

North Korea's nuclear force roadmap: hard choices



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I. SUMMARY

In this report Peter Hayes and Roger Cavazos lay out a possible roadmap for North Korea's nuclear operational force. The authors state: "The laws of physics that determine how nuclear weapons and delivery systems perform are the same in North Korea as anywhere else, in spite of North Korean voluntarist thinking and improvised practice found in all domains of North Korean life. Conversely, North Korean ideology will inflect how strategic options are shaped and deployed within these physical parameters, possibly in ways alien to western strategic thinking. Finally, North Korea has

stated its intentions and demonstrated its capabilities in observable ways, providing a limited but substantial empirical basis for analysis and interpretation of this threat which will only continue to grow.”

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II. REPORT BY PETER HAYES AND ROGER CAVAZOS

North Korea’s nuclear force roadmap: hard choices

Introduction

In the last two years, strategic thinkers have begun to investigate North Korea’s possible declaratory nuclear policy, its operational and deployment policy, and its future nuclear weapons force posture.^[1] Much of this analysis is necessarily speculative given the opacity of North Korea to outsiders. However, sufficient is known to make it worthwhile to examine its broad options. After all, it faces many of the same decisions and tradeoffs as the previous nine states that have made nuclear weapons. The laws of physics that determine how nuclear weapons and delivery systems perform are the same in North Korea as anywhere else, in spite of North Korean voluntarist thinking and improvised practice found in all domains of North Korean life. Conversely, North Korean ideology will inflect how strategic options are shaped and deployed within these physical parameters, possibly in ways alien to western strategic thinking. Finally, North Korea has stated its intentions and demonstrated its capabilities in observable ways, providing a limited but substantial empirical basis for analysis and interpretation of this threat which will only continue to grow.

Relatedly, the United States and its allies as well as third parties, especially China and Russia, must respond according to their self-interest to the political, financial and military challenges posed by North Korea’s nuclear weapons. This response has political, diplomatic, fiscal and military dimensions for each of these parties. Part of the North Korean problem now is that its nuclear armament may become self-justifying (in North Korean eyes) given this response, especially the countervailing nuclear component of US and allied strategy. Put differently, the American and allied response, if not crafted with great care and subtlety, may over-reach and become a self-fulfilling prophecy.

Thus, providing a realistic interpretation of the DPRK’s nuclear weapons program and its prospective development—a roadmap if you will—has immediate policy significance. It also anticipates possible military consequences that translate directly into what kind of response,

conventional and nuclear, that may be developed by US and ROK forces, including signaling, exercises, force commitment, forward deployment, targeting, and warplans, alongside US and allied diplomatic engagement and on-going efforts to reverse North Korea's nuclear armament.

This essay has lays out a possible roadmap for North Korea's nuclear operational force for consideration should this latter effort fail. Like any roadmap, it covers strategic goals, direction including plausible architecture and drivers over time, technological choice given the drivers, and possible action plan over time setting priorities in light of resource deficits and operational constraints.

The roadmap is laid out in seven sections. Section one describes and evaluates the DPRK's current nuclear weapons and long-range delivery systems. Section two appraises the DPRK's options for short-range nuclear weapons delivery, and concludes that North Korean nuclear-first use scenarios using these means are mostly incredible but in a narrow range of circumstances, some are conceivable and bear consideration of countervailing responses. Section three considers other postulated "bolt-out-of-the-blue" nuclear first-use scenarios and appraises these also to be incredible. Section four examines other nuclear first use options including in the midst of a civil war, and as part of a territorial defense strategy, and concludes that these first-use scenarios have limited credibility. Section five considers what type of force structure the DPRK may develop over the coming decades in light of Israeli and Chinese models, and given the constraints that pertain in the DPRK. Section six describes key nuclear command-and-control issues for the professional military in the Korean People's Army, and suggests that there may still be time for the KPA to define itself as a conventional force and avoid it reconstituting its core identity around the strategic nuclear mission. Section seven concludes by reflecting on the likelihood that DPRK-style strategic nuclear doctrines and practices will have a distinctive, even alien (to western) conceptual basis, rooted in the DPRK's history and strategic culture. Once the KPA defines itself in terms of a strategic nuclear force, bureaucratic inertia, organizational theory and vested interests will make denuclearization that much harder to achieve.

Baseline Fissile Material Warhead Equivalents and Delivery Systems

The DPRK's nuclear weapons roadmap begins with how many "nuclear warhead equivalents" or IAEA "significant quantities" of fissile material are already in its possession. A significant quantity is 8kg of plutonium or 20 kg of highly enriched uranium (HEU).

Our own best guess is that the DPRK has one to five crude plutonium (Pu)-based nuclear devices. It could be slightly more if their past Pu production, reprocessing, and warhead manufacture was near perfect (unlike every other state in the nuclear weapons business, all of whom experienced significant technical problems in each of these in the first two of these activities). To this must be added devices based on HEU, the number of which depends on how many centrifuges are in motion for how long, which is uncertain in the DPRK, although it is prudent to assume that they have been operating for many years at a clandestine facility as well as at the Yongbyon enrichment plant unveiled in 2010. A reasonable range of estimates for Pu and HEU warhead fissile material equivalents is provided by Allbright and Walrond as follows: the DPRK's nuclear stockpile may be as small as five weapons (five plutonium and zero HEU) or it may be as large as twenty seven (seventeen plutonium plus ten HEU).[\[2\]](#)

Allbright's February 2015 updated estimate is that at the end of 2014, the DPRK may have as low as eleven to twelve Pu and HEU based actual weapons, and a high of fifteen to sixteen Pu and HEU based weapons, depending on the scenarios of warhead type used to calculate the best estimates, etc.[\[3\]](#) To what extent this fissile material has been weaponized, how many warheads have been deployed, if any, and the location of such deployments, are unknown.

Even if the fissile material is weaponized and deployed, delivering these weapons is another matter altogether. North Korea has proven short- and medium-range nuclear delivery capability; including bombers, fighters, and missiles--once it has made nuclear weapons small enough to fit on these different types of delivery platforms.

No-one outside of North Korea knows if and when they will be able to miniaturize nuclear capabilities. In October 2014, General Curtis Scaparotti, head of US Forces Korea, stated that North Korea has the technology to make a small nuclear warhead and put it on a missile. But, he also added, he did not know if they had done so, and if they had, it would likely have low reliability. "We've not seen it tested at this point," he stated. "Something that's that complex, without it being tested, the probability of it being effective is pretty darn low." [4] In February 2015, the ROK Ministry of Defense stated that the DPRK did not appear to have miniaturized its warhead. [5]

There are two working assumptions that are required to evaluate whether this baseline warhead and long-range missile delivery capacity provides a credible threat to North Korea. The first is to assume that Kim Jong Un (equated with North Korea in this paper) is a rational actor and understands the strategic calculus of nuclear warfare, including the likelihood that any use may lead to his and his states immediate demise, whatever initial political or military gain is obtained by first-use. The second is to assume that Kim Jong Un (again, equated with North Korea's nuclear command in this paper) is irrational to some degree, due to degraded cognitive process, group bias, information distortion in his decision support systems, psychosis, erratic decision-making, overconfidence, inexperience, delusional individual or collective decision making, etc.; and may resort to first-use nuclear weapons even if this use is to the DPRK's strategic disadvantage. We do not consider the case that some confluence of events leads to accidental detonation; nor do we consider the complicating factor of possible non-state nuclear terrorism in North Korea.

Assuming for the purposes of analysis that Kim Jong Un (hereafter "Kim") is a *rational* actor, does he possess a *credible* long-range threat (by which we mean to the United States)?

When he came to power, Kim inherited the DPRK's slow motion long-range missile development, with a twenty percent demonstrated success rate over two decades and five firings; zero long-range re-entry vehicle (RV) tests resulting in an indeterminate probability for a long-range RV; a sixty six percent or less (depending on how one interprets results of the October 2006 nuclear test) success rate of nuclear device detonation; and an imputed eighty percent reliability of a re-entry. A North Korean long-range missile-delivered warhead at this point likely has a roughly ten percent or less probability of working at all--let alone hitting a target (that is, the probability that the re-entry vehicle will survive re-entry without being incinerated and the probability that fuzing and guidance systems will work are not accounted for at all in this estimate of missile reliability).

Missile engineers assess the reliability of DPRK long-range rockets by breaking them down further into the reliability of each of the separate essential components such as each rocket stage, etc. When one does so, the probability that North Korean long-range rockets will work is further degraded. An estimate for how many missiles and warheads that Kim would have to fire to have a reasonable confidence that a target would be destroyed by firing his existing, unreliable long-range missiles, assuming that he can arm them with small warheads at all, suggests that North Korea would need far more missiles and warheads than it has now or will have in the next few years--on the order of 80 to 100. Perhaps Kim would accept a far lower reliability than the US president would demand before he fires a long-range missile at an inter-continental target (the American standard is roughly 80 percent reliability). Or, perhaps Kim believes that fielding an unreliable long-range, nuclear-armed missile force suffices to deter the United States and South Korea from using military force or nuclear weapons against the DPRK. Maybe he believes simply developing some basic capabilities positively correlates with a cost imposition strategy whereby the US and its allies will spend heavily

in response. We don't know; and maybe he doesn't either. But if he is rational, he knows he doesn't have a militarily usable nuclear arsenal deliverable with long-range missiles that can sustain a strategic offensive or support a conventional offensive at this time.

If Kim is *irrational* for the reasons adduced above, what can we say about whether he poses a credible long-range threat (by which we mean to the United States)? Certainly, he has shown himself to be a decisive leader capable of responding to domestic threats (as evidenced by the execution of his uncle in 2013 and still remaining at least the visible face of North Korea's leadership) and willing to respond strongly to perceived external threats, as occurred in March-April 2014. Nonetheless, all the same physical and technological limits are still operating, and Kim cannot overcome them by an act of will or an absolute directive to his generals. The physical basis for a credible long-range threat does not yet exist. We conclude therefore that long-range nuclear strikes delivered by missiles are incredible at this time. Whether Kim is a rational or irrational leader makes no difference.

That does not mean that nuclear threats have no utility for Kim at this time. In fact, the extraordinary campaign of nuclear threat directed at the ROK, South Korea, and Japan in March-April 2014 suggests the opposite. North Korea is convinced that even unreliable missiles and incredible threats of nuclear strikes are worth making because of their observed psychological impact on his adversaries. He and his key advisors no doubt see how much money the United States pours into missile defense thereby leading to friction between the United States, China, and Russia and creating space in which the DPRK can maneuver between the great powers. . He saw that the risk of escalation perceived by the United States and third parties reached the level that induced the United States to delay a long-planned ICBM test in April 2013, even though this test was not in the vicinity of North Korea.[\[6\]](#) He also observed that the Governor of Guam declared a state of emergency on April 11-12 2013 in response to the DPRK's nuclear threat rhetoric.[\[7\]](#)

Thus, for purposes of compellence—forcing the United States to stop doing something it was already doing—Kim needs only to be confident that his adversaries find his threats to be worrisome, not that his threats are credible. He found that these threats were insufficiently compelling to force the United States and the ROK from conducting military exercises including simulated nuclear strikes by B52 and B2 bombers against North Korea. In short, threats by North Korea to launch long-range nuclear strikes are not militarily credible; but they suffice to have some psychological, budgetary and political impact on the United States and the ROK, but not enough to make a militarily significant difference in US-ROK actions.

Short-Range First-Use is Incredible

If threats to use nuclear weapons delivered by long-range missiles aren't credible, what about nuclear attacks delivered by short and medium-range missiles? These delivery systems can handle much bigger warheads over shorter distances and there is no shortage of these missiles in the DPRK's inventories. North Korea has proven that it has credible short- and middle-range delivery capability including KN-02, Scud B and C, Nodong, and Musudan missiles. Like the North's long-range rockets, these missiles are known to be unreliable and inaccurate. But if the DPRK were firing nuclear weapons in an all-out attack on South Korean cities, this deficit might not matter to the DPRK's commanders. Thus, Pyongyang plausibly has some missile nuclear weapons delivery capability—enough to cause considerable damage to South Korea, and possibly even to Japan.

However, although it is plausible that such an attack could be made, the credibility of the first-use of missile-delivered nuclear weapons against South Korea rests on the answer to the question: what then? If the next move is strategically untenable, likely suicidal, then the range of circumstances in which Kim would launch a suicidal first nuclear strike is very narrow, possibly non-existent, as addressed below. Terrence Roehrig puts it thus: "Can North Korea credibly threaten the use of

nuclear weapons, given the likelihood that doing so would bring about its demise?"[8]

The only way to impute a strategically suicidal use option to Kim is to degrade his rationality, as is done by Hyeongpil Ham and Jaehak Lee who provide a "situational deterrence" model of North Korean decision-making. They posit a range of possible North Korean nuclear first-use scenarios in which they find that the costs to North Korea's leadership of not-using nuclear weapons are greater than the costs of doing so.[9] Discarding their escalation scenarios that entail initiating suicidal wars against the ROK and/or the United States with nuclear first strikes, their taxonomy of possible situationally-motivated first use scenarios reduces to those that might arise in the midst of civil war in the DPRK; and in response to a pre-emptive conventional and/or nuclear strike by the United States (and presumably the ROK) on its nuclear weapons or posing an existential threat to the DPRK in a retaliatory counter-attack in response to DPRK conventional attack. Is the threat of nuclear first-use by Kim credible in these instances?

This scenario of first-use inside North Korea is hardly new. For many years, North Korea specialists have warned those seeking the DPRK's collapse that achieving their goal could bring about just such a catastrophic scenario, along with possible footloose warheads or fissile material in the midst of chaos. In 2009, for example, Hayes and Bruce wrote:

Collapse is always possible although we judge it to be of low probability. A collapsed North Korea could lead to civil war and chaos, and loss of state control over nuclear weapons, fissile material, and nuclear-capable scientists that could lead to leakage of these capacities to other state or non-state actors; or to actual nuclear usage in a Korean conflict. Thus, those who advocate squeezing North Korea to deal with its nuclear threat projection should be concerned of the risks associated with the possibility, however faint, that their prescription works.[10]

Unfortunately, this possible scenario is now more realistic, not because the DPRK is about to collapse, but because the weapons and fissile material now exist in greater quantities and are possibly mated with actual delivery systems. However, it is also not a scenario that Kim is likely to use as a basis for the DPRK's declaratory policy, force structure, or threat rhetoric, nor is it likely to guide him in any of the critical decisions related to force development or force structure over time. These attributes likely will be determined by his perception of external factors, mediated and refracted by the views of his key advisors and decision-support systems. His choices will be guided by a strategic logic that he judges to be realistic in the face of the real military, economic, and technological-physical constraints and driving forces that confront North Korea. It is precisely the combination of domestic constraint and insuperable external factors that dictate at this early stage in its development that it is incredible that Kim would use his existing nuclear weapons capabilities to launch a pre-emptive nuclear strike against external targets short of all-out war with external parties.

This leaves the two variants of the all-out war scenario in which the DPRK might use nuclear weapons first against Seoul or Tokyo in a conventional war in which US-ROK forces have begun an all-out attack on DPRK command-and-control, communications, and intelligence systems. Such attacks are a hallmark of modern American military interventions which, if replicated in renewed war with the DPRK would be concurrent with attempts to destroy or capture as many North Korean nuclear weapons as possible to suppress the risk of nuclear counter-attack and to limit damage in case not all are disabled and are fired. Such attacks would prefigure immediate occupation of the DPRK and would come after a period of intense military confrontation on the DMZ or offshore.

There are many reasons such a war could start; and many strategic motivations that could be in play in Pyongyang or Seoul as it ratchets upwards. Regardless of who starts such a war—and the initial cause might never be known if it involves covert forces of one or both sides—it could escalate almost

instantly—in minutes, hours, or a few days--to an existential war of survival for both Koreas, one which the North is almost certain to lose. Once begun, assuming they did not use nuclear weapons early on to stop attacking forces in North Korea, and with US-ROK troops poised to move northwards to capture Pyongyang and searching and destroying the North's nuclear weapons, the DPRK's leadership could be tempted to launch nuclear attacks.

In almost all of these cases, a North Korean first-use of nuclear weapons against cities and civilians, or against military targets, would be suicidal, implying that Kim has become irrational or is playing his own game with no recognizable rules - but with near certain war crimes tribunals for Kim and his elites if they survive. Even at the brink, he might intentionally exploit the risk of going to war precisely because the DPRK is weak and the brink is so dangerous, in order to restore the status quo ante on acceptable terms, or to secure a new armistice that allows the regime to survive to fight another day, perhaps with the DMZ moved northward. Such threats would be extraordinarily dangerous with only the slimmest possibilities of success.

These options would present Kim with an exquisite dilemma. On the one hand, he could use balancing on the brink of war as an opportunity to exploit risk for purposes of coercive leverage, to avoid war, to force a stand-down, to seek some other concession. However, the more aggressive, the overt, and the more nuclear his threat display, the more likely US and ROK commanders will be driven to consider pre-emption, if only to limit damage and even at the risk of achieving only partial suppression of a possible DPRK nuclear attack. On the other hand, once convinced that he has actually fallen over the brink, he may feel obliged to launch a nuclear first-strike in the desperate hope of somehow staving off pending obliteration, stalling the attack, or appealing to third parties (see below). However, in this case, his regime would be doomed by the certainty of a devastating and overwhelming response to such an attack. American and ROK commanders would face a mirror image of this escalation risk dilemma.

Thus, unless Kim faces pending personal, national command, and regime annihilation, it would be irrational for him to order nuclear first-use against ground targets in the ROK or Japan. Doing so would confirm to the United States and the ROK that deterrence had failed and only the most extreme measures will restore confidence in extended nuclear deterrence. No party (including China) could guarantee that additional nuclear attacks would not be forthcoming - all of them on and/or over North Korea's borders. Such first-use could wreak enormous damage; but would also accelerate the demise of the regime, sooner or later, and would impel the United States and the ROK to redouble their military effort to end the regime in short order with China either helping regime change or staying neutral.

It is conceivable that an irrational Kim could order a nuclear first-use at the brink or the midst of war simply to impose as much suffering and pain as possible on his enemies, as a matter of apocalyptic revenge. However, such a choice would be beyond external influence or control. Although this contingency is conceivable, there is no way to deter Kim to not fire nuclear weapons in a terrorist manner, wearing the equivalent of a nuclear suicide vest.

Thus, we are left confronting the irreducible risk that Kim Jong Un might use nuclear weapons against the ROK or other third parties at the outset of a losing war, in the midst of a losing war, or against insurgent North Korean military forces, in the midst of a war in the North. The domestic use option is not against an external party outside of North Korea, however, alarming as it might be if it occurred. Only the former scenarios entail first use against the ROK, the United States, or other third parties, and are therefore conceivable, even if strategically incredible, leading as they would to the demise of the regime.

North Korean first-use in these scenarios cannot be "deterred" but the risk that it occurs can be

managed and reduced. In the first instance, first-use arising from collapse and civil war, it is amenable to external influence that reduces the stress on the DPRK regime that may lead to its collapse. In the conventional war scenarios, this risk of first-use can be managed and reduced via engagement with the DPRK as part of a full-fledged campaign of coercive diplomacy to avoid war in the first place—a combination conspicuously absent for the last fourteen years of American policy towards the DPRK, and is beyond the scope of this essay. The important point here is that it is also beyond the reach of countervailing nuclear threat as the postulated North Korean uses would be aimed at forcing the United States and the ROK to stop what they are already doing, not deter them from doing it in the first place.

Bolt-Out-Of-The-Blue First-Use Scenarios are Incredible

If Kim is assumed to be irrational and capable of making suicidal decisions, there is no limit to the imaginable threat and use scenarios. The DPRK could for example, load all its existing Pu and HEU devices on its Soviet era bombers (today, between eleven and sixteen warheads), disperse their bombers to their twelve airfields, simultaneously put their entire bomber fleet of eighty two Ilyushin planes in the air, and fly them as a swarm at their maximum 900 km per hour speed at low altitude directly at the DMZ, in the hope that at least one of the maximum today of twenty seven nuclear-armed bombers penetrates south to reach a military or civilian target, and detonates a nuclear weapon, possibly mid-air without jettisoning it.[\[11\]](#) Or it could put them on a foreign flagged merchant ship, a fishing trawler, or even a submarine, and blow up a port city in the ROK or Japan. If it has such a weapon, it could put nuclear backpack bombs on individual commandos, and send them south across the DMZ. However, such means of delivery would require pre-delegated use authority by Kim plus small and reliable warheads, and would risk loss via defection, or loss via discovery and capture before use, inability to recall after deployment in changed circumstances, and subsequent great power intervention. Bombers that loiter over North Korea or try to reach Japan must be refueled and would face a high likelihood of being shot down. Therefore, such attacks are implausible and incredible.

All such “bolt-out-of-the blue” surprise attack scenarios face the inescapable question: what then? If Kim is a rational actor, if he is making the nuclear use decisions, and if his goal is for the DPRK survive as an independent state thereby ensuring his own survival, the only surprise attack that could be acceptable is one that guarantees the obliteration of the enemy and its immediate or eventual political and military defeat. Given the vast American nuclear and conventional arsenal plus the ROK’s conventional military superiority, not to mention the likelihood that the other great powers would be forced to respond to North Korean nuclear first-use, the notion that Kim would launch a nuclear surprise attack is incredible.

Admittedly, this conclusion rests on the view that Kim is capable of realistically judging estimates of the military campaign that would be aimed at the DPRK after it delivers a nuclear first-strike against the ROK. It is true that Kim had mostly political-ideological training in military affairs although he reportedly trained for a couple of years with an artillery unit. Photos of Kim being briefed in military exercises do not suggest that he is highly trained in combat or weaponry. Indeed, astute observers have noted that the body language of his guards in photographs of Kim shooting a guns do not bespeak confidence in his skill at handling firearms.[\[12\]](#)

However, it is improbable that even the youthful and inexperienced Kim is not acutely aware of the sheer scale of nuclear explosions. His leading generals are steeped in the history of warfare and expert in American nuclear strategy, doctrine, and practice. Most Koreans, including North Koreans, know the terrible history of the roughly 50,000 Koreans killed at Hiroshima in 1945 by the first nuclear weapon dropped in history; and the fate of the 3,000 survivors who returned to the North (about 19,000 went to the South). The propaganda issued by North Korea during his rule has

emphasized the annihilative effects of nuclear weapons when used against cities and asserts that the DPRK can deliver such strikes against the United States, the ROK, and other parties. It is incredible that Kim is not aware of the DPRK's absolute and relative vulnerability to countervailing nuclear strikes.

It is also likely that he is aware that North Korean nuclear first-use may result not in "symmetrical" US nuclear retaliation but rather in all-out US-ROK conventional retaliation. Moreover, he must be aware that other great powers could join the fray to overthrow Kim. The odds are practically certain that the great powers would respond to a North Korean nuclear surprise attack by systematically occupying and dismembering the DPRK with conventional forces, and Kim would be captured and tried, or killed in the campaign as would most of the elite in the regime. All the NPT-recognized nuclear weapons states have a vital interest in upholding the NPT regime, especially China with so many neighbors who are already nuclear-armed.

Thus, North Korean bolt-out-of-the-blue first-use scenarios are conceivable; but not credible, at least not for a rational Kim, nor even to a Kim with significantly degraded rationality due to cognitive bias, errors, etc.

Other Possibly Credible, Primarily Political First-Use Options

There are at least three other credible first-use options against external parties which would be delivered against targets in North Korea, not outside its territory.

First, North Korea could realistically pre-deploy emplaced ground devices in the attack corridors north of the DMZ;[\[13\]](#) and use these devices before or at the outset of war to block advancing ground forces in these valleys--a mirror reflection of US nuclear warfighting plans in the late seventies.[\[14\]](#) Due to risk of identification and US-ROK pre-emptive attack, this pre-war emplacement would need to take place well in advance. The devices would be kept underground and could be moved via tunnels from one site to another to preclude pre-emption by US-ROK forces.

Assuming Kim is the release authority, this kind of pre-war emplacement means he would have to make a strategic decision long before tactical warning indicators become evident. It would be risky to pre-deploy these weapons at the brink of a crisis when they might be detected in surface transit; and if not used before or immediately upon the outbreak of hostilities, they could be enveloped quickly or bypassed by US-ROK forces not stupid enough to advance over well-known attack corridors. Letting troops be seen emplacing nuclear weapons as a possible signaling method is also not credible because there is no way for Kim to know that the United States would understand the signal as intended and it could be as easily misinterpreted as understood in the midst of a crisis. Because observable movement of nuclear weapons is an ambiguous but threatening signal, there is a high possibility that the United States would see such actions as signs of imminent attack thus defeating Kim's political goal of averting war by such early deployment

Conversely, the DPRK likely has so few possible weapons at this stage, that early use in numbers needed for military effect against US and ROK ground forces (scores at minimum) would quickly exhaust their maximum arsenal. Also, if we are dealing with Kim as prudent commander, facing the near-certainty of military defeat in full-scale war, and not the Kim as erratic, irrational commander, then he likely would keep a significant fraction, likely one-third or more, of the warheads in reserve, in rear bases, for negotiation for early war termination. This imperative further reduces the usable nuclear force at this time.

These reserve forces would likely be "pop-up" road-mobile missiles kept in tunnels in the mountains, again to preclude early discovery and pre-emption by US-ROK forces. Although they would be road-

mobile, these missiles with warheads would be highly unlikely to take to the surface roads for the simple reason that Kim could not be assured of continuous communications with and direct command-and-control of these forces.^[15] However, firing these reserve forces against external city or ground military targets in the ROK or Japan suffers from the same credibility problems as described in earlier sections.

The second possible nuclear first-use that should be considered as credible in a narrow range of devices is the equivalent political-stun grenade. A suitable would be nuclear attack by a land-based missile or delivered by fast boat (or torpedo) against an American aircraft carrier. A bracket of about 8 reasonably accurate and well distributed 10 kiloton nuclear explosions detonated within 30 minutes of target acquisition would suffice to disable a US aircraft carrier steaming at 30 knots offshore.^[16] The goal of such an attack would not be military but rather, to communicate that the DPRK seeks an early termination of a war in progress. The main audience would not be the United States but rather China. In this scenario, the DPRK would seek to enlist China to press the United States for early and favorable terms.. The DPRK might estimate that such a “limited” nuclear attack would induce China to swing its political support away from two of its largest trade partners toward the DPRK for geostrategic reasons. The DPRK would bank on China putting first priority on Taiwan and national unification. And indeed, China would be extremely wary of allowing the United States and the ROK to use military means to reunify the Peninsula, setting a precedent that Taiwan might follow—especially if the ROK obtained the DPRK’s nuclear weapons after reunification. Thus, the DPRK might have more leverage from such a political first-use of nuclear weapons against US forces offshore than might appear to be the case at first glance.

However, the DPRK lacks the necessary target acquisition intelligence systems (unless a carrier battle group was in plain line of sight or with range of radar), let alone the mid-course missile guidance systems needed to pull off such an attack with any confidence. The DPRK’s fallback might be to target a small island; or simply to explode a nuclear weapon mid-air and offshore; or to conduct an underground nuclear test. Such first-use would be political rather than military in nature, and their strategic utility would depend on the receptivity of external constituencies at the time to the degree of calibrated “subtlety” of the DPRK’s first use. The DPRK at that point would have lost most of its ability to control the escalation of the war, and would in fact signal its weakness and desperation by nuclear first use, in effect ceding the strategic initiative to China. How such a scenario might play out would also depend on the state of the US-ROK alliance. Depending on who occupies the Blue House, the ROK could use such a political nuclear explosion to force a rupture in the alliance if the United States rather than the ROK was perceived to be running needless risk of war with the North. Conversely, the Blue House could insist on a “symmetrical” nuclear response, posing enormous risks of further escalation.

The third possible DPRK first-use is a variant on the war losing scenario combined with the notion of nuclear terrorism. In this instance, the DPRK would have beat a retreat to Pyongyang, possibly firing nuclear weapons to stun US-ROK forces a few times, and possibly in a way intended to invoke great pressure on the United States to implement a cease fire. Assuming that these moves had failed and with US-ROK forces advancing on Pyongyang itself, Kim would effectively booby trap Pyongyang with nuclear weapons and take its population hostage, threatening to destroy the city and kill its civilian population should the city be attacked. Such a threat could be credible and effective and depending on season, might coincide with a war-induced humanitarian emergency in Pyongyang due to shortage of food and fuel that would be felt quickly in a sustained “nuclear siege.”^[17] Although there are some analogies between this scenario with the 1948-49 Berlin Blockade, this case would be far more dangerous due to the wartime circumstances and the necessity to negotiate a safe exit for Kim or play a waiting game while Kim attempts to control his own military in the face of eventual, inevitable defeat and not willing to commit nuclear uricide.

What Nuclear Force Structure Might the DPRK Build?

If the DPRK has only a very limited range of possible, credible nuclear usage today, what does the future portend if the DPRK continues to develop nuclear weapons rather than return to the path of denuclearization and disarmament?

There are nine historical proliferation models for the DPRK to consider. Of these, one of the most interesting to the DPRK is Israel. Some North Koreans view the Israeli nuclear force in the nineties as exemplary—a state proliferating outside the NPT, fielding a nuclear force based on opacity and ambiguity, never demonstrated but sufficiently credible, and backstopping the ruthless application of conventional military and covert forces that remains the mainstay of Israeli strategy.

This model suggests slow, subterranean development of nuclear forces, acquiring sufficient means over the next two or three decades of Kim's intended rule (any children he has would need that long to be able to take over the reins) to be far more credible and deployable than the current "tiny" nuclear arsenal, with only a few if any further demonstrations of nuclear warheads or missiles. The primary vehicle of delivery would be short-range bombers and ballistic and cruise missiles aimed at US forces on surface ships, and US bases in the ROK. The primary technical milestones would not be rocketry, but warheads—first plutonium tested and shown to be survivable, followed by enriched uranium, then thermonuclear, and along the way, if they can find a way to do it, a test flight of a miniaturized warhead on a cruise or ballistic missile.

The second obvious model is China. China developed its nuclear warheads and missiles rapidly after experiencing US nuclear compellence threats in the Korean War, and the "near miss" of the August 1958 Quemoy Matsu crisis, at which time US Pacific Air Forces had fuel and ammunition for less than 3 days conventional operations, and relied instead on forward deployed nuclear weapons, while nuclear howitzers were deployed to Taiwan.[\[18\]](#)

Less than seven years after China's first nuclear test in 1966, they had one hundred warheads (fifty five on bombers, and forty-five on DF2 (20 kt) and DF3 (3MT H-bomb) intermediate range ballistic missiles). The Chinese proceeded at the rate of one nuclear test or more per year for three decades. For comparison, the DPRK may have acquired an estimated eleven to sixteen warheads between 2006 and 2014.

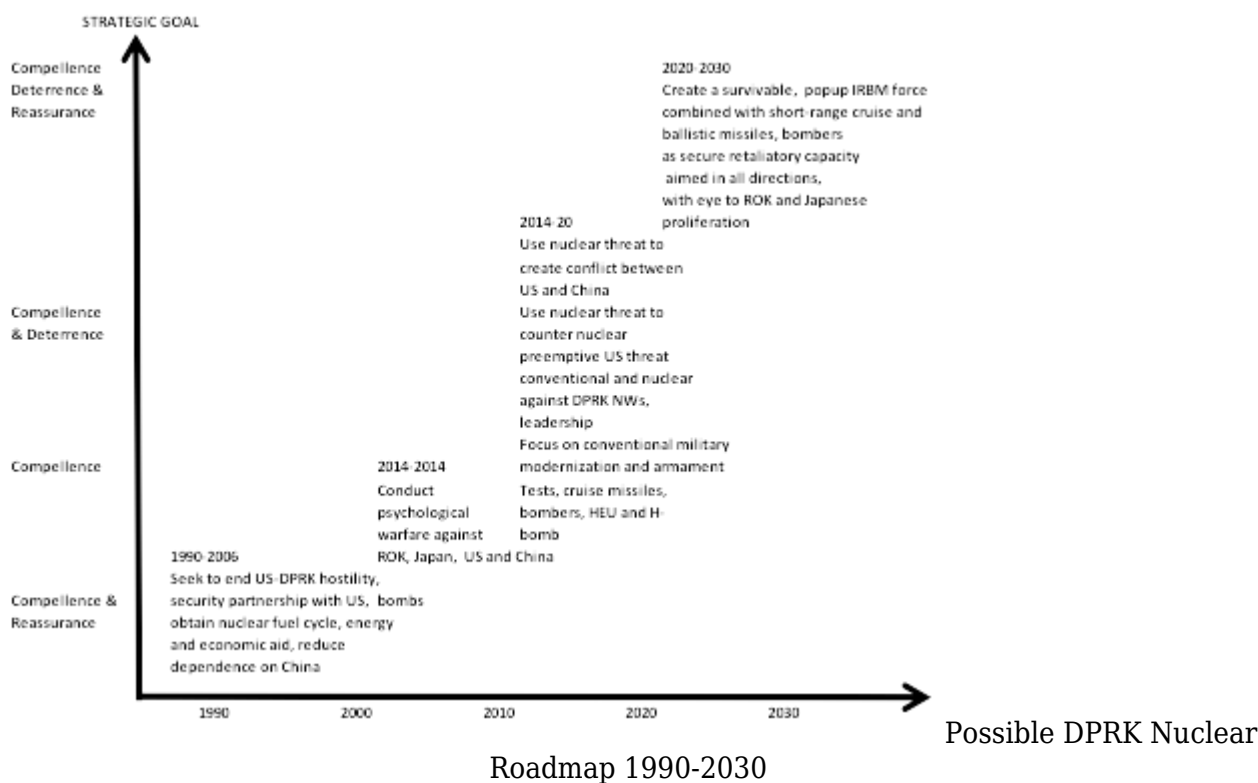
The October 27, 1966 live fire of a nuclear-armed DF2A missile and airburst over Lop Nur was particularly noteworthy.[\[19\]](#) This shot was the only live-fire missile-mated-with-warhead test in history other than the US Polaris live-fire nuclear test over Christmas Island in May 1962 as part of Operation Dominic. An important decision crossroads for Kim will be whether to emulate Israeli opacity (and not conduct such a test); or adopt the Chinese and US approach (in which case: what is the DPRK plausible equivalent of such a spectacular test given the geography and external circumstances?

It is possible, but extremely unlikely that a third country would allow the DPRK to use their territory for testing purposes and just as unlikely that the DPRK would relinquish control of its "treasured sword" to a third party. More likely is that it will attempt to obtain super-computers and model its warheads with only minimal testing. In this regard, it has a latecomer's advantage in that it can take into account what is known to have worked in thousands of nuclear tests by the nuclear weapons states. Knowing what is possible is a tremendous help in such modelling.

Equally noteworthy is that by 1969, many of these earlier Chinese missiles and bombers that were deployed initially to attack US bases in northeast and southeast Asia had been redeployed to target the former Soviet Union. Surely the North Koreans (and Chinese) are thinking through what a North

Korean force structure would look like that could be deployed with 360 degrees delivery or, as the Gaullists used to say about the *force de frappe*, “tout azimut.”

Compared to China which was able to develop a mix of nuclear capabilities in less than a decade, North Korea has far less ability to create an industrial and technological base out of thin air adequate to support a full-fledged nuclear force with credible “minimal deterrent” capacity within one decade, let alone in the next two or three years. This assertion is consistent with the massive effort that they are making to modernize facilities for production of missiles as well as in nuclear fuel cycle and weaponization capacities. First things must come first, and the first priority to build credibility is to accumulate fissile material.



The North Koreans will be forced to make hard choices between types of fissile material, types of warheads, types and diversity of delivery platforms; and between nuclear weapons and delivery systems, and conventional forces, already starved of materiel, resources and energy in the DPRK’s collapsed industrial base. Despite claims to develop simultaneously nuclear weapons and the economy, developing nuclear weapons precludes access to capital, resources, energy and management expertise, in turn keeping the economy in survival mode. The international environment already precludes simultaneously achieving these twin objectives. The DPRK certainly have aspirations to grow a larger and more effective nuclear force, and have expressed this aspiration in their statements and propaganda.[\[20\]](#)

Aspiration is one thing; working and credible is another in the world of nuclear weapons. In the next decade, therefore, we suggest that the DPRK will be unable to develop, test and demonstrate, and even less likely, deploy a credible strategic nuclear force, let alone a long range nuclear force with some degree of secure second strike or retaliatory capacity. To be effective, they will have to focus relatively limited resources on a narrow set of options selected from the theoretically possible “nuclear weapons menu,” not spread them thin.

This logic implies that the DPRK may do best to concentrate on acquiring cruise missiles and better bombers – possibly assisted by a fleet of drones, *not* long-range missiles as the preferred delivery strategy, because these systems are cheaper, recallable, and could swarm southwards over the only

warzone in which the Korean People's Army (KPA) is likely to fight in the next two or three decades. Whether DPRK forces would acquire the requisite aircraft, jet fuel, flight time, and somehow launch a surprise dash for the DMZ in spite of US satellite reconnaissance and other combined ROK-SD-USAFA radars in the region remains an open question. This strategy would require the DPRK to modernize its fighter and bomber fleet—no small task—but one that is easier than developing a relatively reliable long-range missile force.^[21] Or, it could develop and build cruise missiles^[22]—a far less expensive and demanding task than building modern fighters and bombers, let alone long-range missiles. In this approach, it might find nuclear-armed cruise missiles to be an affordable and credible offensive force for nuclear strikes that would complement an expanded and modernized set of road-mobile short and intermediate range missiles kept in reserve in caves.

Drawing on the earlier analysis of its currently credible and near term first-use and retaliatory nuclear options, over the next decade the DPRK might mix and match nuclear warheads on landmines, on short-range missiles, on cruise missiles, and aboard bombers, depending on what testing regime is selected, and what confidence of successful delivery of nuclear detonation over target is required by the DPRK's nuclear command. Within a decade, they could have acquired sufficient nuclear weapons to have a reserve for some form of survivable retaliatory second strike capacity; and to keep missiles, mines, and bombers loaded for immediate use. Whether such a relatively small arsenal would lead the DPRK to adopt a launch-on-warning policy or to instead keep its warheads secure and even separate from delivery systems to bolster central command-and-control, is unknowable. However, a launch-on-warning posture seems highly unlikely to be compatible with the degree of central control exercised by Kim who was declared in 2013 by the DPRK's official newspaper to be the only person who could order that nuclear weapons be fired.^[23]

Over a similar time frame, the DPRK would still make and test long-range missiles aka "space rocketry." It is even possible that it might try to develop a submarine-based strategic nuclear force—although it is decades away from such a capability today that China itself has only begun to deploy in 2014, nearly five decades since its first nuclear test.^[24] If the DPRK can reinforce these rocket test driven-threat perceptions with an enriched uranium and H-bomb tests while winding up plutonium production, Kim can gain externally-oriented coercive capacities without paying the full costs of a strategic nuclear force.

Nuclear Command-and-Control and KPA Identity

In this respect, the situation is inherently unstable for the next decade (or two). Should the DPRK focus mostly on deepening its existing capabilities, and providing occasional glimpses of expansion via demonstrated tests and deployed delivery systems over the coming years, then it can likely integrate nuclear operations into the KPA without much difficulty. The KPA will assuredly follow Kim and party directives to commit fully to a strategic nuclear force. In April 2012, North Korea reportedly upgraded its Missile Guidance Bureau to become a Strategic Rocket Force, apparently separate from the KPA's Army, Navy and Air Force. Its Commander, Lt. Gen. Kim Rak Kyom was elected to the Korean Worker's Party Central Military Committee, underscoring the commitment to developing a deliverable strategic nuclear weapon.^[25]

In reality, nuclear weapons are a distraction from the KPA's primary deterrent mission—to be able to credibly threaten to inflict unacceptable damage on Seoul with its massive conventional forces—and come at high opportunity cost as well as drawing fire—politically and militarily from many angles of concern to the KPA. The stringent requirements for centralized command-and-control as well as security of nuclear weapons logistics also will be difficult for the KPA to sustain given competing demands.^[26]

For such a centralized and personalized command structure as North Korea, this question of control

is critically important. Moreover, the peculiarly North Korean pyramid of power presents the possibility of instant propagation of error and possible inadvertent escalation for a military command structure prone to constant probing by and interaction with devolved US and ROK military forces at the “hard edges” of the DMZ and the Northern Limit Line. Cybernetic errors of the kind that Paul Bracken identified in the US and Soviet nuclear command-and-control organizations[27] may also creep into the DPRK nuclear command and control system. Also, Kim’s nuclear command-and-control system may be susceptible to the Byzantine (traitorous) General subversion problem[28] should war come at a time of disorder and near collapse in the DPRK itself. This risk needs to be studied carefully, as well as what measures may be needed to minimize such dynamics in the interaction between DPRK and US-ROK command and control and communication systems.

In any case, it will take time for the KPA to rebuild its core identity around becoming a nuclear strategic force, and it likely will encounter a great deal of institutional and cultural resistance within the force. Exactly how Kim will use the transition to a nuclear force to build a completely beholden military leadership is not obvious but will surely be an important consideration. Political appointees to general rank such as Choe Ryong-hae are not his problem. Rather, the professional military officers who grew up with conventional forces and force planning may find themselves shunted aside by a new breed of nuclear-oriented military officers who do not have to worry about resource shortfalls or the strategic dilemmas for the conventional KPA created by deployment of nuclear weapons. Many of them have studied American and others’ nuclear postures, and doctrinal history in great depth. They are more likely than not to understand the dilemmas that they now face due to the nuclear choices made by Kim Jong Il and now Kim Jong Un.

The KPA’s professional military leadership is likely already alert to how its nuclear capacities affect and offset the latent nuclear weapons capacities and proliferation propensities of Japan and the ROK. So far, the DPRK does not seem much concerned with evoking a matching proliferation response-in-kind from the ROK and Japan, although the United States, China and many other countries clearly do not want to see the strategic landscape fundamentally altered as a consequence of DPRK proliferation. In this sense, the DPRK’s proliferation is truly a-strategic in nature. In effect, it is free-riding on the ability of the great powers to ensure that the ROK, Japan, and even Taiwan do not follow its footsteps. This may not be a problem for the KPA until it becomes convinced that the United States’ ability to restrain such proliferation impulses by Japan and the ROK may not be up to the task. The bigger the North Korean nuclear threat becomes, and the more the KPA is invested in it, the more likely it is to be confronted by nuclear-armed adversaries that are even more hostile to the DPRK and possibly less accommodating than the United States.

Put simply, the longer the United States and its partners wait to reverse the DPRK’s nuclear armament, the harder it will be to undo the institutional logic of the KPA in which nuclear weapons are hard-wired into the core of its being, rather than an ill-fitting plug-in.

Conclusion

Given time, the KPA’s deeply entrenched legacy of guerilla warfare, its “ambush mentality,” the notion of “speed campaigns” combined with its a-symmetric conventional and slowly increasing nuclear weapons capacities will inspire strategic thinking for which there is no parallel in the history of nuclear armament.

There is no reason to think that the DPRK’s fusion of its martial origins, lessons learned from military history, and response to the imperatives it faces from external and domestic conditions, will lead it to emulate or replicate western or great power nuclear doctrine and strategies.

In fact, the opposite is likely to be the case. The DPRK has not hesitated to issue unprecedented and

vitriolic campaigns of nuclear threat. Small nuclear-armed states such as the DPRK may launch limited attacks believing that they would not face severe retaliation. They may also use nuclear weapons early to stop further escalation.[29]

The United States and its allies should prepare for more compellence campaigns involving extraordinary nuclear threats[30] unless they can reverse the DPRK's nuclear breakout and engage it in a diplomatic strategy that first arrests, then denuclearizes the DPRK over time.

Frameworks for constructing a completely different roadmap for the DPRK exist and remain untested.[31] Currently, the prevailing policy assumption in Washington DC is that the DPRK is committed to retain its nuclear weapons forever, and that this cannot change so long as the current leadership, and possibly the current regime type, remains in place. However, the United States intelligence community has admitted that they do not know much about Kim's intentions;[32] and the United States can shape the strategic context and the strategic calculus that informs Kim's intentions. It is critical that it constantly tests these intentions and creates a regional security framework that is conducive to changing them.

Should they succeed in negotiating a peaceful end to the DPRK's nuclear armament, they also need to explain how the DPRK could maintain deterrence in ways acceptable to the United States and the ROK (but without nuclear weapons at its disposal) during the process of denuclearization and thereafter--something which no other state has done. (South Africa abandoned its nuclear arms unilaterally and quickly, and its external strategic circumstances shifted dramatically after the domestic changes resulting from the end of Apartheid).

However, this is a hard problem that one would rather have to solve than not when compared with the challenges posed by unbridled DPRK's nuclear armament for alliance management, regional insecurity, and increased risk of further nuclear proliferation and nuclear war.

Banner image credit: CollegeHumor, "Kim Jong Un Launches a Nuke," at 2:06, at: https://www.youtube.com/watch?v=C0zwirfmGIU&index=7&list=PLuKg-WhduhklQR2uqYCE_aSZgfjLsy4fx

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