



DETECTING THE RUSSIAN TACTICAL NUCLEAR ARSENAL

GRADUATE RESEARCH PAPER

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Abstract

Russia has aggressively pursued its national objectives. Crimea in 2014 and continued support of separatist forces in Ukraine have Allied commanders concerned that Russia could launch a conventional attack on a NATO state and use a tactical nuclear weapon (TNW) to de-escalate any NATO military response. This research formulates and tests an expected utility theory model of conditions affecting the Russian decision to use TNWs in a conventional conflict. The model attempts to qualitatively predict the effects a specific western action has on manipulating Russia's TNW decision making process in an effort to deter their use. Actions that minimize the utility associated with TNW use, minimize Russia's perceived probability of losing the conflict, and maximize the utility of actions other than TNW use are predicted to provide deterrent value.

Interview responses from Russian experts challenge the model's underlying assumptions and provide an independent list of recommended actions to deter Russia from using TNWs. Most recommendations could be categorized in only one of the three types of actions predicted to provide deterrent value. This comparison suggests there may be other actions, not considered through a traditional deterrence lens, which could be exploited to provide a deterrent effect and warrants further research.

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DETECTING THE RUSSIAN TACTICAL NUCLEAR ARSENAL

I. Introduction

The 2010 Nuclear Posture Review states “The fundamental role of U.S. nuclear weapons, which will continue as long as nuclear weapons exist, is to deter nuclear attack on the United States, our allies, and partners.” However, Russia threatens to use tactical nuclear weapons (TNW) as a means to de-escalate a conventional conflict as a means to deter NATO from engaging in regional conflicts in areas of Russian national interest (Colby, 2015).

The purpose of this research is to formulate and test an expected utility theory model of conditions affecting the Russian decision to use TNWs in order to predict western actions that could deter their use. The decision to use a TNW in the midst of a conventional conflict is a risk decision whose results can be assumed to provide some form of utility for the decision maker. Assuming the leader making the decision will act to maximize that utility, a utility function can be derived after making further key assumptions about the independent variables that affect the dependent variable of utility.

The theory is informed by Russian national history, the history of United States’ strategic policy, and a perceived Russian TNW strategy based on military exercises. The model is then tested through comparison with interview responses from subject matter experts to validate its entering assumptions and predictions. This comparison provides conclusions regarding possible courses of action that could deter the use of these weapons in the event that NATO is forced into a conventional conflict with Russia.

Background

Gulf War I, II, and Kosovo displayed the United States', and ultimately NATO's conventional military capabilities on the world stage (Suchy and Thayer, 2014). Precision guided conventional munitions and air superiority provided a non-contact environment that allowed the achievement of military objectives while minimizing casualties and collateral damage (Suchy and Thayer, 2014). The Russian Federation took notice. Russia's large standing army and conventional arms cannot counter NATO's conventional capabilities and non-contact tactics. To level the playing field, Russia included a more efficient weapon into their conventional war plans and tactics, the non-strategic nuclear weapon, or tactical nuclear weapon (Colby, 2015).

The threat of using TNWs in a conventional conflict is being used to deter the United States and NATO from getting involved in conflicts near Russian borders. This doctrine emerged after Kosovo in 1999 and continues to be popular today (Sweetman, 2013). This means that Russia continues to view their TNWs as a solution for conventional inferiority, and in the event that conventional defense fails, their use will result in NATO immediately ending the conflict on acceptable terms (Adamsky, 2014).

Considering Russia's actions in Ukraine and Syria, NATO clearly faces a more aggressive nation whose military doctrine now relies on the use of TNWs to achieve conventional objectives. "Russia could exploit this doctrine and its associated capabilities in the event of a crisis or showdown of the Baltic states (Colby, 2015: 7)." With no foreseeable arms controls agreements to restrict these weapons (Schneider, 2016), it is in the best interest of the United States and NATO to take actions to deter Russia from making good on the TNW threat.

Problem Statement

The Russian Federation has become increasingly aggressive in achieving national objectives. They annexed the Crimean peninsula in 2014 and continue to support separatist forces in eastern Ukraine. This aggression has NATO's attention, and their response to Russia's actions diplomatically and militarily was a key concern during the 2016 Warsaw Summit in Poland. Compounding the situation, Russia perceives that NATO's conventional capabilities are superior to their own (Zagorski, 2011). As a result, they have included the use of TNWs in their conventional war plans in order to close the gap and deter NATO intervention in conflicts on Russian borders, similar to Yugoslavia in 1999 during the Kosovo war (Colby, 2015). Allied commanders in Europe are concerned that Russia might launch a conventional attack on a NATO state while threatening nuclear attack to deter a NATO response (Schneider, 2011). Tensions are rising, and so is the probability that NATO could be forced into such a conflict. Russia's reliance on its TNW arsenal in response to NATO action presents a serious concern for security experts (Suchy and Thayer, 2014).

Research Questions

This paper seeks to answer one primary question by addressing two investigative questions:

RESEARCH QUESTION 1: How can the United States and NATO deter the Russian Federation from employing TNWs to de-escalate a conventional conflict?

INVESTIGATIVE QUESTION 1: How does Russian military and government history

influence current policy and decision making?

INVESTIGATIVE QUESTION 2: How has the United States and NATO effectively deterred the USSR and Russia from using nuclear weapons in the past?

Assumptions

Several assumptions are necessary in order to model the Russian Federation's decision to use a TNW in a conventional conflict using a theory of rational choice and expected utility.

Assumption # 1.

The Russian Federation can be treated as a single rational actor whose decisions will always seek to maximize some utility. This is a reasonable assumption based on Vladimir Putin's successful collection of national power over the last decade.

Assumption # 2.

When faced with a situation of overwhelming conventional superiority, the Russian Federation is more likely to use a TNW. The perceived level of overwhelming superiority is positively correlated with the likelihood of the Russian Federation choosing to use a TNW.

Assumption # 3.

Expected utility models were first introduced as economic models in which the utility of

some tangible asset is maximized (i.e. the utility of money). In this situation, the utility the rational actor desires to maximize (U) is assumed to be the utility associated with national security, to include not only the survival of the nation but also the survival of the current government.

Assumption # 4.

Actions taken by the United States and NATO can affect the variables (decision making process) associated with the Russian decision to use TNWs.

Limitations

This research project is limited to unclassified information. Inaccuracies within open source documentation regarding Russian policy and tactics could lead to inaccuracies in the assumptions used to formulate the model. Time restrictions placed on the research project limited the interview sample size to eleven.

Scope

The model applies to the decision made by the Russian Federation after having already engaged in a regional conventional conflict with the United States and/ or one or all of its NATO allies. No presumptions or limitations are made on how or why the conflict has occurred. However, the actions taken by these countries to influence this decision can be made prior to or during the conflict. The actions of other countries are not considered in the model. The use of strategic nuclear weapons are also not considered in this model.

II. Literature Review

Definition of Tactical Nuclear Weapons

There are two definitions of TNWs that are of importance. The first is the western definition, and the second being that of the Russians. The western definition is typically a definition by exclusion. All nuclear weapons that do not fall under the restriction of strategic arms control treaties are considered TNWs (Adamsky, 2014). More specifically, TNWs are weapons with ranges of less than 500 km, gravity bombs delivered by intermediate range aircraft (500-5500 km), and nuclear munitions employed on ballistic missile defense (BMD) and air defense systems (Zagorski, 2011). All other nuclear weapons fall into categories that are controlled by the Intermediate Range Nuclear Forces (INF) Treaty, or the START treaties. The Russian definition is much more difficult to pin down.

The Russians have not officially categorized TNWs, however, the Presidential Nuclear Initiatives (PNIs) of 1991 and 1992 provide some insight. In response to President George H. W. Bush's unilateral decision to remove U.S. TNWs from service by dismantling them or placing them in storage, Russian President Mikhail Gorbachev made a pledge of his own. Russia pledged to dismantle or remove from service nuclear land mines, nuclear artillery shells, half of the nuclear surface to air missiles, naval tactical nuclear warheads, and half of the gravity bombs of the non-strategic air forces (Kipp, 2001). Each weapon example implies that Russia considers TNWs as those weapons with short ranges, meant for limited use on the battlefield in a regional conflict. This implied Russian definition is not dramatically different from the western definition. As such, the western

definition by exclusion will be used in this effort.

The Russian Value of a TNW Arsenal

Gulf War I, II, and Kosovo showcased NATO military tactics and precision guided munitions. The Russian Federation considers the U.S. and or NATO to be their next adversary and quickly recognized that they were well behind in tactics and conventional weapons technology (Such and Thayer, 2014). Russia's military was not built to fight an American non-contact war and would not be capable of countering the American military threat for a long period of time (Suchy and Thayer, 2014).

Russia could not expect to fight and win a conventional conflict with NATO (Kipp, 2001). Instead, they altered their tactics in an attempt to deter such a conflict all together. Russia is relying on TNWs as an interim means to close the conventional capability gap with the west (Colby, 2015). Their reliance on threatening the use of these weapons to deter a conflict with the west will continue until they have satisfactorily closed the gap through advancements in their own conventional capabilities (Kirstensen and Norris, 2015). Russia's threat of using low yield nuclear weapons on the battlefield has given the west reason for pause (Suchy and Thayer, 2014). The actual detonation of one of these weapons could not only potentially level the playing field, but force NATO and the U.S. to make an unthinkable decision (Colby, 2015).

Apparent Russian Doctrine

While real Russian military doctrine is classified, open source information can be

used to make inferences about how TNWs might be used in a conventional conflict and the intended results of their use. American military exercises are a means of communicating resolve and readiness with our perceived adversaries (Brzezinski and Varangis, 2016). The U.S. and NATO should expect that Russian military exercises are no different. Russian exercises (ZAPAD 2009, Vostok 2010) simulating conventional wars provide insight to how TNWs could be used in a regional conflict (Adamsky, 2014). At the end of each scenario, with Russian forces facing an overwhelming enemy onslaught, TNWs were used both on land and at sea resulting in termination of the conflict (Adamsky, 2014). These simulations imply that TNWs would be used as a means to close the conventional capabilities gap with the west in difficult and overwhelming situations.

The intended results of the limited use of nuclear weapons in a regional conflict can be described by a tactic referred to as “escalate to de-escalate” by both Russian and American officials. There is an assumption by the Russian Federation that a regional conventional conflict would not involve stakes high enough for the west to tolerate a nuclear strike. This tactic implies escalation of a conflict using TNWs will force the adversary to de-escalate, or terminate hostilities and seek negotiations favorable to Russian interests (Colby, 2015).

Arms Control as a Solution

Although the actual numbers are classified, most open source information puts the deployed NATO TNW arsenal at 150 to 200 gravity bombs deployed in Europe (Meier and Lunn, 2014). While the Russian arsenal numbers range from 2,000 to 5,000 (Adamsky, 2014), many of which are deployed near the territories of NATO countries (Schneider,

2012). Russia's TNW arsenal is believed to be the largest in the world and is a security concern for NATO and the United States (Adamsky 2014). The 2010 Nuclear Posture Review seeks to include TNWs in continued arms control negotiations with Russia (Zagorski, 2011).

Most academic literature does not propose a solution to dealing with Russia's TNW threat. The few that do, argue that arms control negotiations are the solution to the Russian TNW threat. Meier and Lunn (2014) suggest that these negotiations would "reduce mistrust by verifiably eliminating redundant and potentially insecure [tactical] weapons." Miller and Larsen (2004) propose plan that relies on the west negotiating a plan for "direct purchase of Russia's weapons."

However, even if Russia was willing to agree to limits on TNWs, the history of arms control negotiations suggests that Russia would simply ignore them (Schneider, 2012). Evidence suggests that Russia has purposely violated, or is violating in some manner, every arms control treaty they have entered into since 1972 (Schneider, 2012). Each instance of non-compliance served the purpose of achieving military advantage (Schneider, 2016). Thus, any TNW agreement would only work to further disadvantage the U.S. and NATO. For these reasons, arms control should not be relied upon to mitigate the security risk that Russia's TNW arsenal poses to the west.

Russia's History and its Influence

Russian history, from the time of the Great Princes to the Russian Federation, is a story of struggle. Struggle to cast off the yoke of the Golden Horde, then to defend the Russian Empire from hostile neighbor states, and now, determine the new identity of the

Russian Federation. This new identity will be greatly influenced by Russia's illustrious history and determine, to a great degree, future foreign policy and strategic posture decisions (Tolz, 2001). This section provides an overview of Russian political and military history, followed by an analysis of the influence of that history on the Russian Federation's apparent new identity.

From Muscovy to the Russian Federation.

The geography of the region inhabited by the Eastern Slavs had no natural borders that could be defended against invaders. Hostile states surrounded Muscovy, or Moscow, and were deterred from invading only by the harsh freezes in the winter and the resulting mud in the spring. The Great Princes, and later the Tsars would put great effort into fortifying settlements and closing their vast open borders. Through serfdom, great sacrifices were made by the Russian people to build a garrison state in order to defend Moscow from invaders (Lohr and Poe, 2002). By the end of the 16th century, the Russians' inward, defensive focus had expelled the Mongol rulers and significantly increased the size and wealth of the state.

The Time of Troubles during the first decade of the 17th century would dramatically change Russian military strategy. Famine, political crisis, and peasant rebellion in this decade opened the garrison state to foreign political intervention and eventually invasion. Poland, already at war with Sweden, successfully invaded Russia and took Moscow. The Russians would eventually rally, expel the invaders, and establish the Romanov Dynasty who would rule over Russia for nearly three centuries. Poland's invasion showed that Moscow could still be reached and by foreign invaders, and that Russia's army was in need

of modernization to keep up with the western Europeans.

The Russian Tsars would spend the next three centuries building a military industrial complex to support a modern army capable of projecting great power. Russia was no longer an inward focused garrison state. It evolved into an outward focused offensive empire. They defeated Sweden, Poland, France and Prussia. Russia's empire extended to China's western border and included Ukraine. This expansion not only resulted in greater territory, but it established a great "imperial buffer zone." This buffer zone would keep Moscow physically separated from surrounding threats and allow a modern mobile army to engage would-be invaders at a much greater range from Moscow. Russian imperial expansionism would eventually lead to a massive empire surrounded by a ring of client states and societies that they would depend on for lasting security. The Romanov Dynasty transformed a garrison state into a garrison empire (Lohr and Poe, 2002).

The early 20th century saw the first great World War. With its conclusion came the downfall of Russia's imperial autocratic government and the rise of the Bolsheviks under a communist flag. The communist government would maintain the garrison empire, through socialism instead of serfdom, under the name of the United Soviet Socialist Republic. After the Second World War, the U.S.S.R. and the members of the Warsaw Pact defended Eurasia from the encroaching Americans and NATO, and was to liberate the world from capitalism. Instead, under economic pressure and in the name of progress, the Soviet Union was dissolved. By December of 1991, Russia's borders were similar to those of Muscovy in the 17th century (Tolz, 2001). The Russian Federation was left to design a new government and define their identity.

The Russian Federation.

After the collapse of the Soviet Union, the remaining government officials were left to restructure a broken government, revive a failed, centrally controlled economy, and define who the Russian Federation was going to be. In his book “Russia, Inventing the Nation,” published in 2001, Vera Tolz identifies five main definitions of a nation in Russian intellectual debate, summarized below:

1. Union identity- multi-ethnic state with centuries of coexistence within the borders of the U.S.S.R. Akin to the previous Soviet identity.
2. Nation of common origin- Nation composed of Eastern Slavs with common origin, culture, and past. This national identity includes Ukraine and Belarus whether they believe they share a common identity or not. Influenced by the actions and beliefs of the early Russian empire.
3. Community of Russian speakers- language and orthodoxy, regardless of ethnicity, defines the Russian nation. Similar to the identity of the late Russian Empire. This identity views the break-up of the Soviet Union as dividing the Russian nation.
4. Russians defined racially- blood ties are the basis for national identity. Nations are biological rather than social.
5. Civic Russian nation- all citizens of the Russian Federation, regardless of background, united by loyalty to the government and the constitution.

Many western countries were hopeful, even optimistic, that Russia might adopt a democratic government. With free elections, a constitution, and a multi-party structure, it might appear the Russian Federation had chosen to move forward with a civic identity.

However, recent actions and statements by government officials suggest another identity, hidden behind a democratic façade.

France and Germany blocked a NATO membership action plan (MAP) for Georgia and Ukraine in 2008. This action not only communicated that these states would eventually become NATO members, but that NATO was not yet willing to take actions that would appear to be provocative to Russia. In August of the same year, an emboldened Russia invaded Georgia to install a new government and prevent NATO membership (Van Herpen, 2015). Similarly, in 2014, Russia convinced the Ukrainian President to back out of a deal that would include Ukraine in the European Union. During the political unrest that followed, Russian military intervention resulted in a Crimean declaration of independence. Shortly following the declaration, a referendum, supported by a vast majority of Russian citizens and the inhabitants of the Crimean peninsula, led to the annexation of Crimea by the Russian Federation (Van Herpen, 2015). The international community to this day regards the declaration and referendum as illegal and does not recognize the annexation.

A new civic, democratic national identity that supports and conforms to international norms, does not explain the Russian Federation's foreign policy decisions and military action. One has only to look at Vladimir Putin's address to the Federation Council and State Duma in 2014 regarding the annexation of Crimea to characterize Russia's current identity. Supporting a combination of a Community of Russian Speakers and a Nation of Common Origin, Putin explains:

Everything in Crimea speaks of our shared history and pride. [Prince Vladimir's] spiritual feat of adopting Orthodoxy predetermined the overall basis of the culture, civilization, and human values that unite the peoples of

Russia, Ukraine, and Belarus. [...] In people's hearts and minds, Crimea has always been an inseparable part of Russia. [...] Millions of people went to bed in one country and awoke in different ones, overnight becoming ethnic minorities in former Union Republics, while the Russian nation became one of the biggest, if not the biggest ethnic group in the world to be divided by borders. [...] Our concerns are understandable because we [Russia and Ukraine] are not simply close neighbors, but, as I have said many times already, we are one people. Kiev is the mother of Russian cities. Ancient Rus is our common source and we cannot live without each other.

Supporting the Union Identity, Putin laments about the collapse of the Soviet Union as he commonly does:

The USSR fell apart. Things developed so swiftly that few people realized how truly dramatic those events and their consequences would be. [...] It was only when Crimea ended up as part of a different country that Russia realized that it was not simply robbed, it was plundered. [...] After the dissolution of bipolarity on the planet, we no longer have stability.

Russia's concerns about NATO can be characterized in the same speech:

[...] They have lied to us many times. [...] This happened with NATO's expansion into the east, as well as the deployment of military infrastructures at our borders. [...] NATO remains a military alliance, and we are against having a military alliance make itself at home right in our backyard or in our historic territory. [...] In short, we have every reason to assume that the infamous policy of containment [...] continues today.

Sixteen years ago, Tolz suggested that Russian politicians approach their national identity in three ways, a civic nation, a nation of common origin and Russian speakers, and the union identity. It appears little has changed based on review of recent events. The civic identity is used only to deflect western criticism (Van Herpen, 2015). Russia identifies itself as a nation without borders, composed of a people of common origin, to include Russian speakers. Control of historic Russian territory, the former Soviet borders, are necessary for continued security and defense against an ever-encroaching NATO. It is this context in which future foreign policy and strategic posture decisions must be considered.

U.S. Nuclear Policy vis-a-vis U.S.S.R. / Russian Federation

The following sections provide an overview of the history of the United States' strategic policy regarding the Soviet Union and Russia. While it is difficult to prove a negative, strategic policy and diplomacy over the last sixty years has yet to cause a nuclear exchange. Past examples and historical precedence can provide insight into how a policy or action will be perceived by the Russian Federation. It should be considered in the decision making process that radical policy or action that is historically unprecedented could lead to crisis.

Truman 1945-1953.

President Truman is the only person in history that has authorized the use of nuclear weapons against another country. In 1945, the attacks on Hiroshima and Nagasaki brought a swift end to World War II in the Pacific. From 1945 to the early 1960's the United States benefitted from extreme nuclear superiority. Although there were only a few nuclear

weapons in the world during this time period, the United States had nearly all of them. The Cold War was officially declared by President Truman in his address to a joint session of Congress in 1947. The United States and its allies would contain communist expansion to Turkey and Greece through financial and military aid to their governments. A year later, NSC-30 “United States Policy on Atomic Warfare” was signed by Truman. This document states the decision to employ nuclear weapons is to be made by the President and that the use of atomic weapons is to be considered in the interest of national security. Nuclear planning options were unlimited, and the U.S. nuclear war plan called for a single, general strike on the Soviet Union. This general strike was essentially an extension of conventional strategic bombing used toward the end of World War II. Strategic nuclear bombing became the primary defense against the Soviets in the event of war, with conventional forces being “cut to the bone” in the early 1950s. War plans began to trend toward nuclear weapons as a lower cost substitute for conventional capability (Kinsman and Lawson, 2001). Three priorities were given to Soviet targets. The highest priority was the destruction of targets to prevent Soviet delivery on atomic weapons. The second priority was war-fighting retardation, and the third was liquid fuel and energy industry. Truman authorized work on thermonuclear weapons early in 1950. The Soviet threat was growing and the threat of nuclear retaliation would become increasingly important as the Soviets scrambled to increase their nuclear capabilities.

Eisenhower 1953-1961.

Eisenhower continued with Truman’s containment policy toward the Soviet Union and accelerated the trend of nuclear weapons being used as a low cost substitute for

conventional capabilities. The United States would not start a war, but they would instantly and massively retaliate. The US had escalation dominance over the Soviets and “war plans closely conformed to the principle of rapid and total escalation (Larsen and Kartchner, 2014).” Nuclear weapons were to be considered conventional from a military point of view. Efforts to develop intercontinental ballistic missile (ICBM) capabilities were well underway in the United States and the Soviet Union. It was believed when the Soviets achieved ICBM capabilities, U.S. nuclear superiority would be lost, and mutual deterrence would ensue (Kinsman and Lawson, 2001).

On October 4th, 1957, Sputnik was put into orbit using Soviet ICBM technology. Technology that could put a Soviet weapon in North America. Technology that the United States did not yet have, spurring a “missile gap” crisis. As a result, the first Atlas base was activated in 1958, and the first Titan base in 1960. The Navy had Polaris, and now the Air Force had Atlas, Titan, and their bombers. An integrated targeting plan became necessary to coordinate nuclear attack across services. The result was the nation’s first Single Integrated Operations Plan (SIOP). SIOP 62 was developed to provide massive retaliation against Soviet aggression. It was a massive single inflexible strike package that would be criticized and reformed by every subsequent administration.

Kennedy/ Johnson 1961-1969.

As the Soviets continued to field large numbers of impressive strategic systems, massive retaliation fell out of popularity. Instead, the Kennedy administration, led by Secretary McNamara, decided to shift the strategic focus from massive counterforce retaliation to the idea of assured destruction and flexible response. SIOP 62 was criticized

as being a “blunt instrument.” Instead of giving the President an “irresponsible” single option to counter Soviet aggression, flexible options were desired to keep potential nuclear exchanges limited (Larsen and Kartchner, 2001). Secretary McNamara proposed a “no cities” approach. This approach would focus the initial attack on the forces of the opponent, while withholding the capability to strike Soviet cities in the hope they might show the same restraint. The result was SIOP 63. Unlike the single-option SIOP 62, the revised version contained five large attack options as well as the ability to withhold attacks (Larsen and Kartchner, 2001). By this point, the United States and Soviet Union had relatively invulnerable nuclear weapons systems. Although efforts were made to provide control and flexibility with the use of nuclear weapons, it seemed nearly impossible to actually control a nuclear conflict.

Instead, budgetary considerations and the idea of maintaining assured destruction to deter a nuclear conflict influenced all other nuclear posture decisions. In 1962, the United States and the Soviets came to an impasse when Soviet nuclear weapons were discovered in Cuba. In the words of Robert McNamara, we avoided nuclear war in this crisis because we “lucked out (Payne, 2009).” In June of 1963, the Hotline Agreement was signed to allow quick and reliable communications between nuclear weapons states. In October of 1963, the United States and the Soviets entered into the Limited Test Ban Treaty. This treaty “prohibits nuclear weapons tests or any other nuclear explosion in the atmosphere, in outer space and under water.” During President Johnson’s tenure, McNamara began to push the US and NATO to move away from reliance on nuclear weapons by strengthening conventional force capabilities. The US increased spending on conventional forces, but NATO maintained the status quo (Larsen and Kartchner, 2001). The start of the Vietnam

War pushed serious thinking about nuclear deterrence to the background.

Nixon/ Ford 1969-1977.

Shortly after Nixon entered office, the U.S. entered into the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). This treaty recognizes the United States, Russia, the United Kingdom, France, and China as nuclear weapons states and prevents them from transferring nuclear weapons to non-nuclear states. Non-nuclear weapons states are not to acquire nuclear weapons in exchange for the benefits of peaceful nuclear power (among other restrictions) (Reed and Stillman, 2008). In the meantime, the Nixon administration set to work on nuclear policy. Both Nixon and Ford considered Kennedy's and Johnson's work to provide flexibility in nuclear response inadequate. They were also concerned the shift to mutually assured destruction had degraded the credibility of the U.S. nuclear threat in Europe. Their review of the U.S. strategic posture found the United States had very limited capabilities for a small nuclear attack and were unprepared for a controlled nuclear war. They revised SIOP 63 to include Limited Nuclear Options (LNO) (Larsen and Kartchner, 2001). National Security Decision Memorandum 242 (NSDM-242) was released outlining the new nuclear policy. Early and acceptable war termination was the principle objective of U.S. nuclear employment using a counterforce strategy. Limited nuclear options were to be used in conjunction with political and military actions to control escalation (Larsen and Kartchner, 2001).

Nixon and Ford were attempting to re-establish credibility by shifting from an assured destruction mindset to escalation control. However, the Strategic Arms Limitations Treaty (SALT I) and the Anti-Ballistic Missile (ABM) Treaty, signed in 1972, were

consistent with the tenets of assured destruction. These two treaties were to freeze ballistic missile launchers at existing levels and severely limit ballistic missile defense (BMD) capabilities to ensure the mutual vulnerability of both sides. This guaranteed vulnerability was intended to put a stop to the arms race and Soviet ICBM build-up because large numbers of weapons were not necessary to maintain the stable balance of terror (Payne, 2009). The Threshold Test Ban Treaty was signed in Moscow in July of 1974. This treaty limited underground testing to devices less than 150 kilotons. Advances in missile technology greatly improved nuclear weapon accuracy. In 1976, near the end of Ford's tenure, SIOP 5 was approved. Improved accuracy enabled the plan to provide multiple limited and selective attack options. SIOP 5 remained in place until 1983 and held up to 40,000 individual targets (Larsen and Kartchner, 2001).

Carter 1977-1981.

The Carter administration's nuclear policy continued the search to provide selective options in order to maximize flexibility in a nuclear exchange. His policy, however, differed from his predecessors in its targeting strategy, called a countervailing strategy. A countervailing strategy was to focus targeting on what the Soviets valued most. Carter's administration would focus on instruments of Soviet post-exchange dominance. Presidential Decision 59 (PD-59) was released in 1980. The decision dictated that the U.S. nuclear capabilities needed to clearly communicate to any adversary that no plausible outcome of an attack on the U.S. or its allies could be considered a victory by any definition (Larsen and Kartchner, 2001). In an era of nuclear parity, the goal was not to win a nuclear war, but to deny a Soviet victory. PD-59 also emphasized the importance of improving the

survivability of strategic command, control, communications, and information systems. In October of 1980, SIOP 5F was approved, including a greater focus on leadership targets (Larsen and Kartchner, 2001).

SALT II negotiation began in 1972 with Henry Ford, and after years of negotiation, the treaty was signed by President Carter and Brezhnev in 1979. The agreement limited strategic nuclear delivery vehicles initially to 2400, and place a limit on multiple independently targetable reentry vehicle (MIRV) equipped ballistic missiles. Six months later, the Soviets invaded Afghanistan and ratification of the treaty was delayed. After the discovery of a Soviet brigade stationed in Cuba, the U.S. refused to ratify the treaty. Both sides, however, agreed to comply with the limits of the treaty until its expiration in 1985.

Reagan 1981-1989.

Upon entering office, Reagan immediately rejected the idea that the goal of nuclear war was to deny the Soviet's victory. Instead of denying victory, the goal was decisive victory (Larsen and Kartchner, 2001). President Reagan shifted from a countervailing strategy to a prevailing strategy, outlined in NSDD-13, issued in 1981. The concept of flexible response remained a central principle. During Reagan's administration, defense spending was increased across the board. The Trident D-5 SLBM was deployed and the B-2 program, which was killed by Carter, was brought back to life.

The strategic defense initiative was introduced in 1983 in a speech given by President Reagan. The initiative would begin the research necessary to develop a strategic defensive system capable of defending the U.S. from Soviet ICBMs. In his speech given in March, Reagan states: "I am directing a comprehensive and intensive effort to define a long

term research and development program to begin to achieve our ultimate goal of eliminating the threat posed by strategic nuclear missiles.” By 1987, \$3 Billion was being invested in the initiative annually. The Soviets withdrew from arms control negotiations following the invasion of Afghanistan and the discovery of a Soviet brigade in Cuba in the early 1980s.

However, Reagan’s continued policy of selected targeting options, modernized weapons, and the strategic defense initiative prompted the Soviets to reconsider (Kinsman and Lawson, 2001). President Reagan pushed forward an ambitious arms control agenda. The Intermediate-range Nuclear Forces Treaty was signed in 1987. The treaty required the U.S. and Soviet Union to destroy ground launched ballistic and cruise missiles and launch facilities with ranges between 500km and 5500km by 1990. Negotiations also began under the Reagan administration for what would eventually become the Strategic Arms Reduction Treaty (START), the Conventional Forces in Europe (CFE) Treaty. Both of which would be signed early in the next administration.

Bush 1989-1993.

The Bush administration did not immediately change Reagan’s prevailing targeting strategy. However, with the fall of the Berlin wall in 1989, and the dissolution of the Soviet Union in 1991, the focus of nuclear policy shifted dramatically from deterrence to arms control and nuclear security, and how to deter chemical and biological attacks (Larsen and Kartchner, 2001). In 1992, STRATCOM was established to develop targeting in support of global operations against a more diverse set of adversaries. A new SIOP was approved in 1993, referred to as a “living SIOP.” The focus on arms control led to many agreements,

both bilateral and unilateral, in this time period. President Reagan began the first START negotiations, and President Bush signed the first START treaty in 1991. Among other restrictions, this bilateral treaty prohibited signatories from exceeding 6000 warheads deployed on a total of 1600 ICBMs, SLBMs and bombers.

President Bush also signed the Conventional Forces in Europe (CFE) agreement. This agreement eliminated Soviet overwhelming numerical advantage in conventional weapons in Europe. NATO and the WARSAW pact agreed to equal limits of conventional platforms deployed between the Atlantic Ocean and the Ural Mountains to promote stability in the region. Along with bilateral agreements, two notable unilateral decisions were made. Presidential Nuclear Initiative (PNI) 1 and PNI-2 were introduced in 1991 and 1992 respectively. President Bush outlined these initiatives in his address to the nation in September of 1991. The plan was to unilaterally: 1. Eliminate the U.S. worldwide inventory of ground-launched theater nuclear weapons, to include artillery shells. 2. Withdraw all tactical nuclear weapons from surface ships, attack submarines, and land-based aircraft. 3. Immediately stand down all strategic bombers from alert posture. 4. Immediately stand down from alert all ICBMs scheduled for deactivation under START. 5. Terminate the development of the mobile ICBM program. 6. Urge the Soviet Union to take the same actions. Arms control, reduction, and non-proliferation are common themes in all of the remaining administrations.

Clinton 1993-2001

The second START treaty, START II was signed in 1993. This treaty, among other restrictions, limits the total number of nuclear warheads each nation can have deployed to

3500 by 2003, and removes MIRV capabilities from ICBMs. A Nuclear Posture Review (NPR) was completed a year later. The goal of the review was to evaluate nuclear policy and forces in a post-cold-war environment under the restrictions of START II. The results stated that the START II limits maintained nuclear deterrence, but a reconstitution capability for the stockpile should be maintained. Based on the recommendations of the NPR, President Clinton revised U.S. nuclear policy in 1997. PDD-60 “removes from presidential guidance all previous references to being able to wage a nuclear war successfully (Reagan) or to prevail in nuclear war (Kinsman and Lawson, 2001).”

The U.S. was to lead the world in nuclear disarmament to prevent proliferation, but hedge against adverse situations by maintaining a smaller deterrent force and a reconstitution program. Clinton and Yeltsin then signed a joint statement that once START II entered force, the U.S. and Russia would immediately begin negotiation on START III to reduce deployed warhead levels to around 2000 (Kinsman and Lawson, 2001). In 1996, the United States entered into the Comprehensive Nuclear Test Ban Treaty (CTBT). This treaty is a global legal ban on nuclear explosive testing. This treaty continued the unilateral testing moratorium that the United States had observed since 1992. The stockpile would continue to be maintained without explosive testing. However, President Clinton would continue to fund the Strategic Defense Initiative started by Reagan. The system would be scaled back to defend against weapons from rogue states and renamed Ballistic Missile Defense (BMD).

Bush 2001-2009

The televised attacks on the World Trade Center and the Pentagon underscored that

the United States faced radical threats in a complex and dangerous environment. The 2001 NPR argued deterrence was more uncertain due to the nature of the threats and that more varied capabilities were needed to avoid over reliance on nuclear threats (Larsen and Kartchner, 2001). To counter weapons of mass destruction (WMD) threats, however, the NPR recommended enhancing the current stockpile to create capabilities suited for deterring or destroying WMDs without as much collateral damage. Extreme resistance from Congress prevented the Bush administration from improving the capabilities of the stockpile (Larsen and Kartchner, 2001).

Based on the recommendations of the NPR, President Bush issued National Security Presidential Directive (NSPD) 14. NSPD-14 resulted in STRATCOM changing the nuclear war plan from a single integrated plan to a family of operational plans. The SIOP changed to OPLAN 8044 in 2003, to OPLAN 8010 in 2008. During the Bush administration, the United States would officially withdraw from the ABM treaty. In a public address from the white house in late 2001, President Bush stated: "I have concluded the ABM treaty hinders our government's ways to protect our people from future terrorist or rogue state missile attacks." In 2002, President Bush again renamed the strategic defense initiative, (now BMD) to the Missile Defense Agency for the deployment of a national missile defense system.

Obama 2009-Present.

President Obama would continue Clinton's efforts to lead the world in disarmament and non-proliferation. In the Prague speech of 2009, Obama stated:

The existence of thousands of nuclear weapons is the most dangerous legacy of the Cold War. [...] The United States will take concrete steps towards a world without nuclear weapons. To put an end to Cold War thinking, we will reduce the role of nuclear weapons in our national security strategy, and urge others to do the same. Make no mistake: As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies. [...] To reduce our warheads and stockpiles, we will negotiate a new Strategic Arms Reduction Treaty with the Russians this year.

Shortly after Obama's speech, the 2010 NPR centered around five key objectives for nuclear policy:

1. Preventing nuclear proliferation and nuclear terrorism.
2. Reducing the role of nuclear weapons in security strategy.
3. Maintain strategic deterrence and stability at reduced nuclear force levels.
4. Strengthening regional deterrence and reassuring US allies and partners.
5. Sustaining a safe, secure, and effective U.S. arsenal.

The result of this commitment and recommendations by the NPR was a PDD that reduces national security reliance on nuclear weapons by reducing their role and numbers while narrowing the circumstances of their use. In April of 2010, the New START agreement was signed. This agreement reduces the number of deployed warheads from 3500 to 1550 over the next ten years. The most current nuclear policy is driven by a non-proliferation and disarmament agenda.

Through an understanding of Russian national history, the history of United States'

strategic policy, and perceived Russian TNW doctrine, this research develops and tests a model of conditions affecting the Russian decision to use TNWs using expected utility theory in an attempt to deter their use. The decision to use a TNW in the midst of a conventional conflict is a risk decision whose results can be assumed to provide some form of utility for the decision maker. Assuming the leader making the decision will act to maximize that utility, a utility function can be derived after making further key assumptions about the independent variables that affect the dependent variable of utility. The model is then tested by comparing its entering assumptions and predictions with interview results from subject matter experts. This comparison provides conclusions regarding the validity of the model and possible courses of action that could deter the use of these weapons in the event that NATO is forced to enter into a conventional conflict with Russia.

III. Methodology

Research Method

The bulk of academic literature is primarily focused on arms control strategies to bilaterally reduce TNW stockpiles in order to address the problems posed by Russia's TNWs. This research fills an apparent void in the literature by addressing Russia's TNW threat through deterrence instead of negotiations. Payne (2009), suggests that "details of circumstances, time, place, culture, ideology, religion, domestic politics, and personality decide if and how deterrence operates." Qualitative research methods were selected for this reason. Leedy and Ormrod (2016) state, "In qualitative research, [...] we collect various forms of data and examine them from various angles to construct a rich and meaningful picture of a complex, multifaceted situation."

Expected Utility Theory

Expected utility theory is a subset of rational choice theory. It has been applied across multiple disciplines in an attempt to explain and predict decision making involving risk. From international law (Thompson, 2002), to gambling and the lottery (Bernoulli, 1954), economics (Hildreth, 1974), sociology (Hechter, 1997), and international conflict (De Mesquita, 1980). The decision to use nuclear weapons is the ultimate risky decision, thus expected utility is used in this effort as well. In each of these studies there is one major underlying assumption: *Individuals make risk decisions to attain goals which maximize utility* (Thompson, 2002). When applied specifically to the national decision of

war initiation, expected utility assumes that nations can be treated as rational actors that make decisions by assessing the costs and benefits of their actions (Bennett and Stam, 2000). Leaders will take the option that “promises, on average, the best return, or in other words, the highest expected utility (Bennett and Stam, 2000).”

The decision to use a TNW in the midst of a conventional conflict is a risk decision whose results can be assumed to provide some form of utility for the decision maker. Assuming the leader making the decision will act to maximize that utility, a utility function can be derived after making further key assumptions about the independent variables that affect the dependent variable of utility.

In this study, key assumptions and definitions of dependent and independent variables are informed by the literature review concerning Russian national history and evidence supporting a perceived Russian doctrine for the use of TNWs. In this manner, the details of the circumstance inform the model. The resulting utility function provides a qualitative description of the decision making process. The mathematic relationships between variables are used to infer the types of actions that would be potentially effective and ineffective at deterring the decision to use TNWs.

The model’s initial assumptions and predictions are tested to evaluate the validity of the model. First the model is tested with independent variables at their limits to ensure the predicted results are consistent with the assumptions. Second, initial assumptions and predictions are tested by comparison against the results of interviews with subject matter experts.

Data Collection and Analysis

In addition to literature reviews, primary research information was gathered using semi-structured interviews. A purposive sample of ten participants that are subject matter experts in Russian affairs were selected from academia (4), the intelligence community (2), and the military (4) to provide insight from multiple perspectives. Interviews lasted between 20 to 35 minutes. The semi-structured interview approach allowed for clarification and additional detail that may not have been possible using other means. All interviews were conducted over the phone and recorded to increase accuracy in transcription when allowed. Interview questions (see Appendix A) were designed to address the key issues from which the assumptions were made. The participants were not allowed to see the assumptions associated with each question to minimize response bias. Each question was evaluated by the author to determine if the respondent agreed or disagreed with the underlying assumption. The final question solicited specific recommendations to deter the decision to use TNWs for direct comparison with the initial model predictions.

IV. Analysis and Results

Chapter Overview

The first section in this chapter uses the literature review and expected utility theory to make assumptions about, and develop a model of the Russian TNW decision making process. Each variable within the model and their interactions are defined qualitatively and used to make predictions about actions that could deter the decision to use a TNW in a conventional conflict.

The second section in the chapter discusses the interview results. First, there is an analysis on the respondents' level of agreement on the model's assumptions followed by a discussion of dissenting opinions. Second, the actions recommended by the respondents to deter the Russian's from using a TNW are grouped into common themes and compared to the predictions provided by the model. A full list of the specific recommendations provided by the respondents is provided in Appendix B.

Application of Expected Utility Theory

This theory postulates that a decision involving risk can be modeled using a utility function (Kahneman, 2011). The preferred decision is the one that will maximize utility as governed by the function. A similar application of expected utility theory can be seen in Bruce Bueno De Mesquita's 1980 model of international conflict (De Mesquita, 1980). In a situation in which NATO and the Russian Federation are engaged in a regional conventional conflict, the Russian decision to use a TNW is one that carries significant

risk. Only in this case, the risk involves winning or losing a war. In order to model this decision as one that maximizes utility, the following assumptions are made:

Assumption # 1.

The Russian Federation can be treated as a single rational actor whose decisions will always seek to maximize some utility. This assumption is required for the application of expected utility theory and is reasonable based on Vladimir Putin's successful collection of national power over the last decade. Whether it is Mr. Putin or a designated military representative who makes the final decision, it is assumed the decision will not be made by committee.

Assumption # 2.

From previous discussion, Russian military exercises suggest that TNWs would be used as a means to close the conventional capabilities gap with the west in difficult and overwhelming situations. The implication of this assumption is that overwhelming conventional superiority situations are positively correlated with the likelihood of the Russian Federation choosing to use a TNW.

Assumption # 3.

This type of model was first introduced as an economic model in which the utility of some tangible asset is maximized (i.e. the utility of money). In this situation, based on the historic literature review and its implications for the definition of the Russian nation, the utility the rational actor desires to maximize (U) is assumed to be the utility

associated with national security, to include not only the survival of the nation but also the survival of the current government. This assumption is supported by the review of Russian national history

Assumption # 4.

Actions taken by the United States and NATO can affect the variables (decision making process) associated with the Russian decision to use TNWs. The United States and NATO are capable of deterring the Russian tactical nuclear arsenal. This assumption is supported by the review of previous United States' nuclear policy.

Similar to expected utility models describing two choices in gambling with specific probabilities of success, this decision model is a function of two mutually exclusive decisions (Kahneman, 2011: 274). Decision **a** represents the decision to use a TNW in a conventional conflict with NATO. Decision **b** represents any other decision made in a conventional conflict with NATO. Utility in this case is then defined mathematically in the following manner:

$$U = \max (pL * A, pW * B).$$

The decision maker seeks to maximize utility (U) where:

A = expected contribution to national security if decision **a** is made.

B = expected contribution to national security if decision **b** is made.

pL = Russian perceived probability that they will lose the conventional conflict.

pW = Russian perceived probability that they win the conventional conflict.

$$pL + pW = 1$$

$pL * A$ = national security utility associated with the decision to use a TNW in a conventional conflict with NATO.

$pW * B$ = national security utility associated with any other decision made in a conventional conflict with NATO.

If $pL * A > pW * B$, the theory requires the decision maker to select decision **a**.

If $pL * A < pW * B$, the theory requires the decision maker to select decision **b**.

Expected Utility Theory Implications

Evaluating the function at its extremes shows reasonable validity within the assumed strategy of the Russians. The ZAPAD exercise of 2009 concluded with the Russians using a TNW to stop a conflict with NATO after taking heavy losses and when faced with overwhelming superiority. Overwhelming superiority is represented in the model by pL approaching 1, and pW approaching zero. In this case, $pL * A > pW * B$ for non-zero values of A and B . Thus, when faced with great risk of losing the conflict, the model suggests that the Russians would choose option **a**, use of a TNW, to maximize national security. In the converse case, where it is likely that the Russian Federation is going to win a conventional fight with NATO, it can be seen that the inequality shifts and option **a** is no longer the optimal decision. Both results in this case are consistent with assumption # 2.

Any attempt to define the units of utility or assign numerical values to the variables would be an abstract exercise that misses the point entirely. It is not the

numerical values that matter in this effort. It is the relationship of the variables within the utility function and that their theoretical values might be changed by United States and NATO actions that is important. Deliberate action to manipulate variables in a desired direction could potentially manipulate the decision made by the Russian Federation. The mathematical model provides insights into what types of actions the U.S. and NATO could take to deter the Russians from choosing option **a** in order to de-escalate a conventional conflict.

It is clear that in all cases, to successfully deter the Russians, $pL \cdot A$ must remain less than $pW \cdot B$. In order to maintain this inequality, NATO actions should seek to:

Minimize $pL \cdot A$ while maximizing $pW \cdot B$.

Actions to minimize A.

Russian doctrine suggests that use of a TNW would provide national security utility because NATO would immediately back down from a conventional fight the Russians do not believe they can win, and subsequently enter into negotiations to terminate the conflict. Minimizing the value of A is to take action that communicates the use of a TNW would not result in western capitulation. Public declaration that use of a TNW is unacceptable and would only result in NATO's continued conventional efforts, response in kind, or a strategic response could be used to minimize A. These results are not original ideas and are supported by the actions suggested by Dr. Elbridge Colby in 2015 in his article "Nuclear Weapons in the Third Offset Strategy: Avoiding a Nuclear Blind Spot in the Pentagon's new Initiative."

Actions to minimize pL or maximize pW .

Minimizing pL , (or maximizing pW) would be to make the Russians believe that there is a reasonably high probability that they could win at any given time during a conventional conflict. Exploiting pL for deterrent effect while still pursuing one's own objectives in a conflict is problematic. It is difficult to imagine a circumstance in which one side of a conflict can achieve success while controlling its adversary's perception of that success. The model otherwise suggests that NATO must be very careful not to completely overwhelm the Russian Federation in an engagement unless they are willing to contend with the predicted Russian response.

Actions to maximize B .

Maximizing the value of B would be to maximize the Russian's perception of the value added to national security through actions other than using a TNW. These types of actions could include guaranteeing the survival of the Russian government if the nuclear threshold is not crossed, and providing as many off-ramps as possible for the Russian Federation to withdraw from a conventional fight while still saving political face and not admitting military defeat.

Interview Results with Respect to Assumptions

Interview questions (Appendix A) were administered to a total of ten Russian subject matter experts in the military, academia, and intelligence community. The

transcripts were reviewed by the author and evaluated to determine if the responses provided by each respondent fundamentally agreed with each question's underlying assumption or suggested a possible alternative. The results of the analysis are provided in Table 1 below. Each number represents the fraction of respondents that agreed with the assumptions used to formulate the model.

Table 1. Respondent Agreement with Assumptions

Respondents	Assumption 1	Assumption 2	Assumption 3	Assumption 4
Military	1	.5	.75	.75
Academic	1	.5	.5	1
Intelligence	1	.5	0	1
Total	1	.5	.5	.9

Assumptions 1 and 4 were almost universally agreed with. Russia could be modeled reasonably accurately as a single rational actor, and they can be deterred by US and NATO actions. The one dissenting opinion in assumption 4 suggests that Russia is so committed to their TNWs and the asymmetric advantage they provide, that they cannot be deterred from using them. This opinion renders any effort to understand and deter the Russians effectively mute. However, the previous review of strategic policy and a relatively high level of respondent agreement is evidence to suggest that Russian decision making can be affected by NATO actions and Russia can be deterred.

Responses to assumption 2 showed a high level of disagreement. However, the reasons for disagreement were similar in almost all cases. Each dissenting respondent

expressed concern that Russia would use a TNW *prior to* entering into a conventional engagement with the west. The implications of this concern are that Russia presupposes $p_L = 1$. This presupposition implies that the probability used in the model should not be concerned with winning and losing a conventional fight. Instead, the probability that the US and/ or NATO choose to enter into a conventional conflict, or not, is actually the probability of interest.

One respondent strongly questioned the evidence supporting the escalate-to-deescalate policy, suggesting that it has been assumed by the west and it is not actually the doctrine of the Russian Federation.

Responses to assumption 3 also showed a significant level of disagreement. As in the case of assumption 2, the reasons for disagreement were similar. Respondents suggested that the utility associated with the survival of the country and the government was not the only utility that would motivate a TNW decision. They suggested that the utility associated with protecting gains in the economy and physical land that would contribute to the re-establishment of Russian international prestige could also contribute to the decision to use a TNW against the west. This idea is consistent with the evaluation of Russian history completed in the literature review, and suggests that the utility being maximized by a Russian decision-maker should be reconsidered.

Interview Results with Respect to Model Predictions

The recommended actions from all of the participants are included in Appendix B. From Appendix B, there are three common recommendations to deter Russia made by

the participants. The recommendation most often made was strengthening NATO's communication with the Russian government concerning strategic policy and the will to use nuclear weapons (including the recommendations to conduct more public military exercises). The second most often made recommendation was the deployment of new or the enhancement of existing TNW capabilities. The third most common recommendation was to bolster the strength of NATO, specifically through defense spending.

Actions to minimize A.

Minimizing the value of A is to take action that communicates the use of a TNW would not result in western capitulation. The recommendations regarding NATO's communication with Russia can be described as attempting to minimize A, and is very similar to the model's prediction discussed earlier. The recommendations to enhance our abilities to respond in kind with new capabilities and strengthen NATO also seek to minimize A.

Actions to minimize pL or maximize pW .

Minimizing pL , (or maximizing pW) would be to make the Russians believe that there is a reasonably high probability that they could win at any given time during a conventional conflict. With the problematic nature of these types of actions, it was not surprising that none of the common recommendations fall into this category. However, one recommendation categorized new TNW capabilities in Europe as being too provocative toward Russia. This single recommendation can be viewed as attempting to minimize pL .

Actions to maximize B.

Maximizing the value of B would be to maximize the Russian's perception of the value added to national security through actions other than using a TNW. There were no recommendations made that could be categorized as attempting to maximize B. That is not to say that this idea should not be pursued. For example, Figure 1 below is taken from a STRATCOM presentation on nuclear deterrence. There are off-ramps in the spectrum of conflict that represent opportunities to maximize B before and during a conventional conflict that could affect a nuclear adversary's decision to use a TNW.

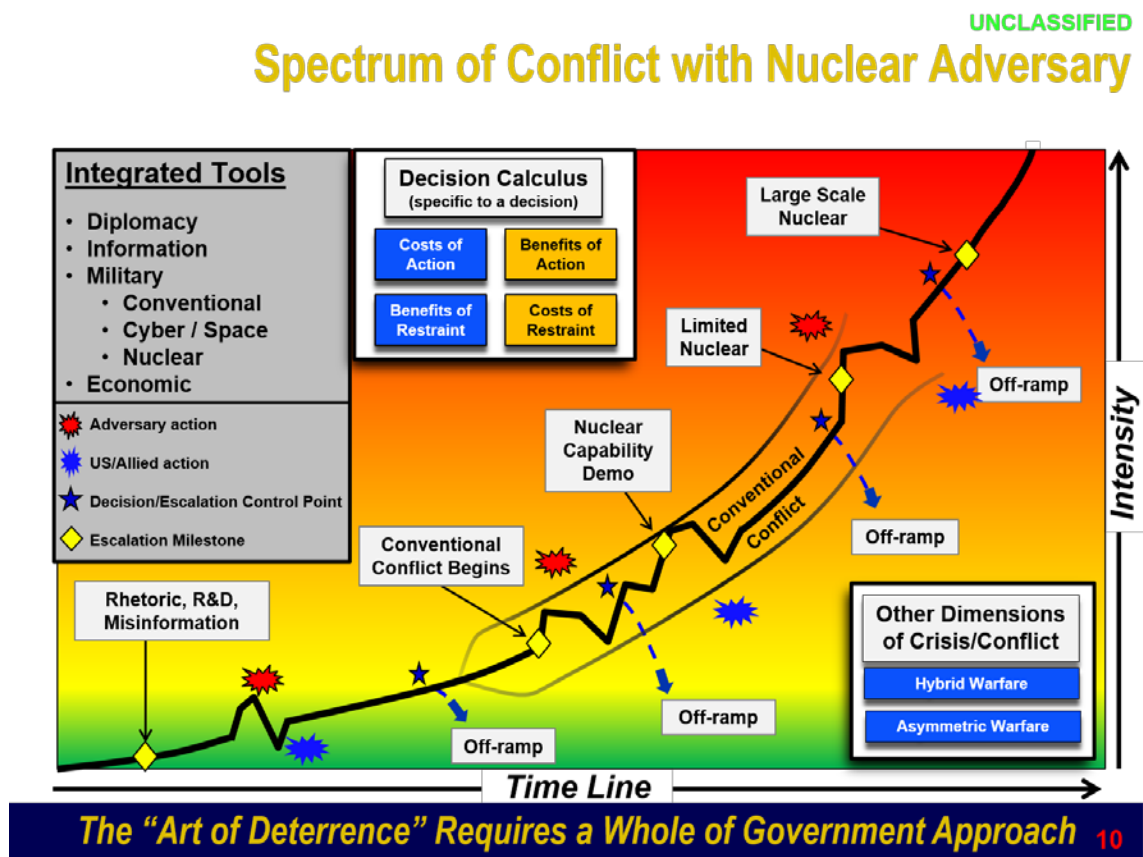


Figure 1

V. Conclusions

Overarching Research Question

This purpose of this research effort was to address how the United States and NATO could deter the Russian Federation from employing TNWs to de-escalate a conventional conflict. The answer to this question will never be known with certainty. To prove that the Soviet Union was deterred from using nuclear weapons by US and NATO action throughout the Cold War, even now, is difficult at best. Although this effort by no means definitively answered the overarching research question, it has provided an original framework with which to qualitatively predict the potential effects a specific action might have on manipulating Russia's decision making process given a set of initial assumptions.

Summary of Research Conclusions

These assumptions were challenged in the interview process and indicate that at least two of them should be reconsidered. First, the expected utility of national security may not be adequate when the desire for international recognition and economic strength are taken into account. Second, the assumption that pL is positively correlated with the decision to use a TNW should be reconsidered. If Russia chooses to demonstrate resolve with a TNW to prevent the start of a conventional engagement (as suggested by at least three respondents), then the probability of concern is the probability that NATO even chooses to engage vice whether or not Russia believes

they can win.

Ultimately, a list of recommendations to deter Russia from using TNWs from each interview is provided in Appendix B for consideration. The decision model predicts that each recommendation has deterrent value but by no means guarantees deterrence. By design, none of the recommendations consider the political consequences associated with their implementation. Although a specific action may be immediately discarded due to its potential consequences, the reason behind the action should not.

Recommendations

Generally, the interview responses provide the most support for actions to present a cohesive, bolstered NATO alliance, which communicates a consistent strategic policy and message to offset a Russian TNW strategy. History has shown that these actions are much easier said than done. A second highly supported, but much more politically charged recommendation, is to consider actions providing greater flexibility for both NATO and the US to respond in kind to a Russian TNW employment.

Future Research Considerations

Although the validity of the model and its underlying assumptions can and should be challenged, it has nonetheless given some insight into traditional deterrence thinking when applied to the recommendations given in the interviews. Two of the

three types of actions that the model predicts could manipulate Russia's decision to use TNWs were not considered by any of the respondents except one. One explanation for this could be selection bias resulting in similar perspectives across a small sample of interview subjects. Another explanation suggests that there may be other types of actions, not necessarily considered through a traditional deterrence lens, which could be exploited to provide a deterrent effect. Figure 1 combined with the single recommendation to not deploy new weapons systems in Europe suggests that the two generally overlooked types of actions are not only unoriginal but also relevant to deterrence. Further research with a much greater sample size to minimize selection bias is necessary to examine these possibilities.

Appendix A

Interview Questions

Assumption 1: Russian Federation can be treated as a single rational actor.

Q1. How would you describe the organization of the Russian Federation's government?

Q1a. Do you consider them as more democratic or autocratic?

Assumption 2: Overwhelming conventional situation is positively correlated with pL and the likelihood that the Russian's would choose to use a TNW.

Q2. Please describe Russia's escalate to de-escalate policy.

Q2a. Why does this policy exist?

Q2b. What is the most likely scenario that the Russians will choose to use a TNW in a conventional conflict?

Assumption 3: The utility that the rational actor will maximize is the utility associated with National Security.

Q3. What does Russia expect to gain from, or what are they trying to protect with the threat of or actual use of a TNW in a conventional conflict with NATO?

Q3a. Do you believe that the Russian's are acting offensively or defensively?

Assumption 4: Actions taken by the United States and NATO can affect the Russian use of TNW decision making process.

Q4. Is it possible for the United States and NATO to take action, either now or during a conflict, that would affect Russia's decision making process regarding the use of TNWs?

Q4a. Can the United States and its allies deter the use of TNWs?

Recommendations :

Q5. What actions can be taken now or during a conflict by NATO, and/or the United States regarding policy, procedures, military posture, communications, etc., if any, that might deter Russia's decision to use tactical nuclear weapons in a future conventional conflict?

Q5a. What are the potential difficulties and challenges associated with each of these actions?

Appendix B

Respondent Recommendations

Respondent	Recommendations
Military #1	• A concerted, consistent strategic mission and communications policy to reinforce NATO's will to use nuclear weapons. "We can't even agree that Russia is a threat."
Military #2	• All 28 countries need to commit their 2% GDP to defense spending. • There has to be a coherent public strategic message from NATO. "They can't even agree that Russia is an adversary." • Wean Europe from Russian energy.
Military #3	• "I don't think ultimately that we could do more. I think that if they are committed they are committed, what they get out of it is far more than what they would lose."
Military #4	• Must present multiple dilemmas to Russia, diplomatic, military, information, economic and they have to believe that is what will happen. • We have to present a united front with our partners. Russia's conflict must be with the U.S., NATO, and our other global partners to change the cost benefit analysis. • It is important that we present incredible deterrence in capability and will, including the ability to respond in kind.
Academic #1	• "Communicate to the Russians NATO's approach to nuclear weapons. A nuclear weapon is a nuclear weapon and you are going to bear the risk of crossing that threshold." Give the Russians doubt that the west would just cave. "We have not communicated this well." • Putting new weapons in Europe provides no additional capability and is too provocative. • Conduct more exercises with NATO leaders that are allowed to cross the nuclear threshold, and let the Russians know about it.
Academic #2	• A robust NATO nuclear posture is necessary. • Potentially, adding NATO nuclear capability similar to the ground launched cruise missile (GLCM) and the intermediate range ballistic missile (IRBM) would provide a robust tactical force. "The Russians would have no recourse."

Academic #3	• We need to provide NATO with a tactical weapon that could penetrate Russian air defenses. I have recommended in past work a nuclear armed surface to air cruise missile.
Academic #4	• Telegraph that you will not be intimidated or back down because of the use of a TNW. • Having a capability to respond that would negate their advantages gained is important. Nuclear capabilities that would hurt the Russians in the same way they hurt us. We are sub-optimally postured to respond using our own TNWs.
Intelligence #1	• “NATO needs to invest in NATO to keep it strong enough to protect itself internally and externally.” • Bring back a “few hundred” TNWs. “[..] artillery, surface to surface, surface to air to provide an intermediate yield capability.” • “Nobody believes we have the will, it’s time to prove the point again. We should discuss the use of a 1KT TNW on ISIS.”
Intelligence #2	• “Anything and everything we can do to increase our flexibility of response across the board. Intelligence, economic, and weapon capabilities in the stockpile.” • Conduct regular exercises with these capabilities and make sure Russia knows about it.

Appendix C

Quad Chart

Detering the Russian Tactical Nuclear Arsenal LCDR Jeremy D. Dawson Advisor: Paul L. Hartman, Ph.D. School of Advanced Nuclear Deterrence Studies (SANDS) Air Force Institute of Technology			
Introduction - Crimea 2014. - Support of Separatist Forces in Ukraine. - Escalate to De-escalate doctrine. - Allied commanders are concerned that NATO military response would be met with use of a Russian tactical nuclear weapon. - Most academic literature approaches this problem through the lens of arms control. - This effort approaches this problem through the lens of deterrence. Research Goals - Overall Research Question: How can the United States and NATO deter the Russian Federation from employing TNWs to de-escalate a conventional conflict? - Investigative Question 1: How does Russian military and government history influence current policy and decision making? - Investigative Question 2: How has the United States and NATO effectively deterred the USSR and Russia from using nuclear weapons in the past? The goal of the research is to formulate and test an expected utility theory model of conditions affecting the Russian decision to use TNWs in order to predict western actions that could deter their use.		Methodology - Expected utility model of dependent and independent variables, whose assumptions are informed by the literature review concerning Russian national history and evidence supporting a perceived Russian doctrine for the use of TNWs. - Model's assumptions and predictions are tested to evaluate the validity of the model. - Tested with independent variables at their limits to ensure predicted results are consistent with the assumptions. - Assumptions and predictions are tested by comparison against the results of interviews with subject matter experts. - Semi-structured interviews with subject matter experts: - Purposive sample of 10 participants. - Interview questions designed to address key issues from which assumptions were made. Conclusions & Recommendations - Two of the model's assumptions should be reconsidered. - Of the three types of actions that could provide deterrence value, only one type of action was primarily recommended in the interviews. - There may be other actions that have a deterrence value that are not considered through a traditional deterrence lens. - Subject matter expert interview responses support actions to present a cohesive, bolstered NATO alliance, which communicates a consistent strategic policy and message to offset a Russian TNW strategy.	

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14. ABSTRACT Russia has aggressively pursued its national objectives. Crimea in 2014 and continued support of separatist forces in Ukraine have Allied commanders concerned that Russia could launch a conventional attack on a NATO state and use a tactical nuclear weapon (TNW) to de-escalate any NATO military response. This research formulates and tests an expected utility theory model of conditions affecting the Russian decision to use TNWs in a conventional conflict. The model attempts to qualitatively predict the effects a specific western action has on manipulating Russia's TNW decision making process in an effort to deter their use. Actions that minimize the utility associated with TNW use, minimize Russia's perceived probability of losing the conflict, and maximize the utility of actions other than TNW use are predicted to provide deterrent value. Interview responses from Russian experts challenge the model's underlying assumptions and provide an independent list of recommended actions to deter Russia from using TNWs. Most recommendations could be categorized in only one of the three types of actions predicted to provide deterrent value. This comparison suggests there may be other actions, not considered through a traditional deterrence lens, which could be exploited to provide a deterrent effect and warrants further research.				
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