

# IGA-677 / RusNatSecPol / Lecture 18

## Nuclear Weapons and Strategy

Yuri M. Zhukov  
Visiting Associate Professor of Public Policy  
Harvard Kennedy School

November 2, 2023

## Today's objectives

1. *Define:* the core elements of nuclear strategy:
  - a) second strike capabilities
  - b) nuclear triad
  - c) counterforce vs. countervalue targeting
  - d) missile defense
  - e) non-strategic nuclear weapons
2. *Consider:* the concept of limited nuclear war, and its place in Soviet/Russian planning

## Nuclear Time Machine!

As the captain of a U.S. navy cargo ship carrying 100 nuclear warheads and delivery systems, you accidentally sail into a time warp and are transported back in time to 1933. You have four options:

1. **Sink the ship**, preventing anyone in 1933 from getting the weapons,
2. **Return the weapons** to the U.S. government,
3. Distribute the nuclear arsenal asymmetrically to **2-3 great powers**, so that each has a reliable “second-strike” capability,
4. Distribute the arsenal evenly to **as many states as possible** (second-strike capability not guaranteed for all recipients).

Which option would you choose?

# Origins of Nuclear Strategy

## I am become Death. Destroyer of worlds

1. Trinity test, 16 July 1945
  - a) first test of nuclear device
  - b) New Mexico, USA
  - c) 20 kiloton TNT equivalent
2. Soviet reaction
  - a) Truman tells Stalin about test at Potsdam Conference
  - b) Stalin already knows
  - c) first Soviet test in 1949

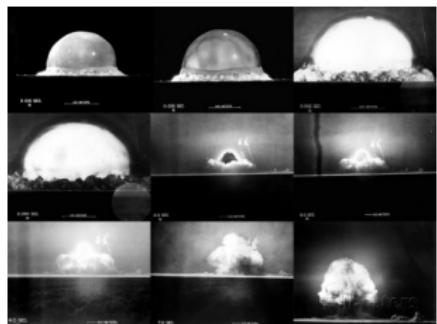


Figure 1: Trinity Test



Figure 2: Ne boltay

## What's Different About Nukes?

## A new kind of weapon?

1. Tokyo firebombing (9-10 Mar 1945)
  - a) 16km<sup>2</sup> destroyed, 100K killed
  - b) 334 bombers
  - c) 1,665 tons explosive
2. Hiroshima (6 Aug 1945)
  - a) 4mi<sup>2</sup> destroyed, 80K killed
  - b) 1 bomber
  - c) 15,000 tons TNT equivalent
3. Nagasaki (9 Aug 1945)
  - a) 13mi<sup>2</sup> destroyed, 75K killed
  - b) 1 bomber
  - c) 21,000 tons TNT equivalent



Figure 3: Tokyo or Hiroshima



Figure 4: Tokyo or Hiroshima

## Could you survive a nuclear strike?

1. Trinity Test (20kt)
  - a) first nuclear bomb tested
  - b) same yield as Nagasaki bomb
  - c) .1 mi radius: fireball
  - d) .5 mi: complete destruction to buildings, 100% fatalities
  - e) 1.4 mi: major damage to buildings, 50-90% fatalities, 3rd degree burns
  - f) 77mi: fallout cloud
  - g) estimated casualties: 38,070 killed, 71,440 injured

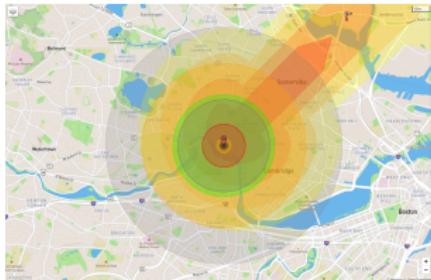


Figure 5: Blast site, 20kt

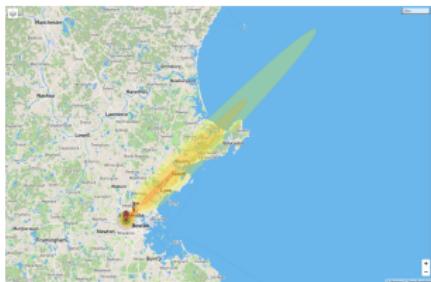


Figure 6: Fallout cloud

## Could you survive a nuclear strike?

2. Ivy Mike (10Mt)
  - a) first H-bomb tested  
(Nov 1952, USA)
  - b) 2 mi radius: fireball
  - c) 3 mi: complete destruction to buildings, 100% fatalities
  - d) 18 mi: major damage to buildings, 50-90% fatalities, 3rd degree burns
  - e) 526mi: fallout cloud
  - f) 1,127,930 killed, 135,550 injured

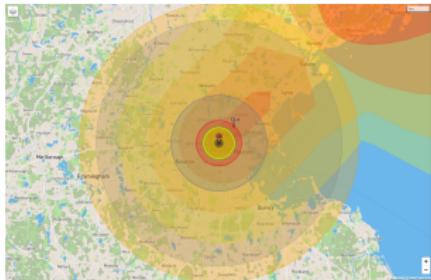


Figure 7: Blast site, 10Mt

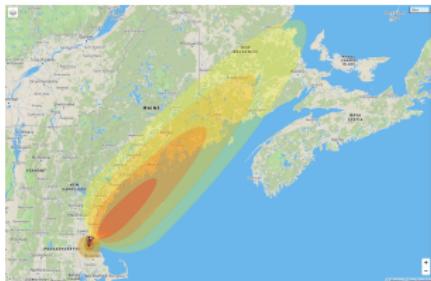


Figure 8: Fallout cloud

## Could you survive a nuclear strike?

3. Tsar Bomba (100Mt)
  - a) largest nuclear device tested  
(Oct 1961, USSR)
  - b) 3.8 mi radius: fireball
  - c) 23 mi: complete destruction to buildings, 100% fatalities
  - d) 46 mi: major damage to buildings, 50-90% fatalities, 3rd degree burns
  - e) 1000mi: fallout cloud
  - f) 2,233,100 killed, 2,337,650 injured

if in NYC: 7.6M killed, 7M injured



Figure 9: Blast site, 100Mt

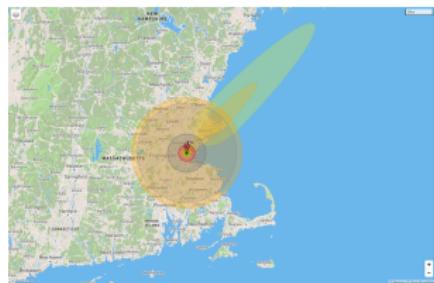


Figure 10: Fallout cloud

## The puzzle

1. Why so many nukes?
  - a) fewer than 300 U.S. cities with > 100K population
  - b) fewer than 200 Soviet cities with > 100K population
  - c) not enough targets!
  - d) U.S. plans called for launching entire arsenal simultaneously
  - e) even attacking non-aligned countries

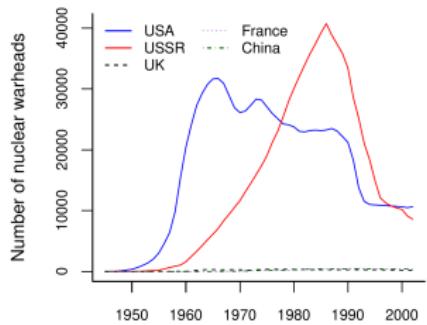


Figure 11: Nuclear balance

## Legacy of WWI and WWII

1. Avoiding strategic stalemate
  - a) technological solutions
    - tanks
    - aircraft
    - long-range bombers
    - ballistic missiles (e.g. V2)
  - b) new strategic concepts
    - strategic use of air power  
(independent of ground ops)
    - expanded target set  
(military and civilian)
    - target will & capacity to fight

Nukes: different in degree or kind?



Figure 12: How to avoid this



Figure 13: This is how

## Logic of Deterrence

## Early deterrence theory

1. Bernard Brodie (*Absolute Weapon*, 1946)
  - a) if 2 sides have nuclear weapons,  
nukes become useless in attack
  - b) costs of nuclear attack too high if  
enemy can retaliate
  - c) only purpose: *deterrence*  
(increasing costs of attack)
2. New chapter in history of war
  - a) nukes not like other weapons
  - b) only effective when *not* used

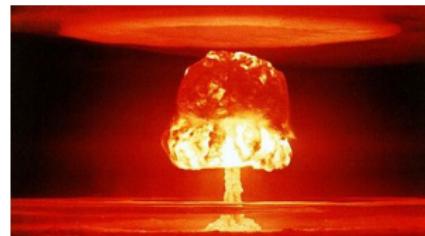
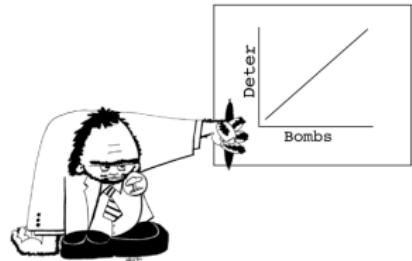


Figure 14: New era begins

## Is more better?

1. How many nukes are enough?
  - a) enough = more than we got
  - b) enough to survive enemy's 1st strike
  - c) enough to retaliate, cause unacceptable damage in 2nd strike
2. How ensure 2nd strike capability?
  - a) quantity: more nukes better
    - retaliation requires surplus of nuclear weapons
    - as enemy acquires more nukes, fewer of our nukes will survive first strike
  - b) deployment: nuclear triad
    - (1) air
    - (2) land
    - (3) sea



More Bombs Deter More. Next Slide Please.

Figure 15: A new science

## The Triad (1 of 3)

### 1. Air

(long-range bombers)

- a) oldest delivery vehicle
- b) advantages
  - flexible range
  - large payloads
  - precise delivery
  - can recall at short notice
  - reusable
- c) disadvantages
  - vulnerable on ground and air
  - difficult to sustain high alert for long periods
  - slow



Figure 16: B2 bomber

## The Triad (2 of 3)

### 2. Land

(intercontinental ballistic missiles)

- a) 2nd-oldest delivery vehicle
- b) advantages
  - short flight time
  - high defense penetration
  - high accuracy
  - easy retargetability
  - flexible crisis management
  - low vulnerability to 1st strike
- c) disadvantages
  - not recallable
  - relatively small payloads



Figure 17: Topol ICBM

## The Triad (3 of 3)

### 3. Sea

(submarine-launched ballistic missiles)

- a) newest delivery vehicle
- b) advantages
  - extremely low vulnerability to 1st strike
  - short flight time
- c) disadvantages
  - worse accuracy than ICBM
  - difficult communications
  - inflexible crisis management
  - not recallable
  - relatively small payloads



Figure 18: Trident SLBM

## Defensive systems

1. Appeal of ballistic missile defense
  - a) reduce number of enemy weapons that reach targets
  - b) minimize damage caused by enemy weapons
2. Can defense be destabilizing?
  - a) “yes”
    - investment in defense provokes enemy investment in offense
    - enemy ability to retaliate is necessary for deterrence
    - investment in defense signals 1st strike intention (insulate self from retaliation)
  - b) “no”
    - U.S., Russia both capable of penetrating other’s BMD
    - BMD has only a marginal effect on strategic stability

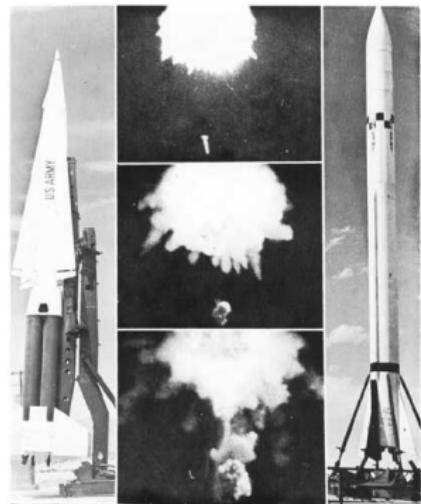


Figure 19: Nike Hercules

## Counterforce vs. countervalue

1. Target enemy's nukes?  
(counterforce targeting)
    - a) reduce number of weapons enemy can launch
    - b) reduce civilian casualties
    - c) but signals 1st strike intention  
(missiles will be gone by 2nd strike)
  2. Target enemy's population centers?  
(countervalue targeting)
    - a) high civilian casualties
    - b) signals 2nd strike intention  
(does not prevent retaliation)
    - c) considered more stabilizing



Figure 20: Where to strike

# How to Win a Nuclear War

## *Discussion*

1. Can you “win” a nuclear war? What would victory look like?
2. What level of damage is unacceptable?  
(percent of population, physical infrastructure, vegetation)

## Deterring vs. winning conventional war

### 1. Strategic nuclear weapons

- a) *purpose*: win war with nukes alone
- b) original intent: threaten nuclear retaliation for Soviet ground offensive in Europe
- c) but more complicated if Soviets also have nukes
- d) threat of mass retaliation less credible with Soviet 2nd strike

### 2. Non-strategic/tactical nuclear weapons

- a) *purpose*: use nukes for support of (conventional) combat operations
- b) but is it possible to keep nuclear exchange limited?



Figure 21: Nuclear artillery

## Soviet Approach to Deterrence

## Soviet nuclear strategy

1. Did Soviets buy U.S. deterrence theory?
  - a) yes, but not completely
  - b) concern that MAD is more fragile than U.S. thinks
    - technical advances to offensive, defense systems will undermine strategic stability
  - c) belief that nuclear effects make war costly, but still winnable
2. Evidence
  - a) emphasis on civil defense
  - b) Moscow missile defense
  - c) deep underground command centers
  - d) writings of Soviet military theorists
3. Official stance
  - a) “no first use” policy (1982)
  - b) but mismatch between declared policy and doctrine



Figure 22: Just for show?

## What Soviet political leaders thought

1. Stalin's thinking on nukes
  - a) just another weapon
  - b) strategic balance unchanged
  - c) orders military to develop battlefield tactics for nukes
2. Khrushchev's thinking
  - a) nuclear war unwinnable
  - b) but can be effective deterrent
  - c) and good cost-savings
  - d) permanent nuclear standoff
3. Brezhnev's thinking
  - a) avoid nuclear war if possible
  - b) but keep capability to win



Figure 23: Kuzka's mother

## What Soviet military leaders thought

### 1. Pre-Cuban Missile Crisis

(Sokolovskiy, Military Strategy, 1962)

- a) nukes shift objectives from front (enemy forces) to rear (economy, population)
- b) Soviets are upstart nuclear power, lack 2nd strike capability
- c) surprise, 1st strike is decisive

### 2. Post-Cuban Missile Crisis

- a) all-out exchange impossible
- b) use of nukes will stay restricted to theater level
- c) regionally limited nuclear war
  - short-range rockets
  - nuclear-capable artillery
  - employment plans for use at theater, lower levels



Figure 24: Sokolovskiy

## Nukes in Soviet military doctrine

1. Ground force doctrine
  - a) primacy of offensive
  - b) use nuclear artillery to tear gaps in enemy defenses
  - c) disperse forces to limit damage from nuclear strikes
  - d) rely on armor protection from blast, heat, radiation
2. Naval doctrine
  - a) coastal defense is primary mission
  - b) limited blue water operations
  - c) ballistic missile submarines (SSBNs) kept in “bastions” in Barents Sea, Sea of Japan
  - d) emphasis on sea denial to keep US subs, carriers away from SSBNs



Figure 25: To the front



Figure 26: To the bastion

## Russian Nuclear Strategy, Post-1991

## Nukes in Russia's national security strategy

1. № first use
  - a) abandons “no first use” in 1993
  - b) reliance on nuclear weapons to offset conventional weaknesses
  - c) policy allows for nuclear retaliation in case of conventional attack (if “existence of state” is threatened)
2. Different approaches for different wars
  - a) local war (vs small states)
    - nuclear use mainly demonstrative
  - b) regional war (vs coalition of states)
    - nuclear use mainly demonstrative
  - c) large-scale war (multiple theaters)
    - strategic use of nukes expected
3. Escalate to de-escalate?
  - a) compel war termination through early use of nuclear arms
  - b) but declaratory policy is ambiguous



Figure 27: Duck and cover

# NEXT MEETING

*Russian Military Strategy After the Soviet Collapse (Tu, Nov. 7)*

- How has Russia adapted to loss of empire, superpower status?
- What has been the focus of Russia's military reforms? How successful have these reforms been?
- What kind of force is Russia building now?