue long-term nuclear programmes.

Second case study in the U.K.: Babcock International

Babcock International has signed a five-year contract with the U.K. MOD worth £3.5 billion for naval base operations, including at HMNB Clyde (Muñoz et al. 2022: 17). In November 2023, it was given a four-year contract of £750 million for the "delivery of infrastructure to support the future capability of the Royal Navy and the U.K.'s Defence Nuclear Enterprise" (Muñoz et al. 2025: 31). The company also completed the life-extension programme for the HMS Vanguard, and under a new £560 million contract (awarded in March 2024), it is working to modernise the second of the Vanguard Class to enable it to continue its operation well into the 2030s (Muñoz et al. 2025: 31). Overall, Babcock International holds at least six outstanding contracts related to the U.K. nuclear arsenal, value of which are reported to be at least $3.9 billion (Sanders-Zakre / Snyder 2024: 25).

Although information on Babcock's lobbying activities and funding of think tanks is not publicly available, its board members include prominent figures such as The Right Honourable Lord

Parker of Minsmere, who is also a Distinguished Fellow of the Royal United Services Institute (RUSI) (Sanders-Zakre / Snyder 2024: 25). This connection suggests that Babcock International may have indirect access to influential policy and strategic debates through think-tank networks, enhancing its visibility and credibility within defence circles. Such positioning can make the company more competitive for major defence programmes, including nuclear modernisation projects, which in turn could support long-term economic gains through substantial contracts.

France

France is reported to have approximately 290 warheads (Kristensen / Korda 2025: 181). It is working to develop a third-generation SSBN and a new air-launched cruise missile (ALCM) – the ASN4G – alongside upgrading existing systems. French M51.3 missile is scheduled for commissioning by the end of 2025 and will carry a TNO-2.67 warhead (Kristensen / Korda 2025: 191). While the French state maintains control over nuclear doctrine and strategic planning, the modernisation and development of these capabilities rely heavily on private defence contractors, including Airbus and Safran. Both companies play a major role in the production, maintenance and upgrading of missiles, and related technologies as explained below.

First case study in France: Airbus

Airbus is the "exclusive provider of ballistic missiles" used in the French nuclear arsenal through its participation in the Ariane Group and MBDA joint ventures (Campaign for Nuclear Disarmament 2021: 1). On August 28, 2025, the Directorate General of Armaments (DGA) commissioned ArianeGroup (in which Airbus has 50% share) to develop and produce the M51.4 strategic ballistic missile (DGA 2025; Safran Group n.d). Its enhanced performance – notably in range, accuracy, and the penetration of opposing defences – is designed to maintain the credibility of French oceanic nuclear arsenal against evolving threats (Ariane Group 2025).

Apart from manufacturing, Airbus spent more than $4.4 million in lobby expenditures in France and the U.S., of which $1.1 million was spent hiring external firms (Sanders-Zakre / Snyder 2024: 23). Not just this, around $250,000–$499,999 were given to Atlantic Council in the name of financial support, and in 2019, the French Institute of International Relations (IFRI) also listed three companies that produce nuclear weapons as corporate partners, including Airbus, Naval Group and MBDA (Sanders-Zakre / Snyder 2021: 23-53). These examples illustrate how financial engagement allows defence companies to remain embedded within both policy networks and influential research environments, potentially shaping the broader context in which nuclear modernisation is discussed and considered.

Second case study in France: Safran Group

With a 50% share of the Ariane Group, Safran is involved in French nuclear weapons production, including the manufacturing of the M51.3 missile (European Commission 2011). The French defence procurement agency DGA also selected Safran Electronics & Defence to build an advance navigation system currently deployed on the Triomphant-class nuclear ballistic missile submarines. Until December 2024, Safran's subsidiary, Safran Ceramics, produced equipment's for all types of tactical and cruise missiles (Muñoz et al. 2025: 73-75).

Apart from manufacturing, Safran spent $520,000 on lobbying, out of which $120,000 was spent hiring external lobbyists in 2023 (Sanders-Zakre / Snyder 2024: 59). Additionally, it provided financial support of around $25,000-49,999 to the Atlantic Council, which has programmes or publications related to nuclear weapons (Sanders-Zakre / Snyder 2024: 59). By contributing to such research and policy institutions, companies like Safran may gain access to policy debates, networks, and platforms where technical and strategic perspectives are discussed.

Taken together, the case studies of the U.S., U.K. and France indicate the role of defence contractors in nuclear weapons production. It further elaborates the probable ways in which these firms remain closely embedded in policy and research networks, i.e. through lobbying and think tank funding. While no direct causation can be established between lobbying expenditures, think tank funding, and specific nuclear-related policy decisions in these countries, the size of the contracts awarded to these companies hints towards the impact such activities have in policymaking circles. Added to this is the problem of limited mechanisms to hold private companies accountable under international law, which mainly imposes obligations on states.

Taken together, the case studies of the U.S., U.K. and France indicate the role of defence contractors in nuclear weapons production. While no direct causation can be established between lobbying expenditures, think tank funding, and specific nuclear-related policy decisions in these countries, the size of the contracts awarded to these companies hints towards the impact such activities have in the policymaking circles.

Research Limitations

The role of private defence companies in the production and modernisation of nuclear enterprise remains an important yet underexplored area of research. Understanding how these companies may shape nuclear policy debates and agendas through mechanisms such as lobbying and think tank funding can provide valuable insights into the broader ecosystem of nuclear governance. Nevertheless, there are several limitations to this research.

A structural limitation of this study is the availability of data from states with less transparent contracting systems, particularly Russia, China, and North Korea. In the liberal-democratic system, open-source regulatory filing allows some degree of scrutiny of the nuclear weapons industry sector. Defence contractors in the U.S., U.K. and France exert influence through lobbying and think tank funding, defence companies in other states may be state-owned or otherwise tightly entrenched with state systems. Thus, there is a dearth of published information about lobbying and think tank funding. Criticism should not be targeted at the private sector per se. Nothing would be gained if the private defence companies that were mentioned in the case studies were nationalised. The military-industrial complex is problematic in all nuclear-weapon states, whether privately organised or state-directed.

Comprehensive documentation is difficult for more reasons, even in democratic countries. Firstly, the study relies heavily on secondary sources, including publicly available reports and statistics, which may not fully capture all corporate activities as many lobbying efforts and funding activities occur through private channels. Moreover, the data gathering due to resource restrictions intentionally only covers a select number industry and leading think tanks, not small actors or less visible channels through which corporate influence might operate.

Secondly, specific information on how funding may contribute to nuclear-related decision-making is not fully transparent. What is typically accessible are only the amounts companies provide to think tanks working in this area, not the impact. It is also for this reason that this article focuses on measuring the measurable, and then drawing attention to the potential influence of private defence companies rather than establishing direct causal links. While patterns of funding and lobbying suggest possible pathways of impact, it is not possible to definitively claim that these activities directly determine policy outcomes because decision making involves multiple actors and complex variables.

Despite these limitations, this research seeks to stimulate further discussion on how the private sector may intersect with nuclear weapons development, modernisation and sustainment processes, and the structural conditions that facilitate their engagement, offering a foundation for further investigation and more detailed empirical studies.

Conclusion

The role of defence contractors in states' nuclear arsenals underscores that modern nuclear arsenals are not merely a matter of national security, but also of economic and political interests. From the production and maintenance of sophisticated delivery systems to lobbying and think tank funding, these companies indirectly influence, in a subtle way, the existing debate on the need for nuclear weapons. The massive purchasing power of these major corporations may stretch beyond indirect influence, instead seeking to shape agendas and oppose critical thinking. This is profoundly asymmetric in the nuclear weapons debate, as no other actors have the same level of resources to deploy. Case studies of the U.S., U.K. and France illustrate how the corporate sector role extends from the factory floor to the corridors of power. It explicates how economic incentives and national security priorities potentially reinforce one another, and how these dynamics erode democratic oversight, as critical debates on disarmament and proliferation are either filtered or suppressed. It means that the evidence-based arguments against nuclear weapons and in support, for example of the Treaty on the Prohibition of Nuclear Weapons, are not engaged in constructively by those who seek to promote their own corporate interests. When this happens, institutions risk becoming performative rather than participatory, and it weakens public trust in state's institutions. Nuclear weapons are designed with the express purpose of delivering catastrophic destruction, threatening civilian populations and urban infrastructures at a scale unmatched by conventional arms leading to decades of harm. Therefore, as corporate and state interests drive nuclear proliferation, modernisation and deny disarmament, it is important to prioritise intergenerational justice. The need is to ensure that today's decisions do not impede the security, environment, and freedoms of future generations, and that we actively work to create a safer, more accountable world for those who come after us.

Endnote

1 Most of the data regarding the six defence companies involved in the U.S., U.K. and France, including their funding of think tanks and lobbying activities, is drawn from the following reports: *Producing Mass Destruction: Private companies and the nuclear weapon industry* (Snyder et al. 2019), *Complicit: 2020 Global Nuclear Weapons Spending* (Muñoz / Snyder 2021), *Risky Returns: Nuclear Weapon Producers and their Financers* (Muñoz et al. 2022), *Surge: 2023 Global Nuclear Weapons Spending* (Sanders-Zakre / Snyder 2024), *Hidden Costs: Nuclear Weapons Spending in 2024* (Sanders-Zakre / Snyder 2025) and *At Great Cost: Nuclear weapon producers and their financiers* (Muñoz et al. 2025).

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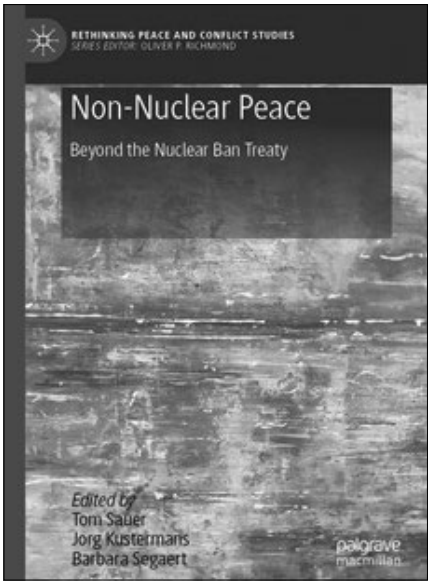
Tom Sauer, Jorg Kustermans and Barbara Segaert (eds.): Non-Nuclear Peace: Beyond the Nuclear Ban Treaty

Reviewed by Jason Adolph



In an era marked by renewed geopolitical and nuclear tensions, reaching a world free of nuclear weapons regained significance. What institutions, policies, and discursive strategies are necessary to convince advocates of nuclear deterrence to leave nuclear weapons behind? This is the question explored in *Non-Nuclear Peace: Beyond the Nuclear Ban Treaty* (2020). For Tom Sauer – a professor in international politics – Jorg Kustermans – a professor of international relations – and Barbara Segaert – a scientific coordinator – the objective of "non-nuclear peace is to prevent a nuclear war" (2). The concept challenges nuclear deterrence theories. It transcends mere disarmament and calls for reimagining the global security landscape.

The collection addresses various themes in nuclear peace research, including nuclear deterrence, non-proliferation, the humanitarian debate, and disarmament. The eight contributors, from fields including international relations, political science, and history, join the editors in this interdisciplinary effort to move beyond entrenched debates about nuclear weapons. The goal is to envision a peaceful international order without the "fear of nuclear war" (2).

The volume is structured around three thematic sections. The first part examines criticisms and commendations of nuclear deterrence and proliferation. The second part discusses how to drive normative change to delegitimise nuclear weapons through discursive strategies. The final section explores the institutions and norms that should be established to achieve a nuclear weapons-free world.

In Chapter 1, the editors outline the book's conceptual framework. The volume builds on the tradition of nuclear pacifism. They oppose nuclear weapons on ethical grounds and highlight the disproportionate risks these weapons pose in relation to their stabilising effects. They define non-nuclear peace as a concept that "takes issue with the logic of nuclear deterrence and that envisions a peace order attuned to the exigencies of a post-nuclear world" (2). This corresponds to a world free from the fear of nuclear war. Recognising the changing international circumstances and the conclusion of the Treaty on the Prohibition of Nuclear Weapons (TPNW), the editors want to provide new intellectual input on how such a world might be realised.

Expanding on this theoretical groundwork, Casper Sylvest, in Chapter 2, conducts a historical analysis of how nuclear weapons were conceptualised during the early nuclear age. He argues that, from their onset, nuclear weapons sparked a debate between those who viewed them as essential for security and those who condemned them on moral and humanitarian grounds. Sylvest illustrates this duality by recounting four areas of contestation that have shaped nuclear thinking: the (im)morality of nuclear weapons, the military use of (thermo)nuclear weapons, their implications for stability, and their nature as a technological innovation. His exploration shows how these debates contributed to contradictory understandings of nuclear weapons across political, academic, and public discourse – many of which continue to influence contemporary thinking. Sylvest puts forward that one should not only focus on financial and security costs, but also on the hidden costs for the environment and marginalised communities to disenchant nuclear weapons.

Departing from the historical perspective, in Chapter 3, Patricia Lewis emphasises the need to rethink outdated strategic doctrines amid a changing risk environment in the 21st century. She argues that recent developments, such as heightened awareness of nuclear winter, the environmental impact of detonation, and the lowering of thresholds for nuclear use, have reshaped the nuclear risk calculations. While the probability of nuclear use remains low, its consequences have grown exponentially. Lewis asserts that a human error surrounding nuclear weapons cannot be eradicated in an increasingly complex security environment. Thus, she concludes that due to the disproportionate risks of nuclear weapons, they should be abandoned.

In Chapter 4, Katarzyna Kubiak examines the relationship between vertical proliferation – the qualitative and quantitative enhancement of existing nuclear arsenals (62) – and nuclear disarmament. Through a legal analysis of the Non-Proliferation Treaty (NPT), she argues that the treaty does not explicitly prohibit vertical proliferation. However, Kubiak highlights how modernisation efforts – such as extending the lifespan of warheads – can undermine disarmament obligations by improving nuclear capabilities. She also acknowledges that modernisation measures – like reducing warhead numbers – could align with the NPT's disarmament goals. Kubiak proposes viewing the relationship between proliferation and disarmament as a spectrum, rather than a binary opposition (75). The chapter concludes with a call to action for non-nuclear-weapon states to challenge practices that violate the spirit of the NPT.

Complementing Kubiak's analysis, in Chapter 5, Rodger A. Payne explores how ridicule – instrumental humour that exposes the absurdity of ideas (92) – can stigmatise nuclear deterrence and promote normative change. He contends that deterrence remains the

central justification for nuclear weapons. Yet its logical flaws, exposed through academic critique and cultural satire, make deterrence vulnerable to ridicule. Payne argues that ridicule can drive normative change by delegitimising deterrence in public and elite perceptions, thereby weakening the normative foundation of nuclear weapons. He concludes by advocating for a broader use of ridicule to challenge the legitimacy of nuclear deterrence in both scholarly and public discourse.

Chapters 6 and 7 offer complementary evaluations of the TPNW. Firstly, Nina Tannenwald asserts that the TPNW created a new non-universal legal norm banning nuclear weapons amid strong opposition by nuclear powers. She addresses the treaty's criticisms, such as the lack of verification, potential distraction from pragmatic arms control, and risk of reinforcing nuclear states' justifications for nuclear weapons. Compared to a traditional disarmament treaty, Tannenberg argues that the treaty should be seen as a normative tool for stigmatising nuclear weapons and moving closer towards an absolute nuclear taboo.

Building on Tannenberg's evaluation, Michal Onderco examines in Chapter 7 the TPNW's institutional impact on the non-proliferation regime. His analysis reveals that the TPNW has not bridged divides between non-aligned states and those under extended deterrence, nor has it played a significant role in the NPT review conferences. While he finds no conflict between the two treaties, he concludes that the TPNW has not advanced disarmament within the NPT framework. Together, these chapters highlight the TPNW's potential to reshape norms, but also its limited practical influence on global disarmament efforts.

In Chapter 8, Harald Müller argues for the creation of new institutions, both physical and ideational, to verify, enforce, and sustain disarmament towards a non-nuclear world. He proposes eliminating reconstitution capabilities, developing robust verification systems to prevent breakout, and establishing an informal security concert system among major powers to avoid war. He calls for replacing deterrence thinking with conventional defence, collective security, and diplomacy (160) to prevent war. While Müller sees the TPNW as a vital normative step to reinforce the nuclear taboo, he stresses that it alone cannot guarantee a non-nuclear future.

Campbell Craig examines the prospects for nuclear disarmament within the current anarchic international system in Chapter 9. He argues that disarmament is implausible due to the absence of a reliable verification mechanism, enduring faith in deterrence, the unique destructive nature of nuclear weapons, and the ease of reconstitution. Without a central authority to enforce and monitor disarmament, Craig contends, a nuclear-free world remains unimaginable. He proposes a radical transformation of the international system through the creation of a world government capable of ensuring irreversible disarmament by all states, including major powers. Though he acknowledges this idea as "utopian" (177), Craig sees it as the only path to a lasting non-nuclear peace.

Overall, *Non-Nuclear Peace* succeeds in leaving "the trenches and to make another constructive step forward in the thinking on how to reach and sustain a peaceful order without nuclear weapons" (4). By critically engaging with over 70 years of nuclear peace research, the book presents both the possibilities and practical limitations of achieving nuclear abolition in the long term. It sets realistic expectations, framing disarmament as a gradual process unfolding over decades. Within this framework, the volume effectively situates the TPNW as a humanitarian-driven tool for delegitimising nuclear weapons and fostering global normative change.

One of the book's key contributions is its emphasis on norm-building and discursive strategies. By emphasising the increasingly drastic consequences of nuclear weapons, the contributors convincingly illustrate the weapons' immorality. However, the book does not resolve the security concerns that drive nuclear-armed states to retain their arsenals. As Payne notes, deterrence remains the central "justification for the retention of nuclear arsenals" (90). Müller advocates for creating a "Concert of Europe"-style (158) security system to create a stable security environment. In a time of heightened animosities and mutual distrust, it is hard to imagine smaller nuclear states, such as Israel or North Korea, abandoning their nuclear capabilities to truthfully cooperate with adversarial states, such as the U.S. or Iran. While the book rightly argues that states themselves create a security environment that requires nuclear weapons, it does not conceptualise which credible security guarantees could replace deterrence for smaller nuclear powers or those allies under extended deterrence.

Furthermore, some readers may find the book lacking in realisable disarmament strategies. Craig's proposal for a world government, or Müller's proposals for forcible responses to a nuclear breakout, remain largely theoretical. Müller's suggestions to reinterpret Article 51 of the UN Charter or empower the General Assembly to authorise a forceful response to a nuclear breakout through a Uniting for Peace resolution raise significant legal and political challenges. The former might evolve through customary law, but the latter would require amendments to the UN Charter – an unlikely prospect given the Security Council's gridlock. Finally, a question persists: How does a forceful attack on a state developing nuclear weapons prevent the state from using these weapons as a measure of last resort?

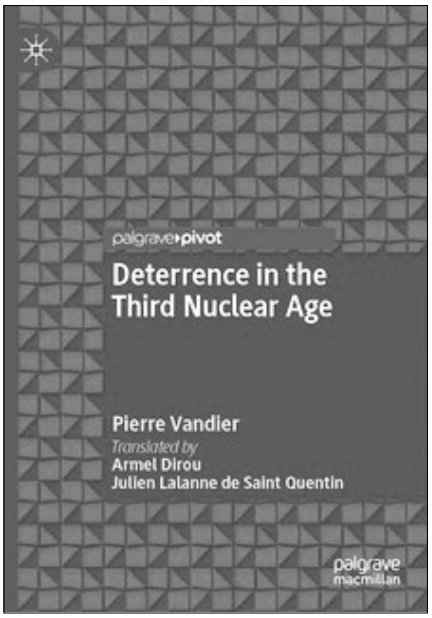
The book also leaves open the question of how discursive strategies apply beyond Western contexts. The strategies help to stigmatise and delegitimise nuclear weapons within the U.S. and its allies. They offer limited insight into how discursive strategies might influence nuclear policy in states with limited or no democratic oversight, such as Russia, China, Iran, or North Korea. The potential for normative pressure to drive political change in authoritarian or diplomatically isolated states remains underexplored.

That being said, *Non-Nuclear Peace* is a valuable contribution to the field of nuclear peacekeeping. It brings together diverse and compelling arguments that challenge current deterrence thinking, introduce innovative tools for normative change, and propose institutional pathways toward a nuclear-free world, though mostly theoretical in nature. Anyone – student or expert – interested in the future of global security and nuclear disarmament will find this a thought-provoking read.

Sauer, Tom/ Kustermans, Jorg / Segaert, Barbara (eds.) (2020): Non-Nuclear Peace: Beyond the Nuclear Ban Treaty. Cham: Palgrave Macmillan. 194 Pages. ISBN 9783030266882 (eBook). ISBN 9783030266875 (Print). Price hardcover: 118€.

Pierre Vandier: Deterrence in the Third Nuclear Age

Reviewed by Ayesha Zafar



As the Russia-Ukraine war unfolds under the shadow of nuclear rhetoric, the possibility of a world free of nuclear weapons is weakened. Reshaping the contours of European security, the war has unveiled an unsettling truth: nuclear weapons remain central to global power politics. Nuclear deterrence, once considered a relic of Cold War logic, appears to be defining the strategic reality of the 21st century again. Building on this line of thought, Admiral Pierre Vandier – Supreme Allied Commander Transformation in NATO and former Chief of Staff of the French Navy – in his concise yet timely book *Deterrence in the Third Nuclear Age*, published in March 2025 (part of the Rethinking Political Violence series issued by Palgrave Macmillan), offers an insightful discussion on the global nuclear order. He argues that the system, once structured by bipolar stability and later through arms control optimism, is undergoing a complex and unpredictable phase.

Emphasising how "disarmament efforts have not succeeded in removing these weapons from their status as the centrepiece of relations between states," Vandier argued, "the end of the Cold War was not the end of nuclear weapons" (xiii). Thus, drawing on his extensive experience within the French defence establishment, he analyses how today's world has entered a 'third nuclear age,' marked by competitive multipolarity, technological disruption, and, more importantly, the erosion of an established deterrence framework. Linking strategic theory and practical realities of statecraft, he warned against complacency in adapting defence postures, which could potentially result in strategic miscalculations.

Applying the widely established conceptual framework of 'three nuclear ages' – not novel to Vandier – to explicate how nuclear deterrence is not a static doctrine, his book questions how credible deterrence can be maintained in an era of hybrid warfare and shifting power dynamics. It examines the strategic adjustments that nuclear states like France require to preserve their credibility and stability. By reflecting on the first (U.S.-Soviet confrontation) and second nuclear ages (arms control and disarmament), Vandier's analysis challenges readers to question the resilience of classical nuclear deterrence in the current strategic environment.

In this regard, Chapter 1 lays the groundwork by outlining the conceptual and historical foundations of nuclear deterrence, the 'first nuclear age,' tracing its origin back to the bombing of Hiroshima and Nagasaki in 1945. Vandier argues that nuclear weapons have fundamentally reversed the nature of conflict, creating a normative 'nuclear taboo' that prevented their use due to the realisation of the "danger of triggering an uncontrollable escalation of violence" (3). Nuclear weapons are not merely a product of technological innovation but a deliberate construction of strategic rationality, shaped by military, political and psychological factors. Vandier underscores how the strength of nuclear weapons relies on operational readiness and the adversary's perception of resolve. Therefore, reflecting on structured stability – the notion that deterrence stability during the Cold War was mainly due to the predictable bipolar order – Vandier deliberated how the U.S. and Soviet Union relied on symmetric capabilities and a shared understanding of escalation threshold that helped prevent miscalculations. The chapter concludes with a discussion of the emergence of the 1968 Nuclear Non-Proliferation Treaty (NPT) as a pivotal moment in global nuclear governance – an attempt to institutionalise deterrence through cooperation and control.

Articulating this era of hope, Chapter 2 delves into the 'second nuclear age,' a period characterised by optimism and a belief that nuclear threats could be contained through arms control and disarmament initiatives. It revives the "ambition of a definitive and total ban on nuclear weapons" (8). However, this optimism and call for the 'Global Zero' initiative were challenged by the events of 9/11, which revealed the limitations of nuclear deterrence against non-state and unconventional threats. Vandier situates these developments within the boarder strategic context. He notes how the 2003 U.S. invasion of Iraq without the United Nations consent, the refusal of Pakistan, India and Israel to sign NPT, and the continued proliferation by Iran and North Korea, collectively undermined the credibility of "good faith disarmament" and led states to struggle for their "ultimate safeguards" (14).

Drawing on a realist perspective, Vandier argues that this shift marked the onset of the 'third nuclear age' – a period where deterrence persists not as a relic of the past but as an adaptive and enduring principle of statecraft. He introduces the strategy "beneath the nuclear canopy" (23), emphasising that while total war remains unlikely, nuclear weapons continue to shape the global strategic order by preserving power hierarchies. In Vandier's perspective, the elimination of nuclear weapons or the hopes of it are "totally unrealistic" (21). No state, he argues, has an objective interest in achieving the 'Global Zero' objective; rather, states are modernising their deterrence system to secure their survival. Notably, Vandier neither dismisses the achievement of arms control nor romanticises disarmament idealism. Instead, he exposes the inherent tensions between normative aspirations and strategic imperatives. While international treaties are valuable, they cannot replace the deterrent logic that underpinned the nuclear stability of the Cold War era.

This way, Chapter 2 establishes the continuing relevance of deterrence in global security thinking – a premise that Chapter 3 builds upon through an investigation of France's internalisation of this logic within its strategic doctrine. Vandier emphasises that France's nuclear deterrent is both a tool of its national security and a symbol of its strategic autonomy, especially in the European context, which is increasingly influenced by the U.S. and NATO dynamics. Pointing to France's sovereign right to implement deterrence, Vandier notes that the country is both "fully in and radically out of NATO" (29). This status enables it to retain the "freedom to qualify its strategic situation" and "control over the threshold, i.e. the assessment of the criticality level of the threat it faces" (29). In this regard, the structural elements of the French nuclear triad and the challenges posed by emerging technologies, i.e. hypersonic weapons, cyber threats, and precision strike capabilities, were discussed to explicate how these innovations compel France to rethink its deterrence thresholds. Particularly, the commissioning of new warships by the Chinese Navy, which are equivalent to France's current fleet, is seen by Vandier as a major challenge. He argues that the expansion of China's conventional naval forces is altering the maritime balance, posing a direct strategic test for France. Thus, in the absence of "real conventional resilience," Vandier concludes that "nuclear technology is more necessary than ever to allow a rebalancing of power" (33). He calls it an "effective means of strategic rebalancing," especially in a world where France's technological edge is diminishing compared to other "emerging countries" (33).

In Chapter 4, Vandier underscores the necessity of strategic recalibrations, asserting that deterrence is not a static doctrine but one that should be tested and refined in response to emerging challenges. He connects historical and national perspectives to propose a forward-looking assessment of nuclear doctrine. Vandier argues that classical deterrence of the Cold War is conceptually robust but insufficient for navigating the complexities of contemporary geopolitics. To him, conventional and nuclear arms are "essential to strengthen the credibility of deterrence" (39). Therefore, emphasising, France, in the absence of a territory with strategic depth, but with the privileged access to oceans, should put its "nuclear eggs" in a "basket as elusive as possible" and make an effort to "maintain the tactical advantage of submarine platforms in the long term" (41). He warns that technological advancements and North Korea's nuclear ambitions have introduced new vectors of escalation, requiring refined signalling and readiness. Without a credible nuclear deterrent, France would face a dual burden of overreliance on conventional forces and exposure to the strategic dominance of more assertive powers. In essence, Vandier reaffirms that nuclear deterrence is not merely a defensive tool but the cornerstone of France's long-term strategic stability.

Overall, Vandier's work is a very compelling and timely contribution to the study of nuclear strategy, offering both a historical lens and a forward-looking approach to nuclear deterrence, especially in today's world of increasing uncertainty. The book is an essential read for students, policymakers, and scholars since it bridges the gap between theoretical frameworks and practical strategic considerations. It prompts the reader to question the relevance of nuclear deterrence and to understand it not as an abstract concept but as a dynamic instrument shaped by technological innovations, evolving threats, and political calculations.

One of the book's primary strengths lies in contextualising the lessons from the Cold War and post-Cold War periods to inform the strategic dilemmas of the 21st century, particularly in light of the Russia-Ukraine war. Vandier's conceptualisation of the 'third nuclear age' resonates strongly with current debates on nuclear coercion and escalation control. It offers a valuable lens for interpreting Europe's strategic anxieties and France's pursuit of autonomy in a security environment, currently shaped by NATO-Russia confrontation. As Keir Giles (Chatham House, 2023) argues, Russia has achieved "substantial success in constraining Western support for Ukraine through use of threatening language around the possible use of nuclear weapons," which has created a form of "fear-induced paralysis" among Western decision-makers (1). This weaponisation of rhetoric exemplifies how deterrence has evolved from tangible arsenals to the psychological and informational domains, which Vandier identifies as central to the current strategic era. Thus, effective deterrence in the third nuclear age requires not only credible nuclear postures but also strategic autonomy, flexible signalling, and the political will to confront coercive nuclear narratives.

Nonetheless, Vandier's realist approach carries inherent limitations. His dismissal of disarmament optimism risks normalising nuclear dependence. The book neglects the ethical and intergenerational justice concerns associated with deterrence. By projecting nuclear modernisation as an unavoidable necessity, Vandier's work implicitly forecloses the probability of a nuclear-free world and undercuts global aspirations for arms control and disarmament. Not engaging enough with the normative and humanitarian perspectives – particularly the long-term consequences of perpetuating nuclear deterrence – his work suggests an acceptance of strategic fatalism. Thereby, downplaying the potential role of multilateral frameworks such as NPT and civil society initiatives like the International Campaign to Abolish Nuclear Weapons (ICAN) in mitigating escalation risks.

While Vandier's case study of France offers a national perspective, it reflects a certain degree of Western-centric bias. There is comparatively limited discussion of nuclear developments in Asia, the Middle East, or the Global South. Likewise, the impact of cyber warfare and artificial intelligence on the command-and-control system, as well as the risk of accidental escalation, could have been explored in greater depth. It is also important to note that Vandier oversimplified the doctrinal adaptation process and is short on discussing the complexities surrounding this procedure, especially the political, organisational, and ethical challenges.

In conclusion, as a high-ranked naval officer, Vandier's work offers a unique voice to the debates on the relevance of nuclear deterrence, which are otherwise dominated by academics and policy theorists. His work is intellectually rigorous and offers anyone interested in understanding the complexities of nuclear deterrence an opportunity to see how the concept has evolved and should continue to adapt in the face of emerging challenges.

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