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With the advent of nuclear weapons came the question of how their very existence changed the way we conduct and think about warfare. Nearly seventy five years after their first (and, to date, only) use at the end of World War II, the question remains far from resolved, as nuclear ‘optimists’ and ‘pessimists’ continue to debate what Andrew H. Kydd presents as a seemingly simple question: “Is the world better off with nuclear weapons or without?” (645). Kydd’s goal in this article is not to definitively adjudicate the question and come down conclusively on either side, but rather to add the conceptual element of ‘expected costs’ to the debate. In doing so, he introduces a useful meeting point for the two camps.

The article begins with an overview of the two sides, characterized by those who take British Prime Minister Winston Churchill’s view that “safety will be the sturdy child of terror” (646) on one hand and those of U.S. President John Kennedy’s view that “[e]very man, woman and child lives under a nuclear sword of Damocles” (645) on the other. The former view is that of the nuclear optimists, who are associated in academic literature with the work of Kenneth N. Waltz, and the latter is that of the nuclear pessimists, led by Scott D. Sagan.¹ Kydd points out that the two camps use different metrics to answer the question, leading to their different conclusions; while the optimists posit that nuclear weapons reduce the *frequency* of war and are therefore a boon to the international system, the pessimists claim the increased *costs* of war that could be inflicted with nuclear weapons make them so dangerous that they should not exist. In Kydd’s view, both sides have part of the story right. He suggests that what the debate has lacked thus far is consideration of how these two pieces, the frequency of war and the costs of war, interact. Therefore it is the *expected cost* of war, as defined as war’s likelihood multiplied by its cost, which we should use to approach the question (647). The expected costs of war lie at the heart of the article, which considers how those costs may be affected by five factors: the upper limit on war damage, the floor on the likelihood of war, our level of risk aversion/acceptance, strategic interaction among actors, and the cost per war. On the whole, he reports three points in favor of nuclear pessimism and two in favor of optimism.

¹ Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: An Enduring Debate*, 3rd ed. (New York: W.W. Norton, 2012).

At its core, Kydd's argument is that if the expected costs of war in a world with nuclear weapons are lower than in a world without them, the nuclear optimists are correct in their assessment that such weapons make the world safer. Conversely, if the expected costs are higher with nuclear weapons than without, the pessimists are correct that these weapons make the world more dangerous. In his formulation, there is a tradeoff between how much nuclear weapons increase the damage of war and how much they decrease its likelihood, and the answer to the overarching question depends on which of these outweighs the other. It becomes a question not of which argument is correct, but which effect prevails.

He first uses the simplified example of 'total war,' i.e. war that inflicts as much damage as possible through the use of all available weapons, to explore the main intuition of his argument. In this configuration, he considers the number of nuclear weapons in a conflict, denoted N . This means N is the quantity of nuclear weapons in the system, rather than the number of actors with nuclear weapons. He then moves on to the case of limited war, including limited nuclear war, in which the entirety of a state's arsenal is not brought to bear. This allows the level of damage, or cost, inflicted by war to vary.

There are some difficult comparisons to make here, as we do not simply flip a switch and move from a situation where two countries have only conventional weapons to one where the same two countries are nuclear-armed. There are several possibilities in terms of how an increase in the number of nuclear weapons could affect war. First, we could move from a scenario in which no countries have nuclear weapons to one in which some do possess them. This would speak to the question of what effect the mere presence of nuclear weapons would have, regardless of the quantity (with the caveat that this would presume a secure second-strike capability on each side). Second, the number of weapons existing nuclear states possess could increase. This would be a case of vertical proliferation, or stockpiling, where the number of nuclear weapons increases but the number of nuclear-armed actors remains the same. Third, the number of nuclear-armed states could increase as new members join this nuclear club. This horizontal proliferation is what we typically think of when we consider 'proliferation' and brings with it more complicated questions.

Kydd considers the number of nuclear weapons when discussing things like the potential damage of war, but not the number of *actors* with these weapons. Specifically, N is the number of nuclear weapons collectively possessed by warring states, and so allowing N to vary means allowing for more or fewer total nuclear weapons between warring parties. In this way, the work deals more directly with the stockpiling of weapons, or vertical proliferation, than with the spread of nuclear weapons technology to new states, or horizontal proliferation. This is not to say the analysis could not be read in the context of expanding membership in the nuclear club, but doing so requires adding some conceptual layers. In the post-Cold War era of reducing stockpiles by established nuclear superpowers, it seems likely that increased numbers of nuclear weapons will come from new states acquiring these weapons and working to establish secure second-strike capabilities. This means extending the consideration of how nuclear weapons affect the likelihood of war to look at how they affect the process of war initiation.

Another way to think about this is to consider that in this formulation, increasing the number of nuclear weapons increases the level of damage that is possible in war, but it does not necessarily follow that all of these weapons will be relevant in any one conflict. If we think about increasing N through horizontal proliferation, then although there are more such weapons in the system overall, this increase may not affect the total destruction that could be waged in a conflict between two countries. There may be more cases where there is a higher potential cost, or rather more nuclear dyads that could come into conflict, but this may not mean that the potential cost of any one conflict is increased above existing levels. Increasing the number of nuclear dyads may still increase the expected costs of war, but perhaps through a different mechanism. Kydd's use of the bargaining model of war to consider an endogenous probability of war, in which the actors themselves take into account the nuclear weapons on hand and choose their actions accordingly, assumes two actors and allows them to consider varying levels of potential damage. This stops somewhat short of theorizing on how the presence of other actors with nuclear weapons affects this decision-making process. This is certainly a much more complicated theory and one beyond the scope of this article, and so it opens a door for further theorizing using Kydd's new metric.

A somewhat more concrete version of this new pathway can be found later in the discussion on endogenizing the probability of war, where Kydd uses a standard game of chicken to represent a nuclear crisis, as laid out in Table 2 (668). He finds a mixed-strategy equilibrium in which each of two players can choose to ‘concede’ or ‘escalate’ and uses the result to suggest that when players can choose the probability of war, expected costs overall decline (described in Result 4). There seems to be a link missing between this game of chicken and the discussion of Schelling’s “threat that leaves something to chance.”² In the chicken representation, we reach the outcome of (nuclear) war when both sides choose to escalate, which each does with some probability calculated to render the other indifferent over escalating and conceding. Kydd himself acknowledges that this approach is a first step that leaves open the path to more satisfactory game theoretic analysis, and I believe we should take him up on this suggestion and push this line of thinking forward.

The idea of Schelling’s threat is that precisely because of the extremely costly nature of nuclear weapons, any overt threat to use them will be deemed incredible, and therefore such threats require some element of chance. In Robert Powell’s model of nuclear brinkmanship, escalating a crisis in and of itself does not lead directly to war.³ Instead, each escalation offers yet another opportunity for something to go out of control, which may or may not happen. War is essentially an accident, rather than a decision. As Kydd himself notes (675), models of nuclear crisis bargaining are a logical next step down this path, and in particular this consideration of out of control escalation as a risk both sides run rather than a possible outcome of simultaneous choices would bring the analysis better into line with conceptions of credible threats in the nuclear realm.

On the empirical side of the coin, one of the enduring difficulties in writing on nuclear weapons is the relative dearth of observations with which we have to work. As a consequence, the field must rely on careful theorizing and finding observable implications of that theory. Toward this end, Kydd’s use of casualty data marks an innovative approach to the problem, using observational data to consider the relationship between the costliness of wars and their frequency. Instead of focusing specifically on data related to nuclear weapons, Kydd takes a broader look at the losses incurred by wars and the relative frequency of the various magnitudes of war. When adjusting previous analyses to consider the expected costs of war, he finds that these expected costs are declining as a function of the overall cost. He notes that the sample does not include any nuclear wars (excepting World War II), but that it does cover the nuclear era. As his analysis covers the two hundred years of wars included in the Correlates of War data, including nearly seventy years in this nuclear age, it would be interesting to see whether splitting the sample at the introduction of nuclear weapons would yield similar trends in the pre- and post-nuclear ages, or if the introduction of the atom bomb had any noticeable effect on this relationship. As a first cut it is reasonable to look at the overall relationship between the costs and expected costs of war, but for a second look it might be instructive to look for signs that the potential for escalation into nuclear exchanges has in some way augmented (or attenuated) this effect.

On the whole, this work makes the valuable contribution of noting that in discussing the effects of nuclear weapons on war and the safety of humanity, those in the optimist and pessimist camps may be disagreeing in large part because they are talking past each other. By using different metrics, they have reached a point where both may be correct in their assessments and yet still arrive at opposing conclusions. Considering how their two foci – the potential destruction wrought by nuclear weapons and their effect on the likelihood of war – interact should prove a useful corrective in getting theorists on the same page. From this point, we should move further forward into considering how the presence of nuclear weapons may change preferences, and thereby strategies, when the likelihood of war is endogenized. In this article, Kydd has opened up a new and vital pathway into the debate.

² Thomas Schelling, *The Strategy of Conflict* (Cambridge: Harvard University Press, 1960).

³ Robert Powell, “Nuclear Deterrence Theory, Nuclear Proliferation, and National Missile Defense,” *International Security* 27:4 (2003): 86-118.

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