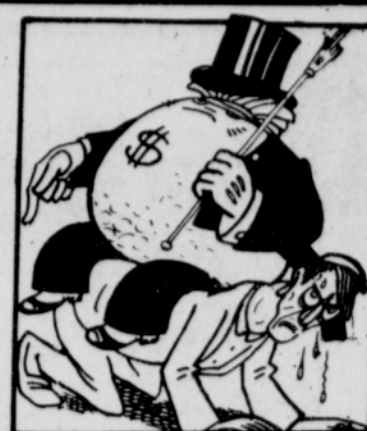




WAR & PEACE



What Chance Armageddon?

by James M. Penman

What is the chance of a nuclear war? The Government admits no uncertainty on this question, telling us in effect that the risk is negligible — always provided we maintain what is called a credible nuclear deterrent.

The no-risk myth might be necessary to statecraft but few people really believe it. On the contrary, there is much evidence for a generalized belief that the risk of nuclear war is increasing. And this concern is not confined to the radical peace movement: elder statesmen of the military establishment have expressed their doubts about present policy and even Laurence Martin, delivering in the 1981 Reith Lectures one of the depressingly few attempts at an intellectual rebuttal of the reemergent peace movement characterized our present strategic situation as "miserably dangerous" (although he could think of no better hole to go to).

An expert poll on the relative risk of nuclear war has actually been available since 1947 when the Bulletin of the Atomic Scientists first published on its front cover the clock that shows how close we are to midnight. Its authors intend the clock to be a reliable indicator of the danger of the outbreak of nuclear war. The history of the clock's movement shows no systematic decline in the risk of nuclear war. Between 1979 and 1981 the hands moved from nine to four minutes to midnight reflecting the same apprehensions that have given rise to the re-emergence of the peace movement as a force in world politics, and the advent of a counterforce nuclear arms race ushered in by current technological developments in strategic and theater nuclear weapons which would seem certain to take the clock closer still to midnight.

Few things are certain under the sun but one of them is that an event which has a finite probability that does not diminish with time will eventually occur.

This is what makes the clock so depressing, indicating as it does no downward trend in the risk of destruction and with the near prospect of developments that may take it as close, or closer to midnight than it stood at the height of the cold war. However, the clock only provides a relative measure of probability. Those wishing to go further with the consideration of risk must make their own estimates of an actual probability of nuclear war, which of course will have to be related to a time interval over which the risk is run.

The most convenient way to proceed is to decide on a typical time period over which we run a fifty percent chance of the outbreak of nuclear war. A professed optimist will prefer a long time for this period, which will effectively remove the danger from the horizon of most people. Pessimists (who probably include most serious analysts) will choose rather shorter times.

Taking account of the incidence of reported accidents and malfunctions of military nuclear hardware (not to mention software), as well as the possibility of political miscalculation, a fundamental period of one or two decades



Granby Hanley

would not seem unreasonable, especially with the advent of counterforce weapons. One can think of the fifty percent probability as the result of an accumulation of lesser risks run over time. However, it is sobering to recall Kennedy's reputed estimate that the Cuban missile crisis entailed a risk of war between one-third and even. Thus a sufficiently serious crisis every decade or so might by itself determine the fifty percent period suggested. However, the discussion below applies equally to any preferred period over which the integrated probability of nuclear war is fifty percent.

Having made the fifty percent period the basis for further discussion, the inevitability in the context of nondiminishing risk of nuclear war can be discussed in terms of spinning a coin. At each spin the chance of tails is fifty percent, likewise the chance of nuclear war occurring during a fifty percent period is by definition fifty percent. If therefore tails is associated with nuclear war a succession of fifty percent periods can be regarded as a succession of spins of a coin.

Suppose the fifty percent period is fifteen years. Then if the risk of nuclear war does not diminish a child born today with a life expectancy of seventy-five years will have to avoid nuclear war during five successive fifty percent periods. The chance of avoidance is clearly the same as the chance of heads being the outcome at each five spins of the coin.

Five spins of a coin have thirty-two possible outcomes, i.e., thirty-two different combinations of heads and tails. They are easy enough to write down and of course each has the same chance of being an actual outcome. But only one

outcome is five heads. The chance of the child avoiding nuclear war during the five fifty percent periods is therefore one in thirty-two or about three percent. Since nuclear war or no nuclear war are mutually exclusive events their probability over any time period must add to unity, and so the chance of the child encountering nuclear war at some time during his or her potential life span is $(1 - 1/32)$ or about ninety-seven percent.

A similar calculation can be performed for any number of fifty percent periods and for convenience the results are tabulated below:

Number of fifty percent periods	Probability of avoiding nuclear war
1	50 percent
2	25 percent
3	13 percent
4	6 percent
5	3 percent
6	2 percent
7	1 percent

The table applies of course to any preferred fifty percent period and is therefore of use to optimists and pessimists alike. The fifty percent periods do not even have to be constant and so it can be used to explore the consequences of a risk that increases or diminishes with time. The probability of nuclear war becomes arbitrarily close to one hundred percent as the number of fifty percent periods increases beyond even but it is not possible to show this on a table with only two significant figures.

This analysis denies the bland establishment assurance that deterrence, having worked for thirty years, will continue to do so. As has often been pointed out, thirty years without nuclear war does not constitute proof of anything at all. You can continue to believe in deterrence up to the instant it fails (and then you will have proof that you were wrong).

It is not unreasonable to argue that nuclear weapons have some deterrent effect, but to pretend that deterrence amounts to a cast-iron guarantee that nuclear war will not occur is a dangerous delusion because it prevents proper consideration of what really is vital: steady reduction of the probability per unit time of nuclear war. Unfortunately, the dynamics of the present arms race give little ground for optimism.

James M. Penman is a research fellow at the department of Physics at Exeter University. His article has been reprinted from the Manchester Guardian.



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