The Signaling Function of Nuclear Deterrence and Some Non-Obvious Historical Parallels

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Abstract

Russia's Special Military Operation (SMO) in Ukraine has dramatically increased the demand for effective deterrents against Western countries that support Kiev. This article examines the signaling component of strategic nuclear deterrence. The author suggests that the speculative nature of nuclear strategy, and lack of practical knowledge about the dangers of nuclear escalation, can be ameliorated by analyzing the mobilization crisis of 1914 as an instance when the failure of a deterrent signal plunged the country into escalation and world war. The crisis developed rapidly and irreversibly due to the deployment of multimillion-strong armies. The author proves that the use of nuclear deterrence's signaling function carries similar

escalation risks. Understanding mobilization's irreversibility, as established in the military theory of the 1920s, may facilitate assessment of nuclear escalation's risks now that strategic deterrence is regaining prominence.

Keywords: foreign policy, Russia, international security, SMO, strategy, nuclear deterrence, signaling function.

Russian political leaders' references to nuclear weapons amidst the Special Military Operation (SMO) have fueled debates on the signaling function of strategic nuclear deterrence. In the early days of the SMO, when Russia's victory seemed imminent, public references to the nuclear factor demonstrated the leadership's intention to decisively and irrevocably consolidate its accomplishment. President Vladimir Putin's threatening overtone in a televised address on 24 February 2022[1] aimed to present the West with a fait accompli and, ideally, exclude any foreign interference.

As the fighting became protracted, the nuclear argument's role had to change. In a public address on 21 September 2022, announcing partial mobilization, Putin (2022b) again mentioned nuclear weapons in a bid to set limits on Western involvement (including support for the Ukrainian military), and make up (as much as possible) for a shortage of troops.

The world was closest to a nuclear crisis in the fall of 2022, at the peak of the Russian army's setbacks (Kühn, 2025). Superficially, there were no signs of escalation like those during the Berlin Crisis of 1961, the Cuban Missile Crisis of 1962, and lesser-known incidents such as DEFCON in 1973 and Able Archer in 1983 (Kaplan, 2020, pp. 147-151). There were no intimidating military demonstrations or tit-for-tat responses, just as there were no maneuvers or command-and-staff exercises with ambiguous scenarios. American troops did not mass in on NATO's eastern flank, except for the temporarily-deployed XVIII Airborne Corps. Yet Russia and the U.S. were gradually approaching an

[1] "…Russia will respond immediately, and the consequences will be such as you have never seen in your entire history" (Putin, 2022a).

invisible frontier, beyond which the U.S. client's pressure on the Russian army would heighten nuclear risks. Ukraine's battlefield successes were leading less to Moscow's military-political humiliation, and more towards a threshold[2] beyond which hitherto unthinkable reactions became possible.

Large-scale hostilities prompted Russia to revise its nuclear doctrine on 19 November 2024, clearly lowering its nuclear threshold (Bogdanov, 2025). On 21 November 2024, Ukraine's Yuzhmash plant near Dnepropetrovsk was struck by an experimental Oreshnik missile, presumably a modified RS-26 Rubezh ballistic missile. This did not fundamentally change the situation on the ground, but sent an unambiguous warning—this time not verbal but demonstrative—to Ukraine's Western allies.

THE SIGNALING FUNCTION OF NUCLEAR ESCALATION

Nuclear escalation has many forms. It can be intentional or unintentional, controlled or uncontrolled. It can be used for de-escalation (Livshin, Nedelin and Sosnovsky, 1999) to eliminate a threat to an ally, to consolidate success, to prevent failure in a critical area (Lautsch, 2022, p. 199), to end a conflict on better terms (as a last-ditch measure), or to restore undermined nuclear deterrence after all else has failed (Bogdanov, 2022, p. 6).

Such a "final warning" is not limited to the actual use of a nuclear weapon. Signals can be sent through any nonroutine nuclear-balance-affecting actions, such as U.S. 'nuclear sharing' in Western Europe or the Russian equivalent in Belarus, the destruction of key military and industrial infrastructure with dual-use systems (such as Oreshnik), field tests, or the detonation of a warhead in an uninhabited area near the war theater. With the appropriate temperament, it may be a fascinating exercise to invent a graduated scale of nuclear warnings (Trenin, Avakyantz, and Karaganov, 2024, pp. 95-101).

It should be again emphasized that the threat and actual use of nuclear weapons is not intended to achieve specific military results,

[2] For a theoretical conceptualization of non-nuclear or pre-nuclear deterrence, see Kokoshin, 2013, pp. 208-223.

but to demonstrate steadfastness and determination. But there is no guarantee that the other side will read the signal correctly, and there is a danger of instead provoking further escalation. The extension of nuclear deterrence to include instances other than retaliation (Trenin, Avakyantz, and Karaganov, 2024, p. 152) carries even greater risk of being misread.

The Ukraine crisis is evolving in two realms of strategic communication: internal (Russia-Ukraine) and external (Russia-West) to the theater of hostilities. As the Oreshnik experience has shown, a warning sent within the actual theater may be ignored outside it. It might even be interpreted as a sign of weakness, indicating Russia's inability to win by conventional means. Conversely, a strong signal to Ukraine's Western allies carries the risk of uncontrollable escalation, since the target of an attack is unlikely to reflect on whether the attack is demonstrative or disarming. An attack would also inevitably create complications with neutral powers, whose benevolent attitude is crucial for mitigating the effects of Western sanctions and for the smooth operation of the Russian military-industrial complex.

CAN A NUCLEAR THREAT COMPENSATE FOR CONVENTIONAL WEAKNESS?

The Cold War offers no examples of nuclear signaling that successfully compensated for conventional weakness. In 1950, in the peripheral Korean theater, American nuclear signaling did not work either as a compensating factor (Chinese and North Korean troops dared to storm Seoul, ignoring the superpower's nuclear capabilities and de facto monopoly on their transcontinental projection) or as a pacifying factor (in the pursuit of armistice talks in 1953) (Dingman, 1988). In addition, the prospects of using nuclear weapons against North Korea or China raised deep skepticism in the U.S.'s key British ally (Hastings, 2020). The world's strongest economy, nuclear weapons, and strategic bombers proved unable to defeat a manifestly weaker opponent (Doughty, 1979). And victory with conventional weapons would demand military and economic mobilization. Since limited political goals did not justify extreme methods, the U.S.'s nuclear arsenal did not provide any actual

advantage. The Korean War demonstrated the U.S.'s need for a more balanced military posture.

Deterrence remained effective in the potential European theater, so there was no need for signaling. Despite fundamental ideological disagreements, the opposing sides were basically satisfied with their military and political situations. The established strategic asymmetry, in which American nuclear weapons made up for the Warsaw Pact's numerical superiority, was not perceived by the USSR as an immediate threat. The effectiveness of the U.S.'s strategic compensation was not disputed but accepted on faith. Aware of the high risk of an uncontrolled nuclear confrontation, the USSR never tested the U.S.'s nuclear compensation for conventional weakness (Lautsch, 2022, pp. 69-70).

With relative nuclear parity in place, asymmetry transformed into symmetry. Moscow believed that the Soviet nuclear buildup in the European theater would block the U.S.'s use of nuclear weapons in the "in-being" mode if it decided to compensate for the relative weakness of NATO's general-purpose forces. In other words, the U.S.-USSR nuclear parity in Europe made the use of nuclear weapons in a hypothetical military confrontation senseless. In such a case a campaign on the Rhine would have been conducted with conventional weapons from start to finish, making operations predictable and controllable, thus confirming the importance of Soviet superiority in manpower and firepower (Hines, 1995, pp. 38, 208) and prioritizing general-purpose forces' combat capability.

The new conditions required that the U.S. proportionally expand its ground forces in Europe and improve their technological capabilities (with a focus on the development of high-precision weapons) (Harrison, 2010, p. 355). By the beginning of the 1980s, Soviet military theory had come full logical circle. If the use of nuclear weapons could be avoided or at least limited, then the basic principles of deep offensive operations designed forty years earlier became relevant again, albeit at a higher technological level (Ibid). So, at the end of the Cold War, tactical nuclear weapons did not so much compensate for insufficient conventional capabilities as guaranteed non-use of nuclear weapons by the adversary. At a critical moment, this emergency brake was

supposed to keep military developments within traditional non-nuclear boundaries.

The military, politicians, and academic experts do not fully understand precisely how nuclear escalation would go; fortunately, it has never yet reached the point of no return. What exactly will escalation look like in a crisis? Aside from the natural fear of falling prey to a first strike, what will drive parties to act proactively? All this remains unclear. The emotional strain may obscure rational political-strategic thinking when interpreting signals from the opposite side, especially if those signals are more demonstrative than rhetorical.

THE 1914 MOBILIZATION CRISIS AS PROTOTYPE OF AN ESCALATORY SURGE

Misuse of military forces is common but dangerous. The past contains several examples that are useful when considering nuclear escalation. For example, in the era of multimillion-strong armies, mobilization performed a demonstrative signaling function.

Naturally, mobilization escalation cannot be considered an earlier version of nuclear escalation. There are fundamental differences: while nuclear weapons throughout their history have gradually ceased to be a practical tool of war, mobilization has always been primarily the act of readying a peacetime army for war. Opportunities for its demonstrative use were limited, and the choice between partial and general mobilization depended not only on the *perceived* reality of a threat, but also on the practical complexities of mobilization itself.

Sudden mobilization was extremely complicated in the Russian Empire and the Soviet Union due to their colossal size, low population density, relative economic weakness, and multiple fronts distant from each other and the nation's core. Infrastructure investments, even in railways, promised no easy solution. If Germany needed to transport a reservist 300 kilometers, Russia needed to move him 1,000.

The complexity and bulkiness of the mass army meant that any improvisation in the course of mobilization would risk disorganizing it, delaying and disrupting the readying, transportation, and deployment of troops. And if the enemy deployed faster, this could mean defeat

on the border and then—with the highest-readiness part of the army destroyed—overall catastrophe.

Prominent Soviet military theorist Marshal Boris Shaposhnikov placed mobilization at the conceptual center of the "odium" preceding the First World War: "A declaration of mobilization is essentially a declaration of war. Mobilization is war, and cannot be thought of otherwise" (Shaposhnikov, 1929, p. 296). In the 1920s, Shaposhnikov was not alone in his views on the political-strategic irreversibility of mobilization. His opinion was fully shared by former head of the General Staff's Mobilization Department (already in exile), Lt. Gen. Sergei Dobrorolsky (2023/1922), and by renowned military theorist Alexander Svechin (1927) in the USSR.

The mass army, based on the ideas of a nation-in-arms and the citizen-warrior, was the product of modernity's fundamental social transformations. Beginning with the French Revolution, leading European powers' transition to a new system of recruitment and military deployment accelerated in the late 1800s. Russia's mobilization in 1914 was its first on that scale with such speed. Deployment in 1876, on the eve of war with Turkey, involved six corps and then grew in 1877-1878 as relations with Great Britain and the Germanic powers deteriorated (Airapetov, 2024). When war broke out with Japan in 1904, mobilization was only partial.

However, Marshal Shaposhnikov's formula of *mobilization equals war* applied only to inter-bloc confrontation of the early 20th century, when an explosive situation was formed by the complex knot of adversarial powers' guarantees and by the need to complete (and therefore to commence) mobilization in a timely manner. The latter process had tremendous inertia, and strategy focused on it crushed the last opportunities for preserving peace.

Yet the conclusions of military science in the 1920s appear less axiomatic in the second half of the 19th century. In 1850-1913, the Prussian-German army was partly or fully mobilized six times, of which three did not lead to war, one evolved into a local conflict, and only two broke out into full-scale hostilities. The first group—mobilizations against Austria in 1850, against France in 1859, and

against Austria again in 1870 (Lackey, 1995)—consisted of military precautions and signals meant to demonstrate resolve to the adversary.

The mobilization crisis in July 1914 was initially accompanied by attempts to achieve escalation dominance. The announcement of public, even partial, mobilization by one of the parties to a conflict caused an irreversible chain reaction. Austria-Hungary's actions against Serbia, and Russia's against Austria-Hungary, amounted to political demonstrations. Russia had already suffered the "diplomatic Tsushima" of 1909, had reached its limit of foreign policy concessions, and was determined to save face by protecting its Serbian ally from Vienna through a show of force. It was only in the crisis's later stages that the intricacies of alliance obligations, and the dangerous rigidity of mobilization systems, plunged the continent into escalation and war.

Each great power faced unique circumstances dictating its mobilization policy. The Germans and Austrians were terrified of fighting on two fronts, the Russians would have finished mobilization too late if they started when the German powers did, and the French could not decide which forces to use for initial operations.

However, neither concrete circumstances, nor specific national strategic thinking would have allowed interpreting an adversary's mobilization other than an imminent threat. In 1914, the European states' mobilization systems simply ruled out a flexible response. Their armies could safely react only by strategically acting as before. This strategic "legacy" manifested itself, among other things, in the desire to accomplish the bulk of mobilization tasks in peace time, which, in nuclear-era parlance, can be interpreted as "near-threshold" actions.

Thus, Russia's actions in July 1914, prior to the formal announcement of mobilization, were not only a demonstration of force but also had a "near-threshold" feature, as perceived by the Germans. Psychological pressure, risk manipulation, and irreversible strategic decisions characterized Russia's preparations for war. The special pre-mobilization status for its army and railways (Heywood, 2018, pp. 413, 419, 421, 423-425, 438-439) could be interpreted as covert mobilization and thereby drive escalation. As a result, Russia's preemptive actions, actually prompted by the fear of being late in

starting mobilization, subsequently incurred accusations of provoking the war with Germany.

The Russian military's special pre-mobilization regime dates back to November-December 1912 when, at the height of the Balkan crisis, Austrian military preparations on the Serbian and Russian borders looked like hidden partial mobilization. The call-up of 222,000 reservists (25 percent of the Habsburgs' reserves) effectively signaled Austrian resolve and turned out to be manageable and reversible. Russia did not dare to raise the stakes, and Serbia had to make concessions regarding Adriatic ports. While the Danube monarchy's actions did not ignite a pan-European war, they did vex Russia's General Staff (Alpeev, 2024), which feared that the next covert mobilization would not be detected in time, forcing Russia to swallow another humiliation. This partly explains the emotional and over-hasty reaction in July 1914.

But although all the great powers were preparing for war, this did not make it inevitable. Escalation dragged the great powers where they had not actually intended to go. Russia wanted to protect its ally from the Austrians but avoid a coalition war. The Habsburgs believed that Serbia could be eliminated as a political actor in the Balkans without starting a pan-European war. Berlin, just like in March 1909, was determined to support its Austrian ally against Russia, being firmly convinced that St. Petersburg was bluffing. And France had always seen guarantees to Russia versus Austria-Hungary as a necessary evil. Paris twice denied assistance to Russia in 1909 and in 1912, and agreed in 1914 only because another refusal would have jeopardized the alliance. As a result, France would feel the force of seven-eighths of the German offensive under the Schlieffen Plan. The Germans issued an ultimatum to France over the Russian-Austrian showdown in the Balkans because of the ongoing mobilization escalation. For Russia, preemptive mobilization was necessitated by the threat of German victory on the Western front if Russia failed to timely deploy its troops and by the appalling prospect of unavoidable military catastrophe. Each party assessed own risks, but did not even consider the risk of a potential pan-European war.

Interestingly, in the 1920s, the topic of mobilization prompted less reflection in France and Germany than in the USSR and among Russian emigres. France and Germany entered the war, in many ways, reactively, and believed that Russia's proactive role in the escalation largely relieved their military circles of historical responsibility.

MOBILIZATION'S FAILED SIGNALING FUNCTION

In the first fifteen years of their existence, nuclear weapons were themselves seen as practical weapons of war, within the context of the familiar doctrine of strategic bombing (Gray, 2012, p. 160). Conversely, mass mobilization in 1850-1911 was mostly dictated by military factors, but the crises of 1912 and 1914 employed mobilization risks (including the risk of being late with troops deployment) and "near-threshold" actions to send political signals, and this case can also grant insight into 'nuclear' signaling.

The desire to psychologically pressure the opponent imperceptibly evolved into an irreversible strategic act of war. Russia's pre-war preparations were not intended as signals, but were regarded by its adversaries as a direct challenge. Russia was forced to play "near-threshold" games because it could not afford to start mobilization concurrently with the German powers. From the German point of view, it all looked like hidden mobilization (Heywood, 2018), even though it was not.

In 1914, decisions' rationality was not questioned. Deliberate risk manipulation (escalation control) was not yet practiced in full, although a state might imagine something ominous in an adversary's preparations, due to misinterpretations. In the crisis, no one wanted to consider the opponent's point of view.

The July 1914 crisis exposed the outlines of C. Yeaw's "problematic field funnel," escalation akin to "movement within a funnel, under the pressure of constantly changing multidirectional forces from different (and not only nuclear) domains" (Bogdanov, 2023, pp. 30-31). However, in July 1914, sliding into the funnel of war was not yet irreversible. As in December 1912, a tragic outcome was likely but not fatally predetermined.

Nuclear weapons and their command-and-control systems are constantly being technologically improved. Similarly, the development of mobilization systems around 1900 focused on boosting railway capacities, enlarging the reserves, and tightening military strategy's relationship with foreign and domestic policy. The danger of the adversary's possible perception of mobilization as a sign of aggression, not just as a warning, was not even thought of. Marshal Shaposhnikov's definition of mobilization as the "odium" of war would not have been understood in 1850-1913. It was only in the 1920s that the phenomenon was belatedly comprehended in its entirety—only to prove irrelevant, ironically, in the summer of 1939, when World War II erupted without a preceding mobilization race (Kennedy, 1956, p. 25; Mueller-Hillebrand, 1953, p. 52; The Initial Period of War, 1974, p. 136).

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Understanding the irreversibility of mobilization, established by military theory in the 1920s, could be useful for assessing the risks of nuclear escalation now that strategic deterrence is regaining importance. Mobilization races can be considered a pre-nuclear form of escalation dominance. Unlike nuclear crises, which, fortunately, have never led to Armageddon, the mobilization crisis of 1914 eventually escalated into war.

An explosive one-act mobilization, i.e., abrupt increase of troop basis, should be distinguished from its modern interpretation as a complex of efforts (in the military, financial, economic and public spheres) aimed at achieving victory. Thus, the notion of 'preparation for war' is much broader than 'mobilization' per se. It was not preparation for war that provoked mobilization escalation, but mobilization escalation predetermined the specific operational and strategic pattern for the initial period of the future pan-European war. It is no coincidence that even at the height of its strategic deployment, the High Command was still trying to decide whether troops should be sent to the Northwestern or Southwestern front, i.e., the final choice between the anti-Austrian and anti-German strategies involved a good deal of improvisation.

The tragedy of 1914 was programmed by the very logic of the military machine's functioning mode built around a massive reserve army. However, the danger of uncontrolled developments was underestimated, perhaps even more so than the danger of experimenting with nuclear deterrence. Like the complex metaphysics of strategic stability, mobilization preceding WWI was a combination of combat and non-combat, strategic and political, technical and psychological, actual and potential, reversible and irreversible factors.

The participants in the 1914 events did not consider the possibility of a massive response to the threatening use of mobilization as a strategic tool, which eventually plunged the parties into pan-European war.

When it comes to signaling with nuclear weapons, and possible compensation for the deficiencies of conventional forces, this history should always be kept in mind. Hopefully, knowing much more about nuclear escalation today than our ancestors knew about mobilization escalation in 1914, we will not repeat their mistakes.

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