Nuclear negotiations: back to the future?

by Ronald J. Bee

This August 29, 2017, photo distributed by the North Korean government shows what was said to be the test launch of a Hwasong-12 intermediate range missile in Pyongyang, North Korea. (KOREAN CENTRAL NEWS AGENCY/KOREA NEWS SERVICE/AP PHOTO)

In 1986, over 70,000 nuclear warheads had amassed in world arsenals, according to the Federation of American Scientists (FAS). In January 2018, the FAS Nuclear Notebook estimated the total number of nuclear weapons worldwide at 14,485. At first glance, today's numbers seem like a measurable improvement. The end of the Cold War (1947–91) led to 85% reductions in U.S. and Russian arsenals, and the two powers agreed to the Strategic Offensive Reductions Treaty (SORT, 2003) and the New Strategic Arms Reduction Treaty (New START, 2010). The latter, which is set to expire in 2021, reduced the number of strategic missile launchers by 50%, and limited each country to 1,550 strategic nuclear warheads on bombers, submarines and missiles. Even with this treaty in place, the U.S. and Russia still control 93% of all nuclear weapons internationally.

New tensions and conflicts in world politics today threaten to renew strategic nuclear competition between the major powers. A nuclear war ignited by using a small fraction of 9,300 warheads could mean the end of civilization as we know it—a situation that Daniel Ellsberg (famous for leaking the Pentagon Papers report on the Vietnam War in 1971) calls "omnicide."

Since the U.S. bombed the Japanese cities of Hiroshima and Nagasaki on August 6 and 9, 1945, no state has used nuclear weapons in an attack. Why? For those who support the strategy of deterrence, the fact that no state

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Dr.Herbert F.York, the Defense Department's research chief, is shown at a press conference on October 5, 1959, where he said Americans must be prepared for the "acute embarrassment" of seeing Russia launch bigger space vehicles than the U.S. for several more years. The press conference was called in the wake of Russia's new moon-rocket success. (BETTMANN/GETTY IMAGES)

with nuclear weapons has attacked another state with nuclear weapons is an affirmative sign. The superpowers came close to mutual assured destruction in the Berlin and Cuban Missile Crises of 1961 and 1962, but when push came to shove, no politician, American or Soviet, was about to risk nuclear annihilation.

The yin and yang junction of disarmament and deterrence has existed in the nuclear weapons discourse since at least World War II (WWII). In his memoir, *Making Weapons, Talking Peace: A Physicist's Odyssey from Hiroshima to Geneva*, Herbert F. York reveals his ambivalence along these lines by noting the need to build nuclear weapons while simultaneously using them as leverage to negotiate for peace. York, a Manhattan Project scientist, advised six presidents. He became a staunch advocate for dialogue and nuclear arms control. He fully recognized the need to protect the U.S., yet felt anxious about any international breakdown in deterrence that might lead to the destruction of his country and others.

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"Peace through strength," a phrase coined by the Roman Emperor Hadrian in the first century AD, would become a motto of U.S. President Ronald Reagan (1981–89) some 19 centuries later. While "Peace through strength" has consistently appeared in Republican Party platforms in the years since Reagan left office (including in 2016), Democratic Presidents Bill Clinton (1993–2001) and Barack Obama (2009–17) favored another approach: Their "lead but hedge" strategy sought to take the lead on arms reductions and nuclear nonproliferation while maintaining a viable nuclear arsenal to hedge against unforeseen geopolitical developments.

The possibility of "unforeseen developments" lies at the heart of states' rationales for keeping nuclear weapons. Such weapons provide some guarantee of survival in an unpredictable and confrontational world. Every leader of a nuclear-weapons state, no matter their preferred political or economic system, has thus far coveted this hedge. No state, whether democratic or totalitarian, has thus far risked self-destruction by attacking another nuclear-weapons state. Yet as regions become more crowded and less stable, as in the Middle East, it is only prudent to interrogate the status quo.

York, who served as the U.S. ambassador and chief negotiator for the Comprehensive Test Ban Treaty (CTBT) talks, published the second edition of his book in 1989, one month before the Berlin Wall fell and two years before the Soviet Union dissolved. York concluded that "Two great realities dominate the world scene. One is that the strategy of maintaining peace through the threat of mutual annihilation cannot work forever, no matter how stable it may currently be. The other is that finding an effective, moral, and permanent replacement for the current strategy will take serious effort, and a long time, generations at least."

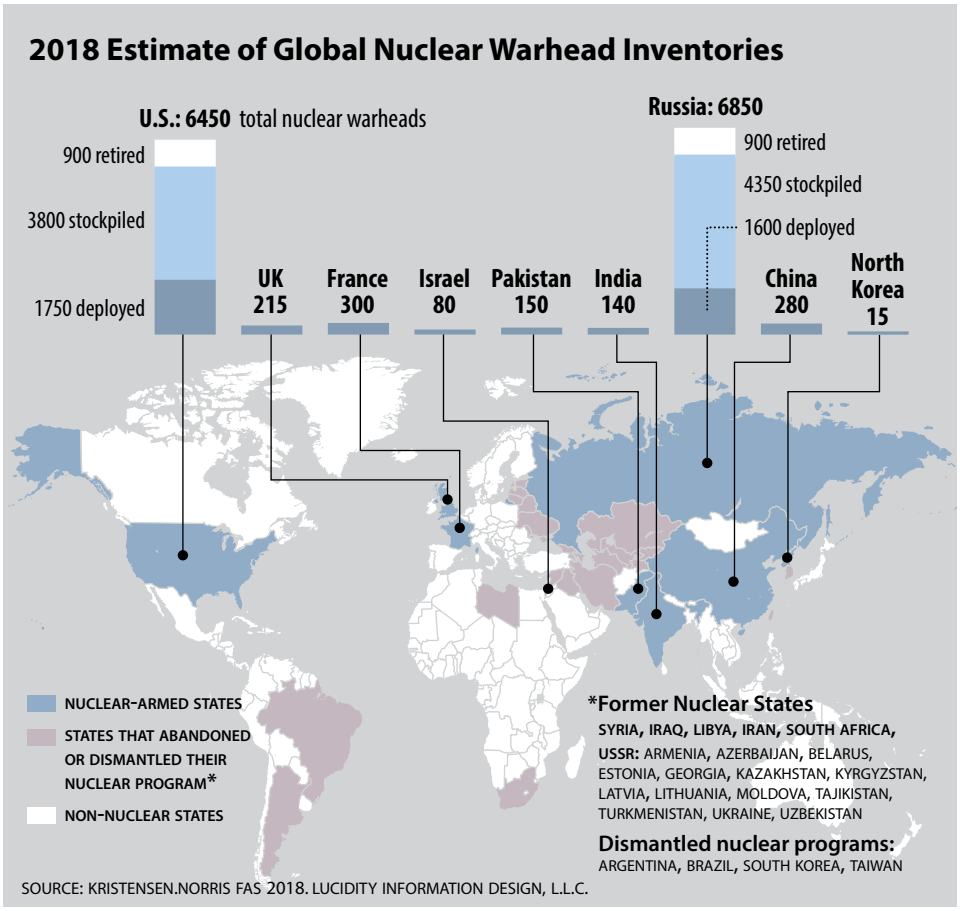
While the U.S. and Russia have reduced their nuclear arsenals, they have not eliminated them. Furthermore, the other three nuclear-weapons states recognized by the Treaty on the Non-Proliferation of Nuclear Weapons (NPT, 1968), the UK, France and China, also maintain their arsenals, and four other countries outside the NPT now possess nuclear arsenals (Israel, India, Pakistan and North Korea).

As the U.S. and Russia ponder renewing the New START Treaty to 2026, competing interests on the world stage threaten to jump-start new nuclear arms races. In February 2018, the U.S. Department of Defense (DoD) released its Nuclear Posture Review (NPR), which determines the role of nuclear weapons in U.S. security strategy. Citing an "uncertain international security environment," the NPR notes that "While the U.S. has continued to reduce the number and salience of nuclear weapons, others, including Russia and China, have moved in the opposite direction…North Korea continues its illicit pursuit of nuclear weapons…[and] Iran retains the technological capacity and much of the capacity necessary to develop a nuclear weapon within one year of a decision to do so." The review warns that "nuclear non-proliferation today faces acute challenges" in North Korea and Iran, and concludes with the statement that "The U.S. remains willing to engage in a prudent arms control agenda."

That prudence looks much like York's "making weapons, talking peace." The U.S. will modernize its nuclear triad, and new tit-for-tat rhetoric

between U.S. President Donald Trump (2017–present) and his Russian counterpart Vladimir Putin (2000–08, 2012–present) in 2018 indicates that both of their countries have begun development of hypersonic cruise missiles that could carry nuclear warheads and circumvent ballistic missile defenses. China has also invested in developing this technology.

The Permanent Five (P5) of the United Nations Security Council (UNSC)—the U.S., the UK, France, Russia and China—all retain nuclear arsenals, despite the best intentions of the NPT, which calls upon those states to eventually destroy their weapons. Hoping for general and complete disarmament as promised in that treaty, however, has become the nuclear equivalent of waiting for Godot. Any nuclear aspirant can readily see by the structure of the United Nations (UN), and the veto power of the P5, that having a nuclear arsenal promises power, prestige and protection.



In June 2018 President Trump announced the establishment of a U.S. Space Force to, among other goals, counter anti-satellite weapons developed by Russia and China. A space race could very well risk the placement of nuclear weapons in space and the deployment of advanced ballistic missile defense systems. Such actions would violate the New START Treaty and the Outer Space Treaty (1967), whose provisions compel the parties "not to place in orbit around the earth, install on the moon, or any celestial body, or otherwise station in outer space, nuclear or any other weapons of mass destruction."

The Intermediate-Range Nuclear Forces Treaty (INF, 1987) has also come into question, with Russia appearing to have abrogated that accord. The U.S. claims that President Putin has plans to build a land-based nuclear missile system that could attack Europe on short notice. Such a system would violate the INF Treaty. On October 2, 2018, the U.S. permanent representative to the North Atlantic Treaty Organization (NATO), Kay Bailey Hutchison, put Russia "on notice," announcing that if Moscow continued to develop the missile system, "countermeasures [by the U.S.] would be to take out the missiles that are in development by Russia in violation of the treaty." On October 20, President Trump announced his decision to terminate the INF Treaty because Russia has built a prohibited missile designated as the 9M729 that could threaten European NATO, and China, not a party to INF, has built intermediate-range missiles that could threaten U.S. and allied interests in Asia. This withdrawal implies that any future talks on intermediate range nuclear missiles should include China.

Secretary of State Hillary Clinton presents Russian Foreign Minister Sergey Lavrov with a device with a red button symbolizing the intention to "reset" U.S.-Russian relations during their meeting in Geneva,Switzerland, on March 6, 2009. (AP PHOTO)

Before and after his election, Trump severely criticized the "reset" policy with Russia that had been spearheaded by his predecessor President Obama and Obama's Secretary of State Hillary Clinton (2009–13). Trump claimed that the policy led directly to the Russian annexation of Crimea, a civil war in Eastern Ukraine and the insertion of Russian troops into Syria to support the Syrian dictator Bashar al-Assad. Trump also criticized the Obama-Clinton approach of "strategic patience" with North Korea, taunted North Korean leader Kim Jong Un (2011–present) by calling him "a maniac" and "little rocket man," and suggested that Japan (steadfastly

anti-nuclear since the events of WWII) might need to develop nuclear weapons to deter Kim. In his first speech to the UN, President Trump warned that if the U.S. "is forced to defend itself or its allies, we will have no choice but to totally destroy North Korea." Mr. Trump also railed against President Obama's nuclear agreement with Iran as "the stupidest deal of all time." The president has since withdrawn the U.S. from that agreement.

President Trump must now deal with Russia, China, North Korea and Iran on the nuclear front, and has juxtaposed fiery public rhetoric with cordial face-to-face dialogue. He has personally met with President Putin, Kim Jong Un and Chinese President Xi Jinping (2013–present), and has said he would be willing to meet with Iranian President Hassan Rouhani (2013–present) with "no preconditions." At the same time, Trump has imposed economic sanctions on Russia for its invasion of Ukraine, on China for unfair trade practices, on North Korea for missile and nuclear tests, and on Iran for supporting terrorism throughout the Middle East.

President Trump's gambits carry high stakes for a variety of constituencies: for U.S. citizens; for the U.S. government as the leader of the free world; for U.S. allies in Europe, Northeast Asia and the Middle East; and for rivals in the not-so-free world that perceive nuclear weapons as an ultimate hedge for political survival. Can a businessman-turned-president apply "the art of the deal" to the age-old dilemma of "making weapons, talking peace," and if so, what can we expect from pending nuclear negotiations, and for the future of arms control talks in general? What options does the president have, and what lessons should he consider in navigating today's nuclear waters?

The economics of nuclear weapons

Since the beginning of the nuclear age, much debate has unfolded over the question "how much is enough?" How many nuclear weapons do we need to deter our enemies, and how much money should we invest in that arsenal to protect the peace? Tracking the actual money expended by the U.S. for nuclear weapons over time should provide salient insight into how the country has answered these questions.

In a 1998 Brookings Institution book, *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940*, the authors calculated that the U.S. spent $5.5 trillion on nuclear weapons and weapons-related programs through 1996—some 29% of all military spending during that period. In 2014, the James Martin Center for Nonproliferation Studies released a report estimating that the U.S. would spend a trillion dollars over the next 30 years to modernize or replace the full triad of air-, land- and sea-based nuclear weapons. The DoD, in a 2018 fact sheet, "U.S. Nuclear Modernization," had a more moderate estimate: "Recapitalization, including plans for sustainment and modernization, will cost approximately 6.4% of the DoD base budget ($230–290 billion in 2018 dollars) spread from 2018 to 2040."

As the percentage of the military budget devoted to nuclear weapons has gone down, the budget for post-9/11 conventional operations has drastically gone up. The total U.S. defense budget enacted for fiscal year 2018 equals $700 billion, and fiscal year 2019 will amount to $716 billion. After WWII, in fact, the U.S. turned to nuclear weapons as a *cost-saving measure*. In 1953, President Dwight Eisenhower (1953–61) announced his New Look strategy, which reduced costs by bringing U.S. troops home to contribute to the post-war economy; the U.S. would now rely on deploying nuclear weapons in Europe to deter Communist aggression. At the time of this decision, President Eisenhower had just witnessed a bloody Korean War (1950–53) that ended in stalemate, and a Soviet build-up of huge conventional forces in Eastern Europe that required a counterbalance in Western Europe—both hugely expensive endeavors.

Non-nuclear conflicts since 9/11 have certainly borne out Eisenhower's warnings about the long-term costs of conventional conflicts. In a May 2018 report from the Stimson Center, a nonpartisan study group concluded that the total spending on counterterrorism since 9/11 amounted to $2.8 trillion from fiscal year 2002 to 2017. These expenditures included "governmentwide homeland security efforts,

international programs, and the wars in Afghanistan, Iraq, and Syria."

Some ask why we should continue to expend so much money, labor and opportunity costs on weapons that prove useful only if they are never used. Indeed, *Atomic Audit* concludes that "The time has come to consider carefully the costs of and consequences to the U.S., and the world, of producing tens of thousands of nuclear weapons and basing national security on the threat of nuclear annihilation." The contrasting school of thought argues that nuclear weapons have proven their worth every day by deterring attack from our adversaries. This view holds that nuclear weapons kept the peace during the Cold War, until the Soviet Union unraveled from within, and that they continue to keep the peace with Russia today.

In reviewing the U.S.-Soviet nuclear contest, James Schlesinger, former secretary of defense and director of central intelligence, argued that nuclear weapons "shaped the outcome." He added, "It is far, far harder to argue that the West generally, and Western Europe in particular, would have been better off without nuclear weapons. Without the nuclear deterrent, the kind of semi-darkness that held the nations of Eastern Europe in its grip for more than four decades might also have afflicted much of Western Europe. Despite the worries of the past and the prospect of concern about nuclear weapons in the future, in this century their benefits have exceeded their costs."

These words continue to ring true to a national security community faced with new risks from troubled state and non-state actors. Secretary Schlesinger and political scientist Kenneth Waltz subscribed to a "nuclear peace theory" of international relations, which maintains that under some circumstances nuclear weapons induce stability and reduce the chances of escalation. Waltz's famous *Adelphi Paper #171*, "The Spread of Nuclear Weapons: More May Be Better," argues in favor of this perspective. The counterargument, made by Scott Sagan at Stanford University, asserts that "more will be worse" due to lack of civilian control over nuclear policy, and the potential for accidental use with catastrophic consequences.

Since the Berlin Wall fell on November 9, 1989, nuclear weapons have done nothing to deter ethnic conflicts in the former Yugoslavia and sub-Saharan Africa (Somalia, Sudan and Rwanda), a war in Afghanistan (Operation Enduring Freedom, 2001) two wars in Iraq (Operation Desert Storm, 1991, and Operation Iraqi Freedom, 2003), terrorist attacks in the U.S. and Europe, civil wars in the wake of the 2011 Arab Spring (Egypt, Syria, Libya and Yemen), and the invasion of Ukraine (2014).

Only in Syria have nuclear states—the U.S. and Russia—backed different factions with troop deployments. In this particular case, both parties coordinate their air force movements via a "deconfliction line" to reduce the likelihood of a collision between aircraft. This provides a modern-day conventional weapons equivalent of the 1963 hotline agreement, which built a direct communications link between the U.S. and the Soviet Union in order to prevent an accidental nuclear war. Since 1963, additional hotlines have been established, including between the U.S. and Russia, the U.S. and China, France and Russia, the UK and Russia, and between India and Pakistan.

States with smaller arsenals have also calculated the costs and benefits of developing nuclear deterrents. The usual conclusion is that minimal nuclear deterrence with smaller arsenals will prevent attack from potential adversaries. The UK, France, China, Israel, India, Pakistan and North Korea have all made those calculations to protect their respective national interests. In the case of North Korea and now Iran, authoritarian regimes have embraced what we might call "making weapons, talking survival" as part of a long-term gambit to protect their power.

Both the UK and France have recently re-invested in nuclear deterrence. In 2016, UK Parliament voted to renew its arsenal with a commitment to a new fleet of Trident submarines, which will come into service in the 2030s. In February 2018, on the heels of the U.S NPR, France announced that it would invest 37 billion euros in upgrading its nuclear deterrent.

Nuclear weapons, whether we like it or not, continue to serve a political purpose. For liberal republics, they hedge against illiberal regimes. For authoritarian and totalitarian regimes, they deter regime change from abroad and instill fear in their citizens at home. Tolerating costs to budget and population, nine states have chosen to build and keep nuclear weapons.

Indian military forces display an Agni II missile during the Republic Day Parade on January 26, 2002. The Agni II is the most powerful missile capable of carrying nuclear warheads in the Indian arsenal. Earlier that week, India had tested a shorter range nuclear-capable ballistic missile, heightening tensions with Pakistan. (AMI VITALE/PANOS PICTURES/REDUX)

Nuclear weapons cooperation agreements: maintaining deterrence

The U.S. has nuclear weapons cooperation agreements with its two nuclear allies in NATO, the UK and France. The UK and the U.S. have, since WWII, worked together on nuclear weapons development. In 1958, they signed a mutual defense pact to improve each party's "atomic weapon design, development and fabrication capability." In 2014, President Obama announced an update to that agreement that will last until 2024: The UK "intends to continue to maintain viable nuclear forces into the foreseeable future," he explained, adding that it remained in the U.S. interest to help the UK retain "a credible nuclear deterrent."

U.S. nuclear cooperation with France began during the administration of President Richard Nixon (1969–74), when both countries quietly cooperated on ballistic missile design, and, later, safety and security of nuclear weapons. On June 19, 1974, the U.S. signed the NATO Ottawa Declaration, which recognizes the role of British and French nuclear forces in NATO. In 1996, according to the *Washington Post*, the Clinton administration entered into an agreement with France to share nuclear weapons data from simulated explosions, and to increase cooperation between nuclear scientists.

While the French sharply disagreed with the 2003 U.S. invasion of Iraq and with President Trump's decision to withdraw from the 2015 nuclear deal with Iran, the two countries remain on the same page regarding Syria and the value of nuclear deterrence for collective security.

Since November 2, 2010, via the Lancaster House Treaties, the British and French also cooperate on nuclear stockpile stewardship, including working together at a joint facility in Valduc, France, to "model performance of nuclear warheads and materials to ensure long-term viability, security and safety."

Atoms for Peace?: nuclear energy cooperation agreements

The U.S. also enters into nuclear cooperation agreements with non-weapons states. These are designed to promote peaceful nuclear energy while thwarting the proliferation of nuclear weapons. Known as 123 Agreements, after Section 123 of the 1954 Atomic Energy Act (AEA), Congress formally calls them U.S. Bilateral Agreements for Peaceful Nuclear Cooperation.

The 123 Agreements have their origin in the Atoms for Peace program, part of President Eisenhower's Operation Candor—an effort to create an informed and cautious U.S. public in the nuclear age, and to project to the world that the U.S. had more interest in peace than in war. Atoms for Peace grew out of a December 1953 address by President Eisenhower to the UN General Assembly. The speech came in the wake of fears generated by the destruction of Hiroshima and Nagasaki, as well as by the 42 U.S. nuclear tests conducted since the end of WWII, among them the detonation in 1952 of a thermonuclear device with a blast effect over 60 times larger than that of the Hiroshima bomb.

The Atoms for Peace program has a mixed legacy of success. It supplied nuclear materials and know-how to India, Pakistan, Iran and Israel. In these cases, honorable intentions led to the diversion of technology for military purposes. Leonard Weiss, an expert on nonproliferation, has noted, "[I]t is legitimate to ask whether Atoms for Peace accelerated proliferation by helping some nations achieve more advanced arsenals than would have otherwise been the case. The jury has been in for some time on this question, and the answer is yes."

(Original Caption) Washington, D.C.: Postmaster General Arthur E. Summerfield announced that a special 3-cent stamp to commemorate "Atoms for Peace" will be first placed on sale at Washington, D.C. on July 28, 1955. The stamp will be blue in color and the central design is composed of two spheres showing each side of the atlas encircled with the orbital emblem which has become symbolic of atomic energy.(Bettmann/Getty Images)

Eisenhower's initiative also called for the establishment of the International Atomic Energy Agency (IAEA), which eventually occurred on July 29, 1957. The IAEA serves as an independent wing of the UN and promotes peaceful and safe uses of atomic energy, while acting as a nuclear watchdog agency. It has become an essential component of the NPT, which is itself the cornerstone of international efforts to stop the spread of nuclear weapons. The NPT calls for a grand bargain wherein nuclear-weapons states promise to negotiate the reduction of their arsenals (Article VI) and refrain from helping non-nuclear states to acquire nuclear weapons (Article I). In exchange, non-nuclear states agree not to build nuclear weapons (Article II), and place all of their nuclear facilities under international safeguards (Article III). Those safeguards require IAEA inspectors to verify compliance by visiting nuclear facilities of member states to ensure that nuclear materials, equipment and know-how do not get diverted for military purposes. Inspectors report any non-compliance to the UNSC. Most of the nuclear weapons controversies in North Korea, Iraq and Iran began when those countries denied access to IAEA inspectors.

Since Atoms for Peace, the U.S. has entered into 123 Agreements by selling nuclear reactors, critical parts of reactors and reactor fuel. The U.S. requires 123 Agreements for companies that wish to sell materials overseas that can be used to construct energy-producing nuclear reactors. The U.S.

has 123 agreements with 48 countries, the IAEA and Taiwan. In 2015, the U.S. negotiated new agreements with China and South Korea, and in 2018, renewed its agreement with Japan. Saudi Arabia and Mexico are currently seeking agreements. The UK plans to exit the European Union (EU) in 2019, and will then require a new 123 Agreement with the U.S., as the current accord exists under the rubric of the European Atomic Energy Community.

In testimony to the House Foreign Affairs Subcommittee on the Middle East and North Africa in 2018, Henry Sokolski, executive director of the Nonproliferation Policy Education Center, warned that the Middle East was at risk of becoming a "nuclear Wild, Wild West." In particular, he criticized the Trump administration proposal for a 123 Agreement with Saudi Arabia that would not require the kingdom to stop enriching or reprocessing nuclear fuel (the processes used to make a nuclear weapon). This oversight, Sokolski argued, "risks pouring kerosene on the embers of nuclear proliferation already present in the Middle East."

Some of those embers can be found in Iran, a regional rival of Saudi Arabia. Saudi Arabia is already fighting alongside other Arab states against Iranian-backed Houthi rebels in Yemen. Saudi Crown Prince Mohammed bin Salman (2017–present) has threatened to withdraw from the NPT, and he claimed in a March 15, 2018, CBS *60 Minutes* interview that "If Iran developed a nuclear bomb, we will follow suit as soon as possible." Israeli Prime Minister Benjamin Netanyahu (1996–99, 2009–present), in a meeting with the U.S. Senate Foreign Relations Committee, advised Washington not to cut a nuclear deal with Saudi Arabia unless the deal prohibits enrichment and reprocessing.

The Saudi 123 Agreement points to the U.S.' paradoxical interest in creating nuclear business while preventing proliferation. If the U.S. requires a "gold standard" that outlaws enrichment and reprocessing, U.S. companies are likely to lose business to other states like Russia and China with fewer nuclear scruples. Sokolski believes the U.S. must coordinate between all key nuclear reactor suppliers (France, Russia and China) and uranium fuel suppliers (France, a British-Dutch-German consortium and Russia) to stop proliferation. Moreover, we should consider placing an international moratorium on sales of nuclear reactors to the Middle East.

Henry D. Sokolski, executive director of the Nonproliferation Policy Education Center, in the Capitol Visitor Center on October 20, 2017. (TOM WILLIAMS/CQ ROLL CALL/GETTY IMAGES)

Sokolski further warns that the Trump administration "may also renew, revise, or cut additional nuclear cooperation agreements with Jordan, Egypt, Turkey, Morocco, and the [United Arab Emirates]. As a practical matter, there will be tremendous pressure to have these understandings take whatever we allow the Saudis," thus creating conditions for a nuclear arms race in the Middle East. Sokolski believes that Congress should revise and update the AEA to require the gold standard for all nuclear cooperation agreements

Setting this standard would also send a signal to other regions and countries. South Korea, for instance, has expressed a wish to build its own nuclear submarines, which would require enriched uranium fuel. South Korea's current nuclear cooperation agreement with the U.S. compels Seoul to acquire permission to enrich uranium. If the Trump administration acquiesced, this would certainly complicate denuclearization talks underway with North Korea.

How we got here: five nuclear races

We can conceptualize nuclear weapons issues and their related negotiations in terms of five chronological and overlapping races:

1. The ***original*** race against the Nazis during WWII to build the first atomic bomb.

2. A ***vertical*** race between the U.S. and the Soviet Union during the Cold War, which may be reemerging between the modern-day U.S. and Russia.

3. A ***horizontal*** race after the Cuban Missile Crisis to quell state-based proliferation, which endures today in Northeast Asia (North Korea) and the Middle East (Iran).

4. A race of ***denial*** to prevent non-state actors from acquiring nuclear weapons after 9/11, which continues unabated.

5. A nascent ***space race***, in which new cyber, artificial intelligence and space-based technologies may affect the future stability of nuclear deterrence.

The first two nuclear races involved competitions to acquire nuclear weapons; the third and fourth races became

imperatives to stop the spread of nuclear weapons to state and non-state actors; and the fifth race, a competition in outer space, now looms as our next nuclear challenge.

The original race: against the Nazis

The first nuclear race began in 1938, when German scientists Otto Hahn and Fritz Strassmann discovered nuclear fission in Berlin. The Nazi government quickly formed a German atom bomb project—the Uranium Club—in April 1939. A group of prominent German and Hungarian Jewish refugee physicists, including Albert Einstein, warned U.S. President Franklin Roosevelt (1933–45) about the German project. Roosevelt formed his own Uranium Committee to hedge against the possibility that the Germans might wish to attack the U.S. This committee remained highly secret because the U.S. formally remained neutral until attacked by the Japanese at Pearl Harbor on December 7, 1941. Germany declared war on the U.S. four days later on December 11, which led to accelerated spending on the Manhattan Project, the U.S. secret effort to beat Hitler to the atomic bomb.

The U.S. project led to the first successful test of a nuclear weapon, in New Mexico, on July 16, 1945—over a month after Germany had surrendered in Europe. After the defeat of Germany, President Harry Truman (1945–53) pivoted toward Japan, warning the empire to surrender or face a "rain of ruin." The first nuclear race thus ended with the defeat of Nazi Germany and the use of nuclear weapons against Japan, the only use of such weapons in wartime to date.

While the devastation in Japan led to attempts to curtail nuclear weapons proliferation internationally—including via the U.S.-backed Baruch Plan, introduced at the UN in 1946—such proposals fell on deaf ears. The call for "international control of nuclear weapons" did not resonate in an era in which capitalism and Communism competed in a world destroyed by war. Soviet dictator Joseph Stalin (1924–53) fast-tracked his own nuclear weapons program, underway since 1942. The U.S. started testing nuclear weapons again in 1946, only reinforcing Soviet commitment to their own arsenal.

The vertical nuclear race: between the superpowers

The second nuclear race saw the U.S. and the Soviet Union competing to build and deploy a large array of nuclear weapons—short-, medium- and long-range—in an effort to prevent the opposing side from gaining an advantage. The vertical nuclear arms race also witnessed atomic standoffs in Berlin and Cuba, and proxy wars in Korea, Vietnam and Afghanistan. In 1963, after close shaves in Berlin and Cuba, leaders chose to establish the first hotline agreement, as well as the Limited Test Ban Treaty, which banned nuclear testing in the atmosphere, underwater and in outer space. They further committed to a nuclear nonproliferation regime, designed to stem the spread of nuclear weapons to other state actors. The NPT lies at the center of this regime.

With the emergence of a new Soviet leader, Mikhail Gorbachev (1985–91), President Reagan negotiated the Intermediate-Range Nuclear Forces Treaty (INF), which came into effect in 1988. With the end of Communism and the rise of Putinism, however, a new strategic competition has emerged between the U.S., Russia, and China and the INF as of October 2018 President Trump has scrapped the agreement. In February 2014, Russia invaded and annexed Crimea, and began support for Russian separatists in an ongoing civil war in Ukraine. The Obama administration and the EU imposed economic sanctions on Russia for its actions, and those remain in place today. NATO counterbalanced Russian actions by deploying more forces in the region, including ballistic missile defenses to its eastern flank. This move challenged the stability of the New START Treaty: For the Russians, New START hinges on the U.S. not developing its ballistic missile defenses.

In March 2018, Presidents Trump and Putin, in dueling State of the Union speeches, proposed modernization of their respective nuclear arsenals, including new weapons. Putin announced that Russia had developed a new array of "invincible" weapons, including a hypersonic nuclear-powered cruise missile with worldwide range that can evade ballistic missile defenses. The second nuclear race threatens to re-emerge, if it has not already.

The horizontal race: preventing the spread of nuclear weapons to states

The third nuclear race, which began in 1962, refers to the ongoing global policy challenge of preventing proliferation of nuclear weapons by states. The NPT is the glue of the international nonproliferation regime, and can claim success for establishing a norm against proliferation.

Several states, like Argentina, Brazil and South Africa, have decided against developing nuclear weapons. After liberalizing their politics, these countries weighed the costs of owning atomic bombs and found that they paled in comparison to the benefits of remaining in the community of non-nuclear states. Others, including Taiwan, South Korea and Japan, have security guarantees provided to them by the U.S. that obviate the need to develop their own weapons. Still others—Israel, India, Pakistan and North Korea—have chosen a different course. For them, the benefits of building and maintaining nuclear weapons outweigh the economic and diplomatic costs. Israel neither confirms nor denies the existence of its ambiguous nuclear arsenal, yet everyone assumes it has one. India and Pakistan both exploded nuclear weapons in 1998, but the U.S. response to their nuclear programs has been complicated by strategic interests (interests in India, as a democratic country and marketplace of over 1 billion people; interests in Pakistan, which provides essential bases for U.S. operations in Afghanistan).

Rogue states: building weapons, negotiating concessions

The original grand bargain of the NPT holds out peaceful nuclear technology to non-nuclear states in exchange for their never building nuclear weapons. Nuclear safeguards, including inspections by the IAEA, provide oversight. But a number of NPT signatories, including Iraq, Libya, North Korea and Iran, have used the NPT to secretly develop their own nuclear weapons capabilities. In these cases, non-nuclear states abrogated their NPT obligations and built nuclear "sticks" so that they could leverage both political and economic "carrots." This "new nuclear bargain" has turned the NPT on its head.

The events of 9/11 changed the calculus for dealing with rogue regimes. The George W. Bush administration (2001–09) created the Department of Homeland Security to defend against terrorism domestically, and went after threats from abroad by invading Afghanistan (2001) and Iraq (2003), and conducting a global "war on terrorism." President Bush wanted to prevent a *nuclear* 9/11 and used "preemptive nonproliferation" to inhibit Iraq from aiding terrorists.

In 2003, Libyan dictator Muammar Gaddafi (1969–2011) watched the overthrow of Iraqi dictator Saddam Hussein (1979–2003) with trepidation. Gaddafi saw this as a wake-up call for his own regime, since Libya, too, had a not-so-secret weapons of mass destruction (WMD) program. Italy had seized a ship bound for Libya with parts for nuclear centrifuges. Gaddafi worried that the U.S. would invade Libya next, so he entered into secret talks with the U.S. and the UK: He would give away his nuclear program in exchange for regime survival and the end of economic sanctions. The U.S., UK and IAEA dismantled Libya's WMD program in 2004.

Then in February 2011, during the Arab Spring, Gaddafi's army brutally killed scores of peaceful protestors in the city of Benghazi. A civil war ensued, and the UN re-imposed sanctions on Libya for human rights abuses. The U.S., the UK, France and several other NATO members attacked Libya in support of the rebels (Operation Unified Protector). On October 20, 2011, rebel forces captured Gaddafi and killed him on the spot. While President Obama hailed this operation as an example of how collective security should work, nuclear proliferators like North Korea and Iran likely drew the conclusion that the U.S. could not be trusted to keep its nuclear deals.

U.S. President Donald Trump (R) gestures as he meets with North Korea's leader Kim Jong Un (L) at the start of their historic summit, at the Capella Hotel on Sentosa island in Singapore on June 12, 2018.(SAUL LOEB/AFP/GETTY IMAGES)

The "Libya model" for North Korean disarmament, proposed by John Bolton after he became President Trump's third national security adviser in April 2018, likely raised eyebrows in Pyongyang. Since the U.S. and North Korea negotiated an agreed nuclear framework in 1994, North Korea has always used its nuclear program as leverage for economic and political benefits in negotiations. (On the table then were two reactors for peaceful energy production and heavy oil transfers). Twelve years later, in 2006, North Korea detonated its first atomic weapon, and shortly thereafter left the NPT—the only country ever to have left the treaty.

Since 2011, Kim Jong Un's regime has also conducted scores of long-range missile tests, as well as five nuclear weapons tests, and made threats against Guam and the U.S. Kim has called President Trump a "mentally deranged U.S. dotard," and claimed "I have a nuclear button on the desk in my office. All of the mainland U.S. is within the range of our nuclear strike." Not one to back down from a war of words, Trump retaliated, calling Kim "little rocket man" and tweeting the message, "Will someone from his depleted and food-starved regime please inform him that I too have a Nuclear Button, but it is much bigger and more powerful than his, and my button works!" Amidst this schoolyard banter, three U.S. aircraft carriers were deployed around North Korea.

Under pressure from the U.S., the Chinese supported UN sanctions against North Korea, and warned that China would not come to Kim's defense if he launched missiles aimed at U.S. territory. Meanwhile, South Korean President Moon Jae-in (2017–present) has met twice with his North Korean counterpart, and has invited him to visit Seoul. Many South Koreans have relatives in the North, and President Moon has always supported peaceful unification of the Koreas.

On June 12, 2018, President Trump and Kim met in Singapore—the first summit meeting ever between a sitting

U.S. president and a North Korean leader. President Trump apparently conceded to stop U.S.-South Korean naval exercises, without first informing the U.S.'s South Korean allies. This led to "a joint statement committing to denuclearization of the Korean peninsula. Similar commitments have been made before, and now we await the devil in the details. The U.S. wants the North Koreans to denuclearize as a precondition for any concessions such as ending the Korean War, recognizing North Korea as a state or promising not to invade. North Korea, for its part, says that the U.S. needs to officially end the Korean War as a minimum prerequisite for denuclearization. Talks continue and a second summit may occur. In a positive development, North Korea has not conducted any nuclear or missile tests since the meeting.

Iran, for its part, used its nuclear program to negotiate an end to U.S. and EU economic sanctions through the Joint Comprehensive Plan of Action (JCPOA, 2015), signed by Iran, the P5 of the UN, and Germany. A signature achievement of the Obama administration, the deal has been intensely criticized by President Trump and by Prime Minister Netanyahu. In May 2018, President Trump announced that the U.S. would withdraw from the deal and re-impose sanctions on Iran.

The Iranian threat in Lebanon and Syria, and Tehran's abiding interest in atomic weapons, has increased the level of panic in Israel. It is possible that Israel could attack Iran should the kingdom decide to re-start its nuclear program. Israel has employed "preemptive nonproliferation" before: On June 7, 1981, it struck Iraq's Osirak reactor, and on September 6, 2007, it hit a Syrian nuclear compound. Moreover, Saudi Arabia, other Sunni states and Israel now have common cause against the growing Iranian threat.

The race of denial: denying non-state actors access to nuclear weapons

The fourth nuclear race emerged after 9/11. It aims to keep nuclear weapons out of the hands of terrorists. Indeed, the invasions of Afghanistan and Iraq were carried out on the pretext of protecting against a hypothetical nuclear terrorist attack. We now know that in fact, Saddam Hussein had bluffed about having WMDs in an effort to deter invasion and to intimidate his enemies at home. In September 2003, the U.S. and ten other countries established the Proliferation Security Initiative (PSI), with the mission of stopping WMD trafficking by state *and* non-state actors. This effort helped uncover the Libyan nuclear program, as well as the Abdul Qadeer (A.Q.) Khan proliferation network that supplied nuclear technology to Libya, North Korea and Iran from Pakistan. Today, 105 countries have committed to the PSI.

States still pose the biggest proliferation threat. The excessive costs of buying or building weapons prove prohibitive to terrorists; moreover, rogue nuclear states prefer to avoid the risk of having any weapons they might hand over to non-state actors traced back to them. Nonetheless, loose nuclear materials pose a threat as dirty-bombs—conventional explosives laced with radioactive materials. Keeping a lid on the spread of nuclear materials to terrorists remains a high priority.

Race five on the horizon: the new space race

In 1957, the Soviet Union launched the Sputnik satellite into space. The exorbitant financial costs of the ensuing "space race" between the U.S. and the Soviet Union eventually led to arms control efforts and the Anti-Ballistic Missile Treaty (ABM, 1972). The ABM Treaty came under fire during the Reagan administration, when the president began his Strategic Defense Initiative (SDI, 1983), also known as Stars Wars. This well-funded research and development program sought to produce viable ballistic missile defense systems. President Reagan marketed the idea as one that could render nuclear weapons obsolete. But the Soviets accurately saw it as the next expensive chapter in the arms race.

Reagan decided to rebuild the U.S. military to better compete with the Soviet Union. The Soviets had been under strain for years, with a collapsing economic system and military overspending. The Pentagon's Competitive Strategies plan involved leveraging U.S. economic strengths against Soviet weaknesses. Secretary of Defense Caspar Weinberger (1981–87) outlined the approach in his 1986 Foreign Affairs article "US Defense Strategy"; SDI became one of the fronts for that strategy. Speaking at Princeton University in February 1993, Mikhail Gorbachev admitted that SDI had helped end the Cold War, and that any attempt to compete with it would have come at unrecoverable cost to the Soviet economy.

On June 18, 2018, nearly 30 years after the collapse of the Soviet Union, President Trump signed a presidential directive to create a U.S. Space Force as a sixth branch of the Armed Forces. Congress initially raised the issue of a separate Space Force out of "concern over the slow pace with which the Department of Defense…and the Air Force have addressed the growing threat to U.S. national security in space from adversaries, particularly Russia and China, and to a lesser extent North Korea and Iran." Congress has passed, and the president has signed into law, the fiscal year 2019 National Defense Authorization Act (NDAA), which includes the creation of a subordinate Space Command under the auspices of U.S. Strategic Command.

Has President Trump taken a page out of the Reagan strategy? Are we going back to the future by strengthening the economy at home, rebuilding the military abroad, modernizing our nuclear forces and building a new space force to compete with Russia, and possibly China? The Russian economy has many structural problems, and the Chinese economy has sputtered since Trump levied sanctions for unfair trade practices. Russia, China, North Korea and Iran all currently have U.S. sanctions levied against them. Could this prove a set-up for second-term negotiations to reduce threats to the U.S. and its allies?

Options for alternative nuclear futures: between hope and fear

A number of options have emerged for how and when to proceed with nuclear weapons negotiations. They include moving toward a global ban—eliminating all nuclear weapons; moving toward a deterrence-only posture—fewer, and ultimately zero, nuclear weapons; and prioritizing the modernization of U.S. nuclear arsenals, followed by an assessment of the potential for negotiations.

Nuclear weapons ban: On July 7, 2017, the UN passed a Treaty on the Prohibition of Nuclear Weapons. It represents the first legally binding international agreement to prohibit nuclear weapons. The accord urges that nuclear-weapons states fulfill their obligations to general and complete disarmament. In addition, UN Secretary General António Guterres (2017–present) has proposed a five-point plan to achieve nuclear disarmament:

1. Urge nuclear-weapons states to work toward this goal, specifically at the Conference on Disarmament in Geneva, Switzerland;

2. Ask the UNSC to convene a summit on nuclear disarmament;

3. Resume talks on a CTBT and a Fissile Material Cut-off Treaty, and reaffirm nuclear-weapons-free zones;

4. Improve transparency on numbers of weapons, stocks of fissile material and disarmament efforts; and

5. Bolster efforts against WMD terrorism and put limits on conventional arms, with new bans on missile and space weapons.

Deterrence-only posture: Bruce G. Blair, a nuclear security expert currently at Princeton University, has written "The End of Nuclear Warfighting: Moving to a Deterrence-Only Posture," an alternative to the 2018 NPR. He suggests that we reduce U.S. and Russian arsenals while maintaining nuclear deterrence. This plan calls for eliminating all silo-based intercontinental ballistic missiles (ICBMs), reducing deployed nuclear weapons by two thirds to 650 warheads, and deploying those warheads on five nuclear submarines backed by a small reserve of 40 strategic bombers. A "deterrence only" posture, Blair argues, should have a no-first-use clause for nuclear weapons, no counterforce options against ICBMs, and a no-hair-trigger response to avoid accidental nuclear war. This plan would provide an interim step toward negotiating a nuclear-free world. The international non-governmental organization Global Zero endorses this approach, and believes it can help reach total world disarmament by 2030.

Modernize nuclear weapons, then negotiate: This option reflects the 2018 NPR's conclusion that the world remains a dangerous place, with the existence of potential adversaries—Russia, China, North Korea and Iran—necessitating the modernization of the U.S. triad. By modernizing existing ICBMs, submarines and bombers to maintain deterrence, the U.S. can negotiate from a position of strength in the future.

All three of these approaches see a role for nuclear negotiations, but at different times: one immediately, the second a little later and the third, once conditions prove correct. The U.S. should renew the New START treaty with Moscow, stay focused on reducing proliferation threats from North Korea and Iran, and insist that U.S. nuclear cooperation agreements—especially in the Middle East—uphold the gold standard of preventing uranium enrichment and reprocessing. The PSI must also remain focused on preventing the illicit sale and transfer of nuclear materials to state and non-state actors.

The Trump administration has a tall order of nuclear business ahead of it. It must negotiate between ideals of disarmament and fears of losing strategic advantages to potential enemies. In his 1987 book *The Art of the Deal*, Trump signaled that he likes to think big: "Most people think small, because most people are afraid of success, afraid of making decisions, afraid of winning." What will "winning big" mean in terms of the future of nuclear peace? As the president likes to say when planning his next move, "we'll see what happens."

Pictured in this screen grab is the Russian Navy Northern Fleet's Project 955 Borei nuclear missile cruiser submarine Yuri Dolgoruky as it launches Bulava missiles from the White Sea in north-west Russia at the Kura testing grounds on Kamchatka Peninsula on Russia's Pacific coast during a military drill in May 2018. (TASS/ GETTY IMAGES)

discussion questions

1. What are the political factors driving nuclear production and negotiations today? Why are nuclear weapons still produced if there are treaties and agreements in place not to utilize them?

2. How have nuclear agreements impacted negotiations in the past? How will President Trump's withdrawal from agreements such as JCPOA impact the United States and its allies?

3. North Korea is arguably the nation with the most unpredictable nuclear arsenal and capabilities. What role can the United States play in disarming this threat? How can past strategies of disarming be useful in this current situation?

4. Developed in the 1940s, nuclear weaponry is relatively recent issue in foreign policy. How has history influenced current nuclear negotiations? How have nuclear negotiations evolved since its emergence in the 20th century?

5. Last summer, Donald Trump announced and took steps towards creating a Space Force to protect American interests in outer space. How would the creation of this branch of military impact nuclear negotiations? Would it increase security against nuclear attacks? Why or why not?

6. Is a nuclear-free world possible? Why or why not? If so, what are the pathways to achieve this goal? What will nuclear negotiations look like in the future?

suggested readings

Ellsberg, Daniel. **The Doomsday Machine: Confessions of a Nuclear War Planner**. 432 pp. New York, NY: Bloomsbury Publishing, 2018. A memoir by the famous Pentagon Papers whistleblower of his time in the Pentagon as a nuclear war planner. He warns that the specter of nuclear war remains upon us and that we must disarm or face "Omnicide."

Feiveson, Harold et. al. **Unmaking the Bomb: A Fissile Material Approach to Nuclear Disarmament and Nonproliferation**. 296 pp. Cambridge, MA: MIT Press, 2016. The authors, based at Princeton University, believe that we can disarm as well as prevent nuclear proliferation and nuclear terrorism by focusing on the production, stockpiling, and disposal of highly enriched uranium and plutonium.

"From the Archive: Nuclear Weapons," **Foreign Affairs**, 1948–2005. Anthology of 12 articles from a leading journal on foreign policy with pieces written by government leaders and experts on the history of nuclear weapons and efforts to control them.

Roberts, Brad. **The Case for Nuclear Weapons in the 21st Century**. 352 pp. Stanford, CA: Stanford University Press, 2016. The Director of the Center for Global Security Research at Lawrence Livermore National Laboratory argues that other nuclear states are not prepared to join the U.S. in reductions and as a result, we must balance the reduction of future dangers with a nuclear strategy to deter potential enemies.

Sagan, Scott D. and Waltz, Kenneth N. **The Spread of Nuclear Weapons: An Enduring Debate (Third Edition)**. 288 pp. New York, NY: W.W. Norton & Company, 2012. Two prominent political scientists lay out the opposing arguments for whether the spread of nuclear weapons makes the world more or less peaceful.

Schultz, George P. and Goodby, James E. **The War That Must Never Be Fought: Dilemmas of Nuclear Deterrence**. 450 pp. Stanford, California: Hoover Institution Press, 2015. Secretary Schultz and Ambassador Goodby challenge the assumptions of classical deterrence theory, while reviewing problem regions in a series of articles that conclude that the global commons must build a new conceptual and institutional foundation for nuclear restraint.

Walt, Stephen M. "The World Does Not Need Any More Nuclear Strategies," **Foreign Policy**, February 6, 2018. The Harvard professor critiques the 2018 Nuclear Posture Review because it implies the Pentagon wants to create a new generation of smaller, usable nuclear weapons.

Don't forget: Ballots start on page 103!

To access web links to these readings, as well as links to additional, shorter readings and suggested web sites,

GO TO www.greatdecisions.org

and click on the topic under Resources, on the right-hand side of the page.