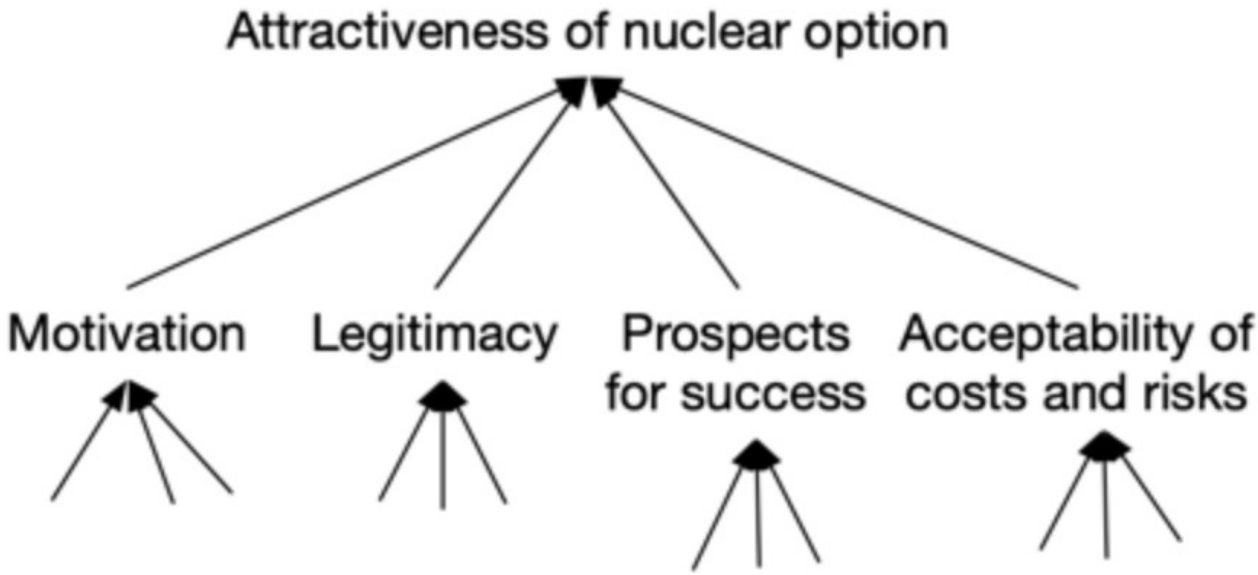
# NUCLEAR-USE CASES FOR CONTEMPLATING CRISIS AND CONFLICT ON THE KOREAN PENINSULA

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**PAUL K. DAVIS AND BRUCE W. BENNETT**

**DECEMBER 9, 2021**

## I. INTRODUCTION

In this essay, Paul Davis and Bruce Bennett sketch ten cases in which nuclear weapons might be brandished or used in a Korea-originated crisis. They offer insights on how and why nuclear war could occur, and the corresponding circumstances that must be avoided. The authors use two

distinct lenses to identify the conceivable nuclear-use scenarios: a logical/ taxonomic reasoning lens and a decision-making lens that asks how a national leader might decide to use nuclear weapons first. Based on the first lens, they identify three possible types of first use cases: peacetime mistakes, unintended escalation in conflict, and intentional first use. Based on the second lens, which asks how a national leader might decide to use nuclear weapons first, they consider human factors such as fear, fatalism or grandiosity, and mental and physical health. Some cases are more plausible than others under present circumstances. Rather than estimating their likelihood, the authors contend that the challenge is to avoid the circumstances that could make the identified nuclear-use cases more likely.

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Banner image: Davis and Bennett, from this special report.

## II. NAPSNET SPECIAL REPORT BY PAUL K. DAVIS AND BRUCE W. BENNETT

## NUCLEAR-USE CASES FOR CONTEMPLATING CRISIS AND CONFLICT ON THE KOREAN PENINSULA

## DECEMBER 9, 2021

**Summary**

This paper motivates and sketches a set of nuclear-use cases involving conflict on the Korean peninsula. The cases reflect a wide range of ways that nuclear weapons might be brandished or used in a Korean crisis. We identify *possible* cases by using two different lenses: a "logical" or taxonomic lens and a decisionmaking lens that asks how an actual national leader might decide to use nuclear weapons first. We then select cases from the space of possibilities to reflect that range usefully. The use cases consider mistakes, unintended escalation, coercive threats, limited nuclear use to reinforce threats, defensive operations, and offensive operations. They also consider the potential role of fear, desperation, responsibility, grandiosity, indomitability, and other human emotions. Some use cases are far more plausible than others at present, but estimating likelihoods is a dubious activity. The real challenge is to avoid circumstances where the use cases would become more likely.

## 1 Introduction

In this paper we develop a number of hypothetical nuclear-use cases (what are often called scenarios) in a Korean conflict for application in a larger project.[1] Our intent is to provide insights about how and why nuclear war could occur and, thus, about circumstances to be avoided.

### 1.1 Reasons for Use Cases

#### *1.1.1 Generic Purposes*

Use cases provide *concreteness* for discussion, debate, and evaluation. They serve many purposes as illustrated in Table 1.

**Table 1: Some Reasons for Use Cases**

| Purpose | Elaboration |
|---|---|
| Education | of analysts, scholars, policymakers, military officers, staffs, students |
| Communication | among scholars and practitioners; with the public; in negotiations |
| Assessing strategic balances | from different perspectives and with different assumptions |
| Assessing arms control options | by governments and outside groups |
| Understanding potential outcomes of nuclear war | in terms of relative and absolute military gains and losses, and more broadly |
| Identifying problems and opportunities in avoiding or mitigating nuclear war | noting particular weaknesses of deterrence and ways to improve it |
| Planning | force planning, operational planning, and crisis planning |

#### *1.1.2 Thinking about the Unthinkable*

A paper identifying use cases should engage in what Herman Kahn called "thinking about the unthinkable" (Kahn, 1962). It should avoid the temptation to ignore a use case because it seems unlikely or because its discussion is controversial. The empirical record of assessing the likelihood of bad events is poor, even by experts (Tetlock, 2017). Readers who are more optimistic about being able to estimate likelihoods should recall that, as late as 2010, there was no sense within American expert circles that Russia would soon be a significant military threat again for NATO—that is, that it would seize Crimea, occupy part of Ukraine, and pose a danger to the Baltic states. Also, readers might ask how plausible it seemed in the mid-1990s that the United States and some NATO allies would invade the sovereign state of Iraq in 2003, arguably in violation of the UN charter (Murphy, 2004). Also, how likely did it seem in 2011 that Syria would use chemical weapons in its civil war, despite U.S. warnings about red lines?

Thinking about the unthinkable has become more challenging as high-end war has expanded to include massive long-range precision fires; cyberwar, anti-satellite weapons; high-altitude electromagnetic pulse (HEMP) bursts; and mass-destruction attacks by chemical, biological, or nuclear weapons.

An escalation "lattice" may be a better metaphor than ladder and we should recognize that antagonists will see levels of conflict differently (Davis, 2017).

Opportunities abound for misperceptions and misjudgments in crisis and conflict. Although high-level wargames during the Cold War with players akin to civilian national leaders ("elite wargames")

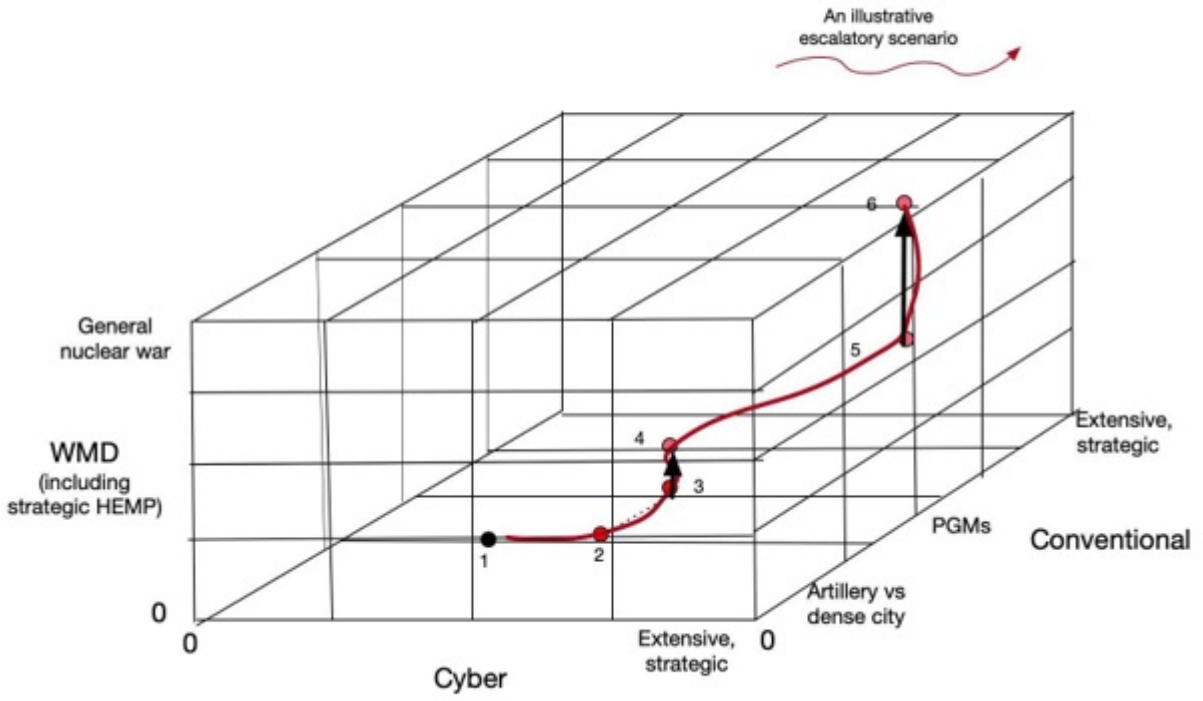
showed extreme reluctance to use nuclear weapons (Pauley, 2018), the boundaries among conflict levels have blurred. In some wargames today, highly competitive players (not necessarily proxies for policymakers) will escalate in ways that seem to them limited but that appear otherwise to the adversary.

This complexity is illustrated in Figure 1, which reduces the n-dimensional escalation space to a three-dimensional cube. For the illustrative case, war begins conventionally (item 1). A major cyberattack against the United States (item 2) leads to more extensive and strategic U.S. use of precision weapons (item 3), which leads the adversary to limited chemical, biological, or nuclear use (item 4). That leads to more comprehensive use of precision weapons and limited nuclear use (item 5) and, finally, general nuclear war (item 6).

The possibilities are even more numerous than with Herman Kahn's 44-rung escalation ladder.

In contemplating Korea-related escalation possibilities, we have drawn on a recent report (Bennett et al., 2021, pp. 39-58), which in turn drew on the literature about North Korean military capabilities and operations plans, and on testimony by and interviews with high-level escapees from the Democratic People's Republic of Korea (DPRK). We also drew on earlier work about instability on the Korean peninsula (Davis et al., 2016).

**Figure 1: An Illustrative Escalatory Spiral**




Source: Davis and Bracken, 2021.

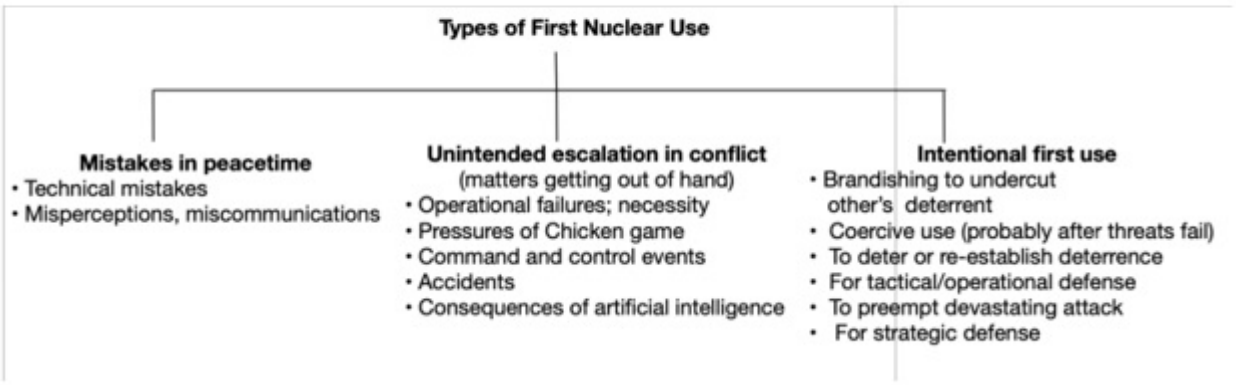
### 1.2 Approach in Identifying Use Cases

We looked for use cases in two ways: (1) asking about *types* of first use by thinking logically and perhaps taxonomically and (2) asking how a human decision maker might be *thinking* when actually deciding to use nuclear weapons first. Viewing issues through these two lenses would lead to different results, albeit with overlap.

## 2 Types of First Use

Figure 2 identifies three types of first use: peacetime mistakes, previously unintended escalation in conflict (matters getting out of control), and intentional first use.

**Figure 2: Origins and Impetus for Nuclear War**




### 2.1 Mistakes

The potential for peacetime mistakes in managing nuclear weapons or interpreting warning data has long been a concern because so many errors have in fact occurred. Some of these matters were discussed decades ago (Blair, 1985; Sagan, 1993). A harrowing account based on declassified documents covers the 3 June 1980 event in which the U.S. warning system led to a middle-of-the night call to the President's National Security Advisor, Zbigniew Brzezinski. A second call corroborated the attack. Just as Brzezinski was about to call President Carter—determined that the U.S. must retaliate—a third call declared a false alarm (Gates, 1996, p.114). Had random events been slightly different, general nuclear war might well have begun.

Serious errors in Soviet early warning systems have also occurred, as with the Petrov incident in 1983 (Hoffman, 1999). President Yeltsin was briefed during a 1995 false-alarm episode in which a Norwegian scientific rocket was reported as attacking the Soviet Union. His "nuclear football" was activated before it was recognized that this was a false alarm (Union of Concerned Scientists, 2015).

Mistakes have also included operational blunders, such as when the U.S. Air Force inadvertently flew nuclear weapons across the country. The mistakes caused Secretary of Defense Robert Gates to fire top Air Force leaders (Shanker, 2008) and to create a special task force co-chaired by ex-Defense Secretaries to review nuclear management (Schlesinger et al., 2008a; Schlesinger et al., 2008b).

A variant of the "mistakes" category involves misperceptions more than technical glitches. An example was the 1983 "War Scare" during NATO's Abel Archer exercise.

President Andropov was already obsessed with the possibility of a U.S. nuclear attack. The exercise, which included NATO preparing for nuclear release as part of defeating a Warsaw Pact attack, was then viewed with alarm by some Soviets—a degree of alarm unrecognized by the United States, later dismissed as false propaganda (Central Intelligence Agency, 1984), and still later described as authentic and worrisome (PFIAB, 1990). The PFIAB report discusses possible reasons for Moscow's alarm. For example, leaders saw themselves as much more vulnerable to a first strike that Western analysts assumed, relations with the United States were bad, there were health and old-age problems among leadership, and certain "live" aspects of the NATO exercise went beyond usual command-and-control exercising) (Ibid., p.38 ff). Secretary of Defense Robert Gates concluded in his memoirs that (Gates, 1996, p.273)

> "*I don't think the Soviets were crying wolf. They may not have believed a NATO attack was imminent in November 1983, but they did seem to believe that the situation was very dangerous. And US intelligence [SNIE 11–9-84 and SNIE 11–10– 84] had failed to grasp the true extent of their anxiety.*"

Fritz Ermarth, the author of the earlier 1984 assessment, held with the view that the war scare had been exaggerated (Ermarth, 2003). That now seems to be the case, especially when folding in information from Russian sources (Miles, 2020), but it is easy to imagine how one or a few additional events and misperceptions might have triggered disaster.

## 2.2 Unintended Escalation

### *2.2.1 When Plans Don't Work Out as Intended*

The second major branch of Figure 2 refers to unintended escalation, the result of things getting out of hand. An important element here is that when forces are put on high alert, mistakes can occur or actions may be taken that were not intended by earlier planning. Officers in the field suffering severe losses may be inclined to use whatever mechanisms they possess to avert immediate disaster. Such possibilities increase as weapons are deployed and authority is delegated. They increase further when military forces are prepared to respond quickly to enemy escalation.

A famous example almost occurred in the Cuban Missile Crisis. Despite conventional Cold War wisdom being that Soviet leadership maintained tight control on nuclear weapons via the KGB, Soviet leadership had in fact pre-delegated nuclear authority to the commander in Cuba because of a well-deserved Soviet fear of U.S. invasion. Also, submarine commanders had nuclear torpedoes with launch authority, although with the requirement for agreement among key officers. None of this was recognized by American decisionmakers as they discussed options and operational procedures. The U.S. Navy dropped small depth charges to force the surfacing of submarines. One of the submarines had lost communications with Moscow and its crew was exhausted and stressed. According to a Soviet officer's later account, the boat's top officers disagreed about whether to launch a nuclear torpedo. The submarine's commander at one point said "We're gonna blast them now! We will die, but we will sink them all – we will not become the shame of the fleet." Fortunately, unanimity among top officers was necessary and views of the senior officer, the flotilla Commander, prevailed. The submarine surfaced without further incident (Burr and Blanton (ed.), 2002). Matters could easily have played out differently.

As mentioned above, the Soviet ground commander also had nuclear weapons and pre-delegated authority (later remanded) to use some of them in defense (Fursenko and Naftali, 1997, pp. 242-43). [2] Had the United States invaded Cuba—as some advisors urged— nuclear weapons might have been used without at-the-time approval by central Soviet authorities.

Unintended escalation might also occur in conflict situations due to failures of command and control, misperception, errors by misbehavior of lower-level officers, or accidents in the field.

A new problem related to unintended escalation is the advent of artificial intelligence (AI). The use of AI is inevitable but is also ominous when combined with the belief that extremely fast decisions are necessary. Defenses against missiles may indeed depend on actions within minutes and defenses against cyberattacks may indeed depend on actions taken within milliseconds. The demand for speed may introduce a bias toward escalation (Wong et al., 2020).

## 2.3 Intentional First Use of Nuclear Weapons

Continuing in Figure 2, let us turn now to the possibility of planned first use. In some ways, deliberate use of nuclear weapons is more plausible now than it has been since early in the Cold War (Bracken, 2012; National Research Council, 2014).

### *2.3.1 Coercion*

*Coercive Threats to Use Nuclear Weapons.* As merely one example, the DPRK might as a provocation seize a small portion of the Republic of Korea's (ROK's) territory, brandish their nuclear weapons, and threaten to use them if the ROK or US made a military response (Bennett et al., 2021, p.43). Or, on a more grandiose scale, the DPRK might threaten to attack the ROK unless the ROK ended its alliance with the United States, demanded that the United States pull out its forces, and declared its new friendly relationship with the North. This is implausible today, but such a threat will become less implausible as the DPRK extends and improves its intercontinental delivery capabilities against the United States, as well as its nuclear capabilities generally.[3] Bluntly, the quality of the U.S. nuclear extended deterrent is doubtful. Moreover, it depends on the President at a given time and political context. This point was foreseen well before the DPRK developed its ICBM capability (Davis et al., 2016). Subsequently, then candidate Donald Trump made clear that he was uncomfortable with the nuclear-umbrella idea (Sanger and Haberman, 2016).

Ironically, such coercion could be even more plausible after a "good" period gone sour—one in which the US and ROK had foregone joint exercises and U.S forces had been drawn down as part of normalizing the peninsula. In such circumstances—depending on details of the process and its history—the perceived credibility of the U.S. nuclear extended deterrent might be especially low.

As an aside, it would hardly be surprising if the ROK chose to develop its own nuclear deterrent, whether or not the United States continued to oppose such a development. Further, it is conceivable that a future President—Democratic or Republican—would even agree to such a development, overtly or covertly. Richard Nixon reportedly acquiesced to Israel's nuclear program in 1969 so long as it was not publicly acknowledged (Cohen and Burr, 2006). That has apparently remained U.S. policy (Entous, 2018).

*Historical Examples of Coercion by Nuclear Threat.* The literature includes numerous historical examples of how the United States allegedly used nuclear threats to deter or coerce (Norris and Kristensen, 2006). In 1946 the United States demanded that the Soviet Union withdraw its forces from Iran, which it did. President Truman claimed to have threatened Stalin with nuclear weapons (Time, 1980), although whether he actually did so is doubtful (Samii, 1987). Dwight Eisenhower's comments about nuclear weapons during the 1952 campaign may have helped influence the Chinese to end the Korean war. Certainly, as of 1953, military plans existed to use nuclear weapons if war resumed on the Peninsula (Gwertzman, 1984).

### *2.3.2 Actual Use as Part of Coercion*

Continuing in Figure 2, we can envision circumstances in which first nuclear use would occur as a way to show determination after mere threats had been ignored.

As mentioned above, perhaps at some point the DPRK would feel emboldened to try coercing the ROK and the United States to make *major* concessions regarding territory, sovereign waters, US-ROK exercises, US forces in the ROK, the DPRK's status in world affairs, or other matters. If so, what might such circumstances be? Military power matters and the DPRK is increasing the number and diversity of its nuclear capabilities rapidly (Gentile et al., 2019; Bennett et al., 2021). Human considerations also matter as discussed in Section 3.

An even more against-the-grain speculation is that, perhaps after unsuccessful coercion but in a context that made backing down impossible politically, the DPRK might invade the ROK, attempting to achieve quick and decisive victory well before the United States could mobilize and deploy forces for effective warfighting on the Korean Peninsula.

Reportedly, DPRK Chairman Kim Jong Un became convinced in 2012 that conventional victory would be impossible, causing him to approve development of a fast-moving plan that would use nuclear weapons for "asymmetric attacks" (Jeong and Ser, 2015; Bennett et al., 2021, p.50). Some of this is corroborated by high-level escapee Yong-Ho Thae, now an elected representative to the South Korean National Assembly.[4] It is unclear what might trigger such a reckless attack, but it is significant that the DPRK has such a military plan.

Another possibility is that, in the event of an internal crisis threatening Kim's control, the DPRK might initiate war as a diversion and a call for unity. Yong-Ho Thae has said that the primary fear in the DPRK government is no longer a threat from the US and ROK, because of the DPRK's nuclear deterrent, but rather the threat of collapse from within—due to pressures from the millennium generation of citizens who know a great deal about the ROK, the United States and the world via the Internet. In his view, they are interested in materialism, not ideology, and see much to like elsewhere.[5] To be sure, other authors claim that the Kim regimes have had internal matters well under control (Byman and Lind, 2010; Kim and Choi, 2021) and that no internal collapse is plausible. Kim and Choi even refer to the collapse scenario as a fallacy or even a mythology. And yet Kim Jong-un has himself said that ROK pop culture is “a ‘vicious cancer’ corrupting young North Koreans’ ‘attire, hairstyles, speeches, behaviors.’ " His state media has warned that if left unchecked, it would make the DPRK "crumble like a damp wall" (Choi, 2021).

### *2.3.3 Operational Defense*

Perhaps a more likely intentional first use of nuclear weapons would be defensive once war had begun for some reason. In the 1950s, the United States drew up plans for nuclear attack of China in the event of war defending the Taiwanese islands Quemoy and Matsu. President Eisenhower approved only mounting a conventional defense, but the nuclear plans might well have come into play if China had not backed off. [6]

In a war, it is conceivable that a losing side would initiate nuclear use either to counter advances of the opponent due to its use of long-range precision fires (the U.S.) or chemical or biological weapons (DPRK). Both sides might contemplate nuclear use in response to a debilitating (or merely dramatic) military success by the adversary.

An important case here is when one nation invades another with the expectation of quick victory, the defender defends bravely but is about to collapse, and the defender then escalates in the hope of re-establishing deterrence. It had not "intended" to do so, but had planned for the possibility. Such thinking was explicit in NATO doctrine during the Cold War.

Russia has developed an analogous concept referred to in the West as escalate-to-de- escalate (Roberts, 2015; Davis et al., 2019, pp. 26-25 (by Edward Geist)). NATO interprets this concept as meaning that if Russia attempted to seize one of the Baltic states, and if NATO's response were sufficiently effective so that Russia began to lose, Russia might use nuclear weapons to raise the stakes so as to salvage its ill-gotten gains. Russia disputes that interpretation, emphasizing that its resort to nuclear weapons would be defensive, and undertaken only when the very existence of the Russian state was in jeopardy (Putin, 2014).

As a different way to appreciate how matters could get out of hand, we might consider the 1983

*Proud Prophet* war game. In 1983 the Reagan administration was seeking to be tougher in its dealings with the Soviet Union, responding to what was seen as Soviet preparations to fight and win a nuclear war. Going into the exercise, which involved a Warsaw Pact invasion of Europe, senior leaders apparently anticipated tough moves by NATO (including very limited nuclear use) leading to termination with Soviet aggression having been stopped. However, in the words of an observer, Paul Bracken (Bracken, 2012, p.93):

> "*The game went nuclear big time, not because Secretary Weinberger and the chairman of the Joint Chiefs were crazy but because they faithfully implemented the prevailing U.S. strategy.*"

The plan included limited nuclear use as NATO's defenses crumbled, which use the Soviets (or rather the exercise's Red Team) did not perceive as NATO intended. The Soviets responded massively, which led to general nuclear war and a half-billion deaths. We might draw some conclusion from this and other data points.

**Sobering Lessons**

- The content of war plans matters, even though—in theory—political leaders may override them *if* doing so is realistically feasible, and *if* enough time exists to enforce such a decision.[7]
- National leaders and local commanders feel the responsibility to allow their military forces to defend themselves. This may include using nuclear weapons.[8]
- Despite their having long been downplayed in U.S. and NATO circles, battlefield nuclear weapons can in some cases be effective militarily, albeit with consequences in terms of fallout (Fursenko and Naftali, 1997, pp. 242-43).[9] See also comments of Lt. General Odom (U.S. Army, retired) when discussing the 1964 Warsaw Pact war plan (Odom, 2000) in a retrospective.

With this background, it is significant that—as mentioned above—the DPRK reportedly has a war plan for a seven-day strategy that includes significant first use of nuclear weapons for decisive military effect (Jeong and Ser, 2015), presumably with the belief that the US lacks the stomach for high-casualty war.[10] Existence of such plans does *not* imply anything about national intentions, confidence in the plan's success, or the likelihood of execution. It does, however, indicate what must be considered plausible events in war.[11] If situations deteriorate and leaders turn to their military for next actions, those will likely involve existing plans.[12]

Yet another kind of unintended escalation might come about after one state used mere conventional weapons (for example, some combination of long-range precision fires, cyberattack, and counter-satellite attacks) in a way that "forced" the adversary to use nuclear weapons because of having no good alternative. A variant might be if an adversary, such as the DPRK, felt "compelled" to employ chemical or biological weapons on U.S. or ROK forces because it lacked the ability to cope with U.S. conventional weapons and perceived that the United States had no appropriate response to such use.[13] The United States might then feel "compelled" to use nuclear weapons to retaliate or to show resolve, preclude DPRK victory, or both.

### *2.3.4 Invasion*

For completeness we should mention the possibility of a straightforward DPRK invasion to unify the peninsula. That, however, seems implausible in the foreseeable future given the weaknesses of the DPRK military and other factors. Although instructions from Kim Jong Il to his son emphasize unification as the ultimate goal of the family (Bennett et al., 2021, p.3; Jeong, 2013), the instructions do not suggest urgency, and in fact proscribe achieving unification via war with the ROK. Still, this is the scenario that DPRK military planning appears to be based on (Jeong and Ser, 2015).

### *2.3.5 Preemption and Preventive War*

Certainly plausible is what would be seen as a preemptive nuclear attack in anticipation of a devastating attack or invasion by the adversary. The DPRK has raised this possibility numerous times over the years and, from a purely logical perspective, it is not inconceivable that the U.S. and ROK would use nuclear weapons in a first strike intended to preemptively head off war about to be initiated by the DPRK. Many see this as absurd because of more general US military capabilities that would seem to make nuclear use unnecessary, but suppose that a decapitation attack was considered essential and that success was seen to require nuclear weapons because of uncertainties about the location of DPRK leadership or the ability to kill the leadership in those locations with conventional weapons.[14] Or, more prosaically, nuclear weapons might be recommended simply because they would improve confidence in actually destroying the targets intended. Even if such an attack currently appears implausible to US and South Korean readers, it may not seem so to North Korean readers. Consider yet another possibility, that U.S. forces are not yet available in the region for effective operations dependent on precision conventional fires, that a DPRK attack is imminent, and that it is perceived as likely to succeed. Or, imagine that war has already begun with a successful surprise attack on a U.S. aircraft carrier that kills hundreds or thousands of sailors, destroys some command-and-control facilities, and/or neutralizes the Guam air base. Is it truly evident that no US President would respond with nuclear weapons?

### *2.3.5 Terminal Missile Defense*

As a last item in Figure 2, consider intentional nuclear first use as part of missile defense. Conventional wisdom in the West holds that nuclear-tipped defenses would be counterproductive and ineffective, but judgments can change. As recently as 2002, Secretary of Defense Rumsfeld asked that the potential value of nuclear-tipped interceptor be reviewed (Graham, 2002). If the goal were to maximize U.S. strategic defense against an actual nuclear attack by the DPRK, recognizing that even one or a few leakers could do catastrophic damage, the alleged virtues of terminal defense with nuclear-tipped interceptors might well be rediscovered because doubts remain about defense effectiveness and because even the best systems leak. Such doubts will increase markedly if the DPRK develops penetration aids, multi-warhead missiles, and/or EMP weapons (Pry, 2021). Such developments could occur much faster than conventional wisdom suggests.[15] Finally—although minimal information exists on the matter (Harris, 2020)—the possibility exists of the DPRK deploying ICBMs with biological weapons that would be released as bomblets early in flight, making defense extremely difficult. The feasibility of that has been credibly asserted with supporting designs that address both the release mechanism and shielding from heat during reentry (Garwin, 1999; Rumsfeld, 1998; Sessler et al. 2000, pp 49 ff). The Soviets had a large bioweapons program with warheads for ICBMs (Alibek and Handelman, 1999; Leintenberg and Zilinsakas, 2012). It is also of interest that Kim Jong Il's final instructions to his son referred to development of biochemical weapons. According to a newspaper account of this DPRK document provided by a North Korean escapee (Jeong, 2013), one admonition was

> "*Keep in mind that the way to maintain peace on the Korean Peninsula is to endlessly develop nuclear, long-range missiles and biochemical weapons and possess a sufficient number of them. Don't ever be caught off guard.*"

It is seldom possible, of course, to fully authenticate such accounts of DPRK documents. Still, these other developments might occur much faster than commonly expected. In the meantime, Russia maintains nuclear-tipped ballistic-missile defense of Moscow.[16]

## 3 Human Factors in Decisions to Employ Nuclear Weapons

As a second lens through which to identify possible nuclear-use cases, let us now consider the *human* decision to employ nuclear weapons first in a conflict. The human considerations have been given relatively short shrift over the decades (National Research Council, 2014).[17] We touch upon some here in the overlapping categories of (1) fear; (2) fatalism or grandiosity; and (3) mental and physical health.

### 3.1 Fear and Desperation

As famously discussed by Robert Jervis (Jervis, 1976) and others, it is common for adversaries to fear each other and not comprehend how their own actions cause fears in their counterparts. This can lead to a *security dilemma*. During the Cold War, Soviet officials feared attack by NATO, despite that seeming irrational to NATO. The United States feared a surprise first strike by the Soviets, even though that seemed irrational to the Soviets, who believed that any preemptive strike on their part would be to head off an imminent U.S. strike, and would come after a lengthy build-up of tensions, not as a bolt from the blue.

Although the DPRK has often been the aggressor in provoking crisis (CSIS, 2019), it has also had reason to fear attack by the United States.[18] This was the case at points in the 1970s and 1990s, and even more so after the Axis of Evil speech by President George W. Bush (Bush, 2002), followed by a book co-authored by his speechwriter elaborating on the United States having a window of opportunity for dealing with rogue states (Frum and Perle, 2004).

### 3.2 Fatalism, Grandiosity, and Related Factors

Other ways in which a decisionmaker might direct use of nuclear weapons could be through some combination of fatalism, grandiosity, a sense of indomitability, or revenge.

People are obviously not always rational—despite the nominal assumptions of some economists, decision theorists, and textbooks. Some historical examples may be instructive.

#### *3.2.1 Grandiosity*

Some accounts describe Hitler as having talked about dying in a dramatic cataclysm that brought down others. Hitler related himself to Jesus and the Messiah and, in discussing dying in battle, said that his death would be inspirational:[19]

> "*We shall not capitulate . . . no, never. We may be destroyed, but if we are, we shall drag a world with us . . . a world in flames . . . we should drag half the world into destruction with us and leave no one to triumph over Germany. There will not be another 1918.*"

As for Korea, a well-known story in the DPRK describes Kim Il Sung praising his son Kim Jong Il for answering a question about what to do if the United States attacked and the DPRK lost the war. Kim Jong Il reportedly said (Kim, 2009)

> "*I will be sure to destroy the Earth! What good is the Earth without North Korea?*"

How we should interpret this story is unclear, but the DPRK government encourages that the story be told, perhaps because of its deterrent value (Bennett et al., 2021, p.44). Even if merely a form of propaganda, the sentiment expressed is peculiar and notable.

#### *3.2.2 Fatalism and Revenge*

As a very different example of how "non rational" considerations may sometimes come into play, we

might consider the case of Israel. The actual status of Israel's nuclear capability, if any, remains classified, but its nuclear program has been called a public secret because so much information is now available in declassified documents indicating that "by 1975 the United States was convinced that Israel had nuclear weapons" (Aftergood and Kristensen, 2007).

Israel reportedly has its *Samson Option*—a plan to attack its enemies with nuclear weapons if Israel is being overrun (Hersh, 1991). The name alludes to the Biblical account of Samson bringing down a Philistine temple upon himself and Philistine captors. Although recognizing deterrence as the primary motivation for Israel's nuclear program, Hersh quotes one former Israeli official with firsthand knowledge of the program. The person was expressing the view that the United States could not be counted on and had backed down during the Suez Crisis in the face of the Soviet nuclear threat. He went on to tell Hersh:

> "*We got the message. We can still remember the smell of Auschwitz and Treblinka. Next time we'll take all of you with us.*"

If war were to mean ultimate doom, a "rational" response might be surrender, but people have often behaved otherwise over the millennia, as famously recorded in the Melian Dialogue of ancient Greece (Thucydides et al., 1976).

### *3.2.3 Indomitability*

However realistic or unrealistic one believes such apocalyptic endings to be, we are all familiar with the real-world relevance of the Chicken Game in which two 1950s teenage males approach each other with hot rods on a road at high speeds, neither willing to give way because to do so would be to show less courage and to be labeled subsequently as a chicken.[20] The ultimate demonstration of indomitability, suggested by Thomas Schelling, is when one protagonist tears off his steering wheel so as show that he cannot veer away (it is unclear how, in the real world, one visibly tears off a steering wheel, but that is a mere detail).[21]

The relevance may be seen by imagining that the nuclear-armed DPRK attempts coercion by demanding that the ROK surrender and promise fealty. Suppose that the DPRK threatens to annihilate San Francisco if the United States joins the ROK in military resistance. If a hubris-dominated DPRK leader perceives the ROK and President as rational but weak, he might truly expect capitulation—if not initially, then after an initial round that vaporized one or more cities in the ROK and the United States.[22] We suspect that such a DPRK leader would prove wrong: it might be more likely for a President to "stand tall" and unleash a massive attack despite the consequences.

### *3.2.4 Responsibility and Desperation*

One important effect of emotions can be a preeminent focus on discharging responsibility under desperate circumstances. This was discussed late in the Cold War in a monograph asking how, *really*, nuclear war might begin—as distinct from it beginning as the result of some power calculation. Two speculative possibilities were (Davis, 1989)

- *Use-or-Lose, Coupled with Responsibility.* During a superpower crisis, an SSBN commander has lost communications with the homeland, is under trail by a hunter- killer submarine, and feels a deep patriotic responsibility to launch his missiles before being sunk).[23]
- In an extremely tense superpower crisis, a nation's leader is told by military authorities that—despite past assertions and conventional wisdom—it may not be possible to ride out a first strike and retaliate: "Sir, despite what you've heard, our command and control would probably fail and we would be paralyzed. Since general nuclear war is inevitable and the adversary is preparing

a first strike, the *only* chance for national survival (however small) is to conduct a first strike. Perhaps, with luck, the attack will disconnect and paralyze the adversary's command and control system."

### 3.3 Mental and Physical Health

Much is known today about how mental health, substance abuse, and other leader- specific matters arose in Cold War crises, as when President Nixon was badly intoxicated at key points in the 1973 Arab-Israeli crisis and when President Yuri Andropov had an almost paranoid fear of a U.S. first strike in the early 1980s (Burr, 2016).

Even earlier, in WW II, Hitler was a heavy user of strong drugs such as oxycodone (a painkiller) and cocaine. These allowed him to overcome pain, ignore bad news from the front, and project grandiose and rigid optimism. Hitler felt that the drugs allowed him to "be himself"—i.e., to project commanding presence, certainty, and indomitability.[24]

### 3.4 A Factor Tree for a Nuclear Decision Incorporating Human Factors

One qualitative mechanism for reflecting actor-specific considerations is to construct qualitative *cognitive models* that highlight factors that might loom large in leaders' thinking as they contemplate actions such as nuclear first-use. The method dates back to work on Saddam Hussein prior to and during the 1990-1991 Persian Gulf war (Davis and Arquilla, 1991; NRC, 1996).

*Factor trees* can be important elements of cognitive models. They show the factors affecting a decision or development as an approximate tree with factors arrayed in layers of detail. First introduced in modeling for counterterrorism, they have been used in a number of contexts where social-science theory should come into play (Davis and O'Mahony, 2017).

Figure 3 is an example suggesting circumstances under which a national leader might decide on first use of nuclear weapons. In such figures, if some nodes are connected by "ands," it means that all factors must typically be present to a significant degree; if nodes are connected by "ors" (or by nothing), they may substitute for or complement each other. Ordinarily, if one node points to another, it means that more of the former tends to increase the latter (or decrease it, if the sign is negative).

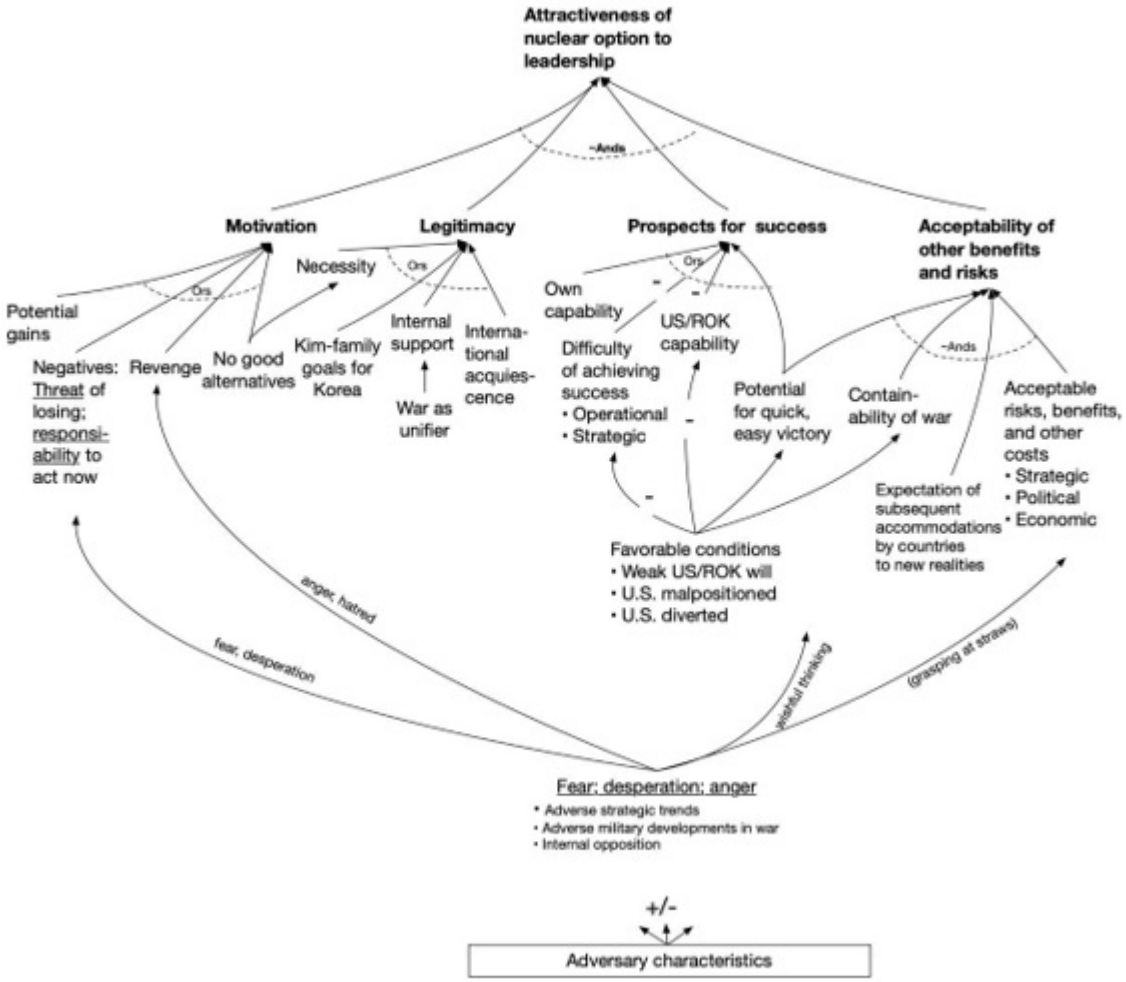
Prominent in Figure 3 and related depictions are concepts such as fear, desperation, visceral competitiveness, indomitability, and fatalism, as well as misperceptions exacerbated by such well-studied psychological phenomena as cognitive biases (Kahneman, 2011). Many of these have been discussed in connection with international affairs by Robert Jervis (Jervis, 1976; Jervis, 2017).

To better understand the intent of Figure 3, recall that the intent is to find possible flows of reasoning that support nuclear use. It is *not* a prescription for how decisionmakers should think, nor a depiction of a cold, objective calculation using cost-benefit analysis.[25] Nor is it our best guess about how Kim Jong Un would reason. Rather, it is an attempt to depict the kind of human reasoning that *could* lead to nuclear use. *What would possess someone to actually initiate nuclear war?* Better understanding this should help in identifying actions to make that reasoning less likely, as illustrated in a recent study about possible Chinese aggression against Taiwan (Davis et al., 2021).

With this background, Figure 3 describes the four top-level factors for decision as motivation (for the nuclear option in question), legitimacy, prospects for success, and acceptability of other benefits and risks. This is deliberately different from a breakdown in terms of pros and cons, or a breakdown in terms of how to calculate net utility. Again, Figure 3 is a cognitive model, an attempt to depict

something more like the reasoning that might go on in a real decisionmaker's head (a stream of reasoning that we want to avoid). In this depiction, we should read the figure left to right: given *reasons* (motivations) for use of nuclear weapons, is such use *legitimate*? Are *prospects* for success for good? And, if so, would the *costs* be tolerable? Readers will recognize that all of us sometimes reason in a similar manner, starting with the desire to do something. This can lead to a bias toward action.

**Figure 3: DPRK Deciding to Use Nuclear Weapons**




Note: every node represents the adversary's *perception*, which may be quite wrong.

Working through the figure, let us look first at motivation. This might be a notion of getting positive benefit, as in causing the adversary's capitulation The motivation might, however, be of a more negative nature: fear of imminent loss or failure to accomplish a sacred mission. Yet another contributor to motivation might be desire for revenge: perhaps the war is already lost, but the leader feels the need to take the adversary down with him (perhaps in a moment of glory). Moving rightward, an important factor is likely to be the perceived absence of good alternatives. Note the "ors," which mean that *any* of these motivating factors might be sufficient for a given decisionmaker at a given time.

Given motivation for nuclear use, a leader might worry about whether nuclear use would be legitimate. Again, the contributing factors in Figure 3 are connected by "ors," meaning that the nuclear option might be justified with any one of a number of rationalizations, the most obvious being a sense of *necessity*.[26] In the case of the DPRK, the leader might feel a solemn obligation to fulfill the Kim-family dream of unifying the peninsula. He or she might also see decisive nuclear use as likely to unify people in the ultimate battle. As for international legitimacy, if considered at all, the

issue might be whether—however critical other nations might be initially—they would come to accept the outcome.

However motivated the leader might be, an important factor would be perceived prospects for success. In sufficiently dire circumstances, the perception might include wishful thinking about the ability to achieve victory quickly because of weakness in the U.S. or ROK leadership or other factors. Or it might be relatively sober, accounting for relative military strengths, the difficulty in actually achieving victory, and so on. Which factors would dominate would depend on personalities and details.

The final factor in the cognitive model is whether the price to be paid for nuclear use is acceptable. In principle, as in a cost-benefit calculation or standard deterrence theory, this factor might rule out the nuclear option. Cognitively, however, real decisionmakers might have a bias toward action and a tendency to underestimate the true costs. In particular, there might be a tendency to assume or hope that the nuclear war would be containable (for example, with quick capitulation of the United States and ROK), in which case negative consequences such as casualties would be distinctly limited.

We should mention one other crucial feature of Figure 3: the node values need not be best estimates. To the contrary, in some circumstances (such as impending doom) the decision may be more in the nature of grasping-at-straws, as when there is *at least a chance* that success will occur and costs will be tolerable.

In summary, Figure 3 can help us identify reasoning patterns with limited rationality leading to nuclear use. Nations should want to avoid the circumstances in which such thought patterns might be generated.

### 4 Illustrative Use Cases

Drawing on the discussion of the previous two sections, we can now consider a range of plausible nuclear-use cases, interpreting "plausible" broadly to anticipate circumstances and leaders different from those that obtain today. An infinite variety is possible but we can attempt to illustrate the range.

Table 2 does so for cases of DPRK first-use. It draws distinctions relating to context, whether emotions are strongly in play, and types of nuclear use. Instead of specifying particular numbers, types, or targets for nuclear weapons, the last several columns anticipate that the use cases should necessarily be parametric. Even in the same context and with the same generic objective, the leader directing first use of nuclear weapons could make very different choices.

Some particular issues to consider when defining variations of use cases are:

- Would an attacker spare a particular city or area to make the adversary's surrender more plausible and avoid destroying high-value facilities that it might otherwise gain?
- Would an attacker constrain weapon use to minimize damage from radiation and fire? That might make the adversary's surrender more plausible and increase the benefits of victory.
- Would an attacker destroy the adversary's strategic command and control system or, to the contrary, assure its continued viability so as better to communicate and so as to assure the adversary's ability to draw down its forces if it succumbs?
- How, if at all, would high-altitude electromagnetic pulse shots (HEMP) be used?[27] What effects

would be expected by its user and what effects might actually occur?

Table 3 has some speculative instances of American first use of nuclear weapons. These are consistent with discussion in earlier sections that postulate instances in which— despite many years of claims that nuclear weapons are useful only for responding to the adversary's nuclear use— the U.S. President might conceivably find first use necessary.

**Table 2: Summary of Illustrative DPRK First-Use Cases**

| Case | Strategic context | Immediate context | DPRK Objective | Emotions in play | Nuclear use | Targets in or near Korea* | Targets outside Korea* | Constraints* |
|---|---|---|---|---|---|---|---|---|
| 1 | Current | DPRK provokes to get attention and benefits | Limited aggression | None | Threatened, then demonstrated | Something innocuous | None | High (air bursts, low yield, few casualties) |
| 2 | After relaxation period weakening US-ROK alliance and reducing US forces in Korea | Process has gone sour; DPRK, with scores of weapons, sees opportunity | Ultimate coercion: DPRK demands pull out of US troops and ROK's announcement of friendship with DPRK | Hubris; wishful thinking | Threat of nu- clear attack, followed by selective use to support the coercion | Demonstrative ex- plosions or, in continuing standoff, in one or two ROK locations | Demonstrative explosions near CONUS or, in continuing standoff, in one or two American cities | Tight (for example., air bursts) |
| 3 | Bad trends with ROK developing nukes | US distracted or at odds with ROK | Quick victory | Fear of trends; hubris; wishful thinking | Extensive (tens) | Battlefield, bases | Guam + demo at IC range Demo at IC range | Focus on military effect a. Spare Seoul for its value b. Raze Seoul |
| 4 | War imminent | All-out war not yet inevitable | Re-establish deterrence | Fear, desperation | HEMP blasts | Seoul, East Sea | a. United States b. U.S. and Japan | Perhaps small for intendedly limited effect |
| 6 | War imminent | Decapitation at- tack is imminent | Re-establish deterrence, preemption | Fear, desperation | Limited (tens?) | A few air bases; threats to and Japan | One or two US cities | Tight (e.g., air bursts) |
| 7 | War imminent | Decapitation at- tack is imminent | Use or lose; hope for best | Fear, desperation | Widespread for military effect (scores of weapons) | Air bases, Guam, bases in Japan | a. EMP over U.S. b. Attack on one or few cities | Limited enough so that U.S. might conceivably terminate war; a significant North Korean reserve would likely be withheld |
| 8 | War underway | End is imminent for Kim | Go out with glory and destruction of enemy | Fear, desperation | Extensive (scores or, in future, 100s) | a. Extensive b. Minimal (if enemy is seen as U.S.) | US homeland cities; Guam, Japan, perhaps even China | None: maximum destruction is intended |

*These should be varied parametrically in analysis rather than relying on some alleged best estimate.

**Table 3: Illustrative Use Cases with U.S. Initiation (Highly Speculative)**

| Ca se | Strategic context | Immediate context | U.S. Objective | Emotions in play | Nuclear use | Targets in or near Korea | Targets outside the DPRK | Constraints |
|---|---|---|---|---|---|---|---|---|
| 9 | War imminent | DPRK chemical, bio- logical, or nuclear (CBW) attack on Seoul and US cities imminent; preemption will be ineffective without nuclear weapons | Decapitation, dam- age limitation | Desperation | Limited | A few nuclear and/or leadership installations | None | Tight (for example, small-yield weapons.) |
| 10 | War underway | DPRK use of chemical or biological weapons in Korea | Warfighting | Pressure to respond immediatel y and decisively | As necessary | As necessary operationally or to counter DPRK WMD | None | Tight (for example, small weapons, air bursts) |
| 11 | War underway | Devastating surprise at- tack on US forces in Korea, Guam and high seas; U.S. regional forces limited | Warfighting | Pressure to respond immediatel y and decisively | As necessary | DPRK nuclear capabilities and leadership | None | Tight (for example, small weapons, air bursts) |

## 5 Conclusions

We have identified and motivated a range of use cases for thinking about how nuclear war might start in a Korea context, drawing on both logical/taxonomic reasoning and a kind of cognitive modeling sensitive to emotions and other human foibles. The cases identified are not equally plausible, but estimating likelihoods is a foolish game to play with a poor empirical record. It is more useful, in our view, to see the identified use cases as ways for things to go very badly so that ways can be found to prevent the corresponding circumstances from arising. Humility is appropriate because of the complexity of real-world command and control and weapon systems, which cannot be

realistically tested.

**APPENDIX A ILLUSTRATING PLANNING TENSIONS IN NUCLEAR PLANNING**

During the Cold War, nuclear planners often encountered strongly felt and widespread beliefs.

Convenient but Unjustified Beliefs

1. Any nuclear war will escalate to general nuclear war, so it is unnecessary to consider limited nuclear war.
2. Deterring or otherwise avoiding nuclear war is the *only* objective; planning for instances in which deterrence fails may encourage thinking about nuclear warfighting, which should be discouraged (see item 1).
3. All relevant national leaders will understand the unacceptable consequences of nuclear war: catastrophic massive losses of life and destruction of societies.

Heated arguments arose when developing official formal objectives, as one of us (Davis) remembers well. Everyone could agree on deterrence as an objective, but what about an objective in the form "In the event that deterrence fails,..."? Any such objective was bitterly controversial. Whether to include if-deterrence-fails objectives had to be resolved by top policymakers, such as Henry Kissinger and Zbigniew Brzezinski.

The inadequacy of these common beliefs weighed heavily on defense Secretaries Laird, Richardson, Rumsfeld, and Brown—a mix of three Republicans and one Democrat.

After years of study, the conclusion by 1980 was that U.S. nuclear forces should be able to deter not just Soviet leaders who read and agreed with American textbooks on deterrence, but also possible leaders who might even believe that it remained possible to fight and win a nuclear war.

The result was the *Countervailing Strategy*, which included plans for ICBM modernization, a new type of nuclear weapon (air-launched cruise missiles), and a targeting doctrine that envisaged destruction of the Soviet Communist Party's organs of power, even if that meant attacking leaders in underground shelters, so as to prevent recovery. The intent was to convince even the most hawkish of Soviet military leaders that the Soviet Union could not "win" a nuclear war even on its own military-technical terms (Brown, 2012; Slocombe, 1981).

The strategy was not well received by the academic community and is barely mentioned in some textbooks about nuclear strategy. In others, it is described as bellicose and destabilizing. It was interpreted by some as about "how to fight a nuclear war" (Burr, 2012). That accusation was enough to generate a rebuttal from Harold Brown (Brown, 2012), one paragraph of which stands out for its enduring relevance.

> "*First, I remain highly skeptical that escalation of a limited nuclear exchange can be controlled, or that it can be stopped short of an all-out, massive exchange. Second, even given this belief, I am convinced that we must do everything we can to make such escalation control possible, that opting out of this effort and resigning ourselves to the inevitability of such escalation is a serious abdication of the awe- some responsibilities nuclear weapons, and the unbelievable damage their uncontrolled use would create, thrust upon us.*"

If Brown reached this conclusion about the need to think about limited nuclear war when dealing with the Soviet Union, then surely a similar conclusion about the need to plan for the event that

deterrence fails is even more imperative for a world in which limited nuclear war is more plausible than is a US-Soviet conflict. As the DPRK increases the size and scope of its nuclear arsenal, the need to do so will only increase.

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## III. ENDNOTES

[1] The project, "Reducing the Risk of Nuclear Weapons Use in Northeast Asia (NU-NEA)" is a collaboration involving the Nautilus Institute (NI; US), the Research Center for Nuclear Weapon Abolition, Nagasaki University (RECNA; Japan), the Panel on Peace and Security of Northeast Asia (PSNA, Japan), and the Asia Pacific Leadership Network for Nuclear Non-Proliferation and Disarmament (APLN, Republic of Korea).

[2] Scholars still debate about the extent of the predelegation, if any, whether it was formally communicated, and whether it matters given that there were no physical controls from Moscow. Details continue to emerge (Plokhy, 2021).

[3] Projections of North Korean nuclear capabilities vary (Ibid., pp. 36-39; Hecker, 2021). The differences don't matter here because even the lower estimates (Hecker, 2021) anticipate the DPRK having scores of nuclear weapons (75 by 2026)—enough to use some weapons tactically and operationally, while holding in reserve enough weapons for attack of cities in the United States, South Korea, and Japan.

[4] Jong-Ho Thae was the DPRK's deputy ambassador to the UK when he defected in 2016. In a presentation, (Thae, 2020) acknowledged Kim Jong Un's conclusion about the need to use nuclear weapons and to focus efforts of nuclear and missile development. He also noted that the DPRK still has a policy of unifying the peninsula by force.

[5] This is discussed at about 6:50 minutes into a presentation (Ibid.). See also an interview with (Barron, 2019).

[6] A White House meeting on August 25, 1958 included the decision (Halperin, 1966, p.113)

"In the event a major attack seriously endangers the Offshore Islands, prepare to assist the GRC [Taiwan] including attacks on coastal air bases. It is probable that initially only conventional weapons will be authorized, but prepare to use atomic weapons to extend deeper into Communist territory if necessary."

[7] Many changes are not feasible quickly. Among the depressing items in declassified Cold-War materials is that, as of 2003, the U.S. President did *not* have city-withhold options and the option to reject launch-on-warning procedures (Burr, 2016). See also discussion by Franklin Miller in a memoir by General Lee Butler (Butler, 2016, pp. 189-456)). It would be unwise to *assume* that the DPRK or the US/ROK alliance has easily-controlled limited military options other than, perhaps, something purely demonstrative, such as blowing up an island or demonstrating an air burst.

[8] In planning related to Cuba in 1962, we know from Soviet sources that the Soviet thinking was "any recourse to military power in Cuba would likely entail the use of nuclear weapons" (Freedman and Michaels, 2019, p.215). This was so despite Khrushchev having no intention of war (Ibid., p.241).

[9] Fursenko and Naftali estimate that General Rommel could have destroyed all five beachheads of the Normandy invasion with perhaps ten nuclear weapons such as those available to the Soviet commander in Cuba during the 1962 crisis (Ibid., pp. 242-243@243).

[10] Some escapee testimony indicates that DPRK leadership believes that the United States is no longer prepared to carry out a conflict with high levels of attrition and as a result would withdraw from such a conflict after suffering 20,000 casualties or so, rather than continue a disastrous war

(Bennett et al., 2021, p.xii). To be sure, such escapee accounts are usually 2nd or 3d hand, or reflect documents that cannot be authenticated, rather than direct evidence from the actual North Korean leaders.

[11] This ambiguity about what the existence of plans means has historical precedents. Warsaw Pact operations plans called for broad and immediate first use of nuclear weapons (Parallel History Project (PHP), 2000). Major disagreements existed within NATO about what the Warsaw Pact would *actually* do. Were the plans real and were those who expected restraint practicing wishful thinking, or was the intelligence wrong because—in the event—wiser minds would prevail? (Nuclear Planning Group, 1974). Some would argue that the Proud Prophet exercise was misleading, ending as it did only because the Red Team was overly influenced by Soviet doctrine.

[12] Arguments about whether to lay plans for limited nuclear war go back to the Cold War as discussed in Appendix A.

[13] Some senior ROK officers believe that the United States should be explicit about intent to respond to chemical use with nuclear use. Otherwise, they see no deterrent to the DPRK's chemical use.

[14] To cite a U.S. National Academy report, “Many of the more important strategic hard and deeply buried targets are beyond the reach of conventional explosive penetrating weapons and can be held at risk of destruction only with nuclear weapons” (National Research Council, 2005, p.1).

[15] A recent Department of Homeland Security (DHS) report makes assertions unusual in an official document

"The West consistently and unwittingly cooperates with North Korea by underestimating the advancement, sophistication, and strategic implications of North Korea’s nuclear weapons and missile programs. Thus, under the nose of the U.S. Intelligence Community, North Korea surprised the world by demonstrating ICBMs that could target any city in the United States and a hydrogen bomb in the summer of 2017. Reportedly, in 2017 U.S. Intelligence Community analysts also revised sharply upward their estimated number of North Korean nuclear weapons from about 20 to 60 and also concluded North Korea can miniaturize warheads for missile delivery—facts some Western analysts are still unwilling to face." (Ibid., p.5).

[16] Some observers have suggested prohibiting nuclear interceptors (Lewis, 2012).

[17] See Appendix E of (Ibid.) for actor-specific characterization factors. The primary author was Jerrold Post, who founded the profiling group of the Central Intelligence Agency (CIA)(Post, 2008; Post and Doucette, 2019).

[18] See Park, 2014 for a comparison of North and South Korean perspectives when thinking about unification.

[19] This is cited in Davis et al., 2016, pp. 19,fn 27, referring to  a 1943 profile of Hitler developed for the Office of Strategic Services (Langer, 1943).

[20] Bertrand Russell gave a mordantly humorous depiction in 1959 (Russell, 2001, p.xviii).

[21] Colin Camerer applies game theory to national politics (Akpan, 2019), illustrating how bizarre political behaviors can be rooted in a kind of logic.

[22] We refer to a generic "DPRK leader" because Kim Jong Un appears quite rational and—despite theatrical rhetoric in exchanges with President Donald Trump— does not appear to suffer from

grandiose hubris. It was noteworthy that, upon testing to ICBM range and thereby demonstrating the ability to attack the United States, Kim immediately launched his version of a charm offensive and put a hold on further overt testing. It appeared that he was willing to recognize success and try to move on to political and economic priorities (Hecker et al., 2018), signs of very sensible behavior. For related discussion, see Spetalnick et al., 2019.

[23] The 1995 movie *Crimson Tide* (starring Gene Hackman and Denzel Washington), had an analogous premise. Further, as mentioned earlier, something similar happened in the Cuban Missile Crisis when the U.S. Navy dropped depth charges to force a Soviet submarine to surface without knowing that it had nuclear torpedoes. (Burr and Blanton (ed.), 2002).

[24] Much of this comes from a German novelist's account (Ohler and Whiteside (translator), 2018), based on papers of Hitler's personal physician. Some reviews dispute the account (Evans, 2016).

[25] Textbooks often argue that deterrence is achieved when the adversary perceives that the expected gains are not worth the expected costs. That discussion misses important elements of limited rationality (National Research Council, 2014, pp. 35-38).

[26]President Harry Truman justified the A-bomb attacks on Japan as necessary to avoid losing perhaps a half-million additional Americans in a bloody invasion (Stimson, 1946) with Japanese fighting to the end, as in Iwo Jima. Revisionist historians have been critical about these explanations (Bernstein, 2015) and note additional strategic reasons played a role, notably keeping the Soviet Union out of the war.

[27] HEMP options are controversial. A DHS report reviews evidence from the alarmist perspective. It asserts that North Korea already has EMP weapons and that Kim Jong Un talks about them (Pry, 2021). A journalistic article discusses the disagreements (Barrett, 2017), quoting scientists skeptical about HEMP effects . A technical report concludes that HEMP could cause serious disruption but not nationwide long-lasting blackouts (Horton, 2019). A critical response to that followed (Stuckenberg et al., 2019). Our view is that the effects *might* in fact prove grievous because U.S. infrastructure was not designed to be adequately robust and spare parts are often not available for many months. Further, even temporary effects might be seen as devastating, a trigger for escalation. Thus, we reject arguments dismissing the significance of HEMP, even though it would be very risky for an attacker to count on it having the effects estimated.

## IV. NAUTILUS INVITES YOUR RESPONSE

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