

History of the nuclear age: 1945 to now

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by

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Outline

- Initial observations
- Science and Technology
- Power structures & relations
- Deterrence theory and practice
- Arms control, non-proliferation & nuclear order
- Sources of nuclear disorder post-1997
- Disarmament politics and movements

Initial remarks

- Nuclear affairs: by now a long history & experience
- Co-evolution; punctuated equilibrium
- Tales of the unexpected! Shocks & surprises
- Position, attitudes & interests of the observer
- Compartmentalization (issue areas, epistemic communities, academic specialization etc)
- Purpose in history: the telos, final cause, of complete disarmament (?)

Science and technology

Military

- 1940s-60s: rapid technological advance (including fission, fusion warheads & their miniaturization, missiles & guidance, satellites, submarines, Permissive Action Links), followed by mainly incremental improvement in most fields.
- 1980s onwards: developments in missile accuracy and defence. Also in computer simulation and non-explosive testing.
- Steadily reducing technological entry barriers

Civilian

- 1950s-70s: development of power reactors (esp. LWR), and of enrichment, fuel fabrication and reprocessing
- False expectations: nuclear power growth rates, 'closed fuel-cycle' (FBR), waste management & disposal (all overestimated); emergence of centrifuge enrichment (underestimated)

Power structures & relations

Overarching:

- = Cold War bipolarity; bloc competition; highly nuclearized
- = Post-Cold War unipolarity then multipolarity

Distinctive regional power structures & their nuclearization:

- = Europe/transatlantic (now diminishing)
- = East Asia, South Asia (increasing)
- = Middle East (trend uncertain)
- = Latin America, Africa ... (denuclearized)

Power transitions: traditionally times of great power conflict.
Nuclear weapons as guarantors of 'peaceful' transitions??

Deterrence theory & practice

- Perennial ethical debates (Walzer, Quinlan, Lee, Shue ...)
- Bernard Brodie: *The Absolute Weapon* (1946)
- Limited War? (Kissinger's *Nuclear Weapons & Foreign Policy...*)
- From Mutually Assured Destruction (MAD) to 'flexible response'
- Second-strike capabilities (Wohlstetter ...)
- First-use and no-first-use doctrines
- 'Extended deterrence' (US to Germany, Japan etc)
- 'Minimum deterrence' (UK, France, China ...)
- 'Virtual deterrence' (India, Pakistan pre-1998)
- 'Catalytic deterrence' (South Africa, Israel ...)
- Nuclear deterrence and missile defence

The nuclear 'taboo' (Nina Tannenbaum) or inhibition (T.V. Paul)

Arms control, non-proliferation & nuclear order

1940s to early 1960s: unregulated arms race; non-proliferation through denial of access + extended deterrence (brief but intense debate in 1946 about elimination of nuclear weapons)

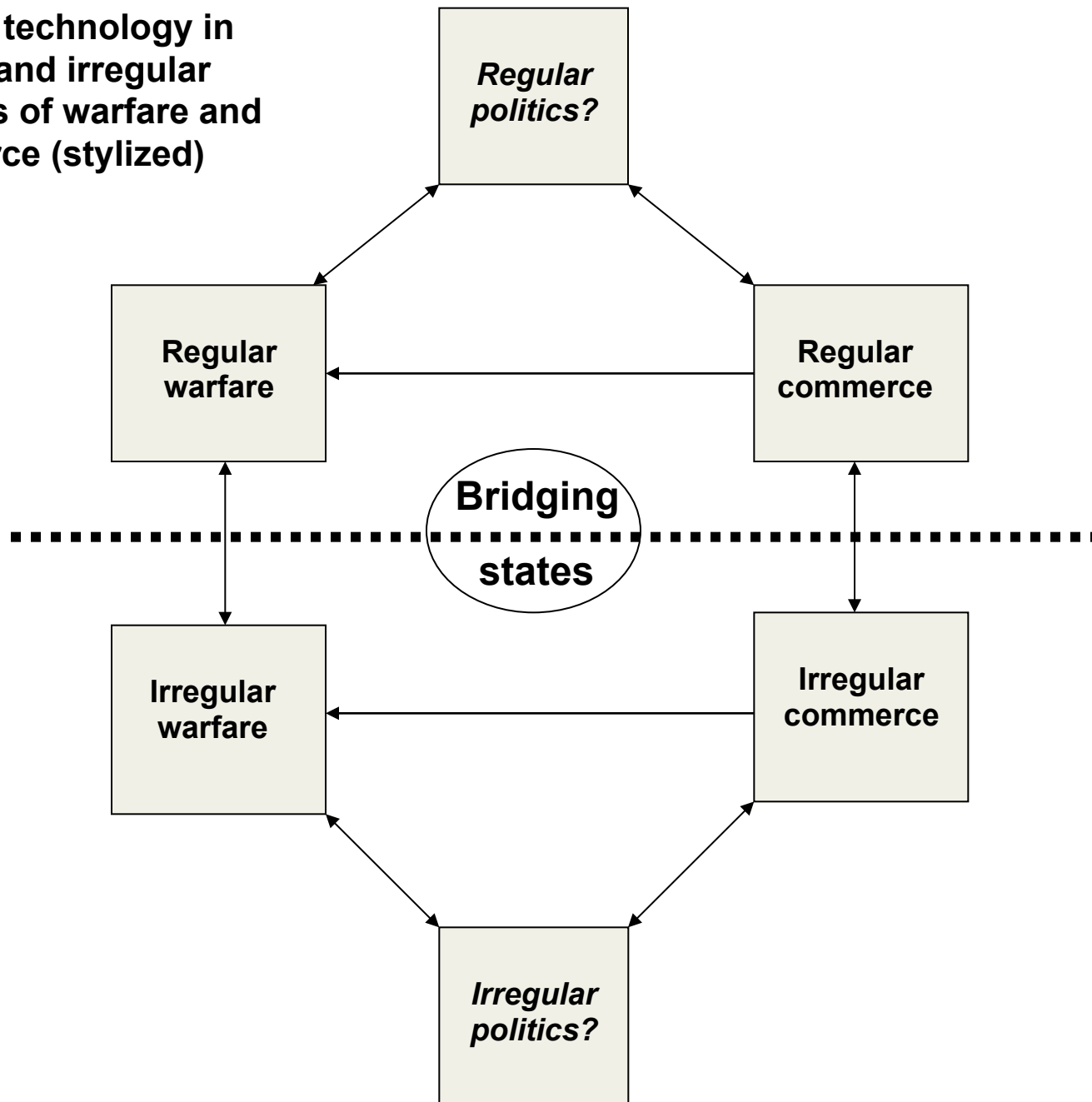
Early 60s to late 70s: arms control treaties (SALT, ABM etc); non-proliferation regime's construction (NPT etc); negative security assurances; an 'international nuclear order' takes shape

1979-86: back to arms racing, but continued development of non-proliferation regime

1986-97, golden age of nuclear ordering: INF, START; FSU's nuclear 'reconstitution'; UNSCOM; NPT expansion & extension; IAEA safeguards reform; CTBT negotiation; NSG's consolidation etc

1997 to the present: various challenges to order

**Nuclear technology in
regular and irregular
domains of warfare and
commerce (stylized)**

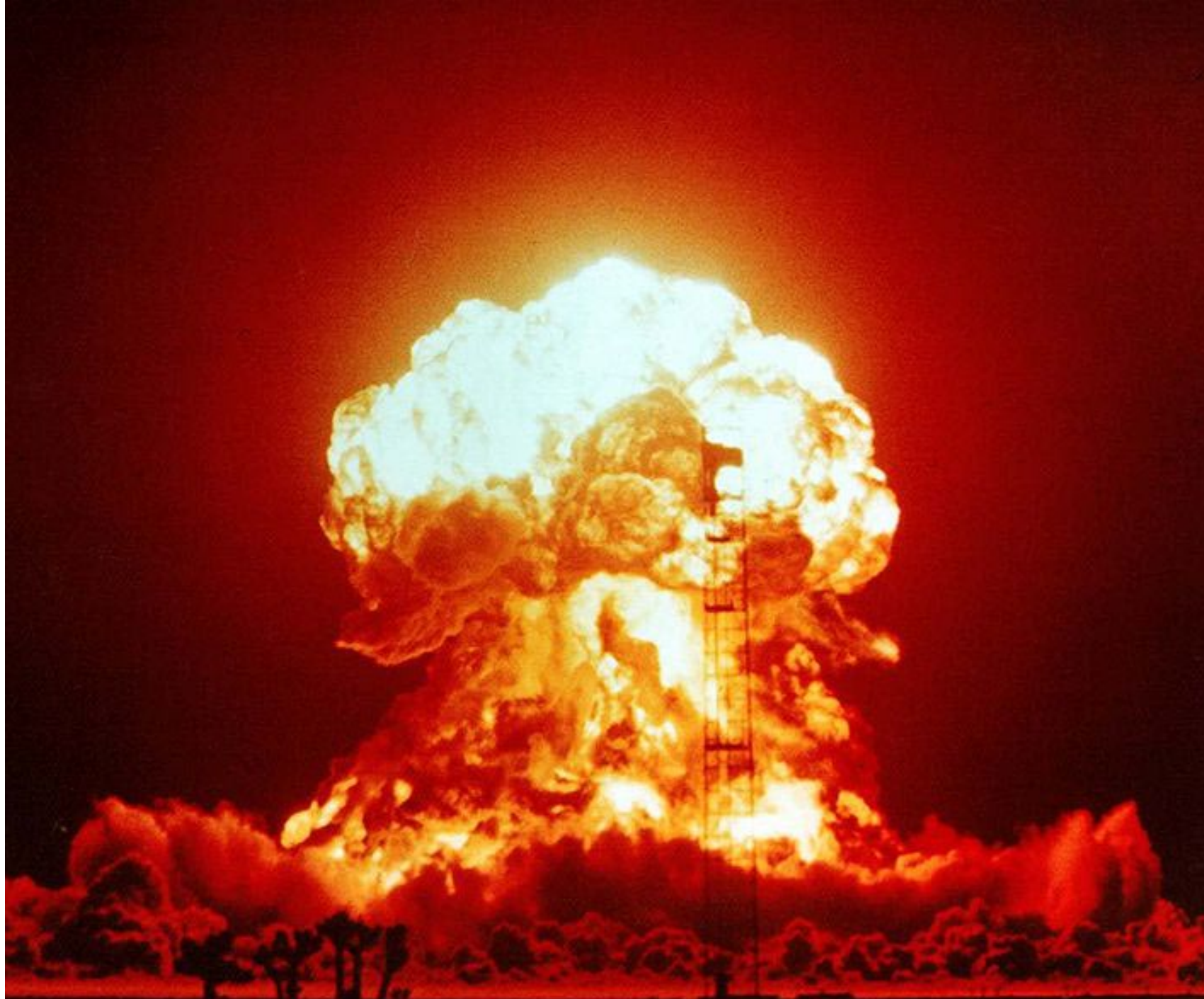


Sources of nuclear disorder

- India, Israel, Pakistan + North Korea: nuclear-armed states not bound by NPT rules & norms; creation of the Israeli and Indian 'exceptions'
- 'Rogue states', problem of non-compliance; linkage to terrorism; emergence of counter-proliferation; the problem of Iran
- Radicalisation of US policy (hegemonic assertion): mistrust of multilateral approaches; regime change & preventive war; Obama's attempted reversal
- NWS' force modernization; Russia's nuclear reassertion
- Conflict and arms racing in Asia: the Chinese pivot
- Frustration with NPT bargains & processes

Disarmament politics

- Hiroshima's impulse, 1945-46 (Acheson-Lilienthal, UN General Assembly etc)
- Gorbachev & Reagan (1986); Rajiv Gandhi (1988); Gang of Four (2007); Obama (2009)
- NPT extension & review conferences (Article VI obligations; NAM's activism)
- Debates about legality of nuclear use & threat of use, recently linked to humanitarian law
- Influence (or lack of it) of NGOs and civil society



A definition of international nuclear order

Given the existence of nuclear technology, the international nuclear order entails evolving patterns of thought and activity that serve primary goals of world survival, war avoidance and economic development; and the quest for a tolerable accommodation of pronounced differences in the capabilities, practices, rights and obligations of states.

W. Walker, *A Perpetual Menace*, p. 12