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The Inherent Threat of the Nuclear Launch Button

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EXECUTIVE SUMMARY: Though the Cold War ended long ago, there remains a danger that a nuclear launch might be initiated. This could occur as a result of human decision-making, artificial intelligence decision-making, or a combination of the two, whether by intent or in error. The only real way to remove the threat of a nuclear weapons launch is to cleanse the world of nuclear weapons, starting with the superpowers.

Mistakes are made by human beings all the time, sometimes with terrible consequences. On January 8 of this year, for example, Iran's air defense system shot down a Ukrainian Boeing 737 aircraft immediately after take-off from Tehran International Airport, resulting in the deaths of all 167 passengers. After several days in which Tehran denied responsibility, it admitted that the plane had been shot down as a result of "human error." According to the Revolutionary Guards Air Force commander, a member of the Iranian air defense team—anxious amid tensions over Qassem Soleimani's killing—mistook the slow-moving civilian aircraft for an American cruise missile. The catastrophe, and the regime's attempt to cover it up, led to angry public protests in the streets of Iran.

As terrible as the downing of the Ukrainian airliner undoubtedly was, it pales in comparison to the possible consequences of a mistaken launching of nuclear weapons.

The only time nuclear weapons have ever been used was by the US against the Japanese cities of Hiroshima and Nagasaki during WWII. There were several close calls, however, that took place against the backdrop of the Cold War between the US and the USSR:

- On November 24, 1961, US Strategic Air Command headquarters in Maryland was cut off from US Aerospace Defense Command (NORAD) in Colorado, as were numerous ballistic missile warning systems. These seemed to be indications of an impending Soviet missile strike, which led Strategic Air Command to prepare to cope with such a strike. It soon became clear that the communication breakdown was the product of a failure at a relay station in Colorado, not an act of Soviet aggression. Fortunately, this clarification came before any irrevocable steps had been taken.

- On October 27, 1962, during what came to be known as the Cuban Missile Crisis, an American naval task force spotted a Soviet submarine off the shores of Cuba. Though they were in international waters, the US ships threw deep explosive charges to force the submarine to surface and identify itself. The Soviet submarine tried to evade the US flotilla by going deep, but lost communication with Moscow in the process. The submarine commander believed war was about to break out with the US and wanted to launch a nuclear torpedo to destroy the American ships, but could not do so without the unanimous approval of the three officers on board. One of them opposed the launch and managed to persuade the commander to surface and await orders from Moscow. In so doing, that officer averted a potential nuclear war that could have broken out had the Soviet nuclear torpedo been fired.

- On September 26, 1983, Soviet nuclear alert command reported that the US had launched a ballistic missile, followed by five more missiles. But Lt. Col. Stanislav Petrov, the officer in charge of the nuclear alert system, believed it was a false alarm. He turned out to be correct: the alert was the result of a malfunctioning satellite system. (Though he had averted a Soviet nuclear attack on the US that could have led to full-scale nuclear war, Petrov was rebuked for ignoring protocol and denied promotion.)

- On June 25, 1995, Russian radar in Murmansk, northern Russia, tracked a rocket off the Norwegian coast. It was a research rocket launched by scientists to study the Northern Lights, but was mistakenly identified by the Russians as a Trident nuclear missile launched by an American submarine. According to the warning system, the missile was going to hit Moscow within 15 minutes, leading Russian president Boris Yeltsin's advisers to conclude that “we are under attack.” Two minutes before Yeltsin had to make a final decision on whether or not to launch a retaliatory strike against the US, the senior officer at the alert center informed him that the rocket’s route indicated it was not a nuclear threat.

Adam Lowther and Curtis McGiffin, nuclear deterrence experts associated with the US Air Force, argued in a recent article that the solution to the danger of a nuclear missile launch resulting from human error is the installation of artificial intelligence (AI) systems designed to perform such launches.

This solution is reminiscent of the "Dead Hand" semi-automatic system previously developed in the USSR. This was a control system for operating the USSR's nuclear arsenal under certain conditions during the Cold War period, especially in a situation in which state leaders were no longer available to push the button themselves.

The advantage of AI in the opinion of the two American experts is its quick response. But in a recent article in *Bulletin of the Atomic Scientists,* Matt Field, one of the journal's editors, claims that putting AI in a C3 (command, control, and communication) system in the nuclear arena introduces the risk of "automation bias". Field cited Michael C. Horowitz, a professor of political science at the University of Pennsylvania, who claims that studies indicate that people tend to trust what automated systems tell them. The mathematical algorithms with which AI systems operate are based on databases related to their fields—but when it comes to launching nuclear weapons, no such databases exist, because no missiles have ever been launched with a nuclear warhead. Preparation of appropriate algorithms for AI can thus only rely on simulation data.

The conclusion appears to be that a sudden nuclear missile launch would ideally entail a maximum interface between AI and an expert human being with the authority to push the button and an understanding of when would be the right moment to do so. But this is only possible on a theoretical level for these reasons:

- The AI system must be sophisticated but also constantly updated—not only technologically but also in terms of its knowledge of the enemy's nuclear arsenal, the probable effects on and responses of the enemy state, and other decision-making considerations.

- The process of identifying a person who is both qualified and appropriate to push the nuclear button is inherently subjective.

No unambiguous solution has yet been found to the problem of the nuclear button, though the global stakes of a launch conducted in error are very high.

According to the 2018 yearbook of the Stockholm International Peace Research Institute (SIPRI), the worldwide nuclear arsenal totals around 14,500 bombs.

Some are on hair trigger status, ready to be launched. The US has 1,750 bombs, Russia 1,600, France 300, and the UK 280.

Still, no nuclear weapons have been deployed since WWII, though many wars have been fought. It remains unlikely that the leaders of the great powers will decide to launch nuclear weapons at one another if for no other reason than that doing so would likely trigger a nuclear counterstrike.

The only way to effectively remove the threat of an errant launch of nuclear weapons is to completely rid the world of nuclear weapons, starting with the superpowers. As for the anxiety of the North Korean leadership over its survival, the thawing of tensions President Trump initiated can be continued. It is likely that all powers will join forces to restore the 2015 nuclear deal with Iran in such a way as to prevent that regime from continuing to develop nuclear weapons.

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