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Shelters: Pro and Kahn

The argument against a bomb-shelter program, based not on its ineffectiveness but on the possibility, against all odds, that it may eventually prove too effective, has been stated with considerable precision by Freeman Dyson, of the Institute for Advanced Study, in the March issue of the *Bulletin of the Atomic Scientists*. The article assumes that this country and the Soviet Union could each dig its people and its resources into the ground so effectively that a new kind of race would result between bombs and shelters: that is, deep shelters would mean bigger bombs which, in turn, would mean deeper shelters and so on. Once this assumption is made, the argument is based on estimates of three quantities of fission energy.

The first quantity is called a "Beach"—the term, which originated at an arms-control conference, refers to Nevil Shute's well-known novel. It is the quantity of fission energy which, if used in atmospheric explosions, would give through global fallout a lethal dose of radiation to half the earth's population. The second quantity Dyson calls a "Kahn." It is the quantity of fission energy which if used on ground targets in either country could kill by local fallout just about everyone in that country. And the third quantity Dyson calls a "Stockpile." It is the quantity of fission energy that will be available during the next decade for release during a war.

On the basis of his calculations, Dyson finds that a Kahn is much smaller than a Beach. This means that a major war without shelters might destroy the United States and the Soviet Union, but permit the rest of the human race to survive, for only a Kahn would be exploded. The owners of the bombs would all be dead before they could explode more. Dyson also finds that a Stockpile is slightly bigger than a Beach. This means that a major war with shelters that are effective in Dyson's sense might result in the death of mankind, for each side would be able to bombard the other until a Stockpile, the set of all bombs, had been exploded.

Such is the argument in outline. The argument is very precise, but its very precision suggests the introduction of still another quantity, or rather a new unit of measurement, the "Dyson." This is a measure of the speculation you must introduce into an argument in order to go from the premise to the conclusion. Some arguments require more Dysons than others. We set arbitrarily at 100 Dysons the amount of speculation in an argument so hypothetical that, like the man in the O. Henry story who meets the same fate no matter which path he takes at a crossroads, you can arrive at the same consequence, starting in the opposite direction and taking steps no more hypothetical than those first used.

Dyson's argument, as he is careful to make clear, is built on certain assumptions. After all, different levels of effectiveness in shelters differ astronomically in cost, and the Administration probably will continue to be governed by its statement that a race between bombs and shelters is unsound because it costs more to dig a deeper hole than it does to build a bigger bomb. The point of the article seems to be that the extreme unlikelihood of such a race must be matched against the absolutely terrible consequence that might result if the race took place. Yet, it seems to us, although we have not yet done our calculations, that the argument is so high on the Dyson scale that a choice here is by no means excluded.

It is possible to accept the argument as an argument against deep shelters, but not find it compelling as an argument against fallout shelters. And so the question remains open whether fallout shelters, although ineffective as Dyson uses the term, might not still be worthwhile.—J.T.