Could the Cold War have been avoided?*

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Abstract

Debates about U.S. President Truman's decision to drop nuclear bombs on Japan have in the eighty years since centered around the question of whether the lives of American soldiers saved were worth the human sacrifice on the ground. Contemporaneous opponents to the use of the bomb included Robert Oppenheimer and General Eisenhower. Eisenhower believed that peace with Russia would have been possible if the bombs had not been dropped. In this paper, we provide a formalization of this point by studying a signaling game. Precisely because not dropping the bomb was costly in terms of American lives, the U.S. could have credibly signaled its peaceful intentions to Russia, thereby avoiding the Cold War and the near-catastrophes the nuclear arms race associated with the Cold War entailed.

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Nobody wants to go through what we went through in Cuba very often. John F. Kennedy, December 1962[1]

1 Introduction

At the Potsdam conference in the second half of July 1945, news about the successful test of a nuclear bomb in New Mexico was shared among the allied leadership. General Eisenhower instantaneously opposed the use of these devastating weapons against Japan that, in his view, " was already defeated." Overcome by depression, he was the lone dissenting voice at the conference, catching the ire of the Secretary of War, who "almost angrily refut[ed] the reasons I gave for my quick conclusions".[2] In August 1945 in Moscow, Eisenhower said that "[b]efore the bomb was used, I would have said yes, I was sure we could keep peace with Russia. Now I don't know. I had hoped the bomb wouldn't figure in this war. ... People are frightened and disturbed all over. Everyone feels insecure again."[3]

Over the nearly eighty years since, debates about President Truman's decision to drop nuclear bombs on Japan have almost exclusively centered around the question of whether the sparing of American soldiers' lives was worth the cost in terms of Japanese civilians killed and maimed. Truman, who never "lost a night's sleep" over any decision he took in office, answered the question affirmatively.

In this paper, we revisit that historic episode. We set up and analyze a signaling game that formalizes Eisenhower's notion that, without dropping the bombs, peace with the Soviet Union would have been possible. In this game, the Soviet Union does not know whether the United States' type is peaceful or aggressive. Exactly because not dropping the nuclear bomb costs the lives of American soldiers can the peaceful type of the United States credibly reveal itself to the Soviet Union and, thereby, avert the Cold War and the nuclear arms race it entails, which, at various junctions, nearly led to nuclear Armageddon. According to this perspective, the overall cost of dropping the bombs was not confined to the harm to the Japanese civilians on the ground in August 1945. Rather, it includes also the increase in the likelihood of nuclear war that would easily have ended human civilization. Viewed through this lens, the onset of the Cold War was as much caused by the lack of strategic thinking as by the advances in nuclear physics.

Of course, a reading of the history of the Cold War easily lends itself to the conclusion that *mutually assured destruction*, aptly abbreviated *MAD*, worked. After all, we are here to

[1]The statement was made during a press conference; see e.g. Hastings (2022).
[2]See e.g. Smith (2013, p.449/50).
[3]See Snow (1959, p.360/1).

contemplate this very question. But survivor bias is non-negligible. There is, by now, ample evidence that humanity escaped catastrophes, repeatedly, merely by a whisker. The Cuban missile crisis of 1962 is perhaps the best known episode. In the midst of it, President Kennedy assessed the odds of entering nuclear war at somewhere between one third and even.[4] The year 1983 alone gave rise to two incidents in which, to quote former U.S. Secretary of Defense Robert Gates, "[w]e may have been at the brink of nuclear war and not even known it."[5] In September of that year, Lieutenant-Colonel Stanislav Petrov's decided not to pass on the—false— alerts of an impending U.S. nuclear attack to the high command of the Red Army. Ultimately, Petrov's decision—which later led U.N. Secretary General Kofi Annan to refer to him as "the man who saved the world" — was based on the insight that an attack would consist of many more than the five or six missiles that the faulty alarm system showed, thereby showing that by the 1980s, strategic thinking had started to catch up with the advances in physics.[6] But the understanding of the strategic situation was still incomplete, as evidenced, for example, by the almost panic-stricken reaction of the paranoid Soviet leadership that could no longer listen in to the joint NATO manoeuvre *Able Archer* later that year because NATO had changed the codes, which led Soviet leadership to prepare launching a nuclear attack on the West without the West even becoming aware of it (see e.g. Downing, 2018).[7]

Ongoing geopolitical tensions may renew interest in nuclear weapons and the existential threat that emanates from them. However, the fundamental problem is independent of political cycles and seems worthy of the attention of economists. By analyzing a simple signaling game in which restraint can help avoid an arms race, this paper provides a step toward a better understanding of the conditions under which disastrously dangerous situations can be avoided.

The remainder of this paper is organized as follows. Section 2 sets up the model. Section 3 shows that this game has a unique perfect Bayesian equilibrium (PBE) that satisfies the intuitive criterion of Cho and Kreps (1987), which conceptualizes Eisenhower's point. A discussion in Section 4 concludes the paper.

[4]Kennedy's assessment of the odds of nuclear Armageddon related to the Berlin was one in five (Hastings, 2022, p.125).

[5]See Downing (2018, p.256).

[6]See e.g. Downing (2018, p.194-201).

[7]Further evidence that the understanding of strategy was lagging behind that of physics is that Thomas Schelling's seminal book on the strategy of conflict (Schelling, 1960) was written a decade or two before the tools to study games with incomplete information were developed.

2 Setup

There are two players, called 1 and 2. Player 1 moves first. Player 1 has nuclear bombs while player 2 does not.[8] Player 1's action set is $\{d, n\}$, where d stands for dropping the bombs and n for not dropping them but credibly revealing to player 2 that it has nuclear bombs and what destructive power these entail. The action set of player 2 is $\{N, R\}$, where R stands for starting an arms race by developing and producing nuclear weapons in large numbers and N stands for *not* starting an arms race, which includes the possibility of producing nuclear weapons in small numbers. Player 2 moves after observing player 1's choice of action $a \in \{d, n\}$.

Player 1's type is $\theta \in \{0, 1\}$ with $\theta = 0$ meaning that player 1 is aggressive and $\theta = 1$ meaning that player 1 is peaceful. Player 2's prior that 1 is peaceful is denoted by π, which is assumed to satisfy $\pi \in (0, 1)$. Given actions $a \in \{d, n\}$, $B \in \{N, R\}$ and type θ, player 1's and 2's payoffs are denoted $U_1(a, B, \theta)$ and $U_2(a, B, \theta)$, respectively. The extensive form of the game is displayed below.

We assume that *Truman*'s inequality holds, that is, for any $B \in \{N, R\}$ and any $\theta \in \{0, 1\}$, we have

$$U_1(d, B, \theta) > U_1(n, B, \theta). \tag{T}$$

In words, whether or not 1 is peaceful, keeping fixed the action of player 2, player 1's unique best action is to drop the bomb because it saves scores of American lives. We assume also what may be called *Eisenhower*'s inequality:

$$U_1(n, N, 1) > U_1(d, R, 1). \tag{E}$$

This is to say that the peaceful type of player 1 is better off by choosing n rather than d if 2 chooses N upon n and R upon d. Of course, by (T), we have $U_1(d, R, 1) > U_1(n, R, 1)$. For simplicity, we assume

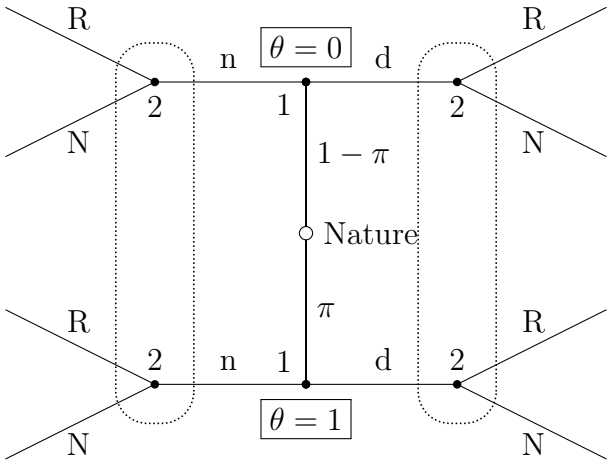
$$U_1(d, R, 0) > U_1(n, N, 0). \tag{1}$$

This is to say that d is a strictly dominant strategy in the sequential game for the aggressive type.[9]

Player 2 has a dominant strategy against either type of player 1. Specifically, for any

[8] In a richer model, 1's type could be extended to also allow for the possibility that 1 may or may not be endowed. But given that its action set is rather limited if not endowed, this extension does not seem to add much value.

[9] Alternatively, we could make the weaker assumption that $U_1(n, N, 1) - U_1(d, R, 1) > U_1(n, N, 0) - U_1(d, R, 0) \geq 0$.



$a \in \{d, n\}$, we have

$$U_2(a, R, 0) > U_2(a, N, 0) \quad \text{and} \quad U_2(a, N, 1) > U_2(a, R, 1).$$

That is, against the aggressive type, the unique optimal choice is R whereas when facing the peaceful type the unique optimal action is N. In other words, player 2 need not intrinsically care about 1's actions, and the lives of Japanese civilians, but only about 1's type. Let $\tilde{\pi} \in (0, 1)$ be such that

$$(1 - \tilde{\pi})[U_2(d, R, 0) - U_2(d, N, 0)] + \tilde{\pi}[U_2(d, R, 1) - U_2(d, N, 1)] = 0.$$

If 2's belief is $\tilde{\pi}$ and player 1 chooses d, then player 2 is indifferent between R and N while for any smaller (larger) belief player 2's unique best response to d is R (N).

3 Eisenhower's point

Our focus is on perfect Bayesian equilibria (PBE) (see e.g. Mas-Colell et al., 1995) that satisfy the intuitive criterion of Cho and Kreps (1987). Let $\mu(a)$ denote 2's updated belief that player 1 is peaceful upon observing the action a.

Proposition 1. *The separating equilibrium in which player* 1 *chooses* n *if of type* 1 *and* d *if of type* 0 *and player* 2 *chooses* N *upon observing* n *and* R *upon observing* d *is the only PBE that satisfies the intuitive criterion. In this PBE, player* 2*'s updated beliefs are* $\mu(d) = 0$ *and* $\mu(n) = 1$.

Perhaps ironically, and certainly importantly, it is precisely Truman's inequality (T)

around which most of the debates since have centered that permits the peaceful type to credibly signal its type. Put differently, this conceptualization of the argument that, say, Eisenhower made, is not denying that Truman's calculations were wrong, merely that they were shortsighted. As it is precisely Truman's inequality that would have permitted Truman to credibly signal his peaceful intentions, the argument explicitly acknowledges the cost in terms of American soldiers' lives this would have entailed.

To establish Proposition 1, notice first that because d is a strictly dominant strategy for the aggressive type of player 1, in any PBE we have $a^*(0) = d.$, where $a^*(\theta)$ denotes the equilibrium action of type θ. Consequently, if $\pi \leq \tilde{\pi}$, there is a pooling PBE in which $a^*(1) = d$ as well and $\mu(d) = \pi$. However, this equilibrium rests on the threat of player 2 to play R with sufficiently high probability upon observing the off equilibrium action n, which in turn requires 2 to assign sufficiently high probability on this deviation coming from the aggressive type, that is, μ to be sufficiently small. But the action n being equilibrium payoff dominated for the aggressive type, the intuitive criterion requires 2 to assign zero probability to this deviation stemming from the aggressive type. Hence, $\mu(n) = 1$. But this implies that the unique optimal action for 2 upon observing n is N, which in turn implies that the deviation from d to n pays off for the peaceful type. Hence, the pooling equilibrium does not satisfy the intuitive criterion. (Essentially the same reasoning also rules out the pooling PBE for $\pi = \tilde{\pi}$ in which 2 plays a non-degenerately mixed strategy upon observing d and plays R with sufficiently high probability upon observing n.)

In contrast, the separating PBE — in which $a^*(0) = d$ and $a^*(1) = n$ — trivially satisfies the intuitive criterion because there are no off-the-equilibrium-path observations, implying that $\mu(n) = 1$ and $\mu(d) = 0$ are pinned down by the equilibrium strategy profile alone.

The reason that the pooling PBE in which both types of player 1 choose d (which exists for $\pi \leq \tilde{\pi}$) and 2 plays R on and off the equilibrium path does not satisfy the intuitive criterion is that the peaceful type of player could credibly convey its type by choosing n. Because this action is equilibrium payoff dominated for the aggressive type, only the peaceful type can potentially benefit from the deviation. Hence, upon observing the off-path action n, by the logic of the intuitive criterion, 2 must assign probability one on player 1 being peaceful. But in this case, 2's unique optimal action is N. Consequently, the peaceful type of player 1 has an incentive to deviate from d by playing n.

4 Discussion

This paper provides a formalization of the possibility for peace with Russia through restraint Eisenhower believed to be possible. Truman's decision to drop the bomb to save American

soldiers' lives was based on a focus on inequality (T) and a disregard of the benefits of restraint that avoids an arms race, that is, inequality (E). This disregard is in turn consistent with Truman's conviction that Russia would never be able to develop nuclear weapons. As Bird and Sherwin (2005, p.331) write, in a meeting with Oppenheimer in the Oval Office in October 1945, "Truman asked him to guess when the Russians would develop their own atomic weapons. When Oppie replied that he did not know, Truman confidently replied that he knew the answer: 'Never.' "

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