**The New Nuclear Age**

How China’s Growing Nuclear Arsenal Threatens Deterrence

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In late June 2021, satellite images revealed that China was building 120 intercontinental ballistic missile (ICBM) silos on the edge of the Gobi Desert. This was followed by the revelation a few weeks later that another 110 missile silos were under construction in Hami, in Xinjiang Province. Together with other planned expansions, these sites amount to a dramatic shift in the country’s approach to nuclear weapons. For decades, China maintained a relatively small nuclear force, but according to current U.S. intelligence estimates, that arsenal is now on track to nearly quadruple, to 1,000 weapons, by 2030, a number that will put China far above any other nuclear power save Russia and the United States. Nor does it seem likely that Beijing will stop there, given President Xi Jinping’s commitment to build a “world class” military by 2049 and his refusal to enter into arms control talks.

It is hard to overstate the significance of this effort. In developing a nuclear arsenal that will soon rival those of Russia and the United States, China is not merely departing from its decades-old status as a minor nuclear state; it is also upending the bipolar nuclear power system. For the 73 years since the Soviet Union’s first nuclear test, that bipolar system, for all its flaws and moments of terror, has averted nuclear war. Now, by closing in on parity with the two existing great nuclear powers, China is heralding a paradigm shift to something much less stable: a tripolar nuclear system. In that world, there will be both a greater risk of a nuclear arms race and heightened incentives for states to resort to nuclear weapons in a crisis. With three competing great nuclear powers, many of the features that enhanced stability in the bipolar system will be rendered either moot or far less reliable.

There is nothing the United States can do to prevent China from joining it and Russia as the world’s top nuclear powers, but there are things that U.S. strategists and defense planners can do to mitigate the consequences. For starters, Washington will need to modernize its nuclear deterrent. But it will also need to engage in new ways of thinking about the nuclear balance of power and how, in a far more complex strategic environment, it can maintain deterrence and keep the nuclear peace.

**GUNFIGHTERS ON A DUSTY STREET**

During the Cold War, both the Soviet Union and the United States were able to focus their nuclear strategies almost entirely on the other. The two superpowers built nuclear arsenals exceeding 20,000 weapons apiece, allowing them to largely discount the arsenals of the minor nuclear states—China, France, Israel, and the United Kingdom—whose stockpiles did not exceed the low hundreds. After the Cold War, Russia and the United States felt comfortable agreeing to reduce their deployed strategic forces to 1,550 nuclear weapons, as they continued to maintain a large advantage over any other nuclear-armed state.

Although the bipolar system did not eliminate the risk of nuclear war, it worked well enough to avoid Armageddon. Two features of the two-power system are parity and mutually assured destruction, or MAD. Ever since they initiated the Strategic Arms Limitation Talks, in 1969, both Moscow and Washington have emphasized maintaining parity, or similar-sized arsenals, as a way to enhance deterrence and crisis stability—a situation in which there are strong disincentives to resort to nuclear weapons, even under conditions of great stress. For both powers, establishing nuclear forces that were similar in size and far larger than that of any other nuclear state placed them on an equal footing. This was especially important for the United States, which sought to discourage Soviet attacks not only on itself but also against key allies and security partners, whom Washington had offered to shelter under its “nuclear umbrella” through extended deterrence. Consequently, Washington was keen to avoid creating the perception among these states that its nuclear forces were in any way inferior to Moscow’s.

As the Soviet arsenal continued expanding in the Cold War’s early period, and especially after the development of thermonuclear weapons, American strategists sought new ways to strengthen deterrence. A key factor in this effort was the concept of assured destruction, according to which the U.S. arsenal needed to be able to absorb a surprise Soviet first strike and still be capable of inflicting a devastating retaliatory, or second-strike, attack that could destroy the Soviet Union as a functioning society. (In 1964, U.S. Defense Secretary Robert McNamara estimated that an arsenal needed to be able to conserve 400 weapons to maintain an assured destruction force for a second strike, which he defined as the ability to destroy a quarter of the Soviet Union’s population and half its industrial capacity.) Later, strategists devised the term “mutually assured destruction” to describe the situation in which both rivals possessed this ability. This apocalyptic standoff was famously characterized by the physicist Robert Oppenheimer, who led the development of the atomic bomb, as the state of two scorpions trapped in a bottle, each able to kill the other, but only at great risk to its own survival.

Simply maintaining the ability to obliterate the adversary’s population centers and industrial infrastructure in retaliation for any nuclear attack did not, however, guarantee that deterrence would hold in every situation. Under what conditions would a rational leader opt to use nuclear weapons in a conflict? The game theorist and Nobel laureate Thomas Schelling pointed out that under certain circumstances, initiating a nuclear war could be seen as a rational act. As Schelling saw it, the two great nuclear powers, instead of resembling scorpions in a bottle, might confront each other as two gunfighters on the dusty street of a lawless Old West town, where whoever is quicker to draw enjoys an advantage. This situation would obtain when one of the two powers sensed what Schelling called “the fear of being a poor second for not going first.” This fear became particularly acute when advances in ballistic missile guidance enabled both the Soviet Union and the United States to execute a “counterforce” nuclear attack on the other’s own nuclear arsenal, thereby potentially compromising the efficacy of any second-strike attack.

These fears were accentuated by the advent of missiles with multiple independently targetable reentry vehicles, or MIRVs. Since each “vehicle,” or nuclear warhead, on such a missile was capable of hitting a different target, there was now the prospect of an attacker using a single missile to destroy several comparably armed enemy missiles in their silos, or of a naval base hosting several ballistic missile submarines, each armed with a dozen or more missiles carrying hundreds of weapons, or of dozens of nuclear-armed bombers at an air base. In military terminology, the attacker could now enjoy a highly favorable “cost-exchange ratio,” in which it could destroy dozens of its rival’s weapons using only a few of its own, thus significantly altering the state of parity that had existed before the attack.

In such a contingency, the victim would be left with two unpalatable forms of retaliation. It could use much or most of its small surviving force to launch an attack in kind against the aggressor’s arsenal. But the prospects for success would now be slight, as the bulk of the aggressor’s nuclear forces would be intact and, along with its air and missile defenses, be standing on full alert. Moreover, such a second strike would also risk leaving the victim with insufficient forces to maintain an assured destruction capability. Alternatively, if the victim chose to conduct a devastating attack on the aggressor’s economy and society, it would be an act of suicide, since it would trigger MAD, provoking a corresponding attack on itself from its adversary, which had preserved its own assured destruction force. The victim would therefore be confined to a third option, retaining its surviving nuclear forces to deter an attack on its economy and society. But if it did so, the attacker would enjoy a substantial surplus of nuclear forces to support acts of coercion or further aggression.

The “fear of being a poor second” led both the Soviet Union and the United States to maintain some of their nuclear forces on high alert, known as a “launch on warning” posture. The objective was to increase the risk to the attacker by having vulnerable forces able to launch before they could be destroyed. This approach had its own hazards: at several points during the Cold War, American or Soviet forces came uncomfortably close to launching a nuclear strike when their early warning systems erroneously detected that an attack was underway. Nonetheless, the general stability of the bipolar system did much to help avert a nuclear conflict for nearly 70 years.

**THREE SCORPIONS, NOT TWO**

China’s attainment of great-nuclear-power status will dramatically upset this delicate equilibrium. Until recently, the Chinese government seemed content with a “minimum deterrent” force of only a few hundred weapons. Now, however, it is moving in an entirely different direction. Along with its silo-building spree, it has developed a new ICBM capable of being armed with up to ten MIRVed nuclear warheads. This combination of proliferating launch silos and hydra-headed missiles will enable the Chinese military to expand its land-based arsenal even further, to as many as 3,000 weapons, simply by filling its silos with these missiles. China has also been modernizing its submarine-launched ballistic missile force and its long-range bomber fleet with an eye to fielding a robust triad of nuclear delivery systems—land, sea, and air—a capability that until now only Russia and the United States have possessed.

Addressing nuclear strategy in a tripolar nuclear system brings to mind the challenges associated with the so-called three-body problem in astrophysics. This is the problem of trying to predict the motion of three celestial bodies based on their initial positions and velocities. In a system of two celestial bodies, such a prediction can readily be made. But when there are three, no general solution has yet been identified (except when at least one of the bodies has a gravitational attraction that is miniscule relative to those of the other two). Because the future positions of the three bodies defy an easy solution, a three-body system is described as “chaotic.” Similarly, with the emergence of three rival nuclear powers, several key features of the bipolar system will break down, and the “fear of being a poor second” for failing to attack first will likely increase.

To begin with, once China, Russia, and the United States all have large nuclear arsenals, each power will have to work to constrain the behavior of not one but two different adversaries. The concept used by the Chinese for deterrence—*weishe*—serves to make the point. It is more expansive than the traditional Western definition of “deterrence,” and it includes two different objectives. The first, similar to the Western concept, involves discouraging, or deterring, an opponent from pursuing a particular course of action. But the second objective of *weishe* is to coerce an opponent into pursuing a course of action it would not otherwise undertake. Thus, *weishe* also includes the Western concept of compellence. This suggests that the Chinese have more ambitious goals for their nuclear forces than U.S. policymakers do for their own. It raises the question of how the Chinese Communist Party would use its nuclear capability for coercive purposes. Washington’s allies are obvious targets.

During the Cold War, U.S. administrations sought to promote collective defense and discourage proliferation by convincing allies to shelter under the United States’ nuclear umbrella. Washington pledged that if Moscow attacked any of them with nuclear weapons, the United States would respond by retaliating with its own. In a tripolar system, however, the credibility of the U.S. nuclear umbrella risks being compromised by Washington’s need to hedge against the threat of two major rival nuclear powers. To the extent that the U.S. nuclear guarantee is seen as diminished, key allies such as Germany, Japan, and South Korea might become vulnerable to coercion by China or Russia—or seek nuclear weapons themselves.

This brings us to the problem of parity. In a tripolar system, it is simply not possible for each state to maintain nuclear parity with the combined arsenals of its two rivals. Assume, for example, that China deployed the same size nuclear force as Russia and the United States: 1,550 weapons. At that point, U.S. strategists might rationally conclude that they need to add an additional 1,550 weapons to achieve parity with the combined forces of China and Russia. Meanwhile, Russian strategists would likely want the same. China, having established an arsenal on par with the two great nuclear powers, would not be inclined to forfeit its newly won status—and so a tripolar system risks collapsing into a Red Queen’s arms race, in which parity is continuously sought but never achieved.

The same holds for MAD. Imagine that both Russia and the United States had 1,550 deployed nuclear weapons, as per the New START treaty, and that 400 nuclear weapons still constituted an assured destruction force: a U.S. force of 1,550 weapons would be sufficient to ensure that 400 weapons would survive a surprise Russian attack. In a tripolar system, however, such a residual force would no longer be enough. If, for example, China made a surprise attack on the U.S. arsenal, the United States could use its residual assured destruction force of 400 weapons to retaliate against China, but that would leave it with insufficient forces to counterbalance Russia’s arsenal. In order to maintain an assured destruction capability against both China and Russia, the United States would need twice as large a residual force—800 weapons—which would arguably require twice as large an original arsenal. And that assumes that both Beijing and Moscow froze their forces at 1,550 weapons, while Washington doubled its own, to 3,100. To expect either rival power to accept such a situation approaches fantasy.

Of course, this simple thought experiment is merely illustrative. It may be possible, for example, to establish an assured destruction force aboard ballistic missile submarines, which, at present, are very difficult to detect and thus to target. But these submarines will ultimately need to return to base, and so unless they launch their weapons before doing so, those weapons, too, will be vulnerable. Moreover, since the three powers have vastly different populations and geographies, each will have different requirements for establishing the needed assured destruction force against the other two. Russia’s population and economic infrastructure are considerably smaller than the United States’, and the United States’ population is but a small fraction of China’s. And so, all other factors being equal, Russia’s assured destruction force—which would have to be sufficient to inflict devastating attacks on not one but both of its much bigger rivals—would need to be significantly larger than China’s and the United States’. But it seems unlikely that Beijing or Washington would accept a rationale that would justify Moscow’s maintaining an arsenal that was significantly larger than its own.

**TRIGGER-HAPPY TYRANTS**

With three great nuclear powers, deterring a first strike in a crisis situation will also become more challenging. For one thing, strategies for managing the “poor second” problem seem likely to prove elusive. Assume that China, Russia, and the United States had roughly equal arsenals. At first blush, the situation might appear akin to having three scorpions in a bottle, where even a successful attack by one scorpion against another would increase the danger of the attacker’s becoming a victim to the third scorpion. If China attacked the United States, for example, it would deplete some of its arsenal in doing so, thus reducing its ability to deter an attack from Russia. The incentives for any of the three powers to strike first would seem to decrease.

But the “poor second” problem does not concern the choice between, on the one hand, attacking and facing an assured counterattack and, on the other, not attacking and not being attacked at all. Instead, it is driven by the gunfighter’s assumption that you must shoot first or get shot. Moreover, now there would be a second adversary with a gun, who could easily take advantage of you if you had dispatched your first rival but were now wounded. Hence, in a crisis situation, if the United States suspected that a Chinese attack on its nuclear arsenal was imminent, not only would it see itself disadvantaged for failing to strike China’s arsenal first; it could also reasonably conclude that it was potentially more vulnerable to Russia’s arsenal for not doing so. Even if, after withstanding a Chinese attack, the United States were able to retain an assured destruction capability against both China and Russia, the loss of a significant part of its arsenal would leave it far more exposed to coercion or aggression from either. Moreover, the threat posed to the United States by two hostile great nuclear powers might well convince many U.S. allies that the U.S. nuclear umbrella that has long shielded them had sprung fatal leaks.

The introduction of a third nuclear power that is, like the Russian Federation, a nondemocratic state could add another element of instability. The war in Ukraine has already demonstrated the risks posed by a leader with unchecked power. Absent a radical shift in the Chinese or the Russian political system, control over the world’s largest nuclear arsenals will, in two out of three cases, rest in the hands of a tyrant with little or no need to consult with others. In democratic systems, the deliberations built into government tend to moderate the impulsiveness of a risk-tolerant leader. Yet tyrants may view their personal survival or the survival of their regime as superseding that of the state. As Winston Churchill warned, nuclear deterrence “does not cover the case of lunatics or dictators in the mood of Hitler when he found himself in his final dug-out.”

The point is not that nuclear war in a tripolar rivalry among China, Russia, and the United States is inevitable but that maintaining stability in crisis situations will likely be significantly more difficult than it is now. Although it may seem far-fetched to imagine a great nuclear power choosing to attack a comparably armed adversary, the costs of failing to understand the incentives for such an attack are potentially catastrophic. As McNamara once observed, the United States’ “security depends on assuming a worst possible case, and having the ability to cope with it.” His views were echoed by the arms control expert Bruce Blair, who declared that deterrence “must remain robust under all conditions, including worst-case scenarios in which massive surprise strikes succeed in comprehensively destroying the opposing strategic forces in their underground silos, submarine pens, and air bases.”

**AN *N*-BODY PROBLEM?**

As China pursues its nuclear ambitions, it may inspire other aspirants to seek larger arsenals of their own. For example, in the face of a much larger Chinese nuclear program, India, its rival, may have an incentive to increase its own nuclear forces significantly, perhaps causing Pakistan to do the same. And with less certainty about extended deterrence, U.S. allies, such as [Japan](https://www.foreignaffairs.com/articles/japan/2021-10-28/japans-hard-choices) and South Korea, may do likewise. Such developments would make stability even more difficult to achieve. In astrophysics, this situation is called “the *n*-body problem”—trying to predict the movements of an arbitrary number of celestial bodies—and reaching a solution is even more taxing than it is for the three-body problem. With the emergence of a tripolar nuclear system, then, a crucial challenge is how to prevent more states from boosting their arsenals.

Oddly enough, arms control agreements that impose relatively low limits on deployed nuclear weapons, such as the New START treaty, could decrease stability by minimizing the entry barriers for other powers seeking great-nuclear-power status. If, for example, China signed on to the New START treaty, with its limit of 1,550 deployed weapons, the threshold for achieving great-nuclear-power status might seem attainable to India or Pakistan. Nor would second-tier nuclear powers need to match China, Russia, and the United States weapon for weapon. Even if these lesser powers were to increase their arsenals to some 500 weapons or so, they would risk introducing substantially more instability into the system. For example, the United States could be confronted with the challenge of fashioning an effective nuclear deterrent against not only the Chinese and Russian arsenals but also the arsenals of [Pakistan](https://www.foreignaffairs.com/articles/afghanistan/2021-09-09/americas-perennial-pakistan-problem), North Korea, or both. To the extent that these countries are aligned with China, Beijing might even find that its interests are served by aiding them in expanding their arsenals as a way of circumventing its New START limits.

Counterintuitively, one possible way of keeping China’s nuclear ambitions from creating an *n*-body problem would be for China, Russia, and the United States to build much larger arsenals. If each maintained a nuclear force level that was closer to that of the Soviet Union or the United States in the Cold War era, perhaps at the original START agreement level of 6,000 deployed weapons, the three states would establish a much higher barrier for other countries seeking to join them.

It’s also possible that a new bipolar system could emerge. At present, Russia seems highly unlikely to allow itself to be eclipsed as a nuclear power, as its flaunting of its nuclear capabilities in the Ukraine crisis has demonstrated. But if Russia stays on the path of economic decline relative to China and the United States, that could allow the latter two to move to force levels substantially higher than those currently possessed by Russia, leaving it unable or unwilling to keep pace. In such an outcome, China and the United States would have to navigate their way to a new bipolar equilibrium by first transitioning through a relatively unstable era of three great nuclear powers.

**MORE BASKETS FOR MORE EGGS**

The issues raised here represent, at best, a modest initial step at identifying the challenges posed by a tripolar nuclear system. Given the uncertainties involved, the United States would be well served by keeping as many options open as possible. To begin with, the Biden administration should follow through on plans to replace the United States’ aging triad of nuclear forces, some now over a half century old, with modern missiles, submarines, and bombers. The United States is even now playing catch-up, as both China and Russia have already embarked on broad-based modernization efforts of their own.

Pursuing modernization will ensure that the United States can at least maintain parity with each of its rivals, if not with their combined forces. Although the current U.S. modernization plan is predicated on a bipolar system, it can readily be adapted to address challenges posed by a tripolar one. According to Washington’s current program, for example, U.S. production lines for land-based missiles, nuclear ballistic missile submarines, and long-range bombers will still be operating in the mid-2030s. Beijing and Moscow will have a greater incentive to negotiate limits on their own nuclear forces if they confront a modernized U.S. nuclear deterrent force rather than one facing so-called block obsolescence, when the reliability of entire weapons systems becomes questionable. Warm production lines would enable the United States to expand its forces to a substantially higher level, if need be, in response to Chinese or Russian actions or perhaps to boost the entry barrier so as to preclude lesser nuclear powers from expanding their own arsenals.

There are also steps that all three parties could take to reduce the incentives to attack first in a crisis. The goal should be to ensure that a prospective attacker will have to expend more weapons in attacking than the victim will lose. One way of accomplishing this is to rely more on land-based missile systems armed with single warheads. In the case of silo-based missiles, for example, it is generally accepted that an attacker must expend at least two weapons, and perhaps as many as four, in attacking each silo to ensure success. When an attacker must use two to four times as many weapons to destroy a single one of the victim’s weapons, attacking becomes far less appealing. Put simply, the attacker confronts the prospect of depleting its own arsenal in a first strike against its rival, rather than the other way around. The broader the attack, the greater the residual disparity that exists in the targeted state’s favor.

Although effective in the case of land-based missiles armed with single warheads, this approach works less well for the other two legs of the nuclear triad. When it comes to submarines, there are, according to current arrangements, many nuclear “eggs” in a handful of submerged “baskets.” Submarines’ principal contribution to deterrence and stability lies in their ability to avoid detection while on patrol. When in port, however, they are sitting ducks. Their vulnerability could be reduced, if only at the margins, by spreading the number of missiles and weapons among a larger number of submarines and finding ways to keep a higher percentage of them on patrol. Like nuclear-armed submarines, strategic bombers are armed with a clutch of nuclear weapons and are hard to target when airborne but relatively easy to attack while at their bases.

Thanks to its triad modernization program, the United States appears well positioned to mitigate some of these drawbacks. The newest generation of land-based missiles are intended to carry one warhead. The new class of submarines will carry fewer missiles than the submarines they are replacing. Plans for the new bombers call for fielding them in significantly greater numbers than those constituting the current airborne leg’s stealthy component. Thus, the opportunity exists to reduce the number of nuclear weapons deployed on any single delivery system and, by doing so, make attacking any of them less rewarding.

The trends in China and [Russia](https://www.foreignaffairs.com/articles/russia-fsu/2021-06-14/how-biden-should-deal-putin) are far less encouraging. Both countries have been increasing the number of weapons carried by each of their land-based missiles. The ICBMs that China has already deployed can be armed with as many as ten warheads; one Russian ICBM in development can carry up to 15. Although either missile could be armed with only one warhead, the problem from a U.S. perspective is that [Beijing](https://www.foreignaffairs.com/articles/china/competition-with-china-without-catastrophe) or Moscow could add extra warheads to the same missiles on short notice to rapidly shift the balance of forces, a phenomenon known as “breakout.” And since single missiles carrying multiple warheads are attractive targets—because several nuclear weapons can be destroyed with just one—these Chinese and Russian missiles would be most effective when employed in a first strike or in a risky “launch on warning” posture: all the more reason to make the U.S. deterrent as unattractive a target as possible.

**DETERRENCE REDEFINED**

For well over half a century, we have inhabited a world of two great nuclear powers. Although never quite as stable as it appeared, this bipolar nuclear system nevertheless succeeded in avoiding nuclear weapons’ use. But that system is now passing into history, and the tripolar system that will emerge appears, at first blush, as though it will be far more fragile and unpredictable than its bipolar predecessor.

In this precarious new strategic environment, it will be crucial for the United States to anticipate new challenges and respond to them nimbly. This means proceeding with current plans to modernize the country’s aging nuclear deterrent. But it will also require sustained intellectual effort from the country’s finest strategic thinkers to find ways to mitigate the growing instability. Priority should be given to identifying methods for offsetting the erosion of stabilizing bipolar-era characteristics, such as parity and MAD, and preventing the tripolar system from devolving into an even more chaotic system of multiple major nuclear powers. Above all, it requires rethinking deterrence strategies and addressing the challenges posed by Beijing’s *weishe* in ways that enhance, rather than compromise, the United States’ security and that of its allies.