

Lessons Learned from Nonproliferation Successes and Failures

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Abstract

There have been a number of nonproliferation successes (Germany, Iraq, Taiwan, Argentina, Brazil, South Africa, Libya, Syria) and failures (USSR, France, China, India, Pakistan, probably Israel, North Korea [DPRK]), and at least one potential proliferator (Iran) whose future is uncertain. The successes are heterogeneous: some resulted from direct military or paramilitary action, while others followed changes in the political situation that removed the strategic rationale for or the willingness to pay the economic and political price of proliferation. The failures have in common a proliferator that perceived a compelling strategic need for nuclear weapons. Such countries resist outside pressures, and may reap the benefits of proliferation even if their weapons are untested. I consider the relevance of CTBT to proliferation in light of this history.

1 Introduction

I am honored to be invited to this International Seminar on Non-Proliferation in Enrico Fermi's homeland. In Fermi's day it required geniuses of his caliber

to develop nuclear weapons. Fermi came to America and devoted his efforts and talents to developing nuclear weapons for the defense of democracy and freedom. Today the bar is much lower and very ordinary scientists and engineers, such as are found in dozens of countries, are capable of developing nuclear weapons. Unfortunately, some of these countries are threats to peace and the proliferation of nuclear weapons to such countries endangers the safety of the world.

2 Technical Aspects

For many years the ability to detect nuclear explosions was controversial. A great deal of effort and expense has been devoted to solving this problem, and it is now generally considered that tamped underground tests can be detected seismically in areas of interest to yields as small as a few tens of tons. In principle, explosion in a pre-formed cavity could increase the detectable yield threshold by a factor of as much as 70, but the excavation of such a cavity is a major undertaking and creates a large spoil pile that might be observable. Atmospheric or oceanic explosions are also readily detectable, and have the additional disadvantage for the tester of releasing debris that can yield detailed information about the nature of the device tested. Hence the verifiability of a CTBT is not seriously at issue; for a more detailed discussion see the US National Academy of Sciences report *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty*, Committee on Technical Issues Related to Ratification of the Comprehensive Nuclear Test Ban Treaty (National Academy Press, Washington, D. C. 2002).

In contrast to the CTBT, the FMCT (Fissile Material Cut-off Treaty) is not verifiable without very intrusive inspections directed by accurate intelligence. Libya, Iran and North Korea each successfully concealed uranium enrichment programs for many years, and the failures of nuclear intelligence in regard to Iraq (failing to detect enrichment programs prior to the First Gulf War, and finding nonexistent programs prior to the Second) are notorious. Significant capability can be concealed, with no distinctive external signature, in buildings of modest size, so any structure larger than a private home would have to be subject to inspection. No country will accept such intrusion into its conventional military, intelligence, security and other sensitive facilities or into its private industry, any of which could conceal a centrifuge cascade. The acknowledged nuclear powers all have much more

Country	Method of Defeat	Year
Germany	Commando Raids, Sabotage, Occupation	1943–45
Japan	Bombing, Occupation	1943–45
South Korea	USA Pressure and Security Guarantee	c. 1975
	Bombing of Osirak Reactor	1981
Iraq	Gulf War Bombing	1991
	Intrusive Inspections	1991–98
Taiwan	USA Pressure and Security Guarantee	1987
Argentina	Democracy, Relaxation of Tension	1990–91
Brazil	Democracy, Relaxation of Tension	1990–91
South Africa	Democracy, Relaxation of Tension	1990–91
Libya	Paramilitary, Relaxation of Tension, 2nd Gulf War	2003
Syria/DPRK	Bombing of Reactor	2007

Table 1: Counter-proliferation successes.

fissile material than they are likely ever to want, so an FMCT would be entirely symbolic for them.

The essential questions therefore do not involve the verifiability of a CTBT. Rather, they involve the effects of a CTBT on proliferation. To discuss those, I first turn to the history of counter-proliferation successes and failures.

3 Successes

In order to understand the problems of non-proliferation and the rôle of the CTBT it is necessary to consider the history of non-proliferation efforts. These go back more than 60 years. Table 1 lists the countries whose efforts to develop nuclear weapons have been thwarted; they are nonproliferation success stories:

Three causes of non-proliferation success can be identified. The first is military or paramilitary action or intrusive inspection following and backed by the threat of military action, which was successful against Germany, Iraq,

Libya¹ and Syria².

The second cause of success were democratic revolutions that led to reconciliation between former adversaries (Argentina and Brazil) or with the world community, and removed the strategic necessity for nuclear proliferation (South Africa). In addition, democratic polities are less willing to pay the substantial economic and political costs of developing nuclear weapons, unless compelled by strategic necessity as in the cases of the US and Great Britain during the Second World War.

The third cause of success was a combination of democratic revolution and a security guarantee from a dominant power that removed the strategic necessity for an independent nuclear force. This was the case for Taiwan, which came under the American nuclear “umbrella”.

Sweden and Switzerland, technically advanced democracies, abandoned embryonic nuclear weapons programs long before the test moratorium, partly because the costs were forbidding and the strategic need lacking, in analogy to South Korea’s and Taiwan’s situation and decision.

Examination of the dates shows no correlation with the present great-power nuclear test moratorium that began in 1992, or with France and China’s adherence to it in 1996. Many proliferation efforts ended before those dates, reflecting changes in the international situation and in the domestic politics of the countries involved, and a few afterwards, all for reasons that appear to have had nothing to do with the test moratorium.

4 Failures

Table 2 lists failures of non-proliferation efforts, those countries that developed nuclear weapons despite attempts to prevent, or at least delay, this:

Two facts from this table are apparent. One is that each country that “went nuclear” did so for strategic reasons, either because it was afraid (with greater or lesser justification) of an adversary or because it wished to use the power of nuclear weapons for strategic advantage. There is, of course, a grey

¹The seizure of a cargo of centrifuge parts was paramilitary, and along with the fate of Saddam Hussein following the 2nd Gulf War may have been decisive, though it is not possible to say to what extent a desire to rejoin the world community motivated Gaddafi’s decision to denuclearize.

²It is unclear whether Syria’s reactor was a commercial purchase from North Korea or a joint project whose production was to be shared by the two countries.

Country	Strategic Imperative	First Bomb
USA/UK	Germany, Japan	1945
USSR	USA, Germany	1949
France	USSR, Germany	1960
China	USSR, USA	1964
India	China	1974
Israel	Egypt, Syria, others	1968? (untested)
South Africa	Cuba, others	1979 (untested)
Pakistan	India	1987? (tested 1998)
North Korea	USA, South Korea, China, Japan	2006
Iran	USA, Turkey, Pakistan, Israel	Future?

Table 2: Nuclear Weapons States. Iran presents a special case. It is pursuing a uranium enrichment capability that has a dual use as a source of weapons-grade uranium, but has not admitted that weapons are a goal. Outside pressure has been unsuccessful in delaying or stopping this program, so Iran is probably best considered a failure to restrain proliferation.

area between these two motives. There is no evidence that weapons testing or development by powers that are not perceived as adversaries has any effect on proliferation. Nor is it plausible that further weapons development by great powers with large arsenals and technically mature programs would have any effect on a perceived need to develop a modest number of probably technically primitive weapons by a country whose strategic imperatives are local or regional.

Official statements from proliferators support this conclusion. For example, in 1998 the Indian Foreign Office stated “It is because of the continuing threat posed to India by the deployment, overtly or covertly, of nuclear weapons in the lands and seas adjoining us that we have been forced to carry out these tests.” Pakistan’s Foreign Secretary stated “The fact of our existence as the neighbour of an expansionist and a hegemonistic power taught us...that we must search for security...The answer lay in credible deterrence.” Even North Korea defended its test “It will contribute to defending the peace and stability on the Korean Peninsula and in the area around it.” Each of these statements is, of course, a completely one-sided description of the political situation, but each is also frank acknowledgement that the purpose of developing nuclear weapons was to strengthen their possessor against its

rivals and enemies.

The second striking fact is that there is no evident correlation between the dates at which countries obtained their first bombs and the USA/UK/Russia test moratorium (amounting to a *de facto* CTBT) beginning in 1992 or the adherence of France and China to the moratorium in 1996. The second round of Indian tests in 1998 (India, rather dubiously, claimed that its 1974 test was not of a bomb, though one wonders what else to call a device that is believed to have yielded about 12 Kilotons) followed the adherence to the moratorium of its strongest strategic adversary and preceded the tests of its other major adversary. Pakistan's only round of tests was clearly in response to India's, which it followed by weeks, and its first bomb preceded those tests by an uncertain period of time, perhaps a decade.

5 Implications

Nuclear proliferation appears to have little to do with testing, or a suspension or renunciation of testing, by other countries unless they are adversaries of the proliferator. The USA/UK/Russia test moratorium in 1992 and its acceptance by France and China in 1996 appear not to have reduced proliferation. In the decade since 1996 two countries exploded their first bombs, and a third resumed testing after a single test 24 years earlier. This was a more rapid rate of proliferation than in the heyday of nuclear testing; in nearly every year between 1960 and 1985 there were more than 50 tests and yet only two additional countries became acknowledged nuclear powers, one with a single test (two more appear to have developed, but never tested, nuclear weapons in that period). Testing, or a refusal to commit to a permanent end of testing, by remote powers that are not considered threats may be unfair to non-weapons states, but has not been sufficient motive to justify the cost and burden of a weapons program when no compelling strategic need is felt.

A number of nuclear weapons states developed weapons that served their strategic purposes without testing them. The first nuclear weapon used in war (at Hiroshima) had never been tested. Israel has not tested its probable weapons, nor did South Africa or Pakistan for a decade after they are believed to have first obtained them (a period ended by disarmament in the case of South Africa and by tests that clearly were a political response to India's tests in the case of Pakistan). The significance of testing is as a demonstration that a state has a working weapon or as part of an experimentally-based

development program. The safety of the world is affected by the existence and willingness to use (or loss of control of) nuclear weapons, not by testing itself.

The CTBT may be irrelevant to proliferation. We should not fall into the trap Kellogg and Briand fell into when in 1928 they created a treaty that renounced force as a tool of national policy. Such a treaty seldom has much efficacy except in those happy dispositions in which it is nearly superfluous. Genuinely bad actors are not restrained by treaties; the Kellogg-Briand pact was signed by Germany, Italy and Japan.

Historical experience shows that fear of enemies, or a desire to intimidate or destroy them (depending on whether a country is fundamentally defensive or aggressive), is what drives proliferation. Conversely, nuclear weapons are renounced when a dictatorship turns into a democracy, when a country reconciles with its adversaries, or when its security is guaranteed by a powerful ally. Nuclear weapons development has on several occasions been disrupted for long periods by military or paramilitary action. When the would-be proliferator regime is destroyed before it can recover and resume development, as was the case for Germany and Iraq, or undergoes a fundamental change in policy (Libya), this disruption has been effective in preventing proliferation.