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Eye of newt, toe of frog... maybe just Novichok?

Recent years have seen chemical and radiological agent used in a number of high-profile assassination attempts; biological toxins have been used in the more distant past. Former Russian intelligence officers Alexander Litvinenko and Sergei Skripal were targeted with polonium-210 and Novichok, respectively, in 2006 and 2018, while Russian and North Korean political opponents, Alexei Navalny and Kim Jong-Nam, were targeted in 2017 and 2020 with Novichok and VX.¹ These cases are just the tip of the iceberg, however. Some historical reviews estimate that Russia and its Soviet predecessor have attempted well over 100 assassinations using chemical agents alone. Others, using more conservative criteria,

estimate just a few dozen across all countries and agent types.²

A substantial majority of state sponsored CBR assassination attempts have been perpetrated by the Russians.³ Even in some cases attributed to others, the Russian foreign intelligence services have been at work. The attacks on Bulgarian political dissident writers Georgi Markov and Vladimir Kostov are two notable examples as Bulgarian secret police executed operations planned and supplied by the KGB.⁴ Identical platinum-iridium pellets containing ricin were found in both victims, as corroborated by Boris Korczak, who was himself targeted in a similar manner in the US.⁵ Beyond the Soviet and Russian adjacent cases, other

countries have conducted assassinations or counterinsurgency operations with CBR agents including South Africa, Rhodesia, Iraq and Chile.⁶

Before digging more deeply into what has been and is likely ongoing, it is well to consider the full impact on someone targeted. Nikolai Khokhlov, a KGB defector and victim of unsuccessful poisoning by the Soviet Union in 1957 has movingly written:

"Moscow could kill me only in a special way... [A way] which will destroy the body in ways unknown to medicine. Kill so the agent has time to leave and so there is no evidence left to expose Soviet intelligence. Kill so rumours and gossip begin, so that it is not clear whether they killed me at all or whether



The attempted assassination of the Skripals propelled Novichoks from classified agent into popular fiction... but to what end?
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*I died... To entangle my name and death with suspicions, conflicting versions, the forced silence of doctors and authorities. Kill me so those familiar with Soviet intelligence will understand where the revenge comes from, but at the same time, so those who are naive or blind would become easy prey to slander and misinformation. After such a death, it would be possible to declare... that there was no Khokhlov at all, and his book was written in Washington by American intelligence officers with the help of the White Guards. In order for Moscow to achieve this, I had to be poisoned with a special mixture of poisons... The recipe... included ingredients worthy of medieval poisoners, plus also the inexperience of western doctors, the inertia of the authorities, and skepticism of western society.”*⁷

Why CBR agents?

There are many factors to explain why an actor might, or might not, choose CBR agents for assassination in lieu of conventional means. These considerations range from production dynamics to the implications of international backlash. One logistical advantage of small-scale CBR use is that agents are relatively easy to conceal, and provide the user with deniability.⁸ An agent-induced heart attack is designed to be harder to label a homicide, and the agent can often be transported and administered covertly. Because of the small lethal dose, some of the more virulent CBR agents like toxins, cyanides and nerve agents can readily be concealed and transported inconspicuously. Potent agents that can be stored in binary form, like sarin, some Novichoks, and VX, provide security in protecting assassins and their surroundings from premature or accidental exposure.⁹

Poison dissemination devices like the CIA's 'heart attack gun' - famously displayed during the Church Committee hearings - or the KGB's ice atomiser use various iterations of an electrical charge, pneumatic mechanism, or small explosive charge to disseminate an agent via dart, pellet or spray. All are significantly quieter and more discreet than a gunshot, some are nearly silent.¹⁰

One significant logistical disadvantage to these modes of delivery is their short range - sometimes just a few metres - and there's the fundamental concern that they resemble a conventional weapon, which can impede concealment. To combat this, some entities have disguised their poison delivery devices as inconspicuous paraphernalia. For example, the South Africa CBR programme, specifically under Project Coast, "...produced specially made covert assassination weapons...including a signet ring with a secret compartment for poison, screwdrivers with a syringe-like mechanism in the handle, and umbrellas and walking sticks designed to fire poison bullets.”¹¹

Accountability/deniability is another factor that helps to determine the use of CBR agents. There's a spectrum of CBR assassination archetypes, ranging from complete deniability, conducted covertly with untraceable agents, to theatrical deployment, conducted overtly and potentially with identifiable agents. Actors choose different archetypes for different reasons.¹² Agents that are hard to detect help maintain a perpetrator's desired balance and may become even better at doing so as new chemical and biomedical engineering techniques are developed and perfected. The extent to which covert actions are deniable, particularly those conducted by repeat offenders like Russia, is subject to debate, a context in which the term 'implausible deniability' was coined.¹³

Assassinations signal an implicit message to people in similar situations to the victim - that they, too, may be targeted if a particular line is crossed. This message is not always straightforward, however, as CBR assassinations can be difficult to curate and execute as designed. Where CBR assassinations are botched and well publicised the audience might not receive the message, while the botch-up may imply that the perpetrator is inept, desperate, and reckless. Intelligence expert and author Kevin Riehle attributes these failures to ignorance, indifference or incompetence depending on the circumstance, and suggests that in some cases the

importance of a tactical victory outweighs the strategic loss through foreign condemnation or criticism.¹⁴

After the 2006 poisoning of Alexander Litvinenko in Britain, the UK expelled four Russian diplomats and intelligence officers, citing the need to "send a clear and proportionate signal.”¹⁵ Similarly, the 2018 poisoning of Sergei and Yulia Skripal, again in Britain, resulted in the expulsion of 23 Russian diplomats, freezes on some Russian assets in Britain, and the suspension of bilateral contacts between the two countries.¹⁶ In addition to widespread diplomatic sanctioning, the poisoning and later death - whose precise causes remain uncertain - of Alexei Navalny, led to an increase in domestic opposition via the anti-corruption movement in Russia, despite Kremlin's efforts to subdue it.¹⁷ The botched assassination of Navalny likely amplified his political voice and gave him a guise of martyrdom. To avoid these unfavourable outcomes, we might expect to see future targeting on domestic soil, and/or with less traceable agents. These would serve to reduce other countries' claims over violations of their sovereignty, and give the user a greater locus of control over externalities.

So what if the backlash from assassinations were at least partly a feature, not a bug? Intuitively, it seems unlikely that Russia would have wanted to accept the consequences of the Litvinenko poisoning. This event was not only uniquely brutal, but uniquely accessible to investigators. The polonium-210 took 22 days to kill Litvinenko, left contamination around Britain, and once identified, was tentatively traced back to a Russian lab where it was probably manufactured.¹⁸ Grandiose attempts, like the Litvinenko or Kim-Jong Nam case, broadcast the perpetrator's message - that they are willing to send a 'costly signal'. Not only is the aggressor prepared to violate state sovereignty and cross borders to assassinate political opponents, but is willing to incur the costs imposed by the international community. By doing so, perpetrators may be signalling that they are undeterred by the current price

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of a foreign CBR assassination. Other dissidents shouldn't feel safe even if they've distanced themselves physically from the country concerned.

Closely related to signaling, assassinations may also have a figurative or even literal theatrical element; literal in the sense that they may play off of conventions of fiction. The publicization and retelling of a poisoning incident necessitates drawn-out explanations characteristic of detective novels or spy movies, unlike an assassination where an individual is killed in more generic ways. Adrian Hänni and Miguel Grossmann argue that Russian direct action against defectors "...has to be understood as a public spectacle in which Russian leaders and intelligence officials never intended to hide their role...[and]...functions primarily as a political tool for a reasserting reasserting Russia to communicate to distinct domestic and foreign audiences."¹⁹ The Kremlin could probably have killed Litvinenko quietly, even with a different CBR agent, but their purpose does not appear to have been discretion or modesty. This raises the question of how specific CBR agents are chosen, and why they might be used over tried and tested conventional assassination methods.

Closely related to signalling, CBR agents provide users with an avenue for theatrical violence; a phenomenon where expressions of violence are regarded "...as means of generating or utilising social capital in order to reinforce social habitus."²⁰ Notable instances of such violence include the Islamic State burning a Jordanian pilot in 2015, and an incident where four US private military contractors from Blackwater were beaten and burned to death, dragged through the streets of Fallujah, Iraq, and their bodies hung from a bridge.²¹ Often, these acts are done publicly or recorded and used as propaganda to broadcast the theatrical brutality of the acts.²² As regards assassinations, examples include the poisoning of Kim Jong-Nam in a Malaysian airport, where footage of the public attack was circulated worldwide via major media outlets.²³ A similar tactic may have been employed in the

covert action campaign against Iran's nuclear programme, where assassinations were conducted in a very specific way against very specific, high value targets to disincentivise further participation in the programme.²⁴ The most recent (2020) assassination of an Iranian nuclear scientist, namely Mohsen Fakhriyadeh, by Mossad, was perhaps the most theatrical. Unlike some of the previous killings of scientists implicated in the programme, who were mostly attacked with car bombs, Fakhriyadeh was killed via an AI-controlled, vehicle mounted machine gun, so accurate that his wife, was not shot despite being only 25cm away.²⁵

The choice of agents like Novichok and polonium-210 may not have been primarily driven by a desire to kill, but to do so grotesquely, in a way that reinforces Russia's desired social habitus. In fact, given the survival of Sergei Skripal and Navalny, it might be inferred that the death of the target is less important than the extreme message sent by attempting to kill them. Historical evidence suggests that there is a spectrum of approaches to CBR assassinations, including "intent to warn" cases where lethality is not prioritized or might be specifically avoided.

As the Jordanian pilot, Blackwater-Fallujah and other examples demonstrate, conventional means can achieve desired theatrical effects to some extent. The erosion of norms against conventional assassinations, targeted killings, and other direct action may be a reason why aggressors feel they need to use a CBR agent to send a sufficiently costly signal or carry theatrical weight. The efficacy of the current legal, moral, and normative structures in prohibiting assassination is contested.²⁶ If the norm of not crossing state borders for direct action erodes significantly, a conventional extraterritorial killing might not send a strong enough deterrent message to a population. There is insufficient 'cost' for the 'costly signal', thus 'theatre' might compensate. The stronger the international reaction to an assassination, the deeper is the aggressor's message. If the international

community increasingly responds to assassinations with diplomatic shoulder shrugging and wrist slapping, regimes may take to more extreme means - such as using CBR tools - to maintain the gravity of their actions.

Targets and methods

Despite the similarities between many historical CBR assassinations - using sophisticated CBR agents, targeting those who pose a threat to a regime, intending lethality - they display a rich variety of tactics that offer a glimpse into the decision-making processes and motives behind certain strategies. And ideal types delineate spectrums; for example, rather than a direct action simply being either covert or theatrical, it may fall somewhere in-between. A conventional weapon used in a domestic assassination offers the perpetrator high lethality without violations of nonproliferation agreements and state sovereignty. Use of a CBR weapon abroad would be harder, allows for 'costliest' signalling in violating sovereignty and non-use agreements, and incurs audience costs for the perpetrator after the event.

This spectrum of operational design sheds light on how seemingly contradictory claims, like "CBR use in assassination offers covertness and unique deniability" and "CBR agents offer a means of conducting theatrical violence and sending costly signals" can both be true. The Navalny attempt was conducted domestically, clearly intended to dissuade a home audience that might seek to disrupt the kleptocratic *status quo*. But Navalny received foreign funding from 46 countries during his 2013 election campaign, which complicated his running in 2018, and for which the Kremlin arrested him on embezzlement charges.²⁷ Assuming that funding was real and not just a ploy by the Kremlin, the attempt on Navalny might have had a secondary intended audience overseas, with a message akin to "don't bother, you're wasting money on a dead man". This could explain the need for a costlier method when targeting domestically as conventional assassination might not have had as profound an international reach.

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Gregory Koblentz articulates, "...domestic politics and prestige models predict that governments would make some information about their CBW programmes public to score points at home or impress foreign audiences. In contrast, CBW programmes pursued for regime security purposes would be highly secretive since they would be intended for use in covert operations and illegal activities such as extrajudicial killings."²⁸ While not specific to assassinations, this spectrum of programme types and their varying notoriety supports the claim that such weapons might be designed to impress the international community, while also remaining secretive and novel to some degree. Koblentz adds, "it is also possible for states to have multiple CBW programmes that are motivated by different threats."²⁹ In many CBR assassinations, it appears these threats are largely individuals with some ability to damage the political *status quo* in the perpetrating country, hence politicians, journalists, lawyers, defectors and former intelligence workers seem to be the most frequent targets. This may reflect the fact that regimes, which hold power through non or semi-democratic means are more likely both to pursue and utilise CBW for purposes of regime security, as well as be threatened by domestic political challengers or investigative journalism.³⁰

Assassinations are already regarded as one of the most serious acts of political violence, on account of their political consequences and the norms they transgress.³¹ The statecraft involved in creating those consequences does not end once a foreign assassination has been attempted. It can be also used in the aftermath of an overt attempt to magnify the costliness of direct actions. The aforementioned diplomatic expulsions by Britain following the Skripal and Litvinenko cases were mirrored by Russia.³² Similarly, India retaliated against Canadian reactions to the killing of Hardeep Singh Nijjar.³³ These cases exacerbated the constriction of diplomatic channels and increased the associated 'cost' of the acts that prompted them. In this

context, CBR agents function as force-multipliers for signalling.

Policy matters

From the perspective of national and international response, more can be done to ensure the likelihood of these killings remains as low as possible. Often, heightening the costs perpetrators face - for example, by bolstering non-use norms - can deter. But sometimes, perpetrators may be seeking to send costly signals, and that is where consequences might deter less or even induce. Consequences can also contribute to escalation and further deterioration of diplomatic channels, possibly leading to future environments more conducive to CBR assassination.

Multilateral binding agreements which reinforce existing legal structures like the Chemical Weapons Convention (CWC), Biological Weapons Convention (BWC) and international humanitarian law likely help to discourage such assassinations. One such initiative, the International Partnership Against Impunity for the Use of Chemical Weapons, has emerged as a medium to identify and publicise weapons infractions.³⁴ Worryingly, past initiatives have been hampered by Russia's veto in the UN security council, as happened with the joint investigative mechanism in 2017.³⁵

One of the surest ways to save victims and hold perpetrators accountable is early detection, which is largely predicated on the depth and availability of the necessary forensics.³⁶ But some virulent agents can kill rapidly, be metabolised to undetectable levels, and/or dissipate into the environment. In the Litvinenko case, medical personnel had an uncharacteristically long time to detect and treat, but on the other hand treatment options for radiological exposure are limited.³⁷

Bolstering preparedness may entail proactively tracking potential targets as well as understanding the atypical response techniques and antidotes required to treat exposure. One such bottom-up approach might include notifying potential targets of the threats they possibly face, as well as connecting

local, national and international law enforcement agencies that may detect foul play before an assassination occurs. Russia has shown a willingness to repeatedly target if initial assassination attempts are unsuccessful. This applied to Anna Politkovskaya (shot dead after her poisoning recovery), Alexander Litvinenko (failed poisoning attempt the day before the successful one), Vladimir Kara-Murza (survived two attempts, one in 2015 and one in 2017), Alexei Navalny (attempts in 2017 and 2020), and likely others.³⁸ Though most treatments for nerve agent exposure are aimed at alleviating symptoms and support rather than curing, atropine is an effective antidote. Anti-epileptics and benzodiazepines can reduce life threatening symptoms such as seizures and cardiac arrest³⁹ that are brought on by nerve agents. Unfortunately, though most hospitals in the US have some atropine on hand, most lack sufficient stockpiles to treat more than one exposure, if that.⁴⁰

One item in the toolkit for preventing CBR assassinations is pressure from allies. After Israel poisoned Palestinian politician Khaled Mashal in Jordan in 1997, Mashal was hospitalised with severe symptoms. As an important ally of Israel, King Hussein of Jordan "...insisted that if Mashal died, or Israel did not identify the substance used in the attack, there would be reprisals including the closure of Israel's embassy..."⁴¹ To further persuade the Israeli government, US president, Bill Clinton, stepped in to coax Israel into supplying an antidote for what we now know was a synthetic agent resembling fentanyl.⁴² This demonstrates how the cosmopolitan linkages that states have via their alliances can affect the outcome of CBR assassination attempts. The prospect of deteriorating relations with a security guarantor such as the US or a regional ally like Jordan was enough to sway the Israeli government. Unfortunately, its allies appear less likely to constrain Russia.

How might this threat evolve?

Various emerging technologies are incrementally, or sometimes more rapidly, changing the CBRN threat space



The botched assassination of Navalny amplified his political voice and gave him a guise of martyrdom ©Michał Siergiejewicz

and affecting both the threat and responses to it.⁴³ For example, CRISPR-Cas9 is frequently cited as a notable growing threat as it allows the synthesis of novel biological agents. But while this potential threat is real, it may be overemphasised due to a focus on large-scale rather than targeted threats. Technologies and agents that we discount for major WMD programmes due to poor transmissibility, difficulty of mass production, degradation in the environment, etc, can not necessarily be discounted for small-scale operations.⁴⁴

In the context of assassination programmes, another new research area provides cause for concern - bioregulator manipulation. Unlike offensive military WMD programmes, an assassination programme does not need large-scale production, delivery vehicles, or prioritising lethality over factors like detectability. Bioregulators are peptides that occur naturally in the human body and are responsible for maintaining the equilibrium conditions that sustain life, known as homeostasis. Recent research into bioregulator synthesis, however, suggests that specific bioregulators could be introduced into the body, triggering a variety of highly calculable effects, and may be used the same way toxins are now, but less detectably. In particular, α ,

β , and δ endorphin, neurokinin, sarafotoxins, kallidin, and vasopressin are noted for their high morbidity, high lethality, ease of dissemination and production, and the lack of antidote therapy and detectability.⁴⁵ There is evidence that the KGB was interested in developing bioregulator technologies as early as the 1980s “because these compounds could not be detected by pathologists.”⁴⁶ Bioregulators’ interaction with bodily functions may enable virtually undetectable assassinations previously exclusive to science fiction. The US state department recently cited bioregulators as a growing threat from Iran, though other states, including Russia, possess considerably greater relevant capabilities.⁴⁷

Research, development, and the production of agents for assassinations could be nested in a broader chemical and/or biological weapons programme, but don’t need to be. The maintenance of defensive biological and chemical programmes, and the dual-use offensive capabilities they entail, has been a contentious issue since the weapons were outlawed under the Geneva Protocol, later reinforced by the CWC and BWC.⁴⁸ An assassination programme need not be industrially scaled, as some biological and chemical facilities have

been in the past. Some novel technologies - like microfluidics, facilitating chemistry at tiny scales - might be particularly suitable to small-scale programmes.⁴⁹

More hearteningly, technological developments have implications for the defensive side of the equation, too. Countries most motivated to respond to the threat - like the US and UK - appear particularly well positioned to take advantage of these developments. In closing, there are arguably greater grounds for pessimism than optimism around the future of CBR assassinations. Attacks appear to be increasing in frequency. The threshold for who merits attacking appears to be falling. And there appears to be a willingness—perhaps even a desire, in the context of sending costly signals—to incur the backlash extra-territorial attacks generate. Policymakers would be well-advised to try to get ahead of, or at least less behind, a troubling threat., all the more so in light of the constraints and dilemmas they face.

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