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ONE HUNDRED SECONDS TO MIDNIGHT

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The Bulletin of Atomic Scientists (BAS) is a non-profit organization created by scientists in the beginning of the nuclear age to educate the general public about the dangers of nuclear war, with their most notable creation being the famous "Doomsday Clock." The Doomsday Clock is set at a selected number of minutes from midnight to indicate how close we are to civilization-ending results of human action. In January 2020 it was reset to 100 seconds to midnight, the closest to midnight it has ever been. The current factors that lead BAS to do this center on three existential threats to civilization: nuclear war, climate change, and deliberate corruption of the information ecosphere. As this volume is looking to the past to draw insights for the future, I will focus on the risk of nuclear war as this was the only criteria the BAS used 25 years ago.

Twenty-five years ago the BAS moved the clock to 14 minutes to midnight, 3 minutes closer to midnight than it had been for the previous four years in the giddy optimism immediately following the end of the Cold War. In a sobering statement, they suggested world leaders should take better advantage of the opportunity that the end of the Cold War had provided with the warning that "deep thinkers have long noted the human propensity to snatch defeat from the jaws of victory."[1]

Unfortunately, since 1995 the clock has consistently moved closer to midnight until reaching the closest position ever in 2020. Conflict among Indo-Pacific powers is one of the key reasons for this as six of nine global nuclear powers contest in the region—China, India, Pakistan, North Korea, Russia, and the United States—and the three new global nuclear pow-

ers since 1995 have all come from the Indo-Pacific—India, Pakistan, and North Korea. Examining the dynamics which have driven the Doomsday Clock's regrettable ratcheting closer and closer to midnight may assist us in seeing where the future may lead us, and more importantly, suggest action we may take now to reach more preferable outcomes in the next 25 years.

Breaking the Security Dilemma

One of the enduring dynamics in international relations is that of an arms race driven by what is termed the security dilemma, wherein country A strengthens its military to make itself secure but that makes country B feel more threatened so that it, in turn, strengthens its military … which then makes country A feel less secure again. The latest manifestation of this cycle in the nuclear realm was the February 2020 announcement that the United States had fielded the W-76-2 warhead on some of its submarine-launched ballistic missile force. The W-76-2 is dubbed a "more usable" nuclear weapon due to its lower yield (10 kilotons rather than the hundreds of kilotons of the standard W-76), which would reduce collateral damage in the case it is used. The logic driving the fielding of this weapon is that with a significant arsenal of lower-yield "tactical" nuclear weapons and the possibility to use one in a conventional conflict against the United States, Russia thinks that the United States would be unwilling to respond with a "strategic" warhead with a yield of hundreds of kilotons—thus handing Russia victory. This is essentially the same logic that drove the United States and the Soviet Union to field tens of thousands of nuclear weapons during the Cold War. While this dynamic was very costly, I am aware of no studies which indicate the large numbers of weapons made either side more secure. Indeed most studies of the Cold War suggest these large arsenals and the "tactical" weapons they included, if anything, made the situation significantly more dangerous. This is further demonstrated by the desire on both sides to reduce arsenals when that became possible with détente in the mid-1970s. Why then is the world going down this path again?

I would argue that we are going down this path again because key nations, including the United States, have been making the mistake of focusing on their own security without any consideration for other country's security needs. While blame for falling into the security dilemma is shared on all sides, getting out of it will fall more heavily on the shoulders of the United States due the huge power asymmetry it has compared to its rivals.[2] In order to more clearly understand what the United States can do to get

out of this dilemma, it would be useful to look back on some of the key developments that got us to where we are today.

One key challenge was the expansion of the North Atlantic Treaty Organization (NATO) eastward in 1999, done with too little concern for how Russia would view this development at a time when Russia was so weak it could do nothing. Unsurprisingly, Russia viewed it as quite alarming given invasions from the west of it had killed tens of millions of Russians in the 20th century. Moreover, the West had demonstrated in Kosovo two weeks after this expansion that it would use military force against Russia's allies when it began the bombing campaign against Serbia despite the lack of a United Nations Security Council resolution authorizing the military campaign.[3] Many believed this bombing campaign a necessity to avoid genocide of Kosovar Albanians, but others believed it violated international norms. In Moscow, it was seen as a very aggressive move by the West against Russia, undermining trust in the international system and driving a sense of a need to re-arm vis-à-vis the West.

Another key policy that produced counter-productive results is the United States' Ballistic Missile Defense (BMD) program. Originally it was posited as a defense against "rogue" regimes such as North Korea or Iran, which may acquire long-range ballistic missiles while being irrational and undeterrable in the way the Soviet Union was. However, this BMD program also threatened to undermine the second-strike retaliatory capabilities that Russia and China depend on to deter the United States. A good example of this is the People's Republic of China (PRC), which was estimated to have roughly 20 warheads capable of hitting the continental United States when Washington began its serious BMD program over 25 years ago. Today that number is 136.[4] In its effort to defend against a small number of nuclear-armed ballistic missiles from "rogue states" such as Iran or North Korea, the United States built a system that would also undermine China's ability to hold at risk a handful of American cities. Thus, my assessment is that the PRC is increasing the size of its arsenal to ensure it is enough to overcome a potential American first-strike coupled with ballistic missile defenses and will continue to do so in response to future BMD developments and deployments.

Over the past 25 years, the United States has spent over US $157 billion on long-range ballistic missile defense according to data from the Missile Defense Agency.[5] That has given it some chance of shooting down an incoming missile (its utility is hotly contested with some critics claiming it has near-zero capability while the staunchest advocates say only that

it has "significant ability").[6] However, regardless of which side is correct, America will remain vulnerable to a ballistic missile attack from adversaries who will continue to simply build larger arsenals no matter how much is spent on BMD. A 1964 Defense Department study found that for every $3.20 America spent on defense against Soviet missile attacks, the Soviets needed to spend only US$1 to defeat it—damage mitigation was "a fairly hopeless strategy."[7] Even if that number were lower today, say 2-1, it seems inevitable that America's adversaries will continue to be able to spend whatever it takes to ensure they can credibly retaliate against a hypothetical attack by the United States. In the case of Russia, it drove President Putin to claim in 2018 that Moscow will field entirely new classes of delivery systems, including a nuclear-powered nuclear-tipped cruise missile, to overcome U.S. BMD.[8]

Looking to the Future

Based on the above analysis, I would predict that in 2045, America, and indeed all nuclear powers, will remain in a nuclear deterrent relationship with all of their current nuclear adversaries regardless of the money spent on ballistic missile defense. Moreover, the more spent on BMD, the more nuclear weapons and delivery systems potential adversaries will build, making everyone less secure because of the increased risk of loss of control of nuclear warheads that accompanies larger inventories. I call it the large N-problem—the greater the number of nuclear weapons, the greater the risk of loss of control. To build a human organization that is 99.9% successful is an amazing achievement but almost impossible. If a state manages to build such an organization while possessing 1000 nuclear weapons[9]—statistically it will lose one. Driving competitors to continue to increase their arsenals increases the dangers from a loss of control of one or more nuclear weapons.

While it was easy to predict that nuclear powers will remain vulnerable to adversary nuclear arsenals in 2045, the exact size of those arsenals is very difficult to predict. Recent history strongly suggests that the United States and Russia are on track to repeat the mistakes of the Cold War and build larger and larger arsenals and delivery systems, at least in the near-to-mid term. One can hope that some development occurs which leads the two nations to reign in nuclear arsenals and work toward crisis stability again. The Cuban Missile Crisis in 1962 was such a wakeup call after, in the words of former U.S. Secretary of Defense Robert McNamara,

"we lucked out! It was luck that prevented nuclear war." Hopefully, we will avoid such a serious crisis, or get lucky again. Breaking this security dilemma will be difficult, but as mentioned above, it seems clear that the best path to doing so is bold action by the biggest power. In other words, courageous action by the United States will be needed, given the dramatic power advantage it has over its rivals.

With regard to smaller nuclear powers, one strategic goal shared by most of the world since 1995 is that North Korea not be a nuclear weapons state. Just over 25 years ago, the Democratic People's Republic of Korea (DPRK) and the United States signed the Agreed Framework under which North Korea pledged to give up its nuclear weapons program in exchange for security guarantees and assistance in building nuclear power reactors. However, the mistrust between the two was very deep-rooted and the agreement unraveled in subsequent years. Gallons of ink have been spilled in arguments over whether and what could have been done differently to prevent a nuclear North Korea, but the reality is that both dovish and hawkish approaches by the United States and South Korea have all failed, initially, to stop North Korea from acquiring nuclear weapons and, subsequently, from convincing its leaders to give the weapons up. There is very little reason to believe that the North will give up the weapons and so, barring an unexpected and hard-to-imagine diplomatic breakthrough, it is logical to conclude that North Korea will likely remain a nuclear power in 2045.

Over 25 years ago, in 1991, in the wake of the end of the Cold War, the United States announced the withdrawal of all nuclear weapons from the Korean peninsula. Seen as a positive development by all at the time, developments over the past several administrations have put us on track to see the reintroduction of nuclear weapons into South Korea as a deterrent to North Korea.[10] Concerns about the American commitment to provide a nuclear umbrella to South Korea began in earnest with the Prague speech by then newly-elected President Obama in 2009 in which he laid out a vision of a world without nuclear weapons. These concerns have significantly grown with the 2017 demonstration by North Korea of an intercontinental ballistic missile capable of hitting much of the continental United States, as well as demonstration of a much larger-yield nuclear warhead. This had been compounded by high-level disagreements between the United States and the Republic of Korea (ROK) regarding burden-sharing.

Alleviating these concerns in future years will likely lead the deployment of nuclear weapons under dual control, similar to agreements the United States has with several European allies. This will be politically challenging for both countries, but it would solidify the credibility of the extended nuclear umbrella. Alternatively, should the U.S.-ROK alliance continue to erode while DPRK nuclear capability grows, at some point the pressure for the ROK to develop and deploy its own nuclear deterrent capability will likely become impossible to resist. Thus, absent fundamental changes to the U.S.-ROK-DPRK relationship, I would predict nuclear arsenals on both sides of the 38th parallel in 2045.

India and Pakistan were both opaque nuclear weapons states in 1995. At that time, experts assessed both had the capability to field nuclear weapons, although neither had done a weapon test (India's nuclear test in 1974 was dubbed a "peaceful nuclear explosion" while Pakistan was assessed to have the capability to field a nuclear weapon from about 1987 forward without having tested it). India conducted multiple weapons tests in May 1998 and Pakistan soon followed suit, confirming for all that they were overt nuclear weapons states. Since that time they have experienced three major international crises—Kargil in 1999, the terrorist attack on the Indian Parliament in 2002, and the Mumbai terror attack in 2008—as well as a less serious crisis in 2019 in which Indian Air Force jets attacked targets across the line of control with Pakistan, which reportedly shot down one or two Indian fighter aircraft. All this happened while both states gradually expanded their nuclear arsenals and delivery systems. Given the continued mutual hostility and territorial dispute over Kashmir, future serious crises are inevitable during which a miscalculation could lead to an escalation neither side wants. Additionally, as their arsenals grow, the large N-problem comes into play again.

The exact situation with regard to nuclear arsenals in South Asia in 2045 is hard to precisely predict, but barring resolution of the Kashmir dispute, it seems certain that both India and Pakistan will have nuclear arsenals. Numerically, they seem on track to continue to gradually expand their arsenals and delivery systems and both will probably field a triad of nuclear systems—nuclear weapons launched from land-based missiles, from submarines, and from long-range bombers. India has a nascent missile defense program today and it is easy to imagine that should that capability mature, Pakistan will expand its arsenal and delivery systems to ensure they can continue to hold Indian targets at risk. A few years ago, India was reported to have a new doctrine dubbed "Cold Start" which would

enable the Indian military to strike swiftly against Pakistan in a future crisis. Pakistan's reported response to this was to consider the use of tactical nuclear weapons to blunt larger Indian conventional military formations. Talk of Cold Start and tactical nuclear weapon use seems to have receded recently, perhaps suggesting that both countries recognize the peril of starting down the path of escalation and de-escalation ladders. This is a hopeful sign and consistent with the past 25 years of relatively conservative nuclear doctrines on the subcontinent. Still, the inevitability of future serious international crises means the risk of nuclear exchange on the subcontinent will remain a serious concern for the foreseeable future.

One last thought with regard to nuclear weapons in 2045 is command and control (C2). Since the beginning of the nuclear age, a decision and an action by a human being has been required for the launch of nuclear weapons (the "Dead Hand" system of the Soviet Union has sometimes been mis-portrayed as autonomous—it was not). Today there is much talk of artificial intelligence (AI) algorithms being used to speed decision making and avoid human error, and some have suggested this be utilized in the nuclear early warning and possibly C2 roles. More sober strategists may want to retain the human in the loop. However, concern that the adversary is using AI to make decisions more accurately and rapidly may well drive adversaries on all sides to feel compelled to take the human out of the loop. This is a very real concern we must face today and I would encourage statesmen on all sides to initiate or continue conversations to ensure we do not go down that path. While AI may make better decisions in some or even many cases, as currently conceived, it is largely a black box making decisions that are difficult or impossible to predict or understand and it is simply far too dangerous to entrust decisions on nuclear use to such systems.

Conclusion

Twenty-five years ago the nuclear weapon age seemed to be on the way out with the end of the Cold War and the concomitant decline in American and Russian arsenals. Hope ran high. Regrettably, traditional world leaders failed to deliver on those hopes and so in 2020 humanity faces a renewed nuclear age which seems to promise more arms races, instability, and increasing the risk of Armageddon as we look to 2045. The answer to this challenge is for experts and national leaders to look clearly at the lessons of the past and recognize that this is the path to insecurity, and not

security. Leaders need to consider their national security policies as part of an international security policy and recognize that pursuit of national security that comes at the expense of other nuclear weapons states' security does not work. As ever the world leader, the United States is best placed to make this happen. Non-nuclear weapon states can afford the wars that all too often result from such a narrow focus; the six nuclear powers of the Indo-Pacific cannot.

Notes

1 Mike Moore, "On the Scale," *Bulletin of the Atomic Scientists* 52, no. 1 (1995): 2, https://thebulletin.org/sites/default/files/1995%20Clock%20Statement.pdf.

2 Michael Beckley, *Unrivaled: Why America Will Remain the World's Sole Superpower* (Ithaca: Cornell University Press, 2018).

3 Michael Krepon, "NATO Expansion and the Great Unraveling of Arms Control," Arms Control Wonk, February 3, 2020, https://www.armscontrolwonk.com/archive/1208648/nato-expansion-and-the-great-unraveling-of-arms-control.

4 Hans M. Kristensen and Matt Korda, "Chinese Nuclear Forces 2019," *Bulletin of the Atomic Scientists* 75, no. 4 (2019): 171-178.

5 "Historical Funding for MDA FY85-17," Missile Defense Agency, https://www.mda.mil/global/documents/pdf/FY17_histfunds.pdf.

6 Henry F. Cooper, "Yes, the U.S. Navy Can Shoot Down North Korean ICBMs," *National Review*, September 28, 2017, https://www.nationalreview.com/2017/09/united-states-navy-north-korea-intercontintal-ballistic-missiles-defense-aegis/.

7 Fred Kaplan, *Wizards of Armageddon* (New York: Simon and Schuster, 1983): 321.

8 "Russia's Putin Reveals 'Invincible' Nuclear Weapons," BBC, March 1, 2018, https://www.bbc.com/news/world-europe-43239331.

9 Global inventory of nuclear weapon today is roughly 13,000. Hans M. Kristensen and Matt Korda, "Status of World Nuclear Forces," Federation of Atomic Scientists, April 2020, https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/.

10 Amy F. Woolf and Emma Chanlett-Avery, *Redeploying U.S. Nuclear Weapons to South Korea: Background and Implications in Brief*, CRS Report No. R44950 (Washington, DC: Congressional Research Service, 2017), https://fas.org/sgp/crs/nuke/R44950.pdf.