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Scientists and the Struggle Against Nuclear Weapons Today: What would Szilard Do?

Zia Mian, Program on Science and Global Security, Princeton University, zia@princeton.edu

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INTRODUCTION

Long standing arms control and nonproliferation arrangements intended to forestall, halt, reverse and eventually eliminate nuclear weapons programs are unraveling and prospects for near-term progress on this critical issue appear bleak. Alongside renewed and intensified strategic rivalry among the major nuclear-armed states, there are ambitious programs for modernization and further development of nuclear arsenals and production complexes, and for some states the conditions for nuclear weapons use seem to be broadening rather than shrinking. The one hopeful recent development, the 2017 United Nations Treaty on the Prohibition of Nuclear Weapons, has elicited opposition rather than support from nuclear-armed states. This turn away from restraint towards a retrenchment of nuclear weapons and warfighting postures exposes some of the inherent contradictions in arms control as a way to end the threat of nuclear war and raises questions about what scientists can do today as part of a renewed struggle against the bomb.

In these remarks, I will review the crisis of arms control and nonproliferation by sketching out what I see as some of the important elements of the present conjuncture, and suggest why it has deeper roots and greater dangers than one might think. I will then focus on lessons that might usefully be learned from organizing initiatives involving Leo Szilard (1898 – 1964), the discoverer of the nuclear chain reaction and a key member of the first generation of physicists to take up the challenge of reducing the danger from nuclear weapons and working for their elimination. In particular, I will highlight some of the ways in which Szilard was a pioneer in efforts by physicists as citizen-scientists to transcend nationalism and to bring science and democracy to bear on the challenge of reducing and eliminating the risks from nuclear weapons. The title of the talk and this essay are inspired by William Lanouette's biography of Szilard, *Genius in the Shadows*, which concludes that "Szilard's legacy is best captured in his mode of thinking.. [and] feisty spirit ... and to ask "What would Leo think?"[1]

THE CRISIS OF ARMS CONTROL AND NONPROLIFERATION

The most recent expression of the crisis of arms control and nonproliferation is the Intermediate Nuclear Forces Treaty, with the United States and Russia withdrawing from the treaty in 2019.[2] This treaty, signed in December 1987, had been in force for 30 years. It is important to note, however, that this is not the first long-standing arms control treaty that has been undone and may not be the last.

There seems to be a 30-year rule that applies to this

great unraveling of arms control. In December 2001 the Bush Administration withdrew the United States from the Anti-Ballistic Missile Treaty.[3] This treaty also was about 30 years old at that time, having been signed in May 1972. The remaining part of the bilateral Cold War era nuclear arms control regime is the series of Strategic Arms Reduction Treaties which began with START I, signed in July 1991. These treaties no longer just capped the number of nuclear weapons for the United States and Russia as had been done under the earlier agreements known as the Strategic Arms Limitation Talks that led to SALT I (signed in 1972) and SALT II (signed in 1979), but began the process of reducing deployed arsenals.[4] New START, the most recent of these treaties, was signed in April 2010, and is set to expire on February 5, 2021.[5] There is great concern that New START will not be renewed because of opposition from the Trump Administration.[6] In the absence of New START, there would be no mutually agreed limit on nuclear arsenals for the United States and Russia for the first time since 1972.

What makes the present crisis more significant still is that for most of the past half century nuclear arms control had been taken for granted. Arms control since at least the early 1970s was supposed to be a ratchet that once put in place would stay in place and prevent the return to the kinds of arms racing and nuclear crises that we had seen earlier. By the late 1960s the U.S. nuclear arsenal peaked at over 30,000 weapons, out of an estimated 40,000 nuclear weapons worldwide – after peaking at an estimated 70,300 weapons in 1986, dramatic reductions in the global nuclear weapons inventory only began in the late 1980s with the INF Treaty.[7]

The second thing worth paying attention to in the present conjuncture is that in the last 25 years a whole series of expected multilateral arms control measures have failed to be realized. These efforts were all part of what was imagined and promised as a step-by-step process to restrain the spread of nuclear weapons and to begin to reverse and roll them back with a view to their elimination.

The first missed step has been the Comprehensive Nuclear Weapons Test Ban Treaty. It is now over 20 years since the treaty was opened for signature. Now signed by 184 countries and ratified by 168 of them, the treaty has still not entered into force. Even though President Clinton signed the treaty in 1996, the United States Senate in 1999 voted by 51-48 along party lines to not ratify it.[8] Among the other nuclear armed states, China and Israel also have not ratified the treaty, while India, Pakistan, and North Korea have not signed it.[9] Entry into force is uncertain.

A second agreement that has failed to materialize is the fissile material cutoff treaty. In 1993 the United Nations, without a dissenting vote, gave a mandate for negotiations at its Conference on Disarmament for a "non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile materials for nuclear weapons or other nuclear explosive devices."[10] Talks have still not started.

A third multilateral arms control treaty that could have been agreed was on no first use of nuclear weapons. In 1994, China offered the other permanent members of the United Nations Security Council (the United States, Russia, Britain, and France), a draft text of a multilateral treaty of no first use of nuclear weapons.[11] There have been no negotiations.

Another missed step is associated with the 1996 International Court of Justice advisory opinion on the legality of the threat or use of nuclear weapons.[12] This opinion by the highest court in the United Nations system followed a request made by the United Nations General Assembly for a finding on the question: "Is the threat or use of nuclear weapons in any circumstance permitted under international law?"[13] The Court found that "the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law."[14] This has obvious implications for the nuclear plans and postures of the nine nuclear-armed states. These states have made no public effort to explain, reassess or revise nuclear war plans and postures in light of the Court's finding.

Alongside arms control unraveling, and arms control steps that could have been taken but were not taken, nuclear dangers are getting worse in other ways. Most important, all nine nuclear weapon states have plans for undertaking expansion, development or modernization of their nuclear arsenals.[15] In some cases, for instance the United States, these plans are going to put in place nuclear weapon systems that will be in operation 60–80 years from now.[16]

Also, the conditions under which some states imagine using nuclear weapons are broadening rather than becoming more restrictive. The 2018 United States Nuclear Posture Review envisages using nuclear weapons to respond to "significant non-nuclear strategic attacks" against "U.S., allied or partner civilian population or infrastructure, and attacks on U.S. or allied nuclear forces, their command and control, or warning and attack assessment capabilities" and cites "chemical, biological, cyber, and large-scale conventional aggression" as specific concerns.[17]

Along with the resumption of a nuclear weapons competition and arms racing between the United States and Russia, the arms race in South Asia has also become a growing concern and is something that could have been prevented. There has been no significant effort by the international community to try and prevent India and Pakistan developing their nuclear weapons since their nuclear tests of 1998. The two countries now have an estimated 130 to 150 nuclear weapons each, and short-range and long-range ballistic missiles, cruise missiles and aircraft to deliver these weapons.[18] They also are putting nuclear weapons at sea and Pakistan is developing battlefield nuclear weapons.

As we saw again in early 2019, India and Pakistan are in a recurring often violent crisis cycle. This time, following a suicide bombing of security forces in Indian-held Kashmir, Indian jets flew into Pakistan to target militants blamed for the attack, leading Pakistan to send jets into India and shoot down an Indian fighter aircraft.[19] This may set a new minimum level of violence that political leaders and generals there think they can safely undertake. The August 2019 decision by India to end the special constitutional status of relative autonomy formally accorded Indian-held Kashmir since 1949 has triggered a new crisis, with large scale repression by Indian forces of the Kashmiri population and threats by Pakistan's Prime Minister Imran Khan that "The time has arrived to teach you [India] a lesson," and that Pakistan would "fight until the end."[20]

Where nonproliferation progress existed, it has started to come undone. The Trump Administration's withdrawal from the July 2015 nuclear deal with Iran reached by President Obama, and imposition of significant new sanctions on Iran – in defiance of a unanimous vote of the United Nations Security Council supporting the deal – triggered Iranian steps away from the caps and restraints it had accepted under the deal.[21] This decision also undercuts prospects of international trust in future nuclear agreements involving the United States

Shifts in United States priorities have undercut other nuclear agreements it sought and helped create. Since the early 1990s the United States has been talking to North Korea about denuclearization and at various times failed to uphold deals that were made or take possible opportunities.[22] In this time, North Korea has gone from a latent nuclear weapons capability to have tested nuclear weapons and various missile types.[23] The current diplomatic process with North Korea seems very uncertain.

In the last part of this sketch of the arms control and nonproliferation crisis, I want to highlight an underlying structural crisis. This structural crisis is a bit like the crisis in the Cold War over the legitimacy of the international order. The United States and the Soviet Union were contesting not just each other's nuclear weapons but who gets to decide what happens in the world. We are at a similar stage now.

A case can be made that there is now a contest over the legitimacy of the international nuclear order. One place that this is being played out is the Nuclear Non-Proliferation Treaty (NPT) Next year, 2020, will mark 50 years since the entry into force of the NPT, with the 10th in the series of the treaty's once every five years Review Conferences. What we have seen in the last few Review Conferences is that the NPT process has gone into profound oscillations between the appearance of progress and the failure to make any kind of progress. This process has reached the point where there are signs not just of cracks but of potential failure of the NPT as an architecture for managing the nuclear part of the international order.

In 1995, there was the coercive extension and indefinite extension of the NPT.[24] By coercive, I mean the United States and the other weapon states that were in the NPT forced an unconditional indefinite extension. Non-weapon states at that time were not happy with the lack of progress towards nuclear disarmament that had been promised in the treaty but could do little. The balance of power in the world system I think has shifted significantly in their favor since then.

At the NPT Review Conference in 2000, in the Final Declaration there was agreement on 13 "practical steps" aiming to make progress on the disarmament obligations of the treaty.[25] As I suggested earlier, none of these steps have been taken and some steps have involved back-tracking, such as the steps to keep the Anti-Ballistic Missile Treaty in force, bring the nuclear test ban treaty into force, and agree a Fissile Material Cutoff Treaty. In 2005, the NPT Review Conference failed to agree on almost anything at all – in large part because the Bush Administration walked back the commitment to the 13 steps and more broadly "rejected the 2000 Final Declaration and all references to it".[26] In 2010, with the Obama Administration in office, the NPT Review Conference saw agreement on a 64-point action plan, which included some of the earlier 13 steps and a promise of a conference to establish a middle east zone free of nuclear weapons and other weapons of mass destruction.[27] No significant progress on the action plan has been made and the promised conference has not taken place. In 2015, the NPT Review Conference failed even to agree on a final document when the United States, Britain and Canada rejected it.[28]

The prospects for 2020 look very bleak. The United States, under the Trump Administration, has said that rather than taking steps on nuclear disarmament it wants to talk about what it would take to create the conditions for further steps on nuclear disarmament.[29] Implicit here is the possibility that the United States and other nuclear weapon states may decide that the conditions for progress on disarmament, as they see them, may never be allowed to come to pass.

At the same time, the structural dynamics and legitimacy crisis of the nuclear order has seen a shift in global power towards a greater exercise of agency by non-weapon states. This is evident in the process that in 2017 led 122 countries at the United Nations to agree on the Treaty on the Prohibition of Nuclear Weapons.[30] This is a historic step. This is the first multilateral nuclear weapons treaty that came from non-weapon states. It was led by countries from the global south and civil society. This is where people hoped back in 1946 we were going to get to with the United States and the Soviet plans to eliminate nuclear weapons before we had the horrors of the arms race.

The fact that 122 countries felt compelled and able to go through this treaty-making process despite the opposition of the nuclear-weapon states shows that these non-weapon states were willing to take a risk that they have never felt willing to

take before. Also, the non-weapon states were able to organize themselves in a way that they had not been able to organize themselves before. Through hard-fought NPT Review Conferences and other multilateral disarmament for a, non-weapon states have seen weapon states make commitments and then watched these promised steps remain unfulfilled. The ban treaty also reflects a positive recommitment by non-weapon states to the NPT and to a world without nuclear weapons despite the failure of the weapon states to meet NPT commitments to nuclear disarmament and despite the emergence of nuclear weapon states outside the NPT. Rather than contemplate withdrawal from the NPT or seek a new bargain with the weapon states, the non-weapon states of the ban treaty have accepted freely an obligation to not acquire nuclear weapons. As of the end of August 2019, the treaty had been signed by 70 countries and ratified by 26 countries.[31]

The ban treaty opens the door for nuclear-weapon states, should they become so enlightened, to join the treaty. A weapon state can do so either by giving up its nuclear weapons and joining the treaty and proving after the fact that it has already eliminated its weapons, or a state can join the treaty and agree with the other treaty members to a verifiable, irreversible, time-bound plan for the elimination of its nuclear weapons. Even without such action by weapon states, the new treaty breaks fundamentally new ground on nuclear weapons in important ways. The treaty does not just say that a state cannot develop, test, produce or manufacture nuclear weapons. It says a state is not allowed to use or threaten to use nuclear weapons. It is a direct and unambiguous challenge to the doctrine of nuclear deterrence: a state cannot base its military and national security policy on the threat to use nuclear weapons. How the countries of the ban treaty and the nuclear-weapon states are going to resolve this fundamental challenge to nuclear doctrines is something that is going to be a critical part of a new and more contentious global nuclear politics for many years.[32]

A NARROW MARGIN OF HOPE

Despite the efforts of a previous generation of activists, scientists, and policy makers, the bomb and the system that makes it possible seem to be winning a new lease of life. The hopefulness at the end of the Cold War 30 years ago that nuclear weapons soon might be abolished has passed, and more recent prospects of progress on disarmament raised by President Obama in his speeches in Prague and in Hiroshima have dimmed.[33] Faced with this reality, what are physicists today to do, and what would Szilard do? Szilard's interventions have been described as "disruptive and creative" and in what follows I will look at four of Szilard's efforts that may be relevant today.[34]

I want first, however, to focus on Szilard's idea that faced with the world as it was he had to do something, whatever he could, without any guarantee of success. This is evident in Szilard's retrospective judgement that in the struggle against nuclear weapons "It is not necessary to succeed in order to persevere. As long as there is a margin of hope, however narrow, we have no choice but to base all our actions on that margin."[35] For Szilard, this determination to act and to persevere came from his sense of responsibility. This sense is on display in his famous short story written in 1947 "My Trial As a War Criminal" in which Szilard is charged with war crimes for his role in the Manhattan Project and the use of the bomb.[36] This impulse was recognized by Soviet physicist and dissident Andrei Sakharov, winner of the 1975 Nobel Peace Prize and the 1983 American Physical Society's Leo Szilard Award, when he spoke of Szilard's "innate, acute feeling of personal responsibility for the fate of mankind on our planet."[37]

I want to begin with one of Szilard's interventions before nuclear weapons. In the early 1930s, Japan was establishing a colonial empire in China. This included in January 1932 a Japanese attack on Shanghai that included aerial bombing.[38] The League of Nations, the forerunner to the United Nations, sought to intervene but the Japanese government resisted. Szilard took exception to this and together with several other young scientists prepared a draft statement that proposed a scientific boycott of Japan. Szilard explained in a letter that "a mere protest by scientists would not be of any great value, but a pledge on the part of leading scientists to initiate and maintain a scientific boycott of Japan might help raise the issue, both in the Japanese scientific community and in the international community that this is an injustice, that what Japan is doing in China is an obvious injustice, and we need

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to have it stopped."[39] In the letter, Szilard argued the boycott was a way to "keep up faith in the cause of justice" and he hoped "scientists in Japan will understand that there is no feeling against them" and see the boycott as encouragement to "undertake the difficult and ungrateful task of exerting their influence in favour of Japan's giving up any attempt at taking the law into its own hands."

Szilard's argument was that even if it does not have great effect in the short term, an organized collective intervention by physicists in the issues that play out in the world could serve to keep "faith in the cause of justice", even if these issues have nothing to do with science. Szilard's sense of responsibility meant throwing whatever political voice and weight he and other scientists had into the process of finding just solutions to the world's problems.

What are the injustices today where the scientific community could call for scientists to show that they have "faith in the cause of justice"? What is so obviously unjust that we should speak up and act? There are many issues. For physicists and scientists in many countries, Israel's occupation of Palestine is sufficient grounds for a boycott. Cosmologist Stephen Hawking, among others, participated in boycotting scientific activities in Israel because of the occupation.[40] But that is not the only injustice in the world. One question for us is to determine if today we even have the commitments and adequate mechanisms as a community to have the conversation about what we as physicists can and should be doing to keep "faith in the cause of justice" rather than focusing only on things that affect us directly.

The second lesson from Szilard that I want to highlight is about scientists taking responsibility for their work. After the first ideas about the nuclear chain reaction and fission started to emerge, Szilard tried to organize a "conspiracy of those scientists who work in this field" to prevent this new knowledge becoming public.[41] Szilard started lobbying the physicists working on these issues that he knew to not publish their work. Szilard, for instance, wrote a letter to Lord Rutherford in 1936 noting that he was worried about "nuclear chain reactions" and the possible "misuse of chain reactions ... if they could be brought about and become widely known in the next few years", explaining that "feeling that I must not publish anything which might spread information of this kind – however limited – indiscriminately, has so far prevented me from publishing anything on this subject."[42]

By February 1939, Szilard was writing more bluntly to Frédéric Joliot that the idea of "a sort of chain reaction … [that] .. might then lead to the construction of bombs which would be extremely dangerous" was being discussed by physicists among themselves and least so far "every individual exercised sufficient discretion to prevent leakage of these ideas into the newspapers", and proposing that "we should take action to prevent anything along this line from being published in scientific periodicals."[43] The effort eventually failed.

The idea of scientists taking responsibility by refusing to work on nuclear weapons has persisted, however. The Göttingen Manifesto of 1957 issued by a group of leading German scientists was a public declaration that none of them were prepared to participate in the creating, testing, or deployment of any type of nuclear weapon.[44] At the time, there was a debate about arming the German military with nuclear weapons. The scientists also declared that "we cannot remain silent on all political questions" and when it came to nuclear weapons they felt "responsible to inform the public about facts that every expert may know about, but the public not enough."[45]

This question has been raised more indirectly within the American Physical Society. In 1986 APS President Sidney Drell was reported to have "raised an interesting, delicate, surely controversial question: Should physicists - and other scientists - try to develop guidelines and appropriate procedures for encouraging self-restraint on the kind of applied research work they conduct when there are potentially harmful consequences of that work (to the environment, to individuals, to mankind)?"[46] The options for discussions included "Can one imagine a version of a "Hippocratic Oath" for research scientists?" The timing of this question was informed no doubt by the debate over President Reagan's Strategic Defense Initiative (SDI) program, commonly known as 'Star Wars', and the Cornell Pledge to not seek or accept funding to work on this program that already had been signed by over 5000 scientists and engineers.[47]

In 1995 on the 50th anniversary of the bombing of Hiroshima and Nagasaki, Nobel Laureate Hans Bethe, who had led the Theoretical Division at Los Alamos during the Manhattan Project, made a public statement in which he said, "I call on all scientists in all countries to cease and desist from work creating, developing, improving, and manufacturing nuclear weapons and other weapons of mass destruction."[48] This is an important call to individual scientists to not do nuclear weapons work, but as in earlier initiatives leaves hanging the larger question: as a community, what does our work make possible that is separate from our work as individuals? One question I would pose to us as a community is what can we do given that today we have a nuclear arms race taking off and nuclear weapons complexes are going out actively recruiting the next generation of young scientists? More simply, what can we do or should we do to prevent the next generation of nuclear weapons and the next generation of nuclear weapon scientists?

A third lesson from Szilard that I want to bring out concerns efforts to impact policy and decision making. Szilard was a great believer in educating and pressuring decision-makers. He wrote and sent an endless stream of letters to important people, including heads of state. He also produced lots of petitions, gathering other people to sign onto his view of looking at things or agreeing together with people to present options and possibilities, and to register public dissent.

Szilard famously was part of the group of Manhattan Project scientists led by James Franck in Chicago that produced the Franck report in 1945 about the future challenges of nuclear weapons.[49] In one section of their report, they raised the question of the possible use of nuclear weapons by the United States against Japan. This is one of the first discussions on the subject. The scientists said that the "the question of the use of the very first available atomic bombs in the Japanese war should be weighed very carefully, not only by military authority, but by the highest political leadership of this country". They argued on humanitarian grounds and prudential grounds against "the first introduction by our own country of such an indiscriminate method of wholesale destruction of civilian life." The United States should desist from dropping the bomb on Japan and they proposed instead that "a demonstration of the new weapon may best be made before the eyes of representatives of all United Nations, on the desert or a barren island." The idea was that Japanese leaders would see what a terrible thing this was and hopefully that might convince them to surrender. The scientists argued that if after such a demonstration and if the ultimatum to surrender failed, the weapon could be used against Japan only "if a sanction of the United Nations (and of the public opinion at home) could be obtained." In other words, it should not be the sole decision of the President and political and military leaders of the United States to decide to drop the atomic bomb. The use of nuclear weapons was something with such grave consequences for humanity that it had to be a decision taken by the world as a whole and by American people because they would carry the moral responsibility of this deed forever.

What would Szilard do now given that the first use of nuclear weapons is a core part of the policy of the United States and of some of the other nuclear-weapon states? One step might be to launch and lead a process within the physics community and the larger scientific community to challenge the possibility of first use of nuclear weapons and seek to end it by engaging with existing decision making processes, which in this case would be for instance the United States Congress. Szilard might well suggest a search for ways to participate in a more organized and collective way with Congress. In 1952, Szilard proposed a lobby for peace, given that industrialists have lobbies and unions have lobbies. There should be a peace lobby in Washington D.C. and a political action committee, whose job it would be to raise money and influence presidential elections. This came to pass in 1962, when Szilard helped found the Council for a Livable World, which still does this work in Washington D.C.[50] Szilard explained this decision to go from organizing scientists to intervening in election campaigns by saying that "I was led to conclude that the sweet voice of reason alone could not do the job, that campaign contributions could not do the job, but the combination of the sweet voice of reason and substantial campaign contributions might very well do the job."[51]

A fourth and last lesson that may be relevant today is that Szilard put great faith in the possibility that if you educate fellow citizens, they will rise to the challenge. In May 1946, Szilard proposed to Einstein that they found an Emergency Committee of the Atomic Scientists.[52] A small group of like-minded scientists was assembled.[53] The office came to be 90 Nassau Street, in Princeton, down the street from Princeton University's Program on Science and Global Security where I work.

Einstein signed and sent to physicists all over the world a fundraising letter, drafted by Szilard in part, asking for a million dollars for the Emergency Committee of the Atomic Scientists.[54] The letter explained the impulse, the ends and the means of this early scientist-led nuclear disarmament effort: "We scientists recognize our inescapable responsibility to carry to our fellow citizens an understanding of the simple facts of atomic energy and its implications for society. In this lies our only security and our only hope. We believe that an informed citizenry will act for life and not for death."[55] Einstein's letter was clear about where he and the other scientists saw Szilard's "margin for hope." Faced with the nuclear danger, the letter declared "there is no possibility of control except through the aroused understanding and insistence of the peoples of the world." The effort attracted a compelling public response.[56]

What would Szilard do, given where we are today? Likely, the advice would be to organize ourselves to act as a community that shows "faith in the cause of justice" in all its aspects in an unjust and violent world, play no part in enabling the renewed threat from nuclear weapons and in training the next generation of nuclear weaponeers, make our voices heard in democratic processes in every way, and reach out to people as fellow citizens and educate them about what it means to live in nuclear-armed world. With a narrow margin of hope, we can play our fullest part in finding ways to shape, choose, and implement policies to end the dangers that nuclear weapons pose to humankind.

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