Ronald Reagan Presidential Library Digital Library Collections

This is a PDF of a folder from our textual collections.

Collection: Green, Max: Files, 1985-1988 Folder Title: Strategic Defense Initiative II (6 of 6) Box: 25

To see more digitized collections visit: <u>https://www.reaganlibrary.gov/archives/digitized-textual-material</u>

To see all Ronald Reagan Presidential Library Inventories, visit: <u>https://www.reaganlibrary.gov/archives/white-house-inventories</u>

Contact a reference archivist at: reagan.library@nara.gov

Citation Guidelines: <u>https://reaganlibrary.gov/archives/research-</u> <u>support/citation-guide</u>

National Archives Catalogue: <u>https://catalog.archives.gov/</u>

Last Updated: 03/11/2025

U.S. Government Messenger Envelope

Standard Form No. 65-5

December 1971 General Services Administration FPMR (41 CFR) 101-11.6

Difference and the second

NAME ION TITLE OF ADDRESSEE, AGENCY, ORDANIZATIONAL UNIT, ADDRESS, AND ROOM		NAME (OR TITLE) OF ADDRESSEE, AGENCY, ORGANIZATIONAL UNIT, ADDRESS, AND ROOM	
Janliou Commutes	STOP 196		STO
New Republic	STOP		STO
	STOP		STO
5	STOP		STO
	STOP		STO
	\$1.0P		STO
\mathcal{O}	STOP	O · · · · ·	510
	STOP		STO
	STOP		STC
O.	STOP	Q	sto

USE THIS SIDE FIRST

Use STOP only when messenger service between Government buildings in Washington, D.C., is required or wherever a STOP is used. Your mail room has STOP information.

Due 8

The War Against "Star Wars"

Robert Jastrow

PRESIDENT REAGAN offered a new strategic vision to the American people in his "Star Wars" speech of March 23, 1983. The policy he had inherited from his predecessors relied on the threat of incinerating millions of Soviet civilians as the main deterrent to a Soviet nuclear attack on our country. The President was troubled by the moral dimensions of this policy. He said: "The human spirit must be capable of rising above dealing with other nations and human beings by threatening their existence." And he called on our scientists to find a way of defending the United States against a Soviet nuclear attack by intercepting the Soviet missiles before they reached our soil.

When I first heard the President's speech, I thought he had a great idea. I wrote an article commenting favorably on the proposal¹ and then, a little later, I traveled to Washington to hear a talk by Dr. George Keyworth, the President's Science Adviser, on the strategic and technical implications of the President's plan.

Since Dr. Keyworth was rumored to have made a major contribution to the thinking behind the "Star Wars" speech, I felt that I would be getting an insider's view of the technical prospects for success in this difficult undertaking. That was particularly interesting to me, because several of my fellow physicists had expressed the gravest reservations about the technical feasibility of the proposal. In fact, Dr. Hans Bethe, a distinguished Nobel laureate in physics, had said bluntly, "I don't think it can be done."

Dr. Keyworth started by describing the circumstances that had led to the President's speech. Then he got into the technical areas I had come to hear about. "For more than five months," he told us, "some fifty of our nation's better technical minds [have] devoted their efforts almost exclusively to one problem—the defense against ballistic missiles." This group of specialists, which included some of the most qualified defense scientists in the country, had concluded that the President's goal was realistic—that it "probably could be done."

"The basis for their optimism," Dr. Keyworth went on, "is our tremendously broad technical progress over the past decade." He pointed specifically to the advances in computers and "new laser techniques." He also mentioned the promising new developments that might enable us to protect the vitally important satellites carrying all this laser weaponry and computing equipment, and prevent the Soviets from knocking these critical satellites out as a preliminary to a nuclear attack on the United States. "These and other recent technical advances," Dr. Keyworth concluded, "offer the possibility of a workable strategic [missile] defense system."

That was pretty clear language. Defense experts had given the President's proposal a green light on its technical merits. I went back to New York with a feeling that the President's vision of the future—a future in which nuclear weapons would be "impotent and obsolete"—was going to become a reality.

The following month a panel of university scientists came out with a report that flatly contradicted Dr. Keyworth's assessment. According to the panel, an effective defense of the United States against Soviet missiles was "unattainable." The report, prepared under the sponsorship of the Union of Concerned Scientists (UCS),² leveled numerous criticisms at the "Star Wars" proposal. It pointed out, inter alia, that thousands of satellites would be needed to provide a defensive screen; that one of the "Star Wars" devices under consideration would require placing in orbit a satellite weighing 40,000 tons; that the power needed for the lasers and other devices proposed would equal as much as 60 percent of the total power output of the United States; and that, in any case, the Soviets would be able to foil our defenses with

ROBERT JASTROW was the founder of the Goddard Institute for Space Studies, which conducts research for NASA in New York City. He received his Ph.D. in theoretical physics from Columbia University and worked in nuclear physics before joining NASA. Dr. Jastrow served as first chairman of NASA's Lunar Exploration Committee and received the Flemming Award for outstanding service in the federal government. He is currently professor of earth sciences at Dartmouth. The most recent of his books is Astronomy: Fundamentals and Frontiers.

¹ COMMENTARY, January 1984.

² A Space-Based Missile Defense, March 1984; The Fallacy of Star Wars, based on studies conducted by the Union of Concerned Scientists, edited by John Tirman, Vintage, 293 pp., \$4.95.

a large bag of relatively inexpensive tricks, such as spinning the missile to prevent the laser from burning a hole in it, or putting a shine on it to reflect the laser light.

The signers of the report included physicists of world renown and great distinction. The impact of their criticisms seemed absolutely devastating.

Around the same time, another study of the feasibility of the "Star Wars" defense came out with more or less the same conclusion. According to that report, which had been prepared for the Office of Technology Assessment (OTA)³ of the Congress, the chance of protecting the American people from a Soviet missile attack is "so remote that it should not serve as the basis for public expectations or national policy."

These scientific studies, documented with charts and tables, apparently sounded the death knell of missile defense. Scientists had judged the President's proposal, and found it wanting. According to *Nature*, the most prestigious science journal in the world:

The scientific community knows that [the President's proposal] will not work. The President's advisers, including his science adviser, Dr. George Keyworth, know it too, but are afraid to say so.

Dr. Keyworth is employed to keep the President informed on these technical matters, but sadly, there is no evidence that he is willing to give Mr. Reagan the bad news.

A few weeks later, I received unclassified summaries of the blue-ribbon panels appointed by the Defense Department to look into the feasibility of a United States defense against Soviet missiles.⁴ These were the documents on which Dr. Keyworth had relied in part for his optimistic appraisal. The reports by the government-appointed consultants were as different from the reports by the university scientists as day is from night. One group of distinguished experts said no fundamental obstacles stood in the way of success; the other group, equally distinguished, said it would not work. Who was right? According to the UCS report, "any inquisitive citizen" could understand the technical issues. I decided to look into the matter. This is what I found.

M ISSILES usually consist of two or three separate rockets or "stages," also called boosters. On top of the uppermost stage sits the "bus" carrying the warheads. One by one, the stages ignite, burn out, and fall away. After the last stage has burned out and departed, the bus continues upward and onward through space. At this point it begins to release its separate warheads. Each warhead is pushed off the bus in a different direction with a different velocity, so as to reach a different target. The missiles with this capability are said to be MIRVed (MIRV stands for multiple independently targetable reentry vehicle). Most of the discussion of the "Star Wars" defense assumes a many-layered defense with three or four distinct layers. The idea behind having several layers is that the total defense can be made nearly perfect in this way, even if the individual layers are less than perfect. For example, if each layer has, say, an 80-percent effectiveness—which means that one in five missiles or warheads will get through—a combination of three such layers will have an overall effectiveness better than 99 percent, which means that no more than one warhead in 100 will reach its target.⁵

The first layer, called the boost-phase defense, goes into effect as the Soviet missile rises above the atmosphere at the beginning of its trajectory. In the second layer, or mid-course defense, the booster has burned out and fallen away, and we concentrate on trying to destroy or disable the "bus" carrying the nuclear warheads, or the individual warheads themselves, as they arc up and over through space on their way to the United States. In the third layer, or terminal defense, we try to intercept each warhead in the final stages of its flight. $\frac{14}{3}$

The boost-phase defense offers the greatest payoff to the defender because at this stage the missile has not yet sent any of its warheads on their separate paths. Since the largest Soviet missiles carry ten warheads each, if our defense can destroy one of these missiles at the beginning of its flight, it will eliminate ten warheads at a time. The defense catches the Soviet missiles when they have all their eggs in one basket, so to speak.

But the boost-phase defense is also the most difficult technically, and has drawn the most fire from critics. How can we destroy a Soviet missile thousands of miles away, within seconds or minutes after it has left its silo?

At the present time, one of the most promising technologies for doing that is the laser, which shoots a bolt of light at the missile as it rises. Missiles move fast, but light moves faster. A laser beam travels a thousand miles in less than a hundredth of a second. Focused in a bright spot on the missile's skin, the laser beam either burns a hole through the thin metal of the skin, which is only about a tenth of an inch thick, or it softens the metal sufficiently so that it ruptures and the missile disintegrates.

Another very promising technology for the boost-phase defense is the Neutral Particle Beam,

⁸ Directed Energy Missile Defense in Space: A Background Paper, April 1984.

⁴ Ballistic Missile Defense and U.S. National Security: A Summary Report, Prepared for the Future Security Strategy Study, October 1983; The Strategic Defense Initiative: Statement by Dr. James C. Fletcher Before the House Committee on Armed Services, March 1984.

⁵ The explanation is that 20 percent get through the first layer; 20 percent of that fraction, or a net of 4 percent, get through the second layer; finally, 20 percent of that 4 percent, or 0.8 percent, get through the third layer. The overall effectiveness of the three layers is 99.2 percent.

which shoots a stream of fast-moving hydrogen atoms at the missile. The atoms travel at a speed of about 60,000 miles a second, which is less than the speed of light but still fast enough to catch up to the missile in a fraction of a second. The beam of fast-moving atoms is very penetrating, and goes through the metal skin of the missile and into the electronic brain that guides it on its course. There the atoms create spurious pulses of electricity that can cause the brain to hallucinate, driving the missile off its course so that it begins to tumble and destroys itself. If the beam is intense enough, it can flip the bits inside the brain's memory so that it remembers the wrong things; or it can cause the brain to lose its memory altogether. Any one of these effects will be deadly to the Soviet missile's execution of its task.

The Neutral Particle Beam can also play havoc with the circuits in the electronic brain that guide the bus sitting on top of the missile. The mischief created here may prevent the bus from releasing its warheads; or it may cause the bus to send the warheads in the wrong directions, so that they miss their targets; or it may damage the electronic circuits in the warheads themselves, after they have been pushed off the bus, so that when they reach their targets they fail to explode.⁶ The Neutral Particle Beam can be lethal to the attacker in the boost phase, the mid-course phase, and the terminal phase. All in all, it is a most useful device.

Now for an important point: to be effective, the laser or the Neutral Particle Beam must have unobstructed views of all the Soviet missile fields. One of the best ways of achieving that is to put the device that produces these beams on a satellite and send it into orbit.

So this, then, is the essence of the plan for a boost-phase defense against Soviet missiles: a fleet of satellites, containing equipment that generates laser beams or Neutral Particle Beams, circles the earth, with enough satellites in the fleet so that several satellites are over the Soviet missile fields at all times—a sufficient number to shoot down, in the worst case, all 1,400 Soviet missiles if they are launched against us simultaneously.

THE plan looks good on paper. Yet according to the UCS report, it has absolutely no practical value. This study shows that because of the realities of satellite orbits, the satellites needed to protect the United States against Soviet attack would "number in the thousands." The report's detailed calculations put the precise number at 2,400 satellites.

Now, everyone acknowledges that these satellites are going to be extremely expensive. Each one will cost a billion dollars or more—as much as an aircraft carrier. Satellites are the big-ticket items in the plan for a space-based defense. If thousands are needed, the cost of implementing the plan will be many trillions of dollars. A defense with a price tag like that is indeed a "turkey," as a spokesman for the UCS called it.

If the numbers put out by the UCS were right, there would be no point in looking into the plan further. But after the UCS report hit the papers, I began to hear rumors from professionals in the field that the numbers were not right. Since the whole "Star Wars" plan rested on this one point, I thought I would just check out the calculations myself. So I got hold of a polar-projection map of the northern hemisphere and a piece of celluloid. I marked the positions of the North Pole and the Soviet missile fields on the celluloid, stuck a pin through the North Pole, and rotated the celluloid around the Pole to imitate the rotation of the earth carrying the missile fields with it. Then I played with the map, the moving celluloid, and different kinds of satellite orbits for a day or two, to get a feel for the problem.

It was soon clear that about 50 evenly spaced satellite orbits, with four satellites in each orbit, would guarantee adequate coverage of the missile fields. In other words, 200 satellites would do the job, and "thousands" were certainly not needed. I could also see that it might be possible to get down to fewer than 100 satellites, but I could not prove that with my celluloid "computer."

I talked again with my friends in the defense community and they told me that my answers were in the right ballpark. The experts had been looking at this problem for more than ten years, and the accurate results were well known. As I had suspected, a hundred or so satellites were adequate. According to careful computer studies done at the Livermore laboratory, 90 satellites could suffice, and if the satellites were put into low-altitude orbits, we might get by with as few as 45 satellites.⁷

So the bottom line is that 90 satellites—and perhaps somewhat fewer—are needed to counter a Soviet attack. That cuts the cost down from many trillions of dollars to a level that could be absorbed into the amount already earmarked by the government for spending on our strategic forces during the next ten or fifteen years. It removes the aura of costliness and impracticality which had been cast over the President's proposal by the Union of Concerned Scientists' report.

The scientists who did these calculations for the UCS had exaggerated the number of satellites by a factor of about twenty-five. How did they make a mistake like that? A modicum of thought should have indicated that "thousands" of satel-

ೆ ಸೆಲ್ಲಿ ಸ್ವೇಖ್ ಸಿಲ್ಲಿ ಸ್ವೇಖ್ ಸಿಲ್ಲಿ ಸಿಲ ಸೆಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲಿ ಸಿಲ್ಲ ಸಿಲ್ಲ ಸಿಲ್ಲ ಸಿಲ್ಲ ಸಿಲ್ಲ ಸಿಲ್ಲ ಸಿಲ್ಲ

⁶ Nuclear explosives, unlike ordinary explosives, do not detonate if you drop them or hit them with a hammer. A series of precisely timed steps, controlled by electronic circuits in the warhead, has to occur before the explosion can happen. If the circuits are damaged, and the steps do not occur, or their timing is off, the warhead will not explode.

⁷ These numbers depend on the power of the laser beams and the sizes of the mirror used to focus them. All the studies described here make the same assumptions—a 20- or 25-million-watt laser and a 30-foot mirror.

lites could not be the right answer. Apparently the members of the panel did begin to think more carefully about the matter later on—but only after they had issued their report—because in testimony before a congressional committee a UCS spokesman lowered his organization's estimate from 2,400 satellites to 800 satellites.⁸ In their most recent publication on the matter, the members of the panel lowered their estimate again, to 300 satellites.⁹ That was getting closer. Another factor of three down and they would be home.

But the Union of Concerned Scientists never said to the press or the Congress: "We have found important mistakes in our calculations, and when these mistakes are corrected the impact is to cut the cost of the missile defense drastically. In fact, correcting these errors of ours has the effect of making the President's idea much more practical than we thought it was when we issued our report." Months after the publication of the report, *Science 84*, published by the American Association for the Advancement of Science, was still referring to the need for "2,400 orbiting laser stations."

THE work by the Union of Concerned Scientists on the question of the satellite fleet is the poorest that has appeared in print, to my knowledge. The report prepared for the Office of Technology Assessment, which does a better job on this particular question, says that 160 satellites are needed for our defense. That is only about double the accurate result that came out of the computer studies at Livermore.

But the report to the OTA has a different failing. Because of an error in reasoning—an extremely inefficient placement of the satellites in their orbits—it concludes that if the Soviets were to build more missiles in an effort to overwhelm our defense, the United States would have to increase the number of its satellites in orbit in direct proportion to the increase in the number of Soviet missiles.¹⁰

This seems like a technical detail, but it has a cosmic impact. It means that if the Soviets build twice as many missiles, we have to build twice as many satellites. If they build four times as many missiles, we have to build four times as many satellites. Since our satellites are going to be expensive, that can be a costly trade-off. In fact, it could enable the Soviets to overwhelm our defense simply by building more missiles. As the New Republic said: "They could just roll out more SS-18's" (the SS-18 is the biggest and most powerful missile in the Soviet arsenal).

But some fine work by the theoretical physicists at Los Alamos has shown that the report to the OTA is seriously in error. The Los Alamos calculations, which have been confirmed by computations at Livermore, show that the number of satellites needed to counter a Soviet attack does *not* go up in direct proportion to the number of Soviet missiles. It turns out instead that the number of satellites goes up approximately in proportion to the square root of the number of missiles.

That also seems like a fine point-almost a quibble-but consider its significance. The square root means that if the Soviets build four times as many missiles, we only have to build twice as many satellites to match them. Suppose the United States built a defensive screen of 100 satellites that could shoot down-as a very conservative estimate -80 percent, or four-fifths, of the Soviet missiles. And suppose the Soviets decided they wanted to build enough missiles so that the number of missiles getting through our defensive screen would be the same as the number that would have reached the United States if we had no defense. That is what "overwhelming the defense" means. To do that, the Soviets would have to build more than 5,000 additional missiles and silos.¹¹ The Los Alamos "square-root" rule tells us that if the Soviets went to that trouble and expense, the United States could counter those thousands of new missiles with only 100 additional satellites.

With numbers like that, the cost trade-offs are bound to favor the defense over the offense. If the Soviets tried to overwhelm our defense, they would be bankrupted before we were.

The report to the OTA has other defects. One is a peculiar passage in which the author exaggerates by a factor of roughly 50 the requirements for a terminal defense, i.e., a defense that tries to destroy the Soviet warheads toward the end of their passage, when they are already over the United States. Current planning assumes that as the warheads descend, they will be intercepted by smart mini-missiles with computer brains and radar or infrared "eyes," which maneuver into the path of the warhead and destroy it on impact. A smart missile of this kind destroyed an oncoming enemy warhead at an altitude of 100 miles on

⁰ The Fallacy of Star Wars, Chapter 5. The explanation offered by the UCS for this correction is that its experts belatedly realized some satellites are closer to their missile quarry than others, and can polish the missile off in a shorter time. That means each satellite can kill more missiles, and, therefore, fewer satellites are needed to do the whole job.

¹⁰ The report assumed the American satellites would move through space in tight bunches, instead of being spread out around their orbits. By bunching them together this way, it kept the satellites from being used effectively, and overestimated the number of satellites we would have to put up to counter an increased Soviet deployment of missiles. The theorists at Livermore and Los Alamos assumed the satellites were spread out evenly in their orbits when they did their calculations. I did also, when I took a look at the problem. Anyone trying to figure out how to build the best defense for the United States at the lowest cost to the taxpayer would do the same.

11 The Soviets have 1,400 missile silos and missiles. To get five times this number and make up for the losses suffered in penetrating our defense, they would have to build another 5,600 missiles and silos.

⁸ The scientist explained that his panel had forgotten that Soviet missile fields are spread out across a 5,000-mile arc in the USSR, and had put all the missiles in one spot. This made it harder for the satellite lasers to reach all the missiles, and meant more satellites were needed.

June 10, 1984, in a successful test of the technology by the Army.

The question is: how many smart missiles are required? Professionals sizing up the problem have concluded that at most 5,000 intercepting missiles will be needed. The answer according to the report to the OTA: 280,000 smart missiles. Though these smart missiles will not cost as much as aircraft carriers, they are not exactly throwaways. Thus the effect of this calculation, as with the studies by the Union of Concerned Scientists on the size of our fleet of laser-equipped satellites, is to create the impression that a defense against Soviet missiles will be so costly as to be impractical.

How did the report to the Office of Technology Assessment arrive at 280,000 missiles? First, the report assumed that about 1,000 sites in the United States--missile silos, command posts, and so on-need to be defended. That is reasonable.

Second, the report assumed the Soviets might choose to concentrate their whole attack on any one of these 1,000 sites. This means that every single site would have to have enough intercepting missiles to counter the Soviet attack, if the entire attack were aimed at this one location.

That is not reasonable. Why would the Soviets launch thousands of warheads—their entire nuclear arsenal—against one American missile silo? This is known in the trade as a GIGO calculation (garbage in, garbage out). The theorist makes an absurd assumption, does some impeccable mathematics, and arrives at an absurd answer.

When theoretical physicists joust over ideas, a factor of two hardly counts; a factor of three matters a bit; factors of ten begin to be important; factors of 100 can win or lose an argument; and factors of 1,000 begin to be embarrassing. In a study of the pradicality of the Neutral Particle Beam—that most promising destroyer of Soviet missiles and warheads—the panel of the Union of Concerned Scientists made a mistake by a cool factor of 1,600. As in the case of the panel's estimate of the size of our satellite fleet, the direction of its error was such as to make this promising "Star Wars" technology seem hopelessly impractical.

According to the scientists who wrote the UCS report, the device—called a linear accelerator needed to generate the Neutral Particle Beam would weigh 40,000 tons. To be effective, this enormous weight would have to be placed in a satellite. Of course, the idea of loading 40,000 tons onto an orbiting satellite is absurd. By comparison, the NASA space station will weigh about 40 tons. This finding by the Union of Concerned Scientists makes it clear that the plan to use the Neutral Particle Beam is ridiculous.

But the UCS's study panel made a mistake. The correct result for the weight of the linear accelerator is 25 tons, and not 40,000 tons. Now, 25 tons is quite a practical weight to put into an orbiting

satellite. It is, in fact, about the same as the payload carried in a single flight of the NASA shuttle.¹²

A UCS spokesman admitted his organization's rather large error in congressional testimony some months ago.¹³ But when he made the admission he did not say: "We have made a mistake by a factor of more than a thousand, and the correct weight of the accelerator for this Neutral Particle Beam is not 40,000 tons, but closer to 25 tons." He said: "We proposed to increase the area of the beam and accelerator, noting that would make the accelerator unacceptably massive for orbital deployment. Our colleagues have pointed out that the area could be increased after the beam leaves the small accelerator."

That was all he said about the mistake in his testimony.

Now, this cryptic remark does not convey to a Senator attending the hearing that the scientist has just confessed to a mistake which changes a 40,000-ton satellite into a 25-ton satellite. There is nothing in his remark to indicate that the UCS's distinguished panel of scientists had reached a false conclusion on one of the best "Star Wars" defenses because the panel had made a whopping error in its calculations.

The report prepared for the OTA also makes a mistake on the Neutral Particle Beam, but this mistake is only by a factor of fifteen. According to the report, the Soviet Union can protect its missiles and warheads from the Neutral Particle Beam with a lead shield about one-tenth of an inch thick. The shield, the report states, would not weigh too much and therefore could be "an attractive countermeasure" for the Soviets.

But scientists at Los Alamos have pointed out that a layer of lead one-tenth of an inch thick will not stop the fast-moving atoms of the Neutral Particle Beam; they will go right through it. In fact, a table printed in the OTA report itself shows that the lead shield must be 15 times thicker —at least 11/2 inches thick—to stop these fastmoving particles.

A layer of lead as thick as that, wrapped around the electronics in the missile and its warheads, would weigh many tons—considerably more than the total weight of all the warheads on the missile. If the Soviets were unwise enough to follow the advice offered them in the report to the Office of Technology Assessment, their missile would be so loaded down with lead that it would be unable to get off the ground.

That would be a great plus for American security, and a nice response from our defense scientists to the President's call for ways of making the Soviet missiles "impotent and obsolete."

ST 14 NAVIN

¹² The shuttle's payload is 33 tons in the orbits currently in use. It would be about 20 tons in the orbits needed for the defensive screen against Soviet missiles.

¹³ Hearings Before the Senate Committee on Armed Services, April 24, 1984.

O THER suggestions for the Soviets can be found in the report by the Union of Concerned Scientists. They include shining up the Soviet missiles, spinning them, attaching "band-aids" and "window shades," as the UCS report calls them, and launching "balloons" as fake warheads. I am not an expert in this dark area of "countermeasures," but I have talked with the experts enough to understand why the professionals in the defense community regard many of these proposals as bordering on inanity.

Putting a shine on the missile sounds like a good idea, because it reflects a part of the laser beam and weakens the beam's effect. However, it would be a poor idea for the Soviets in practice. One reason is that the Soviets could not count on keeping their missiles shiny; during the launch the missile gets dirty, partly because of its own exhaust gases, and its luster is quickly dulled. But the main reason is that no shine, is perfect; some laser energy is bound to get through, and will heat the surface. The heating tends to dull the shine, so more heat gets through, and dulls the shine some more, and still more heat gets through ... and very soon the shine is gone.

Spinning the missile spreads the energy of the laser beam over its whole circumference, and is a better idea than putting a shine on it. However, it only gains the Soviets a factor of pi, or roughly three, at most. And it does not gain them anything at all if the laser energy is transmitted in sharp pulses that catch the missile in one point of its spin, so to speak. The experts say there is no problem in building a laser that sends out its energy in sharp pulses.

Now to the other proposals by the scientists on the UCS panel. The "band-aid" is a metal skirt which slides up and down the outside of the missile, automatically picking out the spot that is receiving the full heat of the laser beam, and protecting the metal skin underneath. The "window shade" is a flexible, metallized sheet which is rolled up and fastened to the outside of the missile when it is launched, and then unrolled at altitudes above fifty miles. It is supposed to protect the missile against the X-ray laser, which is another exotic but promising defense technology.

The trouble with these suggestions is that they do not fit the realities of missile construction very well. A missile is a very fragile object, the ratio of its weight empty to its weight loaded being 10 or 15 to 1—nearly the same as an eggshell. Any attempt to fasten band-aids and window shades on the outside of the missile, even if their contours are smoothed to minimize drag, would put stresses on the flimsy structure that would require a major renovation of the rocket and a new series of test flights. If the Soviets tried to carry out all the suggestions made by the UCS's scientists—putting on band-aids and window shades, spinning their missiles and shining them up—their missile program would be tied up in knots. That would be another fine response from our scientists to the President's call for a way of rendering the Soviet weapons useless.

The "balloon" is still another trick to foil our defenses. The thought here is that after the boost phase is over, and the booster rocket has fallen away, the bus that normally pushes out the Soviet warheads will instead kick out a large number of "balloons"—light, metallized hollow spheres. Some balloons will have warheads inside them, and some will not. Since the empty balloons weigh very little, the Soviets can put out a great many of these. Not knowing which among this great multitude of balloons contain warheads, we will waste our mid-course defenses on killing every balloon in sight, empty or not.

A friend who works on these matters all the time explained to me what was wrong with this idea. He said that a modest amount of thought reveals that it is possible to tell very easily which balloons have warheads, and which do not. All the defense has to do is tap one, in effect, by directing a sharp pulse of laser light at it, and then observing how it recoils. An empty balloon will recoil more rapidly than a loaded one. Once the loaded balloons—the ones with the warheads—are picked out, we can go after them with our Neutral Particle Beams, or other warhead-killers.

This list of proposed countermeasures is not complete, but it is representative. The ideas put forward by the UCS—the band-aid, the window shade, the shining and spinning rockets, and the balloon—remind one of nothing so much as a group of bright students from the Bronx High School of Science getting together to play a game in which they pretend to be Soviet scientists figuring out how to defeat American missile defenses. The ideas they come up with are pretty good for a group of high-school students, but not good enough to stand up to more than a thirty-minute scrutiny by the defense professionals who earn their living in thinking about these matters.

Of course, there is no harm in these proposals. The harm comes in offering shoddy work—superficial analyses, marred by errors of fact, reasoning, and simple carelessness—as a sound scientific study bearing on a decision of vital importance to the American people. The work seems sound enough on casual examination, with its numbers, graphs, and theoretical arguments. Certainly the New York *Times* was impressed when it described the UCS report as "exhaustive and highly technical." It is only when you penetrate more deeply, and begin to talk with knowledgeable people who have thought long and hard about these problems, that you realize something is wrong here

H ow did published work by competent scientists come to have so many major errors? A theorist reviewing these reports on the feasibility of the President's proposal cannot help noticing that all the errors and rough spots/ in the calculations seem to push the results in one direction—toward a bigger and more costly defense, and a negative verdict on the soundness of a "Star Wars" defense against Soviet missiles. If the calculations had been done without bias, conscious or otherwise, you would expect some errors to push the result one way, and other errors to push it the other way.

But all the errors and omissions go in one direction only—toward making the President's plan seem impractical, costly, and ineffective.

This is not to say that the errors were made in a deliberate, conscious effort to deceive. I do not think that for a moment. What happens is quite different, and every theorist will recognize the phenomenon. When you finish a calculation, you check your result against your intuitive feeling as to what the situation should be. You ask yourself: "Does this result make sense, or not?" If the result does not make sense, you know either that you have made a great discovery which will propel you to Stockholm, or you have made a mistake. Usually you assume the latter, and you proceed to check your calculations very carefully. But if the result seems to be in good agreement with everything you expected about the behavior of the system you are investigating, you say to yourself, "Well, that looks all right," and you go on to the next step.

Of course, a careful theorist always checks his calculations anyway, whether the answer seems sensible or not. But he is apt to check them just a mite less carefully if the results agree with what he expected than if they do not.

I think this is what must have happened to the theorists who wrote the report for the Union of Concerned Scientists. Clearly they had a strong bias against the President's proposal from the beginning, because they believed that a defense against Soviet missiles would, in their own words, "have a profoundly destabilizing effect on the nuclear balance, increasing the risk of nuclear war," and that such a defense against missiles "could well produce higher numbers of fatalities" than no defense at all.

So, when the calculations by the panel yielded the result that thousands of laser-equipped satellites would be needed to counter a Soviet attackwhich meant that for this reason alone the whole plan was hopelessly impractical--the members of the panel were not surprised. Their technical studies had simply confirmed what they already knew to be true for other reasons, namely, that the President's idea was terrible.

Now, I would like to wager that if the theorists studying the matter for the UCS had found that only 10 satellites could protect the United States from a massive Soviet attack—if they had gotten a result that indicated the President's proposal, was simple, effective, and inexpensive to carry out then they would have scrutinized their calculations very, very carefully.

M HAT is one to make of all this?

When I was a graduate student in theoretical physics, we revered some of the men who have lent their names to the report by the Union of Concerned Scientists. They are among the giants of 20th-century physics—the golden era in our profession. Yet these scientists have given their endorsement to badly flawed calculations that create a misleading impression in the minds of Congress and the public on the technical feasibility of a proposal aimed at protecting the United States from destruction.

Lowell Wood, a theorist at Livermore and one of the most brilliant of the younger generation of defense scientists, made a comment recently to the New York *Times* about what he also saw as a contradiction between the research talents of Dr. Hans Bethe—the most prominent physicist associated with the Union of Concerned Scientists and the negative views of that great theorist on the technical merits of the proposal to defend the United States against Soviet missiles. Dr. Wood said:

Is Hans Bethe a good physicist? Yes, he's one of the best alive. Is he a rocket engineer? No. Is he a military-systems engineer? No. Is he a general? No. Everybody around here respects Hans Bethe enormously as a physicist. But weapons are my profession: He dabbles as a militarysystems analyst.

It seems to me that Dr. Wood has part of the answer. I think the remainder of the answer is that scientists belong to the human race. As with the rest of us, in matters on which they have strong feelings, their rational judgments can be clouded by their ideological preconceptions.

A Statement of Aims

In sponsoring COMMENTARY, the American Jewish Committee aims to meet the need for a journal of significant thought and opinion on Jewish affairs and contemporary issues. The opinions and views expressed by Com-MENTARY's contributors and editors are their own, and do not necessarily express the Committee's viewpoint or position. The sponsorship of COMMEN-TARY by the Committee is in line with its general program to enlighten and clarify public opinion on problems of Jewish concern, to fight bigotry and protect human rights, and to promote Jewish cultural interest and creative achievement in America.

AMERICAN JEWISH COMMITTEE

Howard I. Friedman, President

The Commentary Publication Committee

Donald M. Blinken, Chairman

Morris B. Abram Norman E. Alexander Theodore Ellenoff Edward E. Elson **Stephen Friedman** Lawrence Goldmuntz Mark Goodson Robert H. Haines Lewis J. Laventhol **Bess Myerson** Robert L. Pelz Ned Pines Frederick P. Rose Michael Saperstein Nanet#e Scofield Henry Sherman John Slawson Alan M. Stroock* Laurence A. Tisch

*Honorary Member

Letters from Readers

"Star Wars" & the Scientists

Robert Jastrow & Critics

To THE EDITOR OF COMMENTARY: I want to commend Robert Jastrow for his article, "The War Against 'Star Wars'" [December 1984]. His arguments are painfully correct in their direction, and, as a result, Mr. Jastrow has been attacked in a very sharp manner.

His detractors, some of whom are publicly well-known, have raised and will continue to raise the argument that Mr. Jastrow, lacking clearance, is inadequately informed. It is important to realize that by abstaining from getting clearance, Mr. Jastrow has retained his freedom of speech. This privilege is one of his main weapons, one which is not available to those ofus who have spent years working on the problem of defensive weapons before supporting a major program for their development.

It is worth noting that Hans A. Bethe, one of the outspoken opponents of the Strategic Defense Initiative (SDI), conceded during a classified discussion in February 1983 that the relevant arguments in physics supported the Livermore Laboratory strategic-defense position. Shortly thereafter, however, Mr. Bethe changed his mind-not because the scientific issues had changed, but on the basis of his ideas about proper politics and military strategy. Mr. Bethe has waited almost two years before scheduling another (forthcoming) visit to review the Livermore strategic-defense work, although he has felt free to attack it on the basis of his outdated knowledge in the interim.

The position taken, by Hans A. Bethe, Victor F. Weisskopf, and many other "concerned" scientists is strongly reminiscent of the hydrogen-bomb controversy which raged more than three decades ago. The argument then was that the project was not scientifically feasible, and if it were successful, the result would be too terrible to bear. Furthermore, the argument went on, if the United States did not attempt the project, probably the Soviets would also forbear.

As it turned out-according to

Andrei Sakharov's biographical statement in Sakharov Speaks (Knopf, 1974)—before the hydrogen-bomb debate began in the United States, the Soviet hydrogenbomb project was already under way. Only months separated the successful tests of a fusion weapon by the United States and the Soviet Union. Yet the United States had the advantage that it had been physically untouched by World War II, while the Soviets had suffered terrible damage.

The consequences of a Soviet success on this project coupled with American non-participation would have speeded up the kind of behavior today being demonstrated by the Soviets on the basis of their military superiority. However, the consequences of the Soviets' successful development of protective defenses and our failure to do so are incomparably greater. There is much evidence-evidence that in comparison with that available in the earlier controversy should be called overwhelming-that the Soviets are hard and successfully at work on strategic defense. President Reagan's Strategic Defense Initiative would be more appropriately named if it were called the Strategic Defense Response. Yet Mr. Weisskopf, present for President Reagan's original speech requesting the cooperation of the scientific community in this effort, appeared to disapprove before the President even had time to develop. his point.

R

Returning to Mr. Jastrow's article and his purported lack of scientific information, I would end with a question. Which better represents the method of scientific inquiry: limited, careful arguments that include all of the pertinent perspectives, or dogged support of narrow convictions based on superficial assessments?

I appreciate Mr. Jastrow's courage in attempting to bring reason and common sense to this vital discussion.

EDWARD TELLER The Hoover Institution Stanford, California

4

67 COMMENTARY MARCH 1985

TO THE EDITOR OF COMMENTARY: I read Robert Jastrow's article with great interest. It has always been a matter of surprise to me that some members of the scientific community have been critical of the technical soundness of our strategic-defense efforts, when it is clear from my knowledge of the research program that the technical promise is great. Indeed, rapid progress has already been realized in some of the most critical areas. In addition, prospects for countering future missile defenses or overwhelming such defenses seem less and less likely as we come to understand better the potential of the new defensive technologies.

JAMES A. ABRAHAMSON Lieutenant General, USAF Director, Strategic Defense

Initiative Organization Department of Defense Washington, D.C.

TO THE EDITOR OF COMMENTARY:

'The War Against 'Star Wars' by Robert Jastrow was as excellent an article on this major publicpolicy question as it was overdue. Those of us constrained by the restrictions of government security clearance often despair of responding effectively in public forums to critics of the Strategic Defense Initiative. Government classification rules perversely permit all manner of nonsensical "straw men" to be put forward and then kicked apart by those holding clearance and exploiting the prestige of being "in the know," while strictly forbidding countervailing arguments containing compelling technical material to be aired publicly. Mr. Jastrow's article demonstrated that a response to SDI critics on a more fundamental level is not only feasible but can be telling, for these critics unblushingly impeach themselves at levels of logical consistency recognizable by a perceptive undergraduate.

A notable example of this gambit of kicking apart a straw man of one's own manufacture, and one with which I happen to be particularly familiar, involves X-ray laser technology, which has been singled out by the Union of Concerned Scientists (UCS) as "the leading candidate" among pop-up defensive systems, and thus has been extensively assailed by them in public. The straw man in this case consists of the assertion that X-ray laser platforms having carefully chosen limitations, when

popped up from carefully selected sea- or land-basing points in time of defensive need, cannot engage even present-generation ICBM's, let alone ICBM's of some future era employing hypothetical "fastburn" boosters, due to limb-of-theearth constraints on X-ray-laserbeam propagation from the platform to the booster targets.

In fact, it has been explained on many occasions, to a variety of government forums all over the country, why and how reasonably-sited, technologically-accessible, poppedup X-ray lasers can plausibly engage even fast-burn boosters, and at cost-exchange ratios which strongly favor the defense. Some of these occasions have involved faceto-face discussions with leading strategic-defense critics, none of whom has contested the technical points being made. Nonetheless, the public debate continues to be saturated with pessimistic assertions by, these critics concerning this point which, to put it charitably, are dis ingenuous.

The stunningly effective supporting barrages laid down by sympathetic sectors of the news media amplify the efforts of SDI critics completely out of proportion to their minuscule numbers, ludi-crously inflating them into "virtually all knowledgeable scientists"; even the Wizard of Oz was less flagrant in his mummery, more modest in his pretensions. This hyperinflation is the more remarkable as anti-strategic-defense arguments have fared uniformly poorly in technical debate in the classified surroundings required by government regulations. In spite of having failed to make their anti-SDI case to their well-informed colleagues in technical discourse, these critics continue to advocate their rejected positions to the public in impassioned terms, immune from the criticism of their technical peers.

Mr. Jastrow has performed a real service to the thoughtful public by documenting how sloppily this tiny group of scientists compound their nostrums, and with what generous dollops of bias. Focusing on this basic point, his article made devastatingly clear that these individuals, capable scientists though they may be, do not merit the political confidence of their fellow citizens.

LOWELL WOOD Lawrence Livermore National Laboratory

Livermore, California

TO THE EDITOR OF COMMENTARY:

f

1

1

i

C

s i

¥

C

r

Ł

F (

F t

ć Ł

t

S

r

r

C

а

Ł

8

C

а

Robert Jastrow has done it again. He seems to be the greatest single asset we have in making a strategic-defense system an eventual reality. . . . Ever since I took part in a debate on strategic issues sponsored by the Union of Concerned Scientists, I have realized the irrational fear of ABM systems among many intellectuals. People who would acquiesce in an actual U.S. surrender to the USSR to obviate the risk of nuclear war, but would not be willing to spend tens of billions of dollars to banish its possibility forever, show where their objectives really lie. . .

GEORGE FISHMAN University of Illinois Champaign, Illinois

TO THE EDITOR OF COMMENTARY: Mr. Reagan's proposed Strategic Defense Initiative raises issues of the utmost gravity. We are astonished that COMMENTARY would spresent a brief for SDI in the guise of an uninformed attack against the report prepared by us under the auspices of the Union of Concerned Scientists, The Fallacy of Star Wars (Vintage, 1984). Robert Jastrow's "The War Against 'Star Wars'" takes issue with our criticisms of SDI by pretending that the entire enterprise stands or falls on a precise calculation of how many laser satellites would be required by the defense. There are some honest disagreements among knowledgeable experts that are central to the SDI debate which we wish to bring to your readers' attention, but this is not one of them.

IN HIS "Star Wars" speech, Mr. Reagan proposed to defend the *population* of the United States against Soviet nuclear-armed missiles, and thereby to replace deterrence as the bedrock of our national security. As recently as December 23, 1984, the President and his Secretary of Defense restated this objective in order to proscribe heresies within their administration: SDI would not be bargained away, they asserted, or be devoted to the lesser goal of merely defending American missile silos.

A ballistic-missile defense (BMD) of cities is inconceivable unless the great majority of Soviet ICBM's could be destroyed while their fragile booster engines are still burning brightly. Missiles that survive this "boost phase" would pose a much more formidable threat to any defense because they would release a large number of elusive and far less vulnerable warheads immersed in a vast swarm of decoys and other "penetration aids." The subsequent defensive layers could not, it is widely acknowledged, cope with such a prodigious "threat cloud." The fact that the earth is round requires an attack on Soviet boosters to be launched from space.

We examined all credible proposals for boost-phase defense. While infrared and laser homing projectiles are promising interceptors for mid-course and terminal defense, they are implausible boost-phase weapons because of their low speed.) Orbiting defenses suffer from a fatal flaw: they would rely on delicate precision instruments which would be exquisitely vulnerable to attack. We share this conclusion with Edward Teller, an ardent SDI advocate, who has said that "lasers in space won't fill the bill-they must be deployed in great numbers at terrible cost and could be destroyed in advance of an attack." As we shall see, Mr. Jastrow's own argument leads to the conclusion that countering new Soviet ICBM deployments with orbiting lasers would be ludicrously expensive.

These pitfalls could be averted if the defensive weapons were "popped-up" into space on warning of attack. But this would pose insuperable time constraints: the defensive weapon must rise to a height of at least 650 miles before the enemy booster completes firing, feasible with current slow-burning Soviet missiles, but hardly practical against a Soviet equivalent of the much faster MX. Furthermore, the Soviets could readily develop boosters that finish burning too soon for any pop-up scheme to work.1 Claims that the Soviets would find it difficult to develop such "fastburn" boosters should be laid to rest by noting that our SPRINT missile, which operated as a BMD interceptor in 1974, already demonstrated this technology.

In sum, no technical scheme exists for a comprehensive strategic defense free of fundamental conceptual flaws. As former Secretary of Defense James Schlesinger has said, "In our lifetime and that of our children, cities will be protected by the forbearance of those on the other side, or through effective deterrence." Nor is there any basis for Mr. Jastrow's assertion that the reports of the "blue-ribbon panels,"

appointed at the President's request, are "as different" from our report "as day is from night." The technical [Fletcher] panel's sum-mary emphasizes that "survivability of the system components is a critical issue whose resolution requires a combination of technologies and tactics that remain to be worked out." Major General John C. Toomay, the panel's Deputy Chairman, has said that the panel tended to be "pessimistic whether these technical objectives could be realized but felt that, on balance, the research and engineering was well worth doing," and that the differ-ence between the panel's qualified assessment and its recommendation is "like the difference between the horse you bet on and the sentimental favorite."2

Not only is there no technical

scheme, there is not even the vaguest outline for a political scenario that might propel us toward a defense-dominated world. That political factors are essential was recognized in the Fletcher report, which stated that the effectiveness of the defense would depend not only on technology, but also on the

¹ The Martin-Marietta Corporation studied fast-burn boosters for the Fletcher panel, and concluded that they would impose a payload-loss of at most 20 percent, a consensus confirmed in writing by the Deputy Chairman of the panel. Claims to the contrary stem from an abandoned Pentagon attempt to discredit Ashton Carter's Congressional Office of Technology Assessment report on SDI. This misinformation is still being spread (e.g., *Wall Street Journal* editorial, December 10, 1984).

² National Journal, July 7, 1984, p. 1316.



degree to which Soviet offensive forces could be constrained. Moreover, the Hoffman panel, which considered the strategic implications of SDI for the President. noted that the past behavior of the Soviets "suggests that they would be more likely to respond with a continuing build-up of their longrange offensive forces.'

Hence our disagreement with knowledgeable and candid supporters of SDI is one of risk assessment. They are gambling on the President's "sentimental favorite," in the hope that unforeseen technical advances might transform the prospects for strategic defense, and are not as troubled as we are by the risks that the pursuit of SDI would entail. Our studies persuaded us that all the envisaged BMD schemes are ruinously expensive, and could not protect the United States from utter destruction because they could be readily overwhelmed or outfoxed at much less cost. We shall also explain why the very attempt to proceed toward a comprehensive missile defense will provoke a massive escalation of the competition in offensive nuclear weapons, and increase the likelihood of nuclear war.

WHY should a thrust toward strategic defense have any risks beyond galloping budget deficits? What is the harm in trying? This has been answered by the Hoffman panel: defenses that could withstand a small attack, but would collapse under a large onslaught, are highly provocative. In the early stages of BMD deployment we would have just such a defense, as well as vulnerable land-based missiles. This would have two grave hazards. First, the Soviets would fear that if the U.S. were to attack preemptively our defense could cope with their surviving missiles; they would also know that our defense could, at most, provide poor protection of our vulnerable missiles against a Soviet first strike. This would greatly enhance their incentive to attack preemptively in a serious crisis.

Second, Soviet leaders have asserted that they would avert this predicament by enlarging their offensive capabilities. This build-up would emphasize submarine-based cruise missiles, which underfly space defenses and provide little warning; ICBM's equipped with countermeasures against U.S. defense; and anti-satellite weapons to

attack our BMD space platforms. Painfully aware of the fragility of our embryonic defense, we would find such Soviet moves highly provocative, and respond in kind. A budding BMD system is therefore a catalyst for an acceleration of the offensive arms race, not for reductions in offensive arms, as many SDI advocates claim.

SDI is often portrayed as a benign research program. But a program launched from the Oval Office, described as a vital element in the nation's future strategic posture, and funded at already so lavish a level, is not merely a research project. It will not be so treated by the Soviets, no matter what we may say or believe. Modern military systems take many years to develop, so the Soviets will feel compelled to initiate programs to counter the still unborn U.S. defense. Hence SDI is likely to enmesh us in a more dangerous offensive confrontation even if it is eventually aban, doned before any defenses are de a cost of one laser battle station ployed. Those who find this farfetched have not learned the saga" of MIRV-the multiple-warhead ICBM. We invented MIRV's as a BMD countermeasure. When the Soviets installed a rudimentary ABM system, we forged ahead with MIRV development, and then to deployment after the ABM treaty prevented the Soviets from installing a defense that made MIRV's necessary. The Soviets then followed suit. As a result, the incentive for a preemptive strike has grown because a single warhead can destroy many MIRVed enemy warheads before they are launched. Now there is a consensus that MIRVing was a dangerous mistake; former MIRV advocates such as Henry Kissinger look back fondly to the days of one warhead per missile.

We are also disturbed that the mere prospect of lavish funds is already giving SDI a life of its own. With jobs, university research, profits, and promotions at stake, such an enterprise can quickly turn into a juggernaut that cannot be stopped even when it is clear that its goals are unattainable.

MANY officials now realize that SDI holds no promise for population defense, and so ersatz rationales are coming into vogue. The most popular is that a partially effective BMD would bolster deterrence because defenses would compound the problem of planning an attack.³

True enough, if the offense stays frozen while the defense is installed. But each superpower's highest priority is a nuclear arsenal that can, with full confidence, penetrate to its opponent's vital targets. Only technologies far more robust and inexpensive than anything now dreamed of could alter that priority.4

1

1

1

٤ 1

¢

S

1

t

1

3

i

ł ł

t

S

C

e

F

Another fashionable rationale is that even a modest BMD could protect us from accidental launches and from terrorists. But protection from accidental launch by the superpowers does not require space weapons. Devices installed on ballistic missiles to destroy them on receipt of secure, encrypted radio messages would suffice. And attack by terrorists would hardly come via ICBM. Delivery of nuclear explosives by plane, ship, or diplomatic pouch would be far easier. A nuclear weapon hidden in a bale of marijuana would apparently find ready entry into the U.S. The uselessly orbiting would pay for legions of secret agents who could actually grapple with this threat.

There are those who favor SDI because they believe it best exploits the great U.S. advantage in high technology. Their position seems to be supported by the apprehension that Soviet leaders express so vigorously about SDI. Is that not enough reason to pursue the program?

We have observed and participated in the nuclear competition since its inception. Thanks to U.S. technological superiority, virtually every new technical initative has come from the United States: the fission bomb, the hydrogen bomb, the intercontinental bomber, submarine-launched missiles, high-accuracy ICBM's, MIRV's, and highaccuracy long-range cruise missiles. The only significant Soviet initia tive was the ICBM itself, but our ICBM's quickly surpassed those of

³ The diversion of SDI to silo defense is the only rationale that makes technical (though not necessarily strategic) sense. Hard targets, especially expendable silos, could be defended. However, we agree with the administration's Scowcroft commission that such defenses are not needed at this time. In any case, space-based weapons are not suited to this purpose.

4 Indeed, the growth in the offense is bound to exceed any attrition that the defense is likely to attain. The U.S. nuclear threat against Moscow multiplied as soon as we learned that the city was being surrounded by ABM batteries.

the Soviets in both quality and numbers. The net result has been a steady erosion of American security. There is no evidence that space weapons will be an exception. It is true that we have a significant edge in all the technologies that strategic defense would depend on. But in the nuclear era a sophisticated defense can be foiled by relatively rudimentary means. Which is easier: the construction or the disruption of an exquisitely shaped mirror 30-feet across which must swiftly turn from one target to another with very high accuracy? Moreover, it is cheap to build devastating weapons that could readily penetrate our exorbitantly ex-pensive "shield." Unless there is a breakthrough in defense as revolutionary as nuclear weapons themselves, the strategic offense will reign supreme.

But if so, why are the Soviets so opposed to SDI? Because they are exceedingly cautious, and have been playing catch-up with American nuclear technology since 1945. Soviet military planners are obliged to take American pronouncements, however implausible, much more seriously than American strategists, and will respond with an offensive build-up and by expanding their already significant BMD research effort.⁵ They seem to recognize that this will require vast expenditures they can ill afford, and that the net result will be a decrease in their national security. The same would be true for us.

We should vigorously exploit our technological advantage to acquire military intelligence about the Soviet Union, to strengthen our strategic command-and-control systems, and to reduce our reliance on nuclear weapons. The search for new BMD techniques must go on, but the distinction between research and deployment should not be blurred. But in assessing military technologies we must recognize that any attempt by either superpower to increase the threat to the other's survival will soon redound to its own disadvantage.

WE NOW return to Mr. Jastrow's caricature of our case against SDI. He would have readers believe that the prospects for SDI can be decided on the basis of just two numbers that we had calculated incorrectly in our earliest report, Space-Based Ballistic Missile Defense (Union of Concerned Scientists, March 1984); and that our "many

major errors . . . go in one direction only—toward making the President's plan seem impractical, costly, and ineffective."

What did we set out to do? Since there is no plausible concept for strategic defense, we sought to fill this void. To that end the technical portions of our report assessed separately the interception mechanisms; illustrated the magnitude of the defender's task by estimating the size of the defensive system required in the absence of all countermeasures; and examined a large variety of countermeasures. A realistic net assessment would integrate the last two items, and incorporate the likely enhancements of Soviet offensive capabilities. Had we carried that through in a hard-nosed fashion it would have led to the conclusion that the cost and size of the defensive system are unbounded. Why? Because the largely unknown defensive technologies, whose ultimate effectiveness is still a matter of speculation, would be pitted against prodigiously effective

weapons and many known countermeasures invented during twentyfive years of BMD research. We firmly believe that countermeasures will carry the day into the foreseeable future.

Mr. Jastrow's two make-or-break numbers are the size of the laser constellation that would have to be in orbit and the weight of a neutral-particle-beam weapon. Regarding the satellite number, he claims that "the whole 'Star Wars' plan rested on this one point." But it is at least as important whether orbiting lasers could themselves

⁵ The Soviets' BMD program seems to be quite similar in character to what ours was before the "Star Wars" speech. We know of no evidence that they are moving toward a comprehensive strategic defense of Soviet society. As the Fletcher panel emphasizes, the most daunting BMD problems are computer-intensive, an area in which the Soviets are exceptionally weak. Indeed, they lag in almost all technologies critical to space-based BMD, so they would be ill-advised to start a contest in this arena.



withstand attack. As for neutralparticle-beam weapons, he asserts that they are "that most promising destroyer of Soviet missiles and warheads," but neglects to mention that once fast-burn boosters are developed they would be completely shielded from such beams by the atmosphere—the reason we relegated our discussion of the characteristics of such devices to a technical appendix.⁶

Mr. Jastrow's allegation that our work contains "many major errors" is both false and undocumented. We erred twice in our first report: in arriving at the number of 2,400 satellites and in estimating the weight of the particle-beam weapon; but these errors had hardly any bearing on our overall assessment of SDI, were corrected in public at our first opportunity five weeks after the initial report was issued, and do not appear in any of our subsequent publications.

The calculation of the number of satellites is not simple. For example, the "fine work by the theoretical physicists at Los Alamos," to which Mr. Jastrow alludes,⁷ makes just the mistake that we had made, even though it appeared four months after our report was publicly corrected. The claim that "the experts had been looking at this problem for more than ten years, and the accurate results were well known" is not correct.

How many satellites must then dance on top of a laser beam? Mr. Jastrow implies that the calculation that produces the smallest number of satellites is the most accurate, a clear absurdity. A small satellite fleet is much more vunerable than a large one. Indeed, there is no "right" number of satellites, for it depends on a host of unknown performance parameters, the nature of the attack, etc. Given the present level of ignorance, all such calculations are based on ad-hoc assumptions of varying degrees of implausibility. They are meant to be illustrative, and bear no relation to actual designs, since they all ignore a host of factors that would greatly increase the number of satellites. Taking the rather small differences in assumed parameters into account, our corrected estimate of 300 laser stations is consistent with those by Carter, Drell et. al,8 a fact Mr. Jastrow neglected to mention.

Unfortunately, Mr. Jastrow has failed to notice that he is impaled on his own sword, blunt instrument though it may be. "Everyone

acknowledges that these satellites are going to be extremely expensive; each one will cost a billon dollars or more," he says. Quite so. What would be the cost trade-off if the Soviets were to deploy a cluster of 3,000 small three-warhead fast-burn ICBM's at a cost of about \$50 billion?⁹ Let us accept Mr. Jastrow's favorite satellite-number calculation,¹⁰ and his cost per satellite. We then find that it would cost the U.S. \$1 trillion to deploy the additional space defenses required by this new \$50 billion threat!¹¹

Mr. Jastrow has painted a picture of the Senate hearing at which our errors were rectified that does not conform with the hearing record.¹² He asserts that our statement on the particle-beam weapon ended with the sentence: "Our colleagues have pointed out that the area could be increased after the beam leaves the small accelerator." Mr. Jastrow then charges us with deceiving the Senators because we did not say that this correction brought with it a great saving in weight. But that was not all that happened. The written testimony of our witness, Richard L. Garwin, distributed before the hearing to the press and the committee, and reproduced in the hearing record, actually reads: ". . . leaves the small accelerator, saving a great deal of weight" (emphasis added). Before our witness took the floor, Donald Kerr, the Director of Los Alamos, had said:

I think the UCS report in many ways helps to illustrate the great difficulty involved in first devising and then developing the technology that might be used for strategic defense. They have properly focused on the concerns with command and control, countermeasures, and vulnerability. In some cases I think their analysis has either been overly simplified for the purpose of the public document that it is, or at least in one case, they are totally in error.

Kerr then described our error concerning satellite numbers, and explained how we had overestimated the weight of the particle-beam weapon. He then went on to say:

So I think on the one hand UCS has done a service to the country in raising these issues. I would hope that a longer-term, more sophisticated analysis, albeit one still in the open unclassified literature, might dispel some of the inaccuracies that are also in it. That analysis was already under way, and is continuing. It is reflected in our October 1984 Scientific American article and in our book, The Fallacy of Star Wars. When our witness testified, there was little point in going over these errors yet again.¹³

w

y۰

c d

d

tl

v

te

tl

g (1 e

tl

S]

S

0

Ł

F

r

F

ŀ

C

t

ŧ

\$

The allegation that we systematically tilted the case against "the President's plan" is untrue. In fact, we granted it every benefit of the doubt allowed by the laws of physics: beams that would be aimed instantly from one booster to the next without ever missing; laser

⁶Mr. Jastrow claims that a neutralparticle-beam weapon would only weigh 25 tons. That agrees with our estimate of the weight of the accelerator alone, but ignores the far heavier beam expansion and targeting magnets (see *The Fallacy of Star Wars*, p. 97).

⁷ G.H. Canavan, Simple Estimates of Satellite Constellation Sizing, Los Alamos National Laboratory, August 6, 1984. A detailed solution of the satellite-coverage problem has now been found (Richard L. Garwin, to be published) which shows that the "square-root law" of the Los Alamos paper, to which Mr. Jastrow ascribes such importance, is incorrect under all but highly artificial circumstances.

⁸S.D. Drell, P.J. Farley, and D. Holloway, The Reagan Strategic Defense Initiative: A Technical, Political, and Arms Control Assessment, Stanford University, July 1984.

⁹This comes from the projected cost of the Midgetman missile, though not in its mobile form, and includes the cost of the extra warheads, the silo, and ten years of maintenance.

10 C.T. Cunningham, Report No. DDV-84-0007, Lawrence Livermore National Laboratory, August 30, 1984.

11 This is arrived at from Cunningham's number of 120 lasers for 1,400 co-located boosters with an engagement time of 150 seconds. Our 3,000 fast-burn boosters give an engagement time of 40 seconds, which then gives 120 (3000/1400) (150/40) = 964 laser satellites. (All agree that the number of lasers is proportional to the number of co-located boosters, not to their squareroot.) Cunningham assumed a booster hardness that is 50 percent of the Fletcher panel's baseline figure. Were the latter used, the laser constellation would cost \$1.9 trillion. This illustrates the sensitivity to assumed parameters.

¹² Department of Defense Authorization for Appropriations for FY85, The Strategic Defense Initiative, Senate Committee on Armed Services, 98th Congress, Second Session, April 24, 1984.

¹³ He did, however, read the phrase at issue, "saving a great deal of weight." Unfortunately the stenotypist missed precisely one line of written text, and the last word, as restored in the record, was misprinted as "height." weapons having a lethality far beyond that for which not even conceptual designs exist; no redundancy to compensate for attrition due to enemy action; no growth in the size and capability of the Soviet ICBM force. No military system in history has ever attained the level of perfection that we granted to "the President's plan." (One of us, Richard L. Garwin, even made an original suggestion that greatly improves the prosspects for the ground-based laser scheme.)

Mr. Jastrow opens his attack on our treatment of countermeasures by admitting that "I am not an expert in this dark area," and then reveals that (always anonymous) professionals of his acquaintance "regard many of [the UCS] proposals as bordering on inanity. His rendition of our treatment of countermeasures is another caricature. It is he who emphasizes "tricks" like spinning the missile or "putting a shine on it." We focused on techniques that would prevent accurate targeting on the booster, on measures that would greatly increase the power levels needed for destruction, and on the inherent vulnerability of spacecraft. He would also have readers believe that decoy balloons are a kind of schoolboy prank, but in reality they have been studied for over two decades14 by "defense professionals," and are taken very seriously.

This picture of us as babes in the cruel woods of countermeasurés · does not wash. One of us (Richard L. Garwin) recently participated in the Discrimination Countermeasures Panel of the Army's BMD Program Office. We (in particular Richard L. Garwin and Kurt Gottfried) have had repeated contacts with senior members of the Flet-cher panel. They have given our countermeasure suggestions serious consideration in those few cases where they had not already been studied by the panel. Since some of these men are devoted advocates of SDI, and not shy, we wonder why these charges of "inanity" have not been voiced in public, but have been whispered only into Mr. Jastrow's ear.

Mr. Jastrow seems perplexed as to how some of "the giants of 20thcentury physics" could have "lent their names" to an effort that is "pretty good for high-school students, but not good enough to stand up to more than a thirty-

minute scrutiny by the defense professionals." He attempts to resolve his paradox by quoting Lowell Wood of Livermore: "Is Hans Bethe a good physicist? Yes, he's one of the best alive. Is he a rocket engineer? No. Is he a military-systems engineer? No. Is he a general? No."

As this quotation is intended to discredit all our work on these matters, we reluctantly respond. Three of us (Hans A. Bethe, Richard L. Garwin, and Henry W. Kendall) have together had a total of over eight decades of extensive experience with a wide variety of military systems, including BMD technologies and countermeasures, extending to nuclear-weapons designs and effects and missile-and-reentryvehicle development. Another (Carl Sagan) has a twenty-five-year continuing involvement in the development of major U.S. space projects. While none of us is a general (in contrast, we presume, to Messrs. Jastrow and Wood), a member of our study panel, Noel Gayler, is an admiral who has served as Commander-in-Chief of all U.S. forces in the Pacific, Director of the National Security Agency, Assistant Chief of Naval Operations for Research and Development, and as Deputy Director of the Joint Strategic Target Planning Staff, which is responsible for the operational plans for all our strategic-nuclear forces.

Mr. Jastrow concedes that we did shot engage "in a deliberate, conscious effort to deceive," but surmises that our "rational judgments [were] clouded by ideological preconceptions." What are these "preconceptions"? A defense against Soviet missiles, he quotes us as be-lieving, would " 'have a profoundly destabilizing effect on the nuclear balance, increasing the risk of nu-clear war,'" and "'could well produce higher numbers of fatalities' than no defense at all." But those are not ideological preconceptions. They are the unhappy conclusions to which our analysis has inexorably led. We stand by them.

Hans A. Bethe Richard L. Garwin Kurt Gottfried Henry W. Kendall Carl Sagan

VICTOR F. WEISSKOPF Cornell University

Ithaca, New York Massachusetts Institute of

Technology Cambridge, Massachusetts TO THE EDITOR OF COMMENTARY:

Robert Jastrow attempts to defend "Star Wars" by criticizing other analysts rather than by setting forth his own analysis. This approach would be inconclusive even if Mr. Jastrow were correct. As it happens, Mr. Jastrow's four criticisms of the Congressional Office of Technology Assessment (OTA) Background Paper which I authored are technically in error. His essay therefore does not offer a serious alternative treatment of this vital national-security issue.

Let me take the four points in turn.

Mr. Jastrow's first and main criticism rests on his proposition that if the Soviet Union increased its arsenal of missiles by a certain factor to try to overwhelm a U.S. laser defense, the U.S. would have to increase its constellation of orbiting lasers by the square root of that factor. This is wrong. The true dependence is closer to a direct proportionality, which the OTA report uses. Mr. Jastrow's proposition would be true if Soviet missiles were distributed uniformly over an enormous area and the U.S. laser satellites were at the same altitude as the missiles. These are hardly good approximations to the real world, where Soviet missiles are deployed in a band stretching from east to west across the Soviet Union and the lasers are in space. Careful calculations making few simplifying assumptions have recently been completed by competent government scientists, notably at the Lawrence Livermore Laboratory. Mr. Jastrow's most misleading error, of course, is implying that constellation size is the key to judgments of the plausibility of "perfect" defense, whereas in fact it is a relatively insignificant issue.

Second, in his footnote 10, Mr. Jastrow criticizes a pedagogical device used in the OTA report, which involved deploying satellites in clusters. This short-cut has little effect on most calculations, since time averages of the constellation coverage enter these calculations. This pedagogy was intended to avoid confusing the reader, but seems to have confused Mr. Jastrow, who thinks it is a serious "error."

Third, Mr. Jastrow misunder-

¹⁴See Richard L. Garwin and Hans A. Bethe, Scientific American, March 1968.

stands the calculation of the number of terminal interceptors needed for nationwide coverage. One thousand defensive batteries are needed for nationwide defense because the missile interceptors in each battery have limited range, not because "1,000 sites in the United States need to be defended," as Mr. Jas-trow supposes. The OTA report makes clear that 280,000 interceptors would be needed only if one aspired to a *literally* leakproof defense that would prevent all Soviet warheads from detonating on U.S. territory. The point of the calculation was to show how absurd that aspiration is. Mr. Jastrow got the point, but missed the irony.

Fourth, Mr. Jastrow claims that the OTA report said that one-tenth of an inch of lead could shield a Soviet booster from a neutral particle beam. This is indeed untrue, as Mr. Jastrow suggests, but the report does not say any such thing. Mr. Jastrow has confused "a few centimeters of lead" on page 49 of the OTA report with "a few grams per square centimeter" on page 50. The point made on those pages was that covering the entire uppermissile stage rather than just parts of it with enough shielding is impractical, a point with which Mr. Jastrow agrees but thinks the report missed.

Mr. Jastrow is therefore wrong on every single point. But there is an interesting pattern to his errors. Last July some Defense Department contractors, in an equally clumsy attack on the OTA report, made exacty the same spurious "criticisms"! How did Mr. Jastrow hit upon precisely the same points as these contractors? Obviously he was simply parroting them, unaware that they were incorrect.

It is furthermore a matter of public record that OTA convened a panel last summer to review these criticisms of its report. The results of this review were conveyed by OTA's Director to Congress and to the Department of Defense. The panel consisted of Charles Townes (Nobel laureate, discoverer of the laser, and adviser to Secretary of Defense Caspar Weinberger), William Perry (former Under Secretary of Defense for Research and Engineering), and General Glenn Kent (USAF, retired). This panel also found no substance to precisely those criticisms that now, six months later, Mr. Jastrow "discovers."

Robert Jastrow has taken up the

lonely task of championing the notion of perfect defense of the United States, a task that is widely agreed to be a poor basis for the Strategic Defense Initiative's research program. To succeed he will need to ask those who are aiding him to keep him better informed.

The issue of strategic defense is not a simple one of "for" and "against." There are many shades in between. The dim prospect for leakproof nuclear defense is a fact that will not be dispelled by shooting the messenger. Moreover, recognizing that fact does not end, but just begins, a serious discussion of other missions for missile defense. COMMENTARY would serve its readers better by drawing out this variety of views rather than by seeking simplistically to set up opposing camps.

Ashton B. Carter John F. Kennedy

School of Government Harvard University Cambridge, Massachusetts

To the Editor of Commentary:

-11

I always look forward to the writings of Robert Jastrow, who manages to be lucid when analyzing the most complex subjects. All the more bewildering, then, his paragraph disposing of decoy balloons.

The picture he paints of laser beams sorting out the decoys from the warheads, after which particle or other beams go after the warheads, somehow does not jibe with my vision of one bullet hitting another, both traveling at enormous speed through the immensity of space. How does one "observe" the recoil of a tapped balloon at such great distances and blazing speeds? Are all the balloons tapped simultaneously, with separate laser beams? Does the device then remember which ones carry warheads, all the while tracking each one? If each of the balloons must be intercepted for identification, why not use the same number of beams to attack? If it is possible to intercept them all, is it not then irrelevant which of them carry warheads? Please, Mr. Jastrow, this subscriber would appreciate a bit more detail.

A. L. DRUMWRIGHT Sarasota, Florida

To THE EDITOR OF COMMENTARY: As an engineer, I would like to disagree with one aspect of Robert Jastrow's defense of the "Star Wars" ABM concept.

His technique for making such a system sound plausible, and for making the possible defensive measures against it sound absurd, is to attribute virtually unlimited ingenuity to those people who are to design the missile-destroying system, and virtual imbecility to those who are to foil it. For example, he says that if the Soviets try, among other things, to spin their missiles and shine them up, "their missile program will be tied in knots." And what is the fatal flaw in the shininess defense? According to Mr. Jastrow, simply that "no shine is perfect," and, given time, a sufficiently powerful laser could burn through it. With a wave of his authoritative hand he has implied that we can deliver massive amounts of focused radiative energy against a distant target for as long as necessary, whereas the Soviets will throw in the towel at the very prospect of mirroring their missiles. Is this the kind of meticulous analysis that Mr. Jastrow would substitute for the supposedly biased science of the Union of Concerned Scientists? In reality, there are many pros and cons to the idea of a durable, reflective missile surface. How reflective can a surface be made? Can we allow it to erode like a heat shield while maintaining control of the missile? On the other hand, can we invent a weapon, by an effort which will not tie our military economy in knots, which can overcome with near-100 percent reliability an optimally reflective, robust missile surface?

٤

1

Such questions are real. One need not be soft on Communism to contemplate them. Perhaps shininess and all other possible defensive measures could be overcome by some attainable, affordable laser technology. However, it is certainly possible that they might not; the idea of missile durability does not "border on inanity." If Mr. Jastrow really thinks so, then I suggest that his judgment is at least as "clouded by ideological preconceptions" as he claims that of the UCS scientists to be, despite his pose of sweet reasonableness.

LARRY CLIFFORD Bethlehem, Pennsylvania

To the Editor of Commentary: Robert Jastrow's "The War Against 'Star Wars'" was, like all

Against 'Star Wars' Was, like all his writing, clearly conceived and powerfully delivered. I agree completely with his scientific arguments; they needed to be made. Yet in the end I was alarmed and frustrated; Mr. Jastrow has provided the right answers, but in doing so he has legitimized some very wrong questions.

The most crucial fact in this entire debate is one that has been totally ignored: "Star Wars" is not an American initiative, it is a response. The Soviet Union has the initiative. . . .

The data supporting this statement are easily researched; they have been available in the popular press for at least seven years, and important scientific clues have been available in technical journals for nearly a decade before that. The most important article, "So-viets Push for Beam Weapons," was published in the May 2, 1977 issue of Aviation Week. The intelligence data contained in the article suggested that the Soviet program was at that point already six to ten years old and was very broad and deep. Jane's Defense Weekly, this year, reported that the Soviets are clearly ahead despite the very broad industrial base America can draw from.

The ramifications of this simple fact are enormous. For instance, Mr. Jastrow excuses the Union of Concerned Scientists on the grounds that "their rational judgments can be clouded by their ideological preconceptions." Yet most of these scientists, led by Harold Brown, were deeply involved in the effort to discount all the evidence of the Soviet program throughout the 70's. Interestingly, this brought them in direct conflict with Air Force intelligence and the data gathered by reconnaissance satellites, the very sources these same scientists claimed could be relied upon for verification of SALT provisions, negating the need for on-site inspections. No, these scientists are not innocents, they are quite familiar with Soviet efforts in this field. . . .

But the more important issue is the way such weapons tie in with the evolving strategic picture. The Soviets already possess a first-strike capability, an existing ABM system which violates the ABM treaty and forms the basis for a multilayered ballistic-missile-defense system, and an extensive civil-defense program. Were they to succeed in being first to emplace even an austere version of "Star Wars," the temptation to launch a first strike would very likely be irresistible. Whatever would be left of the U.S. strategic forces after a first strike might well be handled by the defensive system they are currently building. Even if events proved them wrong, once they acted upon obvious calculations, the world would see a nuclear war. Thus, Mr. Jastrow's tacit acceptance of the UCS argument that "Star Wars" is potentially destabilizing legitimizes a very wrong-headed perception of reality—the situation is already seriously destabilized and the Strategic Defense Initiative is a minimum attempt to restabilize it.

Even the MX missile plays a significant role in the accurate perception of "Star Wars." All our current ballistic missiles, both ICBM's and SLBM's, are so weight-limited that they offer no potential for modifications which might make them effective a decade from now. Only MX and a projected version of Trident provide sufficient flexibility to incorporate a response to whatever emerges from the massive Soviet beam-weapon program. Midgetman, against any potential Soviet defense system, is an anachronistic joke.

One more point-no matter how permeable or vulnerable the space battle stations envisaged in the Strategic Defense Initiative might be, in launching a first strike the Soviets would have to deal with them first. Such action eliminates all possibility of surprise. Indeed, it eliminates even the very idea of a first strike, since action against American satellites would fully jüstify a launch-on-warning stance for American strategic forces, as well as immediate counter-strikes against Soviet satellites and any battle stations. The corollary of this time-sequencing is that, while launching a thousand complex missiles within thirty minutes is a very difficult technical feat, launching sufficient numbers to overwhelm a "Star Wars" defense within the time-frame necessary to achieve an effective first strike is likely to remain impossible for quite a while. . .

Тномая J. Rатн Altadena, California

To THE EDITOR OF COMMENTARY: Robert Jastrow's dismissal of the Union of Concerned Scientists' proposals for countermeasures to the "Star Wars" defensive system leaves me more than a bit confused about how thoroughly the author and the unnamed "experts" to whom he so often refers understand the criticisms they rebut.



"The Resurgent Religious Quest in Contemporary America and Its Social and Political Implications."

Hear Professor Peter Berger, author of The Social Construction of Reality, A Rumor of Angels, Modern Society and the Rediscovery of the Supernatural, The War Over the Family, deliver the first in a new distinguished lecture series in the humanities.

Thursday, March 21 at 8 p.m. Admission \$7. Students \$4.



A beneficiary of the UJA/Federation Campaign.

Mr. Jastrow seems to refute the charge that cheap "balloon" decoys could degrade the performance of a defensive system by conceding the validity of the point. Decoys are intended to force a defensive system to waste precious time and energy by engaging both decoys and balloon-enclosed warheads. Mr. Jastrow's announcement that "a sharp pulse of laser light" will cause decoy balloons to reveal their identity by their rate of recoil comes as no revelation to this inquisitive citizen, as I have never heard a "Star Wars" critic argue to the contrary.

Mr. Jastrow seems also not to have thought through his remarks on the utility of spinning and shining ICBM boosters as a means of complicating the job of defensivebeam weapons. Hans A. Bethe, Richard L. Garwin, and others have proposed the use of a strippable outer coating on missile boosters to reduce the dulling effect that launch would have on a booster shined to reflect laser light. The coating would shed once the missile moved above the atmosphere and within the range of laser weapons.

As for Mr. Jastrow's observation that a laser firing in pulses would be able to concentrate its energy on a single point on a spinning missile, I must say that a lot of confidence is placed in the laser weapon's ability to track and determine the rate of spin of a fastmoving object at long range. A simple countermeasure to a tactic such as Mr. Jastrow describes would be to vary the rate of spin of the missile once incident laser light is detected.

Specific counter-rebuttals aside, several of the tendencies apparent in the article were disturbing to me. Mr. Jastrow's trust in the proclamations of his communicants in the defense community, whose "ideological preconceptions," while unexamined, must certainly be as clouding of judgment as those of the UCS scientists, and his representation . . . that only professional military-systems analysts can assess competently the merits of the "Star Wars" proposal, lead me to suspect that Mr. Jastrow never undertook a dispassionate analysis but sought instead opinions that reinforced his original enthusiasm for the proposal.

I must note, also, that there is no unanimity of opinion on "Star Wars" within the traditionally pro-

defense community. Richard D. DeLauer, Under Secretary of Defense for Research and Engineering, testified before the House Armed Services Committee that "any defensive system can be overcome with proliferation and decoys, decoys, decoys, decoys." Edward Teller has criticized defensive proposals that depend on satellitebased systems because such systems are "costly to put up and cheap to shoot down."...

The most bothersome of Mr. Jastrow's prejudices is his refusal to see criticisms of "Star Wars" for what they are, that is, attempts to inform the public of the vulnerabilities of a system only the putative virtues of which have been presented publicly by the Reagan administration. Mr. Jastrow does not detail the "promising new developments" that might defend components of a defensive system from space- or ground-based attack./ I, and I am sure others, would appreciate any information on progress toward remedying the problem of satellite vulnerability...

Edward F. HENNESSEY Wethersfield, Connecticut

TO THE EDITOR OF COMMENTARY: Robert Jastrow states that "90 satellites-and perhaps somewhat fewer-are needed to counter a Soviet attack." His argument, however, contains one profound flaw. He deals solely with the defensive systems needed to neutralize a massive attack of Soviet land-based missiles. The actual attack scenario would almost certainly include substantial numbers of submarinelaunched missiles as well as cruise missiles that can be fired from a variety of platforms, both moving and stationary. This consideration would exponentially magnify the task of the defense. Indeed, even if the oceans were rendered "transparent" by evolving technology, the cruise missile, relatively inexpensive and readily camouflaged, might easily overwhelm any combination of defensive systems.

Other considerations abound, such as the destabilizing nature of any truly effective defensive system and the obvious inference that its deployment might trigger the very suicidal confrontation that all nations seek to avoid.

I would also assume that any defensive system resulting in the physical destruction of thousands of warheads would result in a literal rain of radioactive bomb compo-

nents into the atmosphere and thence to the surface of the earth. I wonder if Mr. Jastrow's celluloid computer has taken this into account.

DAVID R. PERLES, M.D. Chief Radiologist

1

1

¢

ŝ

1

1

¢

1

S

1

f

٤

t

¢

1

5

Woodruff Community Hospital Long Beach, California

To THE EDITOR OF COMMENTARY: Even if a satellite-type ABM system could be made 100-percent effective against ICBM's, the U.S. would still be vulnerable to submarine-launched ballistic missiles, or cruise-type missiles launched from bombers.

Moreover, the deployment of the "Star Wars" system, intended only for defense, could lead to a far more precarious situation than we are in today.

If it were possible to place a working satellite system above the Soviet Union, our weapons-controllers would be tempted to arm those satellites with nuclear warheads; overwhelmingly tempted. The Soviets would certainly react, not necessarily by trying to disrupt or destroy our "Star Wars" system, but by deploying one of their own, albeit with inferior safety controls.

If such systems are deployed, they will dangerously diminish the response time to suspected attack. Instead of fifteen to thirty minutes, the President or Premier will have about sixty seconds to respond to signs of an adversary's nuclear strike. Hence; both the U.S. and Soviet Union would almost certainly revert to a "launch-on-warning" system, computer-controlled and unalterable by human judgment.

Worse yet, the Soviets, knowing the inferiority of their own radar and signaling equipment, might place their whole nuclear network on a state of constant alert—in which the "red button" does not initiate but merely restrains the launching of their nuclear missiles. Hence, if that trigger were destroyed, a Soviet nuclear attack would automatically follow.

Allen Finegold Amarillo, Texas

TO THE EDITOR OF COMMENTARY:

Robert Jastrow exposes and dramatically debunks some of the errors committed by the enemies of the Strategic Defense Initiative, or "Star Wars" proposal, in their blind attempt to kill this program. However, in addition to claiming erroneously that the hardware required to implement SDI would be virtually impossible to develop, opponents also offer flawed arguments that it would violate the ABM treaty and would stimulate a new defensive arms race.

One way SDI opponents bias their discussions against the feasibility of the hardware is to confine their attention to a perfectly leakproof defense . . ., even though the cost and technical risk of a partially effective nuclear-missile-defense system would be far less than the cost of a leakproof defense. Also, a leaky nuclear-missile defense would strengthen deterrence significantly by drastically reducing Soviet confidence in their ability to launch a successful first-strike nuclear attack. . . .

In an apparent attempt to frighten the public, opponents also declare that SDI violates the terms of the ABM treaty. But SDI is a research program of the kind that is not prohibited by the ABM treaty; it contains no development, testing, or deployment activities. If, in the future, the U.S. determines that it would be in the national interest to go beyond the research stage, then a new kind of activity not in the current SDI program would have to be initiated, and the U.S. would have to determine whether the new activity would violate treaty limits.

This attempt on the part of those who oppose SDI to mislead the public blurs the distinction between the administration's SDI program, which is well within treaty limits, and some hypothetical program, which has neither been proposed nor planned, and which may or may not confront the treaty limits.

Arguments that SDI would trigger a new defensive arms race are contrary to the facts because the Soviets have been racing in this direction since well before the signing of the ABM treaty in 1972. During the past dozen years, they have developed a new, transportable, phased-array ABM radar and a new interceptor missile, both of which could be deployed rapidly should the Soviets choose to do so. (The U.S. has no equivalent deployable capability.) They have also upgraded the Moscow ABM defense system (the U.S. has no defense system), have deployed additional phased-array radars on their periphery for ABM target-acquisition support, and are now developing an advanced anti-tactical-missile-defense system that definitely has value for strategic-missile defense.

The attack against SDI seems to assume that all of the initiative in strategic defense lies with the U.S. It ignores the chilling and fairly obvious possibility that the Soviets will find it advantageous to accelerate their own strategic-defense programs or even break out of the ABM treaty. The political costs to the West of a substantial Soviet lead or break-out in defense would be great.

SDI should be pursued to give us a chance to strengthen the security of the U.S. and the rest of the world by making nuclear-ballistic missiles less useful as instruments of politics and war.

New York City

TO THE EDITOR OF COMMENTARY: Robert Jastrow faults the Union

MARVIN KING



To send a gift of Kedem, call 1-800-L'-C-H-A-Y-I-M (524-2926). Ask for a free catalog. Void where prohibited by Law.

of Concerned Scientists for some unfortunately flawed calculations concerning the size and weight of satellites required to set up a "Star Wars" defense against Soviet ICBM's and the numbers of such satellites that would be needed. But the case against a "Star Wars" defense is far more substantial and is based upon serious technical matters. The numbers and dimen-sions of "Star Wars" satellites are significant only if the X-ray lasers, optical lasers, and particle beams will actually function. The UCS's The Fallacy of Star Wars raises many doubts about these weapons, doubts which Mr. Jastrow ignores in his article.

The use of X-ray lasers powered by nuclear explosions and launched at the time of a Soviet attack would require building a new fleet of submarines to launch the "pop-up" X-ray laser weapons, since we have no satisfactory land bases close enough to Soviet silos to enable us to intercept Soviet ICBM's in the short time which will be available. We would also have to build attack submarines and surface vessels to protect the X-ray laser submarines. The X-rays of this type of laser are unable to penetrate the atmosphere, . . . and the Soviets could easily shorten the boost phase of their ICBM's to end before the missiles have left the atmosphere. The Union of Concerned Scientists has concluded that "the X-ray laser is not a viable BMD weapon."...

In addition, . . . the concept of using the weapons as "pop-up interceptions" is not feasible. The Soviets have located their silos in the area of the Trans-Siberian railway at about 55 degrees latitude. The area closest to these silos that American forces can reasonably use is the Arabian Sea to the south of Pakistan, about 23 degrees latitude. The X-ray lasers would have to be launched to a point where they can fire at the Soviet ICBM's while they are out of the atmosphere and still boosting. Assuming an interception altitude of 110 kilometers, the distance from a submarine to a satisfactory interception firing point for an X-ray laser would have to be at least 1,200 kilometers.

Assuming far more powerful propellants than those currently in use, the minimum flight time of an X-ray laser from launch submarine to interception-firing point would be 120 seconds. To these 120 seconds we have to add the

time involved in the decision to launch the X-ray lasers: the processing and verification of satellite warnings that ICBM's are being launched; the acquisition, processing, and transmssion of targeting information: and the firing of the X-ray lasers from the submarines. According to John Steinbruner, in the January 1984 issue of Scientific American, 120 seconds would be needed merely to process and verify the data from the earlywarning satellites. Regardless of how long this takes, the 120-second flight time of the X-ray lasers is far short of the 50-second booster time the Soviets would be able to achieve for their ICBM's.

Submarines are also crippled by their inability to fire all their X-ray lasers in a single salvo. The first launch would give away the submarine's position and invite a Soviet attack.

The interception of Soviet ICBM's during their boost phase is the most important considerat tion of the "Star Wars" defense. The large ICBM's are easier to locate and track than relatively small warheads after they have been released from the final stage of ICBM's. The Reagan administration's own Defense Technologies Study Team, headed by James C. Fletcher, agreed that a "Star Wars" defense is impossible unless the great majority of Soviet ICBM's were intercepted during the boostphase of their flight. X-ray lasers are clearly not feasible for boostphase interception. The muchtouted particle-beam weapons fired from orbiting satellites are also not feasible because of the effect of the atmosphere and the magnetic field of the earth upon particle beams. The particles from neutral-particlebeam weapons would, if fired into the atmosphere, encounter air molecules in the upper atmosphere and disintegrate into charged particles which would be pulled by the earth's magnetic field, resulting in a steady increasing of the width and consequent decreasing of the intensity of the particle beam.

Optical lasers, which emit light in the infrared (chemical lasers), ultraviolet (excimer lasers), and visible (free-electron lasers) portions of the spectrum, may also be unsuitable for interception of Soviet ICBM's during their boost phase. The wave nature of light means that the edges of the beams will tend to spread out increasing-

ly over increasing distance. This means that the size of a spot upon which a laser can be focused increases in proportion to the distance from the target. Since the energy carried by a laser beam spreads over distance, the effectiveness of a laser weapon decreases over distance in proportion to the square of the distance. The energy needed for optical lasers suggests they could be functional only in low orbits where they would be vulnerable to attack from Soviet anti-satellite weapons of various sorts. Clouds of fine abrasives. for example, could be used to damage the laser mirrors. Clouds of lightabsorbing substances could be used to limit the efficiency of the mirrors. Battle stations in space are much more vulnerable than boostphase ICBM's to a wide variety of rather crude attacks.

Ł

¢

¢

t

C

Ł

C

C

k

Ŧ

Ŧ

a

t

1

C

S

ċ

s

t

а

ł

The "Star Wars" defense would have to have battle-management systems that would deal with hundreds of thousands of objects. For this we would need computers able to carry out at least hundreds of millions and probably billions of authentic operations each second. Even if huge strides in computer technology were to produce hardware able to perform such gigantic numbers of operations per second, other problems connected with the implementation of a "Star Wars" defense would probably never be resolved.

One very serious problem is that of designing and developing the programs (software) needed to direct the defense computers. Experience with the software involved in other defense systems as well as non-defense software indicates it will be extremely difficult—if not impossible—to create software capable of functioning properly in a nuclear attack. . . .

We could never be reasonably confident that a "Star Wars" defense with all its complex facets would function harmoniously and effectively during a strategic-nuclear attack. The "Star Wars" defense would be a gigantic, intricate assemblage, novel in conception, involving the farthest limits of advanced technology, and required to meet an extremely high performance standard, even though it could never be adequately tested.

Complex designs generate complex problems. All large computer programs contain flaws or bugs which decrease over use but which may never be entirely eliminated. ... But no amount of simulated battle situations could satisfactorily examine the actual response of a complex "Star Wars" defense system to an actual nuclear attack. This is so not only because of flaws or bugs in software . . . but also because the precise nature of a nuclear attack, along with the enemy's countermeasures, can never be known in advance. . .

JOSEPH FORBES Pittsburgh, Pennsylvania

ROBERT JASTROW writes:

Edward Teller's letter makes an apt comparison between the controversy over the feasibility of "Star Wars" and the H-bomb controversy of the early 1950's. Confident in the superiority of American scientists, we were certain at that time that the decision to build the weapon rested solely with us. But we now know that the Soviets were in fact hard at work on their version of the Hbomb as we argued over whether it should be built at all.

Today, as we again debate the wisdom of research on another weapons system-this time, a system that destroys weapons rather than people-we assume that the decision will be made in this country, whereas in fact the Soviet Union is already hard at work on its own "Star Wars" program, and has been for many years. In the twelve years since the USSR signed the ABM treaty, the Soviet Union has, according to Secretary of Defense Weinberger, spent more on strategic defense than it has on its arsenal for strategic offense. Elements of the Soviet missile-defense effort that violate the ABM treaty in particularly conspicuous ways were publicized last October in a report to the President by the General Advisory Committee on Arms Control and Disarmament. Because of this massive Soviet strategic-defense effort, Mr. Teller rightly concludes, our government's missile-defense program, officially known as the Strategic Defense Initiative, could better be called the Strategic Defense Response.

Soviet emphasis on a defense against missiles, and the total Soviet rejection of Mutual Assured Destruction (MAD), go back at least two decades. Andrei Gromyko called for the deployment of a missile defense by the superpowers in a speech to the UN in 1962, in which he strongly criticized the doctrine of Mutual Assured Destruction. Gromyko said the "bal-

S

ance of fear," as he called it, kept the world in a "a permanent state of feverish tension." He compared MAD to a duel in which the superpowers "raise their pistols, aim at each other's foreheads, and wait for the other to shoot."

JAMES A. ABRAHAMSON'S letter underscores the fact that attacks on his program by a few academic scientists are entirely at variance with the rapid technical progress being made by thousands of scientists and engineers who work full time on the "Star Wars" project. Even without access to classified information, a diligent reader of aerospace trade journals can gain tantalizing hints of extraordinary developments taking place in the basic technologies of missile defense.

It is also reassuring to have General Abrahamson, who is in a better position to know than anyone else, agree that various Soviet countermeasures to our defensehighly touted by the Union of Concerned Scientists and discussed in my article-are not holding up well under the scrutiny of the defense professionals. The Soviets have confirmed General Abrahamson's evaluation of their countermeasures. If they thought the proposals put forward by the Union of Concerned Scientists were truly effective and inexpensive, they would not be trying so desperately to stop our "Star Wars" research. They would encourage us instead to go on with this expensive program that could be so cheaply countered by them. But they are fighting tooth and nail to kill the "Star Wars" project. Clearly, they disagree with the Union of Concerned Scientists and believe that it will cost them a great deal of money and trouble to counter our defense, if that can be done at all.

LOWELL WOOD of the Lawrence Livermore Laboratory stresses a very significant point which has been made a number of times in my hearing by scientists working on defense matters. The university scientists who put forward the egregiously flawed arguments against missile defense have been repeatedly and firmly corrected by their colleagues in classified technical discussions that are not open to the public. But, as Mr. Wood notes with exasperation, after failing to make their case to their technical peers, they continue to pre-

sent the same rejected arguments over and over again to the press and public.

One of the prime examples is the so-called "pop-up X-ray laser," which requires much additional research and development but holds the promise of being a devastatingly effective destroyer of missiles. In the report by the Union of Concerned Scientists and in the recently published UCS book, The Fallacy of Star Wars, the pop-up Xray laser is dismissed as a useless device, readily countered by Soviet fast-burn boosters-that is, by missiles that accelerate very quickly and burn out at an altitude of 50 miles or less. One UCS criticism relates to the fact that a fast-burn booster may burn out in the atmosphere at depths to which X-rays cannot penetrate. But this criticism turns out to be invalid when classified information relating to the intensity of the X-ray laser beam is taken into account.

The classified information, Mr. Wood notes, has been presented in face-to-face discussions with the critics, who have not contested the technical points being made. Yet the critics continue to make their pessimistic comments in public where they cannot be countered by the classified facts.

This behavior seems to me and many of my colleagues to be less than responsible.

I SHARE with George Fishman his puzzlement over the fears of a space-based missile defense expressed by many academics. These fears seem indeed to be "irrational, as Mr. Fishman says, because the space-based weapons proposed for the "Star Wars" defense are not weapons of mass destruction, and cannot blow up a city or incinerate millions of civilians. The weapons that can do that are on the ground, in silos and submarines. "Star Wars" space weapons do not kill people; they destroy the weapon's that kill people.

THE letter by Hans A. Bethe, Richard L. Garwin, Carl Sagan, *et al.* deals in its first section mainly with the strategic and political dimensions of missile defense. I should like to pass beyond these to the technical issues which were the principal thrust of my article, and take up those in order.

First, Mr. Bethe and his colleagues say that fast-burn boosters protect the Soviets from our neutral particle beams, because the neutral particle beam does not . penetrate the atmosphere. The thought here is that the booster will reach full speed in 50 seconds and burn out at an altitude too low to be reached by the beam. But, as my article noted, the neutral particle beam is just as effective against the bus carrying the warheads after the booster has burned out, as it is against the booster itself. If the beam catches the bus early on, while most of its warheads are still on board, the results are just as good for our defense as destroying the booster would have been.

If the Soviets try to escape the neutral particle beam by pushing their warheads off the bus while it is still within the atmosphere,";air drag will seriously degrade the 'accuracy of the warheads, with disastrous consequences for Soviet hopes of taking out our retaliatory forces. That problem might be overcome by putting every warhead on its own mini-bus, with separate guidance and steering rockets. But if the Soviets do that, the extra weight required will substantially diminish the total number of warheads carried on the missile, probably by a factor of 2 to 5. And when the warheads are released, they are still vulnerable to the neutral particle beam during the long mid-course phase of their flight, which lasts many minutes. So, if the Soviets go to the enormous expense and trouble of replacing all their missiles with 50-second boosters-and, as George Keyworth, the President's Science Adviser, has noted, that means wiping out a fifteen-year investment in their missile force-it will avail them nothing.

In fact, the consensus among the experts is that the fast-burn booster, so highly regarded by the UCS and by Ashton B. Carter in his report to the OTA, is not a useful ploy for the Soviets. This has been pointed out to Mr. Garwin and other critics in classified discussions, but they continue to present their discredited arguments to the public "immune from the criticism of their technical peers," as Mr. Wood has said.

Not only are fast-burn boosters ineffective against several defenses being designed in General Abrahamson's program, but there is even some doubt among missile experts as to whether such a thing as

a 50-second booster can ever be built on a mass-production basis and perform reliably. A rocket that accelerates from a standing start to roughly 15,000 miles an hour in less than a minute presents horrendous technical problems to the missile designer. Fast-burn rockets tend to explode and are not reliable; they get very hot because they move through the atmosphere so rapidly; and their structure must be stiffened to protect them against the battering forces created by their own acceleration. This last point imposes a heavy penalty on the Soviets, because the added weight must be compensated by the loss of a quarter to a third of the missile's payload.

Mr. Bethe and his colleagues cite a report submitted to the Fletcher panel that suggests 50-second boosters are feasible, but fail to mention that after examining all the evidence available to it, the Fletcher panel concluded that the Soviets could not hope to deploy a missile of this kind before the 21st century. In the light of these circumstances, many people in the defense community find it impossible to understand why Mr. Bethe and the UCS put so much emphasis on the fastburn booster as the Soviet response to our defense.

TURNING to the question of the number of satellites needed for our defense, Mr. Bethe and his colleagues dispute my statement that the experts have been looking at this question for more than ten years. My remark was taken from an unclassified report dated May 9, 1984 by O. Judd of Los Alamos. I spoke with Mr. Judd recently and he confirmed the accuracy of the statement.

On this same matter, according to the Bethe letter, I imply that the calculation that produces the smallest number of satellites is the most accurate, which is a "clear absurdity." Not at all. I only note that the UCS calculations went from 2,400 satellites down to 800, then to 300, and, in the most recent report on the matter by Mr. Garwin, to 162 satellites. This sequence of numbers, which started out at 2,400 satellites, seems to be converging to a result in the neighborhood of 100 satellites, which is where the professionals pegged their results all the while.

Anyone can draw his own conclusions from these facts. My impression is that the UCS theorists first

did a hasty piece of work and then, under criticism, did more extended calculations, until finally Mr. Garwin did a careful analysis. Throughout this, long learning process, their numbers came down steadily, until leveling off in the neighborhood of the right answer.

Hans A. Bethe and his colleagues allege that there is no right answer because the answer depends on many factors, some of them unknown. But there is a "right" answer to the specific theoretical problem which they addressed. For that particular problem they presented a calculation to the public which turned out to be wrong by a factor of about 24, and in a direction that made the "Star Wars" plan seem very costly and impractical.

The Bethe letter also mentions the "square-root law," which is critical to the assessment of Soviet prospects for overwhelming our defense, because it indicates that we can overcome a massive build-up of Soviet missile forces with a relatively modest increase in the size of our satellite fleet. Richard L. Garwin's detailed report of December 30, 1984 concedes the validity of this relationship. Yet the letter from Mr. Bethe and his colleagues states that Mr. Garwin has proven the Los Alamos report to be incorrect under "all but highly artificial circumstances." How do we explain this contradiction?

The answer is in Mr. Garwin's paper. He has invented another problem involving satellites and missiles, which is quite different from the problem that was analyzed by the Union of Concerned Scientists in its report, and then in its book, and by Ashton B. Carter in his report to the OTA, and by G.H. Canavan and his colleagues at Los Alamos, and by C.T. Cunningham at the Livermore Laboratory. In this new problem, Mr. Garwin assumes that 3 seconds are needed, on the average, for a laser to swing around from one missile it has just destroyed, and lock its beam onto another missile. This is the so-called "retarget time," which was assumed to be zero in all the calculations mentioned above. If the retarget time is indeed as long as 3 seconds, our laser-equipped satellites will be very inefficient at shooting down Soviet missiles, and many more satellites will be needed than the previous estimates assumed. We will lose not only the square-root law, but the entire effectiveness of this part of our defense.

But the design objectives in General Abrahamson's program call for a retarget time of 0.1 seconds and not 3 seconds. If the retarget time is 0.1 seconds, the results for the number of satellites are not very different from those for zero retarget time. In particular, the important square-root law is valid.

But how can we hope, in a time as short as 0.1 seconds, to rotate the mirror that directs the laser beam, damp down its vibrations, and lock in on a new target? A retarget time of 0.1 seconds would indeed be difficult to achieve if the experts were planning to rotate the mirror mechanically to redirect the beam from one Soviet missile to another. But the "Star Wars" program is probably not going to do that. A part of its funding is going into research on an extraordinary new technology that uses "phase conjugate coatings," which change the direction of the laser beam electronically in a fraction of a second, leaving the mirror fixed in place. The technique is essentially that used in phased-array radars, which do not rotate like the earlier radars, but sweep the sky electronically. This is a fascinating illustration of the black arts being practiced on the cutting edge of technology by the scientists and engineers working with General Abrahamson.

MR. BETHE and his colleagues also take up the critically important question of cost ratios, saying it will cost us a trillion dollars in additional satellites to counter an increased Soviet missile force costing only \$50 billion. With a cost ratio like that, we are lost before we start, for clearly the Soviets can overwhelm our defense by outbuilding us. But I have looked into the cost figures, and they turn out to be entirely different from those given by Mr. Bethe and his colleagues.

1

g

t

D

)-

S

ŀ

е

S

1-

t

y

n

e

۶t

эf

First, on the matter of the cost to the Soviets of building more missiles, the letter states that \$50 billion will buy 3,000 fast-burn, threewarhead, Midgetman-type missiles, including the cost of warheads and silos plus ten years of maintenance. This amounts to about \$15 million per missile, or \$5 million per warhead. Missile designers do not know yet what a fast-burn missile would cost, because none has been designed or built, but we can get an idea of the cost by using the current life-cycle cost for the MX

missile. This is \$40 billion for 100 missiles, each containing 10 warheads. That works out to \$400 million per missile, or \$40 million per warhead.

The cost per warhead for the proposed Midgetman will certainly be more than that, first, because fast-burn boosters are a new generation of missiles that must be built to withstand the stress of high acceleration, and second, because the cost per warhead is greater for small missiles than for big ones. According to Mr. Carter, a fair guess for the cost per warhead of a fast-burn booster is two to three times the corresponding cost per warhead of the MX missile. It is safe to say the cost of the proposed new Soviet missiles is at least \$40 million but probably not more than \$100 million per warhead. Thus, 3,000 fast-burn Midgetman missiles will cost the Soviets between \$400 billion and \$1 trillion.

Now for the cost to us of our defensive satellites. Mr. Bethe and his colleagues say we will require an additional 964 missiles to counter the new Soviet satellites. Using the accepted ballpark figure of \$1 billion per satellite, this works out to \$1 trillion in round numbers. Where does the figure of 964 satellites come from? It rests on the assumption by Messrs. Bethe *et al.* that the Soviets will cluster all 3,000 new missiles tightly together in one spot. But is it conceivable that the Soviets would do that?

For several reasons, they would not. For one thing, if all the missiles are located in one spot, and all are launched at one time, the times of arrival at their various targets in the United States will be widely different. That means the Soviets cannot effect a surprise attack that would take out all at once our command structure, airfields, submarine bases, and missile silos, since these are located at widely different flight times from any single place in the USSR. Suppose the Soviets try to overcome this handicap by launching their missiles over an extended period of time, so as to achieve a simultaneous arrival at the various targets. Then our boost-

94 PROOF 100% GRAIN NEUTRAL

NGLA

"BOM

REFER

(ondon Distilled

Dry Gin

JERRY THOMAS GAVE US THE FIRST MARTINI. BUT BEEFEATER GAVE US ITS FIRST NAME.



original.

Jerry Thomas was a colorful 19th century bartender in San Francisco. Legend has it that he concocted the first martini to

BEEFEATER® GIN.

The Crown Jewel of England.™

traveler on his way to an outlying village called Martinez—which is how the martini got its name.

Its popularity, however, did not grow dramatically until knowledgeable people began making the martini with Beefeater Gin...the driest and most delicate of the classic London gins.

Today, the martini has an acknowledged first name: Beefeater.* We think Jerry Thomas would cheerfully admit it's an improvement on the phase defense becomes enormously more effective, because we can pick off the Soviet missiles one by one as they rise from their silos.

The so-called "point" launch will create other problems for the Soviets. If they launch from one location at one time, all their warheads and decoys are bunched tightly as they course through space. This reduces the retarget time for our mid-course defense and, again, greatly increases its effectiveness. It also makes the warheads ideal targets for the X-ray laser. Finally, putting all the Soviet missiles in one place increases the effectiveness of our terminal defense as well, because it then becomes difficult for the Soviets to "ladder down." That refers to a technique for foiling our terminal defense in which the Soviets explode a nuclear weapon far above the missile silo or other target to create a fireball that will blind the ground radars on which our terminal defense depends. The fireball clears the way for another nuclear weapon that explodes and creates a fireball farther down, which clears the way for still another warhead, and so on, until finally the last warhead, swimming through these fireballs, reaches the target. But laddering down is impossible if all the missiles are in one place, unless they are launched at different times, and that is, as noted, disadvantageous to the Soviets for other reasons.

All in all, the last thing the Soviets are likely to do in response to our defense is to place their entire fleet of new missiles at one location.

But if the assumption that they would do this is removed, and the hypothetical new Soviet missiles are assumed to be spread across the Soviet land mass, as Soviet missiles are today, the number of American satellites required to counter their hypothetical attack goes way down. The reason is that the swath containing Soviet missile fields extends nearly a third of the way around the world at these latitudes. This considerably increases the chance that one missile or another in that vast expanse will be within the range of our satellites. The effect is to reduce by about a factor of approximately 3 the number of satellites required for our defense.

But there is more. The estimate of 964 satellites given by Mr. Bethe and his colleagues also assumes that the Soviets will have available to them a fast-burn booster that completes its acceleration from a stand-

ing start to full velocity in 50 seconds. This assumption means that each satellite has a very short time in which to attack the Soviet missiles, and therefore can destroy only a relatively small number of them. That means, in turn, that we need a large number of satellites to do the whole job.

As a practical matter, however, the goal of a 50-second booster is so difficult that the United States probably could not attain it until the late 1990's, and the Soviets are not expected to achieve it until the 21st century. When the assumption of a 50-second burn time is removed, and the more realistic assumption is made that the Soviets will have boosters similar to our MX, which has a 180-second burn time, the number of satellites required for our fleet goes down to 88, or, in round numbers, to 100.

At a billion dollars a satellite, that brings our investment down to about \$100 billion, compared to between \$400 billion and \$1 trillion for the Soviet investment. In other words, the ratio of costs is very favorable to our defense over their offense.

Next, Mr. Bethe and his colleagues take up the matter of the 40,000-ton accelerator, and suggest that my description of their testimony is distorted because I have omitted the important phrase, "saving a great deal of weight." But I have the stenographic transcript of the hearing in front of me and it does not contain that phrase. Even if that phrase had been in the transcript, it would not have conveyed the full flavor of the difference between 25 tons in orbit and 40,000 tons in orbit; but in any event, it is not there.

TURNING to Ashton B. Carter's letter, objections are raised therein to four points in my criticism of his analysis. First, Mr. Carter says that the "square-root law," to which I attribute much importance, is wrong. He refers to calculations by the Livermore Laboratory for support. But the Livermore report confirms the square-root law. I have in hand the Livermore report on this subject by C.T. Cunningham, dated August 30, 1984. It was one of the sources for my article. The report shows that a fleet of 60 satellites in orbit at an altitude of 300 kilometers will shoot down 97 percent of the Soviet missiles in a mass attack from all 1,400 Soviet missile silos; whereas 90 satellites

will shoot down the same percentage of the Soviet missiles in a mass launch from 2,800 silos simultaneously. According to the square-root rule, a defense against the increased Soviet missile force should require $\sqrt{2} \times 60 = 85$ satellites. But if Mr. Carter's analysis were correct, and the number of American satellites rose in proportion to the number of Soviet missiles, 120 satellites would be needed to counter the doubled threat. It is clear that the Livermore result is much closer to a square-root rule than it is to Mr. Carter's result.

Mr. Carter says his hypothetical deployment of satellites in bunches or clusters was a pedagogical device. But his device has an unfortunate effect, for when the satellites are bunched we lose the square-root rule; and when they are unbunched, we get it back again.

Mr. Carter also says I misunderstood his calculations on the number of intercepting missiles needed for our terminal defense. I think I understand them all too well. Mr. Carter estimates our need for thousands of intercepting missiles on the assumption that the Soviets might throw their entire force against one defended site. This leads to a requirement of 280,000 intercepting missiles. That is an implausible number based on an implausible assumption.

In the matter of the lead shield against a neutral particle beam, Mr. Carter suggests that he has been misquoted. Here are his statements. On page 30, his report states that such shielding could be an "attractive countermeasure" for the Soviets. On page 50, the report states: "But if the third stage, say of the MX, were covered with a few grams per square centimeter of lead [about a tenth of an inch], the shielding would weigh as much as several RV's [i.e., warheads]. On the other hand, if the neutral particle beam is only designed to disrupt or damage sensitive electronics ... only the sensitive components need be shielded. The weight penalty then becomes small." It seems to me that my article gives a fair account of the meaning of these remarks.

Finally, Mr. Carter says a panel of experts found no substance to criticisms of his report which had been directed against it by Los Alamos and other groups. Most important among these is a 57-page technical memorandum issued by the Los Alamos Laboratory that contained many detailed criticisms of Mr. Carter's work, some of them devastating. According to Mr. Carter, the panel refuted these criticisms. But the panel that endorsed Mr. Carter's report offered no technical arguments whatsoever to counter the carefully reasoned criticisms offered by the Los Alamos scientists. The Los Alamos critique was a serious study, bearing on a matter vitally important to the security of the United States, and its criticisms had to be either rebutted or accepted. The distinguished panel of three experts cited by Mr. Carter did neither. As C. Paul Robinson, Principal Associate Director of the Los Alamos Laboratory pointed out, their benediction, unaccompanied by a technical backup, was without value. Mr. Robinson went on to note that "Los Alamos's concerns have since been debated in other technical forums, where they have been sustained.'

IN RESPONSE to A.L. Drumwright, the decoy balloons are tapped rapidly, one after the other, with moderate-energy laser beams, and repeatedly throughout tracked this process to observe their recoil. Computers on our satellites keep track of the separate warheads and decoys and remember the information acquired about each one. As Mr. Drumwright suggests, a little more laser energy could destroy the lightweight decoys, instead of just identifying them. That would mean a different kind of midcourse defense, in which we hit all the warheads and decoys with moderately energetic laser beams, and observe what survives. The surviving objects must be the warheads, and we would go after these with our heavy guns.

S

e

٠t

y

а

£

e

.S

n

۰.

3-

:S

:\$

1-

IS

,r

e

<u>e</u>l

0

đ

)S

1-

e

١ÿ

LARRY CLIFFORD asks about my objections to the Soviets shining up their missiles. This proposal generates even more problems for them than I mentioned in my article. For one, as the booster accelerates it compresses and heats the air above it, and the plume of hot air sweeps downward around the side of the missile, oxidizing the surface and taking its shine away. Furthermore, the shine itself is obtained by applying a thin coat of reflective material to the missile, but under the high heat resulting from the the laser attack and from atmospheric friction, the coating tends

to disintegrate. Finally, the coating has a different coefficient of expansion from the metal skin underneath, and tends to buckle when the missile is heated by the laser beam, leading to its catastrophic failure.

THOMAS J. RATH makes the very interesting point that if the Soviets attempt to destroy the satellites in our space-based defense at the outset, before launching their missiles, they must necessarily give us warning of their attack. For this reason alone, our defenses will make it difficult for them to achieve the element of complete surprise that is essential to the success of a Soviet first strike.

Edward F. HENNESSEY asks about the possibility of a strippable outer coating that would keep the missile surface clean and shiny during launch. The trouble with this suggestion is that the strippable coating, which is to be wrapped around the entire missile, must be quite thin, or it will weigh too much and force the Soviets to eliminate several warheads from the payload. It must be sturdy, or air resistance will strip it away. And it must be heat-resistant, because the missile gets quite hot as it rises rapidly through the atmosphere. These requirements are partly contradictory, and reconciling them will not be easy. A substantial amount of development and testing would be necessary to make certain that such a device works well and does not interfere with reliable missile performance. And all this is for a very uncertain gain to the Soviets, because, as noted in my article, when the coating is stripped away and the shiny surface underneath is exposed to attack by our laser beam, the heat of the laser beam will degrade the shine rapidly.

ALLEN FINEGOLD and David R. Perles suggest the "Star Wars" defense, even if effective against landbased missiles, will be vulnerable to submarine-launched missiles and cruise missiles. This is not the case. When our boost-phase defense system of approximately 100 satellites is in place, a dozen or so satellites will be over the missile fields of the Soviet Union at any one time, defending us against an ICBM attack. But most of the remaining satellites will be over the oceans and in a position to defend us against missiles launched from submarines.

Moreover, for several reasons slower speed, staggered launches, and dispersed launch sites—the interception of submarine-launched missiles is considerably easier than the interception of land-based missiles.

As for defense against cruise missiles, that is a different problem from defense against ballistic missiles, but not a harder one. In fact, it appears to be considerably easier,

UNSATISFACTORY PEOPLE

Ronald Reagan, for screwing up in Minnesota and the District of Columbia. Arthur Schlesinger Jr., for describing Ave-

rell Harriman as "our wisest living statesman."

Howard Metzenbaum, for the big squeeze, followed by the big lie, followed by the big gesture.

Lee lacocca, for selling 550,000 copies of his memoir and wondering if that's good.

The (hee hee hee) House (hah hah hah) Ethics (haw haw haw) Committee. For a free copy of the current issue of National Review write to Dept. C-1. 150 East 35th Street. New York, N.Y. 10016.

"The Sacred Executioner and the Jews."

"The Sacred Executioner" kills as a sacrifice to God and is, therefore, both sacred and accursed.

Follow the trail of this enigmatic figure through mythology and the Bible.

Consider the role of the Jews in the New Testament and the early Christian Church.

Don't miss this provocative, day-long exploration by Dr. Hyam Maccoby, author and librarian of the Leo Baeck College, London.

Hear:

"The Sacred Executioner": A Study of Anti-Semitism. Sunday, March 24, 9:30 am-5 pm. Tickets: \$55. (A Kosher lunch available.) Reservations and information: (212) 427-6000 ext. 162. Y-CHARGE (212) 831-8603.



A beneficiary of the UJA/Federation Campaign.

because we have many minutes or even hours in which to find, track, lock our beams onto, and destroy the relatively slow-moving cruise missiles. Lasers in space, contrary to some views that have been expressed, are effective against cruise missiles and bombers because their beams, being light rays, reach to the ground. Clouds offer a temporary screen, but a cover of clouds is not likely to exist all the way to the target. And bombers fly above the clouds, at stratospheric heights, on their way to their targets, and are vulnerable to space lasers for hours.

MARVIN KING correctly rebuts the charge by some critics of the "Star Wars" research program that it is a violation of the ABM treaty. The language of the treaty states that "Each party undertakes not to develop, test, or deploy ABM systems or components," but research on missile defense is not prohibited.

JOSEPH FORBES'S comments on the usefulness of the X-ray laser are taken from a section of the UCS report which Lowell Wood has shown to be in error. For example, the UCS proposes to have the X-ray laser pop up from submarines located in the Arabian Sea. This relatively distant launch site, about 2,000 miles from the closest Soviet missile fields, would introduce a substantial delay of some minutes in the availability of the X-ray laser for combat-that interval being the time required for the X-ray laser device to climb to an altitude at which the Soviet missile fields are in its line of sight. But, as Mr. Wood pointed out, the eastern Mediterranean and the Sea of Japan are much closer to the Soviet missile fields, and just as accessible to our submarines politically. A launch from these waters largely eliminates the problem cited by the UCS.

Mr. Forbes also says that satellites are necessarily more vulnerable to attack than missiles. This is often stated, but is quite untrue. A satellite, being weightless in orbit, can be defended by heavy armor, guns, and maneuvering rockets. On the other hand, a missile, which must propel itself upward against the backward pull of gravity, cannot afford any substantial amount of armor or shielding, or it loses much of its payload. Today's military satellites are quite vulnerable because no one has been shooting at them, and we have not bothered to go to the expense of protecting them, but tomorrow's satellites will be another story. A substantial part of the Defense Department budget is going into research on the hardening of our military satellites.

As for the computations needed in the "Star Wars" defense, as many as several billion operations per second may be necessary, but parallel computer architectures should make this possible. Computing speed is not expected to be a major problem for our defense. The preparation of the complex programs needed is another matter. This is one of the pacing items in the "Star Wars" program, and is receiving a great deal of attention in early planning.

"The Bostonians"

To the Editor of Commentary: It is not a matter of great moment, and in no way affects the argument of Richard Grenier's brilliant analysis of The Bostonians ["The Bostonians Inside Out," October 1984], but I should like to point out that his reference to Elizabeth Peabody as Hawthorne's elderly sister is incorrect. She was Hawthorne's sister-in-law and was known as one of the famous "Three Sisters of Salem." Another of the sisters, Sophia (a recognized painter in her day), married Nathaniel Hawthorne, and the third sister, Mary, married Horace Mann, the educator, and collaborated with him in his work.

Elizabeth Peabody was only incidentally a feminist. She opened a bookstore in Boston which became the gathering place for intellectuals of the day (mostly male) and there she printed the *Dial* magazine (a literary journal) and three of Hawthorne's first books. In later years, her principal interest lay in the field of education, and in 1860 she established the first kindergarten in America.

CLAIRE L. BARON

Rye, New York

To the Editor of Commentary: Should we be terribly concerned

with Christopher Reeve's "explanation" of the ending of *The Bostonians*? According to Richard Grenier, "Reeve feels that . . . Basil Ransom and Verena [will] live a life 'a lot like' that of Tom Hayden and Jane Fonda." I certainly did not receive this impression from the movie. Granted there are any number of distortions of Henry James's novel in the movie, but let us be fair: this is not one of them. Verena, in choosing Ransom, has unequivocally given up her public life. Throughout much of the movie, Ransom insists on this. Notwithstanding Reeve's personal wishes, there is no evidence in the movie that might lead us to believe otherwise.

My point in this apparent nitpicking is that in an otherwise fine movie review, one among many Mr. Grenier has written, he fails to distinguish what the movie "explains" from one of the "explanations" given by an actor outside the movie. With all due respect, this appears to be a somewhat deliberate confusion on Mr. Grenier's part, in order, perhaps, to support his more general argument, an argument that I believe to be valid, namely, the increased politicization we are now finding in American movies. . .

Adrian R. Valentino Hicksville, New York

To THE EDITOR OF COMMENTARY: I have generally found Richard Grenier's movie reviews emotionally galvanizing and intellectually stimulating, but his article on *The Bostonians* contains serious flaws in judgment....

What Mr. Grenier fails to realize is that in the triad of major characters-the other two being Olive Chancellor and Verena Tarrant-both Ransom and Chancellor are power-driven egotists who fight to possess the poor victim, Verena. It may be true that Ransom is the conquerer, but so was Attila the Hun. Although James may have shared some of Ransom's anti-feminist sentiments, he himself admitted that Ransom was "rather vague and artificial, quite fait de chic." In the novel, James seems to be saying "a plague on both your dogmas.'

Mr. Grenier's zeal to paint a portrait of James in anti-feminist, conservative colors . . . leads him to bring in irrelevant corroboration in an attempt to buttress his case. For example, he quotes William James's praise of "martial virtues" . . . and then goes on to cite the revelation by William's closest friend, Oliver Wendell Holmes, Ir., that his involvement in the Civil War was "the most exalting experience of his life." I suppose if there is such a thing as guilt by association, then there must be glory by association. I prefer to think that one should rest one's

THE NEW REPUBLIC

A Weekly Journal of Opinion

4 TRB FROM WASHINGTON ROCKY HORROR SHOW

ISSUE 3,710

FEBRUARY 24, 1986

بر

Editor-in-Chief and President
MARTIN PERETZ
Editor
MICHAEL KINSLEY
Literary Editor
Senior Editors
FRED BARNES, ANN HULBERT,
CHARLES KRAUTHAMMER
Managing Editor
DOROTHY WICKENDEN Associate Editor
JEFFERSON MORLEY
New Republic Books Editor
(Henry Holt and Company)
STEVE WASSERMAN Filme Theater
STANLEY KAUFFMANN ROBERT BRUSTEIN
Music Poetry
EDWARD ROTHSTEIN ROBERT PINSKY
Economics Correspondent
Contributing Editors
ABRAHAM BRUMBERG,
ROBERT COLES, HENRY FAIRLIE,
JAMES K. GLASSMAN, HENDRIK HERTZBERG,
VINT LAWRENCE, R.W.B. LEWIS,
MARK CRISPIN MILLER, ROBERT B. REICH,
MAGGIE SCARF, RONALD STEEL,
ANNE TYLER, NICHOLAS VON HOFFMAN,
MICHAEL WALZER, C. VANN WOODWARD
West Coast Correspondent
MICKEY KAUS Editorial-Corporate Coordinator
LAURA E. OBOLENSKY
Assistant to the Editors
DINA D. HEIZER
Broduction Manager
PATRICIA A. HOPPER
LAMIE BAYLIS
Production Associate
BRUCE STEINKE
Literary Assistant
JENNIFER KRAUSS
EVAN T. BARR, KIMBERLY K. RICE,
WILLIAM SALETAN, JACOB WEISBERG
Publicher
JEFFREY L. DEARTH
Associate Publisher
REED PHILLIPS
Controller
JEAN GANDY Advertising Manager
JOAN M. STAPLETON
Circulation Director
TOM HICKS
Circulation Manager
Assistant to the Controller
MARIA F. SALATTI
Circulation Assistant
ROBIN CHERRY
Assistant to the Advertising Manager
Advertising Representative
KEVIN LONDON
Accounting Assistant
CHRISTINA R. OVERHOLSER
Duck issues and Keception
Leadership Network Advertising
ROBERT F. SENNOTT JR.

FOUNDED 1914

WASHINGTON, D.C.

	•	What the Soviets don't understand about pop culture	
6	CORRESPONDENCE	Women at work, retirees at risk, &c.	
7	THE EDITORS	HEROES CITED, FACTS SLIGHTED Reagan's evasive State of the Union address. NOTEBOOK Corporate deadbeats, New York suckers, &c.	
8	Fred Barnes	. WHITE HOUSE WATCH: QUITTERS Two officials escape from 1600 Pennsylvania Avenue	
10	WILLIAM SALETAN	. RACE FOR OFFICE On affirmative action, Republicans sing, "Do as I say, not as I do."	
13	ROBERT ENGLISH	. OFFENSIVE STAR WARS SDI's secret potential for attack.	
15	MICKEY KAUS	. AGE OF CELEBRITICS Glitz blitz nixes politix.	
18	RICHARD L. MILLETT	. AFTER THE ELECTIONS Central America's troubled democratic trend.	
20	Edward R othstein	. LEAD ME NOT INTO PEN STATION The political postures and platitudes of the "nonpolitical" 48th International PEN Congress.	
24	STANLEY KAUFFMANN	ON FILMS: THE OLD ORDER CHANGETH NOT Hollywood hip in Down and Out in Beverly Hills.	
26	LEON WIESELTIER	A FABLE Günter Grass visits the South Bronx.	
28	Amos Oz	. A WRITER'S GUIDE A talk from the International PEN Congress.	
29	XAVIER ARGUELLO	A GUERRILLA AND HIS PEN The Nicaraguan revolution's classic: the combat memoirs of Omar Cabezas, interior vice minister.	
35	Donald Fanger	SOPHIA'S CHOICE The Diaries of Sophia Tolstoy translated by Cathy Porter	
36	GARY SOTO	POEM Our Days	
38	DANIEL J. KEVLES	BRAIN TEASERS • The Mind's New Science: A History of the Cognitive Revolution by Howard Gardner	
42	Los Angeles Diarist	TREASURE HOUSES	
С	COVER by Bryan Leister for THE NEW REPUBLIC. Article on page 20.		
_			

THE NEW REPUBLIC, Vol. 194, Number 8, Issue 3,710, February 24, 1986. (Printed on February 5, 1986.) Published weekly (except for combined issues dated Jan. 6 & 13, July 14 & 21, Aug. 11 & 18, and Sept. 15 & 22, 1986) at 1220 19th Street, NW, Washington, DC 20036. Telephone (202) 331-7494. Leadership Network advertising (212) 684-5500. Yearly subscriptions, \$48; foreign, \$73; Canada, \$60. Back issues, \$2.50 (includes postage & handling). ©1986 by The New Republic, Inc. (ISSN 0028-6583). Second-class postage paid at Washington, DC. Indexed in Readers' Guide, Media Review Digest. Available on microfilm from University Microfilms Intnl., 300 N. Zeeb Road, Ann Arbor, MI 48106 and Bell & Howell, Old Mansfield Road, Wooster, OH 44691. Member, Audit Bureau of Circulations. Unsolicited manuscripts can be returned only if accompanied by a stamped, self-addressed envelope. Subscribers: Please send all remittances, changes of address, and subscription inquirles to Subscription Service Dept., The New Republic, P.O. Box 955, Farmingdale, NY 11737-0001. For subscription problems call 800-227-5782.

at the Heritage Foundation, was looking for someone to deliver a speech on American policy toward South Africa as part of the foundation's biweekly lecture series. Heritage has an in-house expert on southern Africa, Bill Pasco. Bruce Weinraub, the think tank's foreign policy director, had toured the country in late May, and Stuart Butler, the domestic policy director, was about to embark on a similar investigation. But when Hart learned that Murdock was planning to take a tour programmed and sponsored by the Southern African Forum, an organization well known for its affiliation with the Botha government (Jerry Falwell happened to be on the same flight), he offered Murdock the speaking engagement. Hart concedes that Murdock has "no connection" to Heritage, is "the youngest of any of the speakers so far," and "isn't an expert on anything." Why give him the opportunity to laud American investment in South Africa? "Well. . . ," Hart stumbles, "... he's young, he's articulate ... " The suspense is painful.

Clearly the question is not whether the Republican Party has made a special effort to assist potential black GOP officeholders, but what we are to make of the fact that it has. Ben Hart's selection of a young black man to preach patience with South Africa to a white audience is rank political exploitation. But such cynicism doesn't have to discredit the whole idea of race-consciousness. There's nothing wrong with Mike Miles's ethnically influenced decision to pick the capable Joe Watkins rather than an aspiring white politico out of a sea of applicants.

Spokespersons for the RNC and the National Republican Congressional Committee reject the comparison to affirmative action. They point out that Lucas, Andrews, Watkins, and Murdock could not have won the party's favor if they were not bright, personable, and diligent. The Republicans also argue that, unlike an employer, a political party must reach out to ethnic constituencies by elevating role models from those groups. And they observe that the party's decisions about where to allocate campaign resources, such as prestigious figures like Ford, Bush, and Dole, involve a host of considerations other than the beneficiary's "merit." In short, they say, there's no hypocrisy.

Ironically, they don't realize that what they are defending is affirmative action. As Ben Andrews observes, affirmative action is not a matter of hiring incompetents. It is a mechanism for propelling capable minorities to positions (in business or in the Republican Party) in which they are presently underrepresented. It aims to establish role models (in the eyes of Americans or in the eyes of potential black Republican voters). It acknowledges that "merit" (in picking a job applicant or a gubernatorial candidate) is an important but perhaps not decisive aspect of complex and subjective judgments. If Reagan and Meese want to pause in their ideological crusading to consider why so many Americans want affirmative action, they could start with their own party.

WILLIAM SALETAN

SDI packs a hidden punch. OFFENSIVE STAR WARS

T HAS BEEN nearly three years since President Reagan announced his vision of a world made safe from nuclear attack through the promise of a Strategic Defense Initiative (SDI). In that time, supporters of "Star Wars" have been hailing the president's wisdom and announcing major technological breakthroughs, while detractors point out the proposed system's numerous flaws and vulnerabilities. Lost in the tangle of opinion is what may be the single most dangerous aspect of space-based weaponry: its potential for attack.

In President Reagan's address to Congress after the Geneva summit, he assured the nation that "SDI has nothing to do with offensive weapons." Only the Soviets contest this assertion. SDI's domestic critics have focused their arguments on the technological feasibility of various defenses and their implications for nuclear stability and deterrence. In doing so, they have largely limited the terms of debate to those outlined by the administration. But Gorbachev's objections should be taken seriously. The development of Star Wars weapon technologies by both sides could result in a world of unimaginable dangers.

There is no such thing as a purely defensive weapon and there hasn't been since prehistoric times. The Stone Age warrior who lost his club quickly discovered that his heavy wooden shield was still useful for bashing an adversary over the head. More recent examples include our sales of F-16 fighter jets to Pakistan and Stinger antiaircraft missiles to Saudi Arabia. Although these were supposedly "defensive" weapons, India and Israel have been justifiably concerned that they might be used for offensive purposes.

And so it will be with the weapons of Star Wars. The offensive potential of this next generation of kinetic and directed-energy weapons is staggering, with frightening strategic implications. Consider the following possibility: suppose that technological advances in SDI research make it possible to develop space-based weapons capable of the swift and accurate destruction of targets in space *and* on the earth's surface. Such systems might even be able to destroy intercontinental ballistic missiles (ICBMs) in their silos in a matter of moments with minimal "collateral" damage. Should they prove feasible, there is no doubt that both the U.S. and Soviet military establishments would find suitable rationales for developing such weapons.

The "surgical" precision of such weapons would make the temptation of a first strike much harder to resist. Even more disconcerting is the extraordinary speed with which space-based weapons could attack. To date, none of the numerous advances in strategic weaponry over the past 20 years have been able to make a first strike credible. No matter how overwhelming one's advantages in megatonnage or accuracy, no attacker could ever escape devastation as long as the enemy had enough time to launch his missiles in retaliation. However, space-based weapons might reduce a half hour of warning to a mere two or three minutes. Of course, the side that felt threatened by such a system might well be compelled to shift from a "launchunder-attack" or "launch-on-warning" posture to one of "launch-under-crisis" for fear of losing the bulk of its retaliatory force before it even knew that it was being attacked. A more hair-trigger world is hard to imagine.

OW MIGHT Star Wars technologies make such L weapons possible? A space-based laser powerful enough to destroy ICBM's in flight could certainly attack satellites and terrestrial targets as well. Separate studies by Argonne National Laboratory and R&D Associates, a private defense research firm, have concluded that spacebased lasers could incinerate flammable targets and set numerous fires on the enemy's home soil. Although deploying a constellation of orbiting lasers with sufficient power sources would be an extremely difficult task, these problems might be circumvented by instead building ground-based lasers that operate in tandem with orbiting targeting mirrors. Techniques such as "adaptive optics," varying wavelengths, and a precisely pulsed beam should enable ground-based lasers to overcome atmospheric interference and to reach the targeting mirrors tightly focused. As the beam is redirected earthward, it will undergo far less "angular interference" since the densest part of the atmosphere is closest to the earth's surface. Only the presence of clouds or smoke would disrupt a strategic laser attack.

Although hardened ICBM silos and command centers will probably remain invulnerable to a laser strike, many other important targets may not. These include earlywarning and antiballistic missile radars, "soft" communications networks, and even mobile missiles.

Of course, such an attack would be suicidal unless it could disable much of the adversary's retaliatory force. If lasers cannot destroy ICBM silos, what space-based weapons can? Perhaps most threatening are the various "kinetic energy" weapons, which range from familiar cannonand rocket-propelled warheads to sophisticated hypervelocity launchers. These so-called "rail guns" hurl projectiles at great speed by means of precisely timed boosts of electromagnetic energy. Although they may one day prove effective in an antisatellite role, rail guns are not likely to be used for ground attack because their projectiles would not survive reentry.

The kinetic energy weapon most likely to have the capacity to "bust silos" is the humble rocket. Imagine a fleet of satellites, each bearing a number of small missiles, that passes over the adversary's territory in low earth orbit. Such a system would superficially resemble the one envisioned in the proposals of "High Frontier," a pro-Star Wars lobbying group. In this case, the missiles would be aimed at ICBM silos and leadership and command centers. For such a system to carry out a successful first strike, before the victim could even "launch on warning," would require great speed. Hypervelocity missiles launched from altitudes of 100 miles or less could easily complete an attack in several minutes—more than rapid enough to preempt any response.

This is not a new idea. In fact, it was feared that the Soviets were developing such an "orbital bombardment system" in the mid-1960s. The idea was dropped within a few years, partly due to the immense technological obstacles and partly because of the great danger and political difficulties raised by stationing nuclear weapons in orbit. Finally, the 1967 treaty prohibiting nuclear weapons in space ended this debate. Twenty years later, though, many of the technological barriers to such a system have been overcome. Moreover, advances in warhead accuracy and guidance technology raise the prospect of using nonnuclear weapons to attack ICBM silos, thereby avoiding the many problems associated with basing nuclear weapons in space. Thus Star War technologies, paradoxically, could give conventional warheads a new and dangerous role in the strategic balance.

ERHAPS the most threatening Star Wars attack would employ a combination of these systems. The aggressor might begin his assault with a laser attack on the other side's communications networks and early-warning systems, including satellites. The "electromagnetic pulse" effects of several high-altitude nuclear explosions would further paralyze command and control systems. With the victim effectively blinded, the attacker could quickly follow with the launch of space-based missiles against such targets as silos, command bunkers, airfields, and other military facilities. Lasers might also be used to pin down missiles in their silos until the silos could be destroyed. Strategic bombers caught on the ground would be highly vulnerable as well. In a matter of minutes, the victim of such an attack might find the bulk of his ICBM and bomber force gone and his command systems in disarray-without having endured any significant damage to his cities and industries.

Assuming that communication with submarines was still possible, the leader might order his submarinelaunched ballistic missiles to retaliate. However, he would then be in the position of initiating a major nuclear war against a far better armed adversary. Partially disarmed, but with his country largely undamaged, suing for peace might be the only choice. Of course, the strategic calculus here would be greatly complicated by both sides' possession of equivalent Star Wars capabilities. The odds of keeping such a conflict nonnuclear would be slim indeed.

Is such a scenario likely? Perhaps not, but it and any number of other offensive possibilities are considerably more plausible than is the president's "peace shield" vision. This is so because in a world of Star Wars technologies, the offense has a number of basic advantages over the defense.

Ŷ

L

For example, the complex tasks of sensing, tracking, and battle management are less demanding for an attacker (who has the advantage of surprise and stationary targets) than they are for the defender (who must respond instantaneously to rapidly moving missiles, warheads, and decoys). A defensive Star Wars system like that envisioned in SDI will have to be able to defend itself from a preemptive strike. But an offensive Star Wars system, designed to strike first, will have no such burden. Finally, the aggressor can wait until atmospheric conditions are ideal for attack, while the defender must be on guard whether it is sunny or not.

Thus it is likely that as some Star Wars technologies mature, the capability to develop offensive systems may be attained well before various defenses prove feasible. Depending on the prevailing political and military circumstances, the pressure to deploy an offensive system might be irresistible. And if we abrogate the ABM treaty and move toward deploying various weapons in space, offensive or defensive, what is there to stop the Soviets from developing a space-based attack system of their own? Certainly not the president's vague promise to "share" our technology with the Soviets. Indeed, the administration's unabashed enthusiasm for the nuclear bomb-pumped X-ray laser may well convince the Soviets that it is no longer necessary or prudent to continue observing the prohibition against nuclear weapons in space.

Why have SDI's critics yet to consider these most destabilizing aspects of space-based weaponry? Understandably, their first priority has been to expose the folly of the peace shield vision. SDI's supporters, few of whom believe in the peace shield either, have focused on the more moderate goal of complicating Soviet attack plans through some of SDI's near-term capabilities, or simply support SDI as a bargaining chip. Nobody has yet grappled with the long-term problem of imagining a world radically transformed by a myriad of futuristic military capabilities.

Neither the U.S. nor the Soviet Union has yet shown much ability to assess the long-term impact of new technologies upon a precarious strategic balance. Every new weapon, from multiple, independently targetable reentry vehicles (MIRVs) and antisatellite weapons to sealaunched cruise missiles, has provided its originator with a fleeting advantage at best, ultimately reducing the security of both. Former secretary of state Henry Kissinger candidly admitted wishing he had "thought through the implications of a MIRVed world" before deciding to deploy these systems in the early 1970s.

The greatest danger may be that as the peace shield vision collapses under the weight of its own infeasibility, critical attention may be diverted from the Star Wars technologies that will eventually bear fruit. Although these weapons may not come into being until the 21st century, many decisions determining their future will likely be made over the next decade. We must put aside such silly arguments as, "If the Russians are against it, then it must be good," or "It's only a bargaining chip." The next time we neglect to "think through the implications" might be our last.

ROBERT ENGLISH

Robert English, a Defense Department policy analyst from 1982 to 1985, is Soviet affairs specialist with the Committee for National Security. Stars and pols ink \$100 million deal.

AGE OF CELEBRITICS

Los Angeles

LET'S SEE. On March 1 we have the Great Peace March. Three thousand people walking from Los Angeles to Washington for nuclear disarmament, starting at a starstudded concert in the L.A. Coliseum. Endorsed by Madonna. Tents provided by North Face. Shoe sponsorship under negotiation. Total cost: \$20 million. Arrives in Washington November 15.

Meanwhile, on May 25, there's Hands Across America. A 4,000-mile human chain from Los Angeles to New York to raise \$100 million to "combat domestic hunger and homelessness." Organized by USA for Africa ("We Are the World"). Chief corporate sponsor: Coca-Cola. Computers by Compaq. Five million to ten million participants, including "the largest number of celebrities ever assembled." Ten dollars for a place in line, \$25 for a commemorative T-shirt.

Did I mention that May 25 is also the date of the "Freedom Festival," a star-studded concert "huge in its scope" designed "to salute America, its music, and its therees" and to raise money for Vietnam veterans, according to celebrity sponsor Don Johnson of "Miami Vice"?

It's getting pretty crowded out there, what with all the monumental affirmations of the American spirit. The looming prospect of compassion gridlock on May 25 was only partially alleviated when the hand-holders spurned the peace marchers' offer of help and "went south," choosing a route that will put some 360 miles between them. The Great March is currently scheduled to be somewhere between Denver and North Platte when the Great Chain steams through Albuquerque, Amarillo, and Little Rock.

True, these coming events are only the latest in a long line of attempts to harness the power of "Entertainment Tonight" and the corporate tax deduction for worthy causes. But they are the most grandiose, and the most political. Except that politics isn't really the right word. What we have here is really the birth of a new form of social activism. Not politics, but Celebritics. In politics, movie and pop stars are just one asset a candidate can throw into the fray. Celebritics is when the celebrities become so powerful that they frame the issues and run the campaigns themselves, dispensing with the boring old politicians altogether.

Celebritics represents the flowering and cross-pollination of two phenomena. The first is the susceptibility of Americans to vague demonstrations of pride under corporate sponsorship. The breakthrough event here was probably the AT&T Olympic Torch Relay. Now hosts of wouldbe Peter Ueberroths are organizing similar logo-laden feelgood campaigns, from the refurbishing of the Statue of Liberty to the outfitting of the next America's Cup con-

The Wonders of Star Wars

Lord Zuckerman

ने न जन्मरी प्रकेश में

Star Warriors: A Penetrating Look Into the Lives of the Young Scientists Behind Our. ce Age Wenponry by William J. Broad. Simon and Schuster, 245 pp., \$16.95

ALL ALL

1 1 + 1 + 1 + 1 + 1 + 1

A state

A

How to Make Nuclear Wenpons Obsolete by Robert Jastrow.

Little, Brown, 175 pp., \$15.95

Ballistic Missile Defense Technologie Congress of the United States, Office of Technology Assessment. 325 pp., \$12.00

L. The Geneva summit has come and gone, leaving Mr. Corbachev adamant that the Strategic Defense Initiative program is a critical impediment to any significant nuclear arms control agreement - for the simple reason that it would inevitably drive the arms race into space. President Reagan on the other hand, remains bewitched by what he continues to call his dream, a dream of a shield of defense systems in space which would liberate manking from "the prison of mutual terror." So there it is -as the USSR sees it, a choice between survival and mutual suicide; for Mr. Reagan, a beautiful dream. Where does reason lie? Will there be anything new at the summit later this year?

Had anyone other than the American president ever invited scientists to try to render "nuclear weapons impotent and obsolete," the suggestion would probably have attracted no more attention than had they been asked to square the circle. or solve the problem of perpetual motion. But it happened to be the President, and he spelled out his vision of a future over which the nuclear bomb no longer casts a shadow in such homely terms that it all sounded real. How could the message fail to appeal? There was also a promise of - vast resources for R&D-a vision therefore not only of peace but, at least in the meantime, of work, prosperity, and excitement for some. For those who might object that the idea was strategically naïve, the President even acknowledged that it would "take years, probably decades of effort" for the dream to become a reality, and that in the meantime defensive systems, "if paired with offensive systems," could be viewed as fostering an aggressive policy."' However fantastic it was, the challenge therefore had to be taken seriously, even by the President's defense secretary who, it had been widely rumored, had been skeptical about the idea until the moment it was suddenly proclaimed to the world ...

The upshot is that within the space of two years, SDI has become one of the best-known acronyms in the world. It has stimulated a global debate. Instead of reducing tensions between East and West and "introducing greater stability into the strategic calculus of both sides," it has exaccreated the tensions. It has also generated strains in the Western alliance. Even more important, it has divided that part of the American scientific community to

Essays on Strategy and Diplomacy: The Strategic Defense Initiative, No. 9, The Keck Center for International Strategic Studies (May 1985).

A. 10050

which the challenge was particularly addressed, with respect both to its technological implications and to its strategic desirability-a part of the debate in which politicians, military people, and ordinary citizens have also engaged. And of course the debate has produced at mountain of comment, including books such as the three under review.

In some respects the debate is a rerun of the controversies that culminated in the 1972 ABM . Treaty, when both sides implicitly acknowledged that it was then beyond their power to design meaningful defenses against intercontinental ballistic

missiles (ICBMs). Both had set about the

job in the same way, just as they deployed

the same variety of anti-aircraft defenses.

There were "acquisition radars" which

scanned the horizon for incoming war-

heads; "tracking radars" linked by com-

outer to nuclear antimissile missiles

whose explosion outside the atmosphere

would cmit X-rays to which the attacking

warheads would in theory be vulnerable

at great distances; and then there were

terminal radars and terminal anti-missile

missiles to deal with such warheads

as would not have been destroyed. By

the late Sixties enough hardware and

computer links had been developed to

But doubts had already started to set

in.³ Could an ABM system work? It

would have to deal not only with nuclear

warheads but with a variety of decoys

and other "penetration aids" which the

missiles would release in order to confuse

the radars. Warhcads might be exploded

outside the atmosphere to create an elec-

tromagnetic blackout that would make

justify deployment, or so it seemed.

is sp

コス

the task of the radars almost impossible. The large radars themselves were clearly vulnerable to direct attack. The scale of an attack could itself be so great as to. swamp any defensive system. Each ballistic missile could carry not one but several warheads which, as was clearly recognized as early as the mid-Sixties, could be made independently maneuverable-what we now call MIRVed.3 And then there was a political problem-people did not want defensive nuclear missiles planted in their back yards. Finally, neither the US nor the USSR could afford to deploy more than a handful of defensive complexes. If these could be made to function effec-

Low Com

de la

and the state all and an and the as de Manare about the is state as and 10 it ultre : Statut St. 4.400 and N. March -35 S to the

> tively, which was the first question that needed an answer, there was then a second problem, who or what was to be defended.

10 00

Despite all the doubts, in 1967 the United States started deploying a "light" ABM system, code-named Sentinel, to defend against a possible missile attack from China. The USSR had started a few years before to deploy one for the presumed defense of Moscow. For, as Mr. Khrushchev saw it, if his ballisticians knew how to "hit a fly in the sky," so too they could hit incoming warheads. It was therefore only rational to try to defend his capital city. President Johnson was not so sure. In 1967, he asked the only question that mattered: Would an ABM system work? The answer from those best qualified to judge was "no."4 No ABM system could reduce significantly the vulnerability of the United States; no nresident could initiate or agree to the in-

See Richard L. Garwin and Hans A. Bethe, "Anti-ballistic missile systems, Scientific American (March . 1968), pp. 21-34.

Herbed York, Race to Oblivion (Simon and Schuster (970). 8. . . .:

itiation of a nuclear exchange without realizing that once it had begun, he could never be sure where it would end—that the risk, were he ever to agree to the actual use of nuclear weapons, was the total devastation of his country. In 1967 President Johnson and Robert McNamara, his defense secretary, tried hard at Glassboro, New Jersey, to persuade Kosygin, Khrushchev's successor, to accept these propositions. Gradually he and the Politburo saw the light. Dubious ABM systems only destabilized a state of mutual nuclear deterrence.

The state of the second

ing n. +

A det anis

And a second and both a first

the result was the ABM Treaty of _ 1972, a treaty that limited ABM deploy-ment to two sites only later changed to one in each country. The treaty did not bar development work that improved the radars, computers, and defensive missiles deployed within the two sites, but specifically prohibited the development of any type of space-based ABM system.

And that was then the order of the political day, And that was the moment - not March of 1983 when President Reagan spokewhen SDI really began. For, not surprisingly, the American and Soviet scientists and engineers who had been working on ; lasers and particle beams as possible Ballistic Missile Defense (BMD) weapons did not cease their experimental inquiries when the 1972 treaty was signed, any more than did the scientists and engineers who were trying to improve the power of the permitted radars and computers, and the design, thrust, and speed of their defending missiles. The military chiefs on both sides, who had anyhow been dubious about the wisdom of the ABM Treaty. were only too ready to encourage them to continue, however little they understood the intricacies of the systems concerned. Most of the scientists and engineers needed little urging. After all, it was their jobs that were on the line,

An important figure who was in no need of any encouragement was Edward Teller, the well-known refugee theoretical nuclear physicist who had worked on the atom bomb under Hans Bethe during the war years. Teller is regarded by some as a distinguished, by others as a notorious, physicist. During the McCarthy years he had played a critical part in the downfall of Robert Oppenheimer, the wartime scientific director of Los Alamos, whether because of jealousy and frustration or because he had conceived of himself as some kind of superpatriot-phis royal que le Roi-it was difficult to say. Whatever his motives, Teller lost the respect of most of his scientific peers, from whom he rapidly became isolated.5 On the other hand he was cagerly supported by members of the defense establishment, particularly in the Air Force, who were only too ready to agree that a more powerful nuclear device than the atom bomb, the "second generation" hy-

⁵"if a person leaves his country, leaves his continent, leaves his relatives, leaves his friends, the only people he knows are his professional colleagues. If more than ninety percent of these then come around to consider him an enemy, an outcast, it is bound to have an effect." Teller, . quoted in Stanley B. Blumberg and Owinn Owens, Energy and Conflict: The Life and Times of Edward Teller (Putnam, 1976).

The New York Review



drogen bomb, would be a valuable addition to America's nuclear assential. They also supported him to his cam-

paign to found a second nuclear warhead laboratory at Livermore as an offshoot of the University of California. Teller had persuaded them that the Los Alamos research center was too liberal. He vehemently opposed the Partial Test Ban Treaty of 1963, basically because it interfered with the testing of new warhead designs, but protesting too that the Soviet Union would be bound to cheat-and that anytiow there was no reason to suppose that the radioactive fallout from nuclear tests in the atmosphere did any harm, it might even do good.4 He became the chosen scientific mouthpiece of the "hard-line right," a term that Europeans have come to identify with those Americans who are intrinsically against arms control, who uncritically assume that more destructive nuclear power than what already exists means more military and political strength, and who, whatever the risks, wish to oppose the Russians and communism at all times and wherever possible.

Teller was also loud in his protestations against the ABM Treaty and against SALT I and II. The Livermore laboratory, his creation, was going to give birth to a third generation nuclear device that would transform the entire strategic scene. According to William Broad, the author of *Star Warriors*, the picture of this third generation of nuclear devices that Teller painted for the President was largely instrumental in instilling in Mr. Reagan's mind a vision of a future in which nuclear weapons could be made impotent and obsolete.

Teller thus lurks behind almost every page of Mr. Broad's book, which focuses on a small but select group of the employees of Livermore, who now number, so we are told, some eight thousand, and who cost the federal government more than \$800 million a year. Although Livermore does many other things, its primary function is the design of warheads, a field in which it competes fiercely, and presumably very successfully, with the older Los, Alamos laboratory. A glossy brochure that was issued to celebrate the station's silver anniversary claimed that Livermore was responsible for nine of the ten strategic warheads now in the American nuclear stockpile. As Mr. Broad was told by a member of the special group with whom he spent a week in the Livermore compound, warhead and weapon designers are free to follow their heads-the number of possible designs is "limited only by one's creativity." The young men Mr. Broad was getting to know were the ones who were responsible for Teller's thirdgeneration nuclear breakthrough.

Their leader, and Teller's main disciple, is Dr. Lowell Wood, now aged forty-two. For a week Mr. Broad stayed with him, consorting during all hours of the day and night with his host's team, which was designated O Group at Livermore, and which numbered no more than a dozen or so young scientists of average age less than thirty. Associated with them were as many part-time workers, some of whom were no more than graduate students. Many of the team had begun as research fellows of the Hertz Foundation, on whose board both Teller and Wood sat, and for which Wood served as the recruiting sergeant. With employment prospects bleak, and competition for jobs fierce, he was able to select from all the universities of the US young scientists

Blumberg and Owens, p. 411.

January 30,979861

and engineers in whom he discerned "outstanding capability that has been developed and exercised in some direction" – usually in mathematics or physics. Apparently men with general interests but no specialized technical accomplishment were not wanted.

Successful candidates were invited to work at Livermore for a summer in an intern program, and were kept on if they made the grade. All but a few of the group were, like Wood himself, bachelors. Few had set out to be bomb makers; but it was either that or, as one of the group told Mr. Broad, working in a beet factory. There was the further attraction that Livermore had the most marvelous equipment with which to work, as well as access to the underground nuclear testing grounds of Nevada, which were shared effect as an outstation-with Los Alamos and the Sandia nuclear development establishment at Albuquerque.

Lowell Wood's young men both collaborated and competed with one another, and celebrated their triumphs at parties at which they ate masses of ice cream and drank gallons of Coca-Cola. Mr. Broad tells us that there were no women around and that O Group was not entirely popular in the main Livermore establishment, one member of which told Mr. Broad that the team was made up of "bright young hotshots" with "no outside interests ... who are socially maladjusted." If the week that Mr. Broad spent with the hotshots was typical, they also seemed to converse only with one another, and when not discussing their work, exchanged naive views about politics. One would imagine from the conversations Mr. Broad describes that the only problem in the world for O Group is the competition for power between the USSR and

the US. Their part of the problem was to construct a shield to keep out Soviet warheads. One of the group told Mr. Broad that as soon as that was done, the US would leave the USSR technologically "in the dust," and that success would prove to the world that democracy. works." Another told him that if the Russians "owned the planet" they would not allow the evolution of technology to continue. So far as this young man knew, "the only reason they are going with technology is that they can't afford not to." He clearly was unaware that in the 1930s the USSR had shocked the West with a revelation of a totally utilitarian view of. science and of its absolute commitment to technology. As propounded by B. Hessen, the Russian ethos holds that science cannot advance in a society which restricts technological advance, that science develops out of production, and those social forms which become fetters upon productive forces likewise become fetters upon science."7 I imagine that this proposition would have appealed to Lowell Wood and his team. They are doers, not philosophers or political scientists. Their business, like that of their opposite numbers in the USSR, is to put scientific knowledge to work.

2.

Long before any of them was born, long before the era of ICBMs, physicists had been building machines—for example, cyclotrons and proton synchrotons—in which the subatomic particles that make up the atom are accelerated into extremely powerful beams of energy. These "par-

³Science at the Crossroads, papers from the International Congress of the History of Science and Technology, 1931 (London: Frank Cass, 1971).

PULITZER PRIZE WINNER GALWAY KINNELL

"One of Walt Whitman's most eloquent heirs....His latest collection of poems, THE PAST, attests to his mastery." —New York Times

THE PAST

10

THE PAST is Galway Kinnell's first collection since his *Selected Poems* in 1982, which earned the Pulitzer Prize, the American Book Award, and later the MacArthur Foundation Award. "Whatever Kinnell writes about, whether it is bomber planes or lovemaking, his voice and the sensuousness of

mising." —Saturday Review

his poems are

uncompro-

2.20

2

and a

ctel design: me Gray 0 1985 ctel Paintin: Wolf Kalm, Targe wer Berid, 1984. Courtesy of the owner. 2 Park Streint, Boston, Massachusetts 02108 of Houghton Mittlin Company 1985

Galway Kinnell

The Southern Review WINTER 1986 A "system founded on the ruins of Reconstruction" C. Vann Woodward, "Time and Place" The noted historian remembers coming of age in the South of the 1930s

"There is no evidence that ... Huey Long ... knew of the existence of The Southern Review." Cleanth Brooks and Robert Penn Warren, "The Origin of The Southern Review"

Other Significant Essays: Thomas M. Carlson, "A Reading of Andrew Lytle's The Velvet Hom"

David Kleinbard, "As I Lay Dying: Literary Imagination, the Child's Mind, and Mental Illness"

John Finlay, "The Otherness of Paul Valery" Five Arresting Stories:

Helen Norris, Robert Drake, Maclin Bocock, Rosanne Coggeshall, Charles Erwin

Poems: John Finlay, Ted Benttinen, W.S. Di Piero, Mary Kinzie,

Frederick Morgan, Daniel Hoffman, and others

1.

121 32

Business Mahager, The Southern Review 43 Allen Hall, Louisiana State University Baton Rouge, Louisiana 70803 Please enter my subscription to The Southern Review for: 1 years, \$12 2 years, \$21 3 years, \$30 My check is enclosed. Charge Visa 1 MasterCard Name______Acct. #

Address ______ Expiration date ______

ticle beams," if directed into space, might, it was later thought, intercept and destroy nuclear warheads. Then, in 1960, came the laser. Ordinary light, as emitted by the heated filament of a light bulb, consists of an incoherent emission of a very wide band of electromagnetic waves - from the longer ones at the red end of the visual spectrum to the shorter ones at the blue. The laser focuses all the energy of a very narrow band of the electromagnetic spectrum within a coherent beam or jst. The discovery" was seized upon by scientists the world over for a myriad of different purposes, from an instrument that can be used for operations on the retina of the eye, to an aiming device for marksmen.

It was not surprising that "defense scientists" also saw in the laser, as in the particle beam, a device which, if furnished with sufficient energy, could operate at great distance – the sort of thing an older generation would have called a death ray. Retired generals started to talk about particle beams as though they were particles which could be poured from one hand to another. The newspapers were not 'slow to hint at a new generation of wonderful weapona.

I he main achievement of O Group, and in particular of Peter Hagelstein, whom Mr. Broad introduces to his readers as , the brightest star of Lowell Wood's team and as a young and troubled engineer who is also interested in classical music and French literature, was the presumed invention of the "nuclear-pumped" X-ray laser. Other workers, including an older Livermore scientist, had also bent their thlents to this problem, but in vain. Xrays belong to the extreme shortwave end of the electromagnetic spectrum (about one thousandth the wavelength of visible light). If a coherent beam of X-rays could be provided with sufficient energy, it would travel outside the atmosphere at the speed of light for thousands of kilometers, imparting its energy to the "first fraction of a millimeter of the aluminum skin of a missile [in its path]. This paperthin layer, would explode, sending a shockwave ['thump'] through the mis-sile," so destroying it." This is the concept that was Teller's basic justification for believing that a space-based ABM system was a possibility. A sufficiently powerful X-ray or other laser or particle beam traveling at the speed of light, that is to say at 186,300 miles a second, could, if properly aimed, destroy a warhcad ose maximum speed was less than ten miles a second.

Were an X-ray laser to serve as an ABM weapon, it would, however, be necessary to use as a source or "pump" of energy a nuclear device, i.e., bomb, of significant force (maybe 100 kilotons in yield or more). On the other hand, in theory the X-ray laser is not the only laser that could do the trick. Los Alamos, among other laboratories, is working on an "excimer" or chemical laser whose wavelength, although much longer than those of X-rays, would be equally effective (but by heating, not "thumping," the target), without the disadvantage that X-rays could be made to lase only at the enormous temperatures associated with the explosion of a nuclear weapon.

¹Discovered independently by Charles Townes, an American, and two Russians, N.G. Basov and A.M. Prochorov, who in 1964 shared a Nobel Prize for their achievement.

⁹Ashton B. Carter, Directed Energy Missile Defense in Space (Congress of the United States, Office of Technology Assessment, April 1984). 26

34

Since X-rays are absorbed by even a thin layer, of the atmosphere, another disadvantage of the nuclear-pumped Xray laser is that it is a device which in practice could only be effectively fired when shot up into space, or shot from a space satellite, a so-called space battle station-which indeed would be necessary for most subatomic particle-beam weapons. An X-ray space battle station would, of course, be a one-shot device, since the whole thing would be destroyed an infinitesimal fraction of a second after the nuclear explosion that generates Xrays, which would be directed along, and amplified by, a series of lasing metal rods built around the whole device. Given certain conditions, the rods could in theory be independently aimed in that millionth

Were it ever possible to bring hiser, particle-beam, or electromagnetic railgun weapons into action during this initial phase of the flight of a missile, the defensive system would also have to include enough artificial surveillance satellites to ensure that as they circled the globe, there would at all times be at least one that was looking down on the Soviet missile fields. Otherwise the curvature of the earth would make it impossible for one or the other side to see its opponent's missiles before their warheads were well into space. The weapons on the "battle stations" circling the earth would have to be ready to be aimed and to strike on automatic command.

But here lies the first major problem. Teller, who we have been led to believe

of a second at a number of enemy launchers as they rose from their silos.

Only land-based weaponry was involved in the ABM systems with which the 1972 agreement was concerned. There was no possibility then of hitting ballistic missiles during their launch phase; since decoys and other countermeasures ruled out effective interception in space, warheads would have become vulnerable only when they reentered the atmosphere on the way to their automatically designated targets.

The 1983 system, if SDI can be called that, differs completely because it is a space-based concept. The theory is that beam weapons or rocket fire could be directed from artificial satellites against enemy missiles during the few minutes of their launch phase, before the ejection of their multiple warheads, and thousands of miles from the targets which they would be programmed to destroy. The same arguments would apply to the electromagnetic rail-gun, another device now being worked on, which uses intense magnetic fields to create the force to shoot out small projectiles ("smart rocks") at very high velocity.

started the whole thing, is convinced that battle stations permanently in space are too vulnerable to enemy attack to be contemplated. Even if, as Lowell Wood suggested to Mr. Broad, they were placed in geosynchronous orbit more than 20,000 miles above the earth, they could in theory be "fooled"-for example, by decoy launches on the ground or by decoys in space furnished with transmitters to send out false signals to confuse the BMD sensor systems, 10 Or they could also be destroyed by space mines, small satellites that would follow the battle stations and would always be ready to explode.

Space-based attacking systems also suffer from an additional handicap-the power sources by which they would be activated would be both very heavy and very bulky. Teller's view is that the X-ray laser, his favorite weapon, should be carried in submarines, and launched into space-"popped-up" is the happy-go-

¹⁰Hans A. Bethe, Jeffrey Boutwell, and Richard L. Garwin, "BMD Technologies and Concepts in the 1980s," *Daedalus* (Spring 1985), pp. 53-71. backy term that is used --by ballistic missiles which would react automatically when commanded to do so by the surveillance satellites that registered the Soviet SS18 and other missiles rising from their silos or launch pads.

Once shot into space, the X-ray laser devices would automatically be focused onto the presumably improtected boosters, which, as they rose above the atmosphere, would be "thumped" by an X-ray laser beam set off by the explosion of a hydrogen bomb. Excimer or chemical lasers on the ground might in theory reach their targets by way of a system of folded mirrors that would be orbiting the earth, ready to open up on computer command to reveal themselves as perfect large reflecting surfaces. These would change their orientation in split second after split second as they aimed the beams impinging on them either directly to their targets, or redirected them to other mirrors that would do the focusing.

Then there would be a computer network that would tie all the surveillance satellites, targeting devices, beam and ray weapons into a single system competent to deal not with one or a few enemy missiles but, if the space shield were to be truly impregnable, with hundreds, even thousands.

What all this means is that if it ever came to action, heaven would become. hell within a few minutes, and, given a failure of the system, that hell would also break out on earth in less than an hour. What is more, even though the whole system would have to start reacting automatically at a moment's notice, somehow or other-no one has said how - there would have to be time for a in link in the chain of interacting hum processes. As a sop to the doubters, the proponents of SDI agree that the fate of mankind is not something that should be simply committed to a computer.

Teller, Lowell Wood and his whizkids, as well as their opposite numbers in Los Alamos and such supporters as they have in the Pentagon and the Department of Energy, believe that all this can be done, or at least that it is worth spending tens of billions of dollars to see whether it can be done. Little time passed, however, before it became clear that some members of Congress had doubts, and that the views of the space warriors were not shared by a number of scientists who know about these things, both within and outside government laboratories. Lowell Wood asserts that all the opposition emanates from a very few scientists. At a small international meeting, not mentioned by Mr: Broad in his fascinating book, Wood told his audience that the number of scientific skeptics could be counted on the fingers of one hand. Unfortunately he said on the fingers of a maimed hand, which rather shocked his audience and reduced the force of his argument.

3.

In fact, the situation is the reverse of what Lowell Wood believes. According to Dr. John Bardeen, twice a Nobel Prize winner in physics, there are few scientists either within or outside the administration who believe that President Reagan's dream could be realized in the foreseeable future. Dr. Bardeen was a member of the White House Science Council at the time of Mr. Reagan's SDI speech, about which both the council and Dr. George Keyworth, its chairman, were ignorant until five days before it was delivered." Teller

"Science (December 13, 1985), pp. 1249-1250.

The New York Review



too does not share Lowell Wood's views about the humber of scientific doubters. He told Mr. Broad that "a great many American scientists, perhaps the majority," are against SDI. The fact is that only a very few independent scientists have come forward to offer their support to the Livermore and Los Alamos enthusiasts. Of these, the quickest off the mark was Dr. Robert Jastrow, a well-known popularizer of science, and a professor of earth sciences at Dartmouth College. His unswerving loyalty to SDI shines out in How to Make Nuclear Weapons Obsolete.

Dr. Jastrow's short book begins with a number of fairly unassailable propositions. Defense, he tells us, is always a good thing; a policy of mutual nuclear deterrence is inhumane since it implies a willingness to destroy populations; if one side acquired an effective defense against . ballistic missiles, it could attack the other with impunity; if both had a defense, nuclear arms would become useless; even an imperfect US defense that left some of its retaliatory nuclear weapons untouched . would foreclose the possibility of a first strike by the USSR. Why the USSR should in any circumstances want to risksuch a strike, knowing that the considerable submarine missile fleet of the United States would be immune to attack, Dr. Jastrow does not make clear. As former president Nixon has recently reminded us, the Soviet leaders are neither madmen nor fools."

Dr. Jastrow then gives an account of the buildup of Soviet land-based missiles in the years since the signing of the SALT treaties, implying that doing so was contrary to what the treaties allowed. For Dr. Jastrow, the USSR has only one end In view, namely the destruction of the land-based components of the US nuclear arsenal in a. first strike. Here Dr. Jastrow's echo of the conventional Pentagon view again clashes with the position of Nixon, who in his recent article in Foreign Affairs observes that the Russians have gained whatever "superiority" they have "in strategic land-based missiles not because of what they did in violation of arms control agreements but because of what we [the US] did not do within the limits allowed by those agreements."

Dr. Jastrow writes about the airborne. and submarine elements of the US nuclear arsenal, including the Trident missile, in terms that rather belittle their value. He talks mysteriously of work going on which will make it possible to detect deeply submerged submarines. This is a possibility that has been contimuously discussed and explored over the years, but so far with no results that would undermine the view that nuclear submarines are, and will continue to be, effectively invulnerable. The picture Jastrow paints seems to imply that Amertica is wide open to attack by the more powerful armory of the USSR: The only real hope, therefore, is "a defense that shielded the American people." And despite what the critics say, that, he asserts, is already available. The new secret weapon is the 670-million-mph laser beam. With this introduction Dr. Jastrow takes us back to SDI.

It turns out that he was so inspired by the President's speech of March 1983 that he immediately and publicly gave it his scientific imprimatur. He then became fortified in his faith by a talk given by Dr. Keyworth, until recently Mr. Reagan's science adviser who, Mr. Broad tells

¹²Richard Nixon, "Superpower Sum-mitry," Foreign Affairs (Autumn 1985).

January 30, 1986

us, was recommended to the President by Teller. Dr. Keyworth is a former member of the staff of Los Alamos, outside which he was little known before, and is a friend of Teller. It would have been surprising if he had not been an ardent crusader for space defense."

Much of the material for Dr. Jastrow's book was provided by Gregory Canavan of Los Alamos, and by Lowell Wood of Livermore, by General James A. Abrahamson, the head of the Pentagon's SDI office, and by a few other officials whom he names. The book contains no original analysis, which perhaps is not surprising since it would seem that Dr. Jastrow has not himself been involved in research either on nuclear weapons or on lasers, radars, or computers. He is a missionary for SDI.14 What the reader therefore gets is a highly optimistic account of the same hypothetical space defensive system of. which countless descriptions have already

asks, find a device that can shield the American people? Of course it can. The invention is already there. "It is called the laser." And the way Dr. Jastrow writes makes it all but child's play to fit together the whole defensive complex. The US could deploy a Mark I system by the early 1990s" and all for a cost of \$60 billion, for which could be bought one hundred satellites, each carrying 150 interceptor rockets, four early-warning satellites in geosynchronous orbits, lower altitude satellites for surveillance, acquisition, tracking, and terminal defense, all the necessary but as yet nonexistent computer networks and other accessories. Everything can be "easily" achieved. Terms such as "easy" and "not too difficult" characterize Dr. Jastrow's rosy picture. **

2845

170

State Republic man

The Village Voice

His optimism is matched only by his breathtaking simplifications. War in space-that is to say, intercepting nuclear warheads with laser or particle beams or with pellets shot from electromagnetically driven rail-guns - is for him like an infantry battle. If the battle-management satellite loses touch with its weapons satellites, they can function autonomously-"like a machine-gunner cut off, from his unit." It would, however, be better, so he writes, were they under the control of the master satellite which, like the general in charge of a land battle, can oversee the whole operation, moving his forces as required. The control function would be exercised by a master satellite -not, it should be noted, by the president of the United States in consultation with the heads of NATO governments-during the three to five minutes of the boost phase of the enemy missiles, whose targets this time would not be hostile soldiers, but defenseless cities with millions of inhabitants in peril of instant death. It reads like a film script. I suspect that were Dr. Jastrow's book to be made required reading for the leaders of America's NATO allies, what reluctant political support some of them have been prevailed upon to give to President Reagan's dream would vanish overnight.

"See, for example, George A. Keyworth II, Security and Stability, IGCC Policy Papers No. 1 (University of California, San Diego, 1985).

¹⁴In congressional testimony (April 22, 1985) Dr. Jastrow admitted that he had not carried out any analysis of SDI on his own, and that he had made it his business to translate into lay language the views of government scientists.

¹⁵Elsewhere in the book he claims that it would take only five years, which I presume means by 1990.



HOLY ANOREX

Milton Rogovin: The Forgotten Ones presents for the first time in one volume selections from each of the artist's major photographic series. There are over 120 images taken from every period of his career, including photographs from his Storefront Churches series; the slums of Buffalo, New York; Appalachia; and from the well-known Working Peoples series, a powerful collection of double . images of people at home and at work, in coal mines and in steel plants, doing what they must to survive.

184 pp., 125 duotone photographs, 81/2" x 111/2" Cloth, \$35.00; paper, \$19.95

Phone Orders (except AK, HI, WA): 1-800-441-4115

University of Washington Press, P.Q. Box C-50096, Seattle, WA 98145

35 .M



Dr. Jastrow fully realizes that a large number of highly reputable American scientists regard the entire idea as technical and strategic nonsense, Yet almost the only point of criticism on which he concentrates relates, first, to an erroneous early estimate, in a report by scientists opposed to SDI, of the number of surveillance satellites that would have to orbit the earth in order to keep the Soviet missile fields constantly in view, and, second, to an estimate of the con siderable weight of a satellite that would be demanded by a particle-beam weapon. Dr. Jastrow did not himself spot the errors. He says he learned about them when they were rumored by "professionals in the field." In fact the authors of the 'report in question," which included such distinguished scientists as Hans Bethe, Richard Garwin, Victor Weisskopf, Kurt Gottfried, and Henry Kendall, themselves drew public attention to the two errors five weeks after their report was issued, and before anyone else had done so."

They also made quite sure that theiruent publications were free of subseq computational errors, at the same time emphasizing that estimates of the numbers of surveillance and laser satellites that a defensive system might call for depended on a varying number of assumptions. Dr. Garwin has subsequently published what seems to be the most complete and unchallenged set of estimates, given several different assump-tions.¹⁰ At any rate it is judged as such by Edward T. Gerry," the chairman of the relevant panel of the Pentagon's Fletcher study team,²⁰ which the administration set up in 1983 to advise whether the pursuit of a space-based defensive system was technically justifiable.

のないないのであるというというというというというというという

、一川北京に

たちまた

13

12.28.

いいないないない

あいろうないろうとうないない

12-20-50

.......

·

3

12 2 × 17.

In reality the two computational errors did not affect any substantive judgment about the feasibility of a space-based defense, as emerged clearly from a vigorous and lengthy exchange of letters published in *Commentary* in March 1985. Dr. Jastrow, who took part in the exchange, nonetheless again hammered

¹⁶Union of Concerned Scientists, Space Based Missile Defense (March 1984).

"Union of Concerned Scientists, The Fallacy of Star Wars (October 1984).

¹¹See Richard L. Garwin's testimony to the Senate Armed Services Committee (April 24, 1984) and his "How many orbiting lasers for broad-phased intercept," *Nature* (May 23, 1985), pp. 184-290.

"Richard L. Garwin and Edward T. Gerry, "Fifteen Agreed Propositions on SDI," publicly presented at Dartmouth College, May 23, 1985.

²⁰Department of Defense, The Strategic Defense Initiative Defensive Technologies Study (March 1984): away at the errors in an article published later in the summer,²⁴ in which he went so far as to imply that the views of his critics about the efficacy of Soviet countermeasures should not be "accepted"-by which I sense he means they should be disregarded. (It should be noted that his present book appeared a year after the corrections had been made by Dr. Garwin in his testimony to the Senate Armed Services Committee, and that Jastrow makes no mention of that testimony.) Someone not competent to follow the technical nuances of the debate could be forgiven were he to assume that Dr. Jastrow's apparent obsession with the long-corrected computational errors reflects a determination to discredit his critics personally.

Dr. Ashton Carter, the author of the first report on SDI to be prepared for Congress's Office of Technology Assessment (OTA), is also the target of Dr. Jastrow's criticisms. He too has pointed out22 that Dr. Jastrow has never provided his own analysis of the problem. It would be unfortunate if the analysis included such meaningless statements as Jastrow's observation, on page 95 of his book, that one molecule of oxygen always consists of two oxygen molecules bound together. In truth, the precision of Dr. Jastrow's style, as manifested in his book, compares poorly with the appearance of scientific exactitude of the papers in which he attacks his critics, and in which he quotes extensively from documents provided him by proponents of SDI at Los Alamos and Livermore. While the voice, like that of Jacob, is obviously Dr. Jastrow's, his papers often read as though the hands of more than one Esau had helped steer his pen.

Dr. Carter's report of April 1984 considered the technical ideas that were discussed by the Fletcher study team as possible ways for attacking enemy ballistic missiles during their brief boost phase. In preparing it, he was helped by every official organization that was concerned, including Los Alamos and Livermore, as well as the CIA. But the conclusions that he drew were his alone, and the main one was that

the prospect that emerging "Star Wars" technologies, when further developed, will provide a perfect or near-perfect defensive system...is so remote that it should not serve as the basis of public expectation or national policy about ballistic missile defense.

Not surprisingly, he was immediately set upon by the proponents of SDI in Los

²¹Robert Jastrow, Journal of International Affairs (Summer 1985), pp. 45, 55. ²²Commentary (March 1985). Alamos, Livermore, and the Defense Department-not to mention Dr. Jastrow.

Dr. Carter's study had been commissioned by OTA at the request of the House Armed Services Committee and the Senate Foreign Relations Committee: In view of the debate that his report stimulated. OTA then undertook an even more extensive study under the scrutiny of an advisory panel, which included among its twenty-one members Michael May, associate director-at-large of Livermore: Robert Clem, the director of systems sciences of the Sandia National Laboratories; senior representatives of several of the major defense contractor companies who are, or who would be, involved in SpI work; General David Jones, the former chairman of the Joint Chiefs of Staff; Robert McNamara, former defense secretary; Gerard Smith, the chief negotiator of the 1972 ABM and the SALT treaties; Major General John Toomay, who had served on the Fletcher study team; as well as Richard Garwin, Sidney Drell, and Ashton Carter, three who have criticized SDI on technical grounds. It would be difficult to conceive of a more distinguished or better balanced group. They advised a project staff which, in addition to writers of the studies they commissioned and an administrative staff, included nine researchers,

So far as I can judge, the new and lengthy OTA report, Ballistic Missile Defense Technologies, and the summary report accompanying it, touch on every. aspect of SDI that has been publicly debated, and they set out both sides of every point at issue. The authors and the advisory panel acknowledge that the USSR is "vigorously developing advanced technologies potentially applicable to BMD." But at the same time, and contrary to the somewhat equivocal views put forward by the proponents of SDI in order to encourage public support, the OTA report does not consider that the Soviet Union has any lead over the US "in any of the 20 basic technologies that have the greatest potential for significantly improving military capabilities inthe next 10 to 20 years." (These were the technologies which were recently reported on in the annual report to Congress of the under-secretary of defense for re-search and engineering in the Pentagon.)²³

The OTA report reviews the requirements that an effective BMD system would have to meet in the face of the obvious Soviet countermeasures. The reader is also warned that it is essential to consider more than just the feasibility of a host of separate technical ideas. What

²⁵The Fiscal Year 1986 Department of Defense Program for Research, Development and Acquisition, Ninety-ninth Congress (1985). matters is operational feasibility-could the developed technical components be combined into an "integrated, reliable system that could operate effectively and maintain that effectiveness over time as new countermeasures appeared." The report reaches the Same general conclusion that Ashton Carter did in his earlier appraisal-"assured survival of the US population appears impossible to achieve if the Soviets are determined to deny it to us."

Press reports suggest that the Pentagon's reaction to GTA's new assessment has been less hostile than it was to Ashton Carter's, and that the defense authorities agree that during the years that it would take to move to a defensive strategy, new risks of nuclear conflict might well arise. On the other hand, the head SDI office in Washington believes that even a partial defense would increase the USSR's uncertaigues were it ever to contemplate a first strike against the US, and would therefore enhance deterrence."

But while administration and congressional leaders, as well as many press commentators, accept the OTA report as a nonpartisan review, which is the way it certainly reads, some die-hards have condemned it. What I find surprising is that they have now been joined by Dr. Frederick Seitz. the chairman of the Pentagon's Defense Science Board, He and Dr. Jastrow recently proclaimed at a meeting of the conservative Heritage Foundation that all the members of the OTA advisory nanel except Dr. Seitz, as well as its staff, were strongly prejudiced ab initio against SDI.' Dr. Seitz is also disturbed that the advisory panel did not vote on the report.²⁶ This, one might suppose, would have been a waste of time, since the vote would surely have gone against SDI in view of his assertion that the majority of those on the panel were in the anti-SDI camp.

General Daniel Graham of High Frontier withdrew from OTA's advisory panel because he anticipated that he would not like the conclusions which were being reached by the study team. He, at least, appears to be committed to SDI whatever the scientific judgment about the program's technical feasibility.²⁶ It is an entirely different matter when a scholar of Dr. Seitz's eminence²⁷ - he took General Graham's place on the panel-disavows the report for such reasons as he has so far made public. These reasons add up to

³⁴International Herald Tribune (September 27, 1985).

²⁹Nature (November 7, 1985).

*Nature (March 7, 1985), p. 7.

⁷⁷Dr. Seitz is a former president of the National Academy of Sciences and of Rockefeller University. He also served a term as chairman of the NATO Science Committee.

The New Tork Review

a blunt denial of what has been said by critics of SDI about the ability of enemy space mines to destroy battle stations, the ability of "spoof launches" to confuse space sensors, and so on. Surely the issue of the technological feasibility of the SDI concept has become far too important to the world at large for it to be argued about by accusations of prejudice, whatever the quarter from which they come, rather than by cogent analyses.

If one were to imagine that the President's dream will one day be given substance, far-reaching political and strategic issues will have to be debated, and debated internationally, in a world in which the 1972 ABM Treaty would have become a dead letter, and which in the meantime would undoubtedly have been transformed by major political events. But that could be decades away. Scientific indoments must come first, and they are an entirely different matter, Regardless of whatever political views he may now entertain the is on record as having declared that the US should be able to make a first strike against the USSR), Dr. Seitz should be expected to argue his case before those of his scientific peers who have reached judgments on the facts some of them in the field of basic science-that are contrary to his.

Dr. Jastrow bluntly says that the views of "professionals," who work full time in the "defense science community," should be given greater weight than those of their scientific critics, however distinguished they may be, and whatever their previous experiences of defense science. Lowell Wood is, not surprisingly, in full agreement. He tells us that Hans Bethe, Richard Garwin, and others who have dared criticize SDI "have fared uniformly poorly in technical debate in the classified surroundings required by government regulations," and that it is because of their failures in secret conclave that they carry the debate to the public "immune from the criticism of those who know hetter "1

tter."" ture This contemptuous dismissal by Lowell Wood of his critics harmonizes well with his claim that all the technological critims of SDI emanate from a few physicists who could be numbered on the fingers of a maimed hand. In any circle where the rules of scientific discourse prevail, both remarks would be dismissed with an equal measure of contempt. Unfortunately laymen who write in favor of . SDI and who presume to make judgments on scientific matters about which they we little or no understanding tend to h cite any scientific claim-for example Lowell Wood's-that reinforces the entrenched views in which they have a vested interest, be it political or financial. It is highly regrettable, therefore, that many of the most influential and ardent proponents of SDI are politicians and officials such as Richard Perle who have so far displayed surprisingly little critical understanding of the difficulties that the

²⁸Commentary (March 1985). Not surprisingly, Wood's assertion has been denied by Garwin and others who have participated in secret debates with Livermore scientists. It is interesting too that at a Congressional hearing in 1985 Teller cited Hans Bethe's opinion in support of an optimistic statement he was making about the X-ray lasers. He said that having discussed the matter with Livermore scientists, Bethe now agreed with him, which Bethe subsequently denied. Ironically, one of Teller's well-known public themes-ploy might be a better word-is to decry the evils of secrecy, beyond the veils of which he is not unknown to vanish when challenged.

January 30, 1986 981

R&D program entails. It is surely absurd that matters which obviously first need to be strictly judged on their scientific and technological merits, and which are of such profound importance to the future of life on earth, should be pronounced upon by laymen lacking either a scientific background or any experience in the management of major R&D projects-or both. The technical feasibility of a spacebased BMD system is not a matter that will be resolved either by a show of hands, or by a slanging match in which the pro-SDI side on occasion goes so far as to suggest that its critics are soft on communism. The laws of physics and judgments about what is technologically feasible are not vardsticks for the measurement of political attitudes, any more than Galileo's discoveries were disposed of by the conventional dogma of the Church.

0.00

The resolution of the technical argument will depend on the clear formulation of a few basic questions and, following that, on those competent to express a view proiding the wisest answers that can be put before the administration, Congress, and the people of the world. For example, a fundamental premise, given that a spacebased ABM system could be devised; is that beam weapons can be aimed from space at a ballistic missile before it ejects its payload of warheads and penetration is, that is to say, they can be aimed at a single target and not have to contend with tens and tens of separate targets. If, as Dr. Garwin and others have argued, and as the Russians claim, the separation of warheads from the missile can be made to occur within, say, the first hundred kilometers of the atmosphere, then X-ray lasers and particle beams fired from satellites would be relatively useless since they lose their effectiveness when they enter the upper layers of the atmosphere.

The primary question, therefore, is whether a ballistic rocket can be fueled and programmed to eject its warheads before reaching that height. The recent OTA report, as well as that of Ashton Carter, gave a positive answer to this question, which was what the Fletcher study team also implied the Russians could do, given time. If this is the consensus of those best able to judge, and if the USSR were to seek to achieve the sary countermeasures over the next decade (if indeed it has not already done so)," the complexion of the entire problem of a space-defense system changes completely.³⁰ One critical part of the SDI concept would evaporate overnight.

Take another question - the enormous number of targets which a space-defense system should be able to engage almost simultaneously. A ship-defense system known as Aegis, which was designed to track two hundred incoming cruise missiles, and to engage sixteen of them at the same time, has not yet been shown to be able to manage two or three.³¹ Have the contractors and engineers who have been

³⁵See Space-Strike Arms and International Security, Report of the Committee of Soviet Scientists for Peace Against the Nuclear Threat (Moscow, October 1985).
³⁶Ashton Carter's views were strongly supported by Major General John C. Toomay, a member of Dr. Fletcher's study team, in his rejoinder (June 22, 1984) to the Department of Defense's criticisms of the Carter report.

³⁴"Star Wars: SDI, The Grand Experiment." Spectrum, the Journal of the American Institute of Electrical and Electronic Engineers (September 1985).



City/State/Zip Please allow 3 weeks for delivery

David Levine Postcards

250 West 57th Street, N.Y., N.Y. 10107

clo The New York Review of Books

working for years on airborne and ship defensive systems given their views in public about the engagement pattern that is presumed to be possible in the SDI concept—the destruction every second of between ten and twenty ballistic missiles * in a salvo of more than a thousand?

What was His or

Towering above all such technical iss is the question whether it could ever be possible to design the computer links that would be needed for a BMD system to function as a whole. This matter, too, is discussed in detail in several reviews, with generally pessimistic conclusions. Dr. David Parnas, a consultant of the Office of Naval Research, and an experienced professor of computer science, spelled out in detail his reasons for resigning from the official SDI panel that is dealing with the computer problems of a space-based ABM system.³² They make formidable reading, adding up as they do to the general conclusion that the job of designing the necessary computer network is an impossible one. In the letter of resignation that covered his detailed submissions, Dr. Parnas wrote that he was aware that there were software experts who would disagree with him, and for whom N. 19913

the project offers a source of funding, funding which will enrich some personally.... During the first sittings of our panel I could see the dollar figures dazzling everyone involved. Almost everyone that I know within the military industrial complex sees in the SDI a new "pot of gold" just waiting to be tapped.

Dr. Parnas is fully supported in his view by the computer specialists who have recently founded an organization called Computer Professionals for Social Responsibility. British computer experts have also expressed their skepticism about what has been proposed," and even more recently Herbert Lin of MIT has ended a review of the entire problem by stating that "no software-engineering technology can be anticipated that will support the goal of a comprehensive ballistic missile defense."" All this is in line with the conclusions of the recently published OTA assessment. The fact that Dr. Solomon Buchsbaum of the Bell Laboratories and Dr. Danny Cohen of the University of Southern California have publicly expressed more optimistic views, even if they do not claim that error-proof or tested software for the SDI concept could be devised, does not dispose of the criticisms. What is more, it is difficult to imagine the political uproar that would result were the public to become aware that in addition to having its destiny entrusted to a computer network, it was one not free from errors in software. I doubt if SDI could ever surmount this obstacle. It would be worse than having nuclear antimissiles in one's back yard. .

The OTA report undoubtedly reinforced the views about the strategic shortcomings of the SDF concept which have been so powerfully expressed by James Schlesinger, Dr. Harold Brown, and Robert McNamara, thits former secretaries of defense; by General Breat Scoweroft, whom the President had earlier put in

¹²David L. Parnas, "Software Aspects of Strategic Defense Systems," American Scientist, Vol. 73 (1985), pp. 432-440.

³⁵New Scientist (October 31, 1985).

³⁴ The Development of Software for Ballistic Missile Defense," Scientific American (December 1985), pp. 32-320

charge of the preparation of a major. report on the strategic forces of the United States; by Gerard Smith; by at least five of the holders of the office of director of defense research and engineering since it was established in the late Fifties, all of whom know from bitter experience, as I do, how easy it is to waste hundreds and thousands of millions of dollars in the pursuit of a technological will-o'-the-wisp; and by a number of other prominent men who have held public office in the field of national security. There may have been some members of Congress who also found it odd when the Canadian government decided that it wanted no part of the SDI program, even though any hypothetical space-based defensive system for the United States would automatically provide a shield over Canadian territory. In view of all the doubts, it is no wonder that Congress has now reduced the SDI budget for the coming fiscal year.

In consequence we are told that next year's SDI RAD program will focus mainly on land-based systems. On the other hand, it should not be expected that the setback to the program will put an end to the work being done in Livermore on nuclear-bomb-pumped X-ray lasers, or at Los Alamos on excimer lasers powered by electron beams. As I have said, both laboratories had embarked on their pet laser and particle-beam projects well before the President spoke in March 1983, and they did so without being disturbed by any thought that the 1972 ABM Treaty barred the development of space-based defense systems, or by the fear that long before any such system could even be devised, the testing of its components would almost certainly constitute an abrogation of the treaty."

There is also no reason to suppose that the men who are working on a supercomputer and software for a space defense system are likely to bring their work to a halt because authoritative computer specialists have declared that it will never be possible to devise an acceptable network which could transform the separate components of a space-based BMD into a workable BMD system. The theatrical dream that was the background of the President's challenge to the scientists of America should in retrospect be seen as a proclamation to the world that work on particle beams and high-power was already in progress. In no sense did it set that work in motion. It would be equally sensible and prudent to suppose that research and development work on lasers and particle beams that is going on in the USSR was not halted by the announcement of the American SDI program.

· 5.

One consequence of the criticisms of the SDI program has been the reduction of the SDI budget. Another is that many of the explanations that are now given by the administration for the need for the program to continue differ from the President's original vision and from his view that a defense against ballistic missiles constitutes a higher category of morality than the maintenance of security through the threat of mutual annihilation. One major justification continues to be heard: that the Russians are engaged on work that corresponds to different elements of the SDI program, and that in many ways they are ahead of the United States. We have also been told that some Russian actions have already breached the terms of the 1972 ABM Treaty. Specific violations are spelled out in impressive brochures.³⁵

The Russians counter by pointing to American actions which in their view are breaches of the treaty. They have even offered to suspend work on the much spoken of, and highly vulnerable, vast phased-array radar system which they are building at Krasnoyarsk if the United States abandons its program to modernize the radar complexes which it has at Fylingdales in the United Kingdom and Thule in Greenland. Their spokesmen argue that these modernization plans, and particularly the rebuilding of Fylingdales as what is rumored to be a 360degree phased-array radar complex, is far more questionable than what the USSR is doing at Krasnoyarsk.

A further accusation by the administration is that the USSR has committed "a far greater investment of plant space, capital, and manpower" to advanced BMD technologies than the US has.³⁵ This extravagant claim is not borne out by a CIA document about Soviet efforts which



was presented to the Armed Services Committee of the Senate on June 26, 1985." Indeed, the document expresses doubt about the applicability of even a network '06- Krasnoyarsk systemsregarded as the most serious breach of the 1972 treaty-for widespread ABM deployment. Dr. Garwin, in a follow-up to testimony presented to a congressional study group on October 10, 1985, has also pointed out that the better part of the large Soviet program on strategic defense is devoted to the upgrading of its anti-aircraft defense system."

But whatever the truth about Krasno-

³⁵Soviet Directed Energy Weapons Perspectives on Strategic Defenses, CIA (March 1985); Soviet Acquisition of Military Significant Western Technology: An Update (September 1985); Soviet Strategic Defense Programs, Department of Defense and Department of State (October 1985); Richard Perle, "The Soviet Record on Arms Control," The National Interest (Fall 1985).

¹⁶Soviet Strategic Defense Programs (Department of Defense and Department of State, October 1985), p. 12.

"Robert M. Gates and Lawrence K. Gershwin, "Soviet Strategic Force Developments."

¹⁹In a submission to Congressman Mrazek (October 10, 1985), in which he also pointed out that the Stanford University Workshop of Strategic Missile Defense, of which he was a member, recommended (April 1985) that the United States should fund an adequate program of work on offensive countermeasures to Soviet SDI, including work on powerful lasers. yarsk, it can hardly be a justification for the US deliberately interpreting the 1972 treaty 30 widely that the Russians aregiven cause to say that the US is proposing to contravene the treaty in a much more specific way, or ways, in order to gain the "advantage" of being able to launch a first strike against the USSR without fear of significant retaination.

It was therefore unfortunate that immediately before the Geneva summit, Robert McFariane, then the head of the National Security Council, declared that no aspect of the development of spacebased BMD components is prohibited by the 1972 ABM Treaty, and that what was intended about testing and development merely implied a shift from the technology that was available at the beginning of the 1970s to what can be undertaken today. This statement could be taken as reflecting the hard fact that major vested interests are now involved in the SDI program-not only the men in the laboratories who started the whole thing and the authorities in the Defense Department who encouraged them, but also the industrialists who see in the SDI program a bonanza that they cannot afford to disregard. Unfortunately the statement also clearly implied an intended breach of the treaty. Indeed, Gerard Smith has pointed out that what McFarlane implied was not just a breach, but a new version of the treaty." That the statement was publicly played down before the President met Mr. Gorbachev was therefore only to be expected.

But it remains highly regrettable that the myriad and diverse arguments about SDI have now induced what might well be described as a state of schizophrenia among America's European allies. All of them recognize that the coherence of NATO is a vital consideration, and one that makes it necessary for the United States, as the keystone of the alliance, to be supported in its policies whenever possible. But at the same time there is considerable skepticism in Europe about some of those policies, and particularly about America's nuclear policies, including the SDI program, which is widely regarded as a threat to the 1972 ABM Treaty and as a spir to the nuclear arms race. The arguments about the deployment of cruise and Pershing II missiles on European territory caused considerable political trauma and their echoes have not yet died.⁴⁰ It would therefore be a major error of political judgment to treat lightly the fact that vast numbers of Europeans are fearful of any moves that might lead to a further buildup of puckear armaments, or to assume that any deterioration in the relations between the US and the USSR as a result of SDI would not produce a new wave of antinuclear, and indeed of anti-American, protest in Europe.

The agonizing that is now going on about the US invitation to engage in SDI work is already a practical sign of the disquiet and suspicion which are entertained about the President's initiative. Some NATO governments have declined because they dislike the entire idea on political and strategic grounds. The British government agreed to participate "The New York Times (October 23,

1985).

⁴⁰For example, on December 3, 1985, the Netherlands government declared that having finally agreed to the stationing of the complement of cruise missiles assigned to it, as compensation it was going to abandon two other nuclear roles which had for long been its responsibility in the NATO strategic plan.

The New York Review

in the knowledge that if it refused to pro- . vide a formal blessing SDI scouts were already in the field seeking to entice European specialists with particular skills to work in the United States. Since the 1972 ABM Treaty bars the United States from sharing with others any technology that relates to strategic ballistic missile defense systems, cooperation will do little to help either the economies or the military defenses of European countries that formally bless collaboration on R&D, except insofar as such SDI R&D contracts as may be won in probably costly competition with American companies could provide employment for some European scientists and engineers in what may well turn out to be no more than a sharecropping exercise.

Europeans who concern themselves with these matters appreciate that even if the nuclear arsenals of both sides were cut by 50 percent - as has now been proposed by both the US and the USSR-more than enough destructive power would still remain, whatever way the cuts were made, to devastate not only the European mainland but also the United States and the western USSR." The concept of nuclear superiority has become meaningless. It belongs, in the language of Lord Carrington, NATO's present secretary general, to the unreal world of "nuclear accountancy."" And Europeans no more believe that their countries could be defended by a space-based BMD than they imagine that the USSR would ever risk a first strike either in Europe or against the US. Many suspect that the picture of a layered space-defense system was fabricated in order to confuse the innocent into supposing that a space-based BMD would operate in a measured sequence, a proportion of the offending missiles or warheads being destroyed as they traversed the layers in turn. The greater the number of layers postulated, the more missiles would be destroyed, until in theory-and on paper -- almost all were eliminated." But, as I have said, it is the first layer defense that is both decisive and regarded as unfeasible by independent scientists. There are also many European officials who, being concerned with real military security, wonder what SDI has to do with Europe. They know that while it is just conceivable that the Russians might one day attack across the Iron Curtain, their purpose would be to occupy territorynot radioactive territory that had been devastated by nuclear weapons.

The President and Mr. Gorbachev now seem to be locked into their respective positions. Time and time again the Russians have declared that if the US continues in its search for a space-based defense system, it will embark upon its own countermeasures, including the further buildup of its offensive forces. This is surely not propaganda. In the Weinberger letter to the President that was leaked just before the Geneva summit, the defense secretary warned that "even a probable territorial defense [by the USSR] would require us to increase the number of our offensive forces and their ability to penetrate Soviet defenses to assure that our operational plans could be executed." That is precisely what the Russians also say they will do if the US continues to seek, through SDI, to develop a "territorial defense." And, as Mr. Nixon warned in his recent article in Foreign Affairs, it would be easy for the Russians

⁴Alastair Buchan Memorial Lecture, given at the Institute for Strategic Studies, London, April 1983.

⁴Boston Sunday Globe (November 24, 1985).

الداري مريد

January 30, 1986

-

to triple in little time the number of warheads that are carried on their giant SS18s, a simple multiplication which in theory would by itself increase the threat that US missile silos face from an SS18 first strike from three thousand to nine thousand MIRVed warheads.

Richard Nixon and Henry Kissinger gave their support to SDI because they saw in it both a means whereby the Russians could be induced to return to Geneva, and a "bargaining chip" in arms control negotiations. But if one were to regard SDI as a bargaining chip, one would also have to accept that the US will gain only if it throws it away. If the SDI R&D program continues, the Russians will respond. Even were SDI to confound its critics and succeed in the sense that its separate components could be fitted together in a working system, the United States and the West as a whole would still lose, not only because the USSR would have devised measures for defeating a space-based BMD, but because there are ways other than landbased ICBMs, for example long range low-flying cruise missiles, whereby the US could be threatened with nuclear devastation.

President Reagan still speaks as though nothing has changed his original dream. But it has been changed. He himself changed it when he declared after the Geneva summit that what the United States was embarking upon was a *aonnuclear* space defensive system. That declaration, if acted upon, would be the death knell of the nuclear pumped X-ray laser, the kernel of the scenario of a defensive astrodome first painted for him by Edward Teller.

Paul Robinson, the principal associate director for national security programs at Los Alamos, has been recently quoted as saying that the X-ray laser is in any event flawed because "it might inadvertently wreak havoc on other SDI components in space," while his colleague, Steven Rockwood, the Los Alamos director of SDI research, asks whether an orbiting device containing a powerful nuclear bomb could ever be politically acceptable.

But, one now has to ask, did an effective X-ray laser ever exist, or could it be made to exist? Whatever the President's motives in insisting in recent weeks that his SDI proposal implied a non-nuclear BMD, his protestations, no doubt inadvertently, coincided with a growing volume of informed comment, based on recently published statements by Livermore itself, to the effect that the claim that an effective nuclear-bomb X-ray laser has been devised was not only premature, but also based upon an unwarranted reading of measurements made in critical tests.⁴

What is more, some directors of SDI research at Livermore have publicly expressed concern because the success of the research for which they are responsible has been exaggerated by Pentagon officials. Dr. George Miller, head of defense programs at the Livermore laboratory, has been reported as saying that the public "is losing sight of how difficult the job is," while his colleague Dr. Cornelius F. Coll III, who is director of "Star Wars" systems studies at Livermore, declared that "overstatements by Pentagon officials were imperiling the pro-

⁶For the above statements by Robinson, Rockwood, and Livermore, see R. Jeffrey Smith, Science, Vol. 230 (November 8, 1985), pp. 646-648 and (November 29, 1985), p. 1023; Los Angeles Times (November 12, 1985).



-

Endangered Species.



Habitat.

 An earlier America once provided wild animals with all the green forests, lush wetlands, untouched deserts and free-flowing rivers they needed for survival.
 Over the years, we have made good use of many of our lands and resources but have needlessly destroyed others. Today many wildlife areas are endangered species.

species. In Louisiana's Atchafalaya Basin, a plan to drain and cultivate 800,000 acres of wooded wetlands would wipe out the home of more than 300 species of birds, 50 species of mammals, and countless thousands of aquatic species. From Louisiana to California, from Maine to Nebraska, habitats are endangered. The National Wildlife Federation is working to save them and the wildlife they.

From Louisiana to California, from Maine to Nebraska, habitats are endangered The National Wildlife Federation is working to save them and the wildlife hey support Join us. Write Department 203, National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036. Save A Place For Wildlife.

By the year 2000, 2 out of 3, Americans could be illiterate.

It's true. Today, 75 million adults... about one American in three, can't read adequately. And by the year 2000, U.S. News & World Report envisions an America with a literacy rate of only 30%. Before that America comes to be, you can stop it...

by joining the fight against ... illiteracy today. Call the Coalition for Literacy at toll-free **1-800-228-8813** and

25

at toll-free **1-800-228-8813** and volunteer. **Volunteer Against Illiteracy.**

The only degree you need is a degree of caring.

Ad Coalition for Literacy

Display Classifieds at only \$60 an inch. Call John Malar of our Classified Department at (212) 757-8070 for further information. we either nuve it, by we'll get it for you! write for our catalog: Poets' Audio Center P.O. Box 50145—Dept. CE Washington, DC 20004-0145 or phone toll-free: 800-824-7888 Ask for Operator 698.

and Arron Hermore, Baker Canad and Artic Liokas Ri Mar. Arron Sand Mar. Arron Start Harrow California Barros Cherker Da Wai Arron Steffel Home, Harros Cherker Radt Arron Steffel Home, Harros Cherker Radt Barros Cherker Start Historical Productors Bioparis Stiff ar press HISTORICAL PRODUCTS Box 220 RS ""WHILE YOU were watching the Summit, the East Germans went right on blowing up buildings along the Berlin Wall, to improve their field of fire should any-

one take Soviet rhetoric too seriously." For a free copy of the Review write to Dep. N-19. 150 East 35th Storet New York, N.Y. gram This job is difficult enough without having to defend hyperbole and exaggeration." It is even reported that a recent demonstration which was laid on to impress a selected audience about the effectiveness of the electromagnetic railgun was a spoof. The demonstration pretended to show that a mock-up of a Soviet SS18 missile could be destroyed by the rail-gun. In fact, General Abrahamson is reported by The New York Times as having later revealed "that the damage had not actually been done by an electromagnetic rail-gun but by a hardened projectile fired from an air-gun"-a weapon whose antiquity goes back to the early eighteenth century!

Surely the President must now appreciate, possibly even from what Gorbachev told him, what the arguments against SDI are. Surely he realizes that the nuclear arms race is different in kind from the competition which takes place in the field of conventional arms; that the idea that the US, the USSR, and Europé could ever by subjected to a nuclear conflict is total madness; and that such a conflict could solve nothing. In the forty years since Hiroshima and Nagasaki, increasing numbers of nuclear warheads and delivery systems, not to mention p sumed defensive measures, have not pro vided greater security to any party-not to the United States, not to the USSR, and not to Europe. What they have done is reduce security for all.

We offer hear the homely term "leaky" in the course of the SDI debate, as though if a perfect BMD defense proves impossible, a "leaky" one would still be worth having. It is yet another of those words which helps to hall the senses, so that we fail to realize the hideous reality-that the fraction of warheads that would "leak" through would today be enough to" cause what once used to be euphemistically called "unacceptable damage." We continue to talk about numbers of warheads and megatons as though they were numbers of tanks and bomber aircraft. The brutal fact which our minds seem incapable of taking in is that were the explosion to occur over New York or Washington, London or Moscow, one megaton would be equivalent to a million instantaneous deaths (what matter if the figure were 100,000 or 200,000 more or less?).

The President may protest that his SDI dream implies a protection of people and not of silos. But however many times he does so, the fact is that were the "unthinkable" ever to occur, a future American president would probaby never know how his enemy had behaved. He could well have disappeared in the nuclear Armageddon. If the SDI program ends up only in protecting America's landbased missiles, no president could be sure

"For the statements by Miller, Coll, and Abrahamson, see William J. Broad, The New York Times (December 16, 1985). that given a nuclear outbreak, the Russians would accessarily confine their fire to the American missile fields and not also aim at centers of population, any more than the Russians can be relied upon to believe that the United States would spare their cities. A "point defense" or SDI II, as some now call it, would, in short, take us back to square one - to the same argument that revealed the futifivy of missile defenses and which ended in the 1972 ABM Treaty.

Adhering to the strictest interpretation of that freaty has therefore become a vital consideration for all of us-not some so-called liberal interpretation of the way its terms were drafted, however legally argued, not some new version, as Gerard Smith has put if, but the treaty in the sense in which it was negotiated by the two sides. Were some demonstration test of a novel BMD component by either side to result in a unilateral breach, it would be but a short step to the abrogation of the few other treaties that have been so painfully negotiated in order to try to stem the spread of nuclear weapons.

A conflict in which nuclear weapons were used would not help solve any of the political disputes that now divide the two superpowers. It would certainly make it impossible for either to help solve the multitude of territorial and racial disputes and problems of social and economic development which now torment the nations of the world, and in the resolution of many of which both have a common interest. Both leaders should therefore remind themselves of the critical difference between the BMD of the Sixties and what is being discussed now. Twenty years ago, active defenses against missile attack were being devised by both sides in response to a formulated operational requirement which it was incorrectly assumed could be technically satisfied. Today SDI is a concept that is "technology led" by the belief that new technological wonders can be fitted together in order to create an effective operational defense system. No one, not even the President, believes that this could ever happen before the turn of the century, if indeed it ever proves possible. He also knows that in the interval there could be military conflict.

The two leaders should therefore keep on reminding each other that were the prevailing state of nuclear deterrence, to break down, the result could be a catastrophe unparalleled in the history of warfare, and one which would make even the worst natural disaster of which history tells us seem like a gust of wind. Let us therefore hope that when President Reagan and Mr. Gorbachev next meet, even if they do not discuss technicalities, their visions of the dangers which they face in the years ahead will move them closer than they appear to have been in Geneva.



The New York Review

THE NEW REPUBLIC

A Weekly Journal of Opinion

4 TRB FROM

6

7

9

25

36

FOUNDED 1914

WASHINGTON, D.C.

Editor-in-Chief and President MARTIN PERETZ

Editor MICHAEL KINSLEY Literary Editor LEON WIESELTIER Senior Editors FRED BARNES, ANN HULBERT, CHARLES KRAUTHAMMER Managing Editor DOROTHY WICKENDEN Associate Editor JEFFERSON MORLEY New Republic Books Editor (Holt, Rinehart and Winston) STEVE WASSERMAN Films Theater STANLEY KAUFFMANN ROBERT BRUSTEIN Poetry ROBERT PINSKY Music EDWARD ROTHSTEIN **Economics** Correspondent ROBERT KUTTNER Contributing Editors ABRAHAM BRUMBERG, ROBERT COLES, HENRY FAIRLIE, JAMES K. GLASSMAN, HENDRIK HERTZBERG, JOHN KEEGAN, MORTON KONDRACKE, R.W.B. LEWIS, MARK CRISPIN MILLER, ROBERT B. REICH, PAUL ROBINSON, MAGGIE SCARF, RONALD STEEL, RICHARD L. STROUT, E. V. THAW, ANNE TYLER, NICHOLAS VON HOFFMAN, MICHAEL WALZER, C. VANN WOODWARD West Coast Correspondent MICKEY KAUS Staff Writer CHARLES LANE Editorial-Corporate Coordinator LAURA E. OBOLENSKY Assistant to the Editors NANCY E. MILLER Production Manager PATRICIA A. HOPPER Copy Editor JAMIE BAYLIS Production Associate BRUCE STEINKE **Reporter-Researchers** DAVID A. BELL, ANTONY J. BLINKEN, TERENCE MORAN, AMY E. SCHWARTZ Publisher JEFFREY L. DEARTH Associate Publisher REED PHILLIPS Controller J. KRISTINE KLASMAN Advertising Manager JOAN M. STAPLETON **Circulation Director** TOM HICKS Circulation Manager GENE SITTENFELD Assistant to the Controller MARIA F. SALATTI Circulation Assistant ROBIN CHERRY

Assistant to the Advertising Manager CATHERINE SCHILLING Advertising Representative KEVIN LONDON Accounting Assistant LYNN J. CLEMENT Back Issues and Reception DARLENE BUSCAGLIO Leadership Network Advertising ROBERT F. SENNOTT JR.

	JULY 8
TRB FROM WASHINGTON	A TAX ON LIBERALS The secret design of Reagan's reform.
CORRESPONDENCE	On Phyllis George, anti-apartheid protests, &c.
THE EDITORS	HERE WE GO AGAIN <i>I</i> America has learned nothing about combating terrorism. There are better ways.

NOTEBOOK On the "Doonesbury" flap and the Rajiv mystique.

FRED BARNES...... QUEEN JEANE She's dazzling crowds and surprising friends. What Washington didn't know about Kirkpatrick.

- 11 STEVEN E. MILLER...... SALT SHAKERS The administration claims the Soviets are cheating. A close look at the compliance issue.
- 15 NATHAN GLAZER NAZIS AND SOVIETS All totalitarians are not alike. Here's why. 16 ZBIGNIEW BRZEZINSKI..... A STAR WARS SOLUTION
 - Reagan's idea is flawed, but the SDI holds promise for a real arms control agreement/with the Soviets. Let's get on with it.
- 18 P. J. CORKERY ADDICTION À L.A. MODE Come to the Betty Ford Center in sunny Palm Springs, and kick your habit with the world's most famous drug addicts. 21 JEFFREY SACHS ISRAEL'S ECONOMIC DISASTER These fiscal woes-vast budget deficits, heavy military costs, and hyperinflation-make our own
 - look puny. It's time for some stiff reforms. STANLEY KAUFFMANN ON FILMS: OLD HANDS Satyajit Ray's The Home and the World is modest fare; Prizzi's Honor is not top Huston fun. LAWRENCE STONE SEX IN THE WEST
 - Our sex-obsessed society is strangely ignorant about the history of sex. There has never been "normal" sex. Herein the annals of the odd and complex moral, religious, and medical practices and prescriptions surrounding the dirty deed.
 - DANIEL HALPERN POEM Summer Nights
- DANIEL PIPES...... SHIA STOOPS TO CONQUER 37 All Fall Down: America's Tragic Encounter with Iran by Gary Sick American Hostages in Iran: The Conduct of a Crisis by Warren Christopher, Harold H. Saunders, et al. 41 GARRETT EPPS INNOCENT ABROAD Stars and Bars by William Boyd

43 WASHINGTON DIARIST CONNIPTIONS

COVER by Allen Carroll for THE NEW REPUBLIC. Article on page 25.

THE NEW REPUBLIC, Vol. 193, Number 2, Issue 3,677, July 8, 1985. (Printed on June 19, 1985.) Published weekly (except for combined issues dated Jan. 7 & 14, July 15 & 22, Aug. 12 & 19, and Sept. 16 & 23, 1985) at 1220 19th Street, NW, Washington, DC 20036. Telephone (202) 331-7494. Leadership Network advertising (212) 684-5500. Yearly sub-scriptions, \$48; foreign, \$73; Canada, \$60. Back issues, \$2.50 (includes postage & handling). ©1985 by The New Re-public, Inc. (ISSN 0028-6583). Second-class postage paid at Washington, DC. Indexed in Readers' Guide, Media Re-view Digest. Available on microfilm from University Microfilms Intnl., 300 N. Zeeb Road, Ann Arbor, MI 48106 and Bell & Howell, Old Mansfield Road, Wooster, OH 44691. Member, Audit Bureau of Circulations. Unsolicited manuscripts can be returned only if accompanied by a stamped, self-addressed envelope. Subscribers: Please send all remittances, changes of address, and subscription inquiries to Subscription Service Dept., The New Republic, P.O. Box 955, Farmingdale, NY 11737-0001. For subscription problems call 800-645-9559 (In N.Y. State call 800-732-9119).

ISSUE 3,677

the awesome military strength of the Soviet Union.

A refusal to make distinctions between totalitarian regimes makes it impossible to understand the world today, as well as making a muddle of history. Vietnam is totalitarian and allied with Russia; Pol Pot is totalitarian (the worst of them all, probably, short of Hitler), and allied with China. Can anyone deny that a better totalitarianism has replaced a worse in Cambodia? We refuse to recognize the better, not because we prefer the worse, but because we hope there is a "third force" that will be preferable to both.

Hannah Arendt, author of *The Origins of Totalitarianism*, believed that to say "totalitarian" told us a good deal about a political regime. When Hitler ruled Germany and Stalin ruled Russia, there was much that supported that belief. But even then there were enormous differences, more important for some people than for others. In Poland Jews and communists and socialists knew that it would be much better to escape to the East (Russia) than to the West (Germany). It was awful in the East, too, and those who could got out fast after the war. But the difference between Nazi Germany and Soviet Russia for many people was as simple as the difference between death and life.

I N OBJECTING to the assertion of "moral equivalence" of all totalitarian regimes, I am concerned about both the past and the future. First, we should not obscure the unique evil of Nazi Germany. That evil had no necessary connection with totalitarianism. "Totalitarian" Fascist Italy (at least it tried to be totalitarian, even if it did not succeed so well) had nothing against its Jews until Hitler forced it to adopt anti-Jewish laws. We will never fully understand the Nazi evil or take its measure. But we can never say Nazi Germany was a nation like other nations even totalitarian nations.

Second, we should not pretend that this concept of "totalitarianism" can be a real guide to our foreign policy. It doesn't tell us what to do about Russia, or about China. Obviously we cannot be indifferent to totalitarianism. The United States prefers democracy, it defends democracy. If it doesn't, it should. But how that affects its foreign and military policy, in the light of all other considerations that must be weighed, is another matter.

One consequence of the emphasis on totalitarianism is that it lets authoritarianism off the hook. In human terms, what Argentina did to people was far worse than what Yugoslavia, for example, does. There is indeed no comparison. In fact, using torture as a test, it may well be that in any given year the authoritarians come out worse than the totalitarians. But I don't recommend torture as a single test, either. The exigencies of foreign policy have caused us to be friends with torturers. Torture should weigh heavily in the balance. But I don't know if one can set up an absolute rule.

In analyzing our conflict with Soviet Russia, old labels are less and less helpful. Marxism doesn't help, Leninism doesn't help, and even totalitarianism, I would argue, doesn't help much. It does not outline the distinctive characteristics of our conflict that cause it to continue today, long past the time when Marxist (or totalitarian) ideologies served as an internal threat to our friends and allies in Europe. Something else is going on, and the totalitarian label doesn't tell us what it is.

NATHAN GLAZER

Nathan Glazer, professor of education and sociology at Harvard, is the editor most recently of *Clamor at the Gates: The New American Immigration* (Institute for Contemporary Studies).

How to break the arms control impasse.

A STAR WARS SOLUTION

THE USUAL *danse macabre* of American-Soviet arms control negotiations is about to begin. The process is typically initiated by a Soviet announcement to leaders of the U.S. government, and to the myriad self-appointed American accommodationists trooping to Moscow to seek on their own a "fair" solution, that the ongoing stalemate is due entirely to American rigidity. The Soviets insist that they cannot give an inch, and that only a massive display of American good faith—translated into unilateral concessions—can revive the negotiations.

In the late 1970s the Soviets made it clear that progress in negotiations would be contingent upon U.S. abandonment of its cruise missile program. In 1984 they premised even the beginning of arms control talks on the dismantling of the U.S. Pershing and cruise missiles already deployed in Europe. Then the MX missile came to be designated as the impediment to any compromise. And now the Strategic Defense Initiative, Reagan's so-called Star Wars proposal, has been identified as the mortal enemy of arms control.

These arguments are then faithfully reproduced on the Op-Ed pages of U.S. and West European papers. Renowned professors, former ambassadors, various politicized scientists, and leaders of the arms control lobby plead for a demonstration of American good faith—which happens to coincide with the acceptance of what the Soviets have been demanding. The process of negotiation thus begins in earnest—but among us Americans! The Russians, meanwhile, sit at the table in Geneva and wait for the eventual U.S. concessions.

It is a normal procedure for the United States to prepare for serious negotiations with the Soviet Union by defining a tough opening gambit, to be followed by a more flexible position that would be exercised in conjunction with some demonstrated Soviet willingness to compromise. But it is usually only a matter of time before some disgruntled official leaks the substance of the fallback position to one of the ex-ambassadors, peace-loving professors, or any one of the 535 representatives and senators who have lately become our surrogate secretaries of defense and state. Any one of them then feels free to publicize the fallback position as his constructive suggestion. Indeed, the latest fashion is to compose a joint letter published under three or four prestigious signatures, strongly urging the U.S. to make further unilateral concessions in order to convince the Soviets that we are negotiating in earnest. After we prove our good intentions, the Russians may be prepared to accept our third—or fourth—fallback position as a proper match for their own unyielding position.

THE SOVIET argument against SDI and the domestic critics' case against SDI are politically complementary. The Soviets say that SDI threatens the militarization of space, and that there will be no arms control agreement unless it is abandoned. The American critics say SDI will not work, that it will cost too much, that the Soviets can very easily overcome it, and that the Soviets are dreadfully fearful of it. The logical inconsistency of these arguments is less important than the political symmetry of their intended effect—namely that the U.S. should unilaterally forgo the SDI program.

In fact, nothing could be more damaging to the prospects for real arms control than the jettisoning of SDI. Indeed, the time has come for the United States to bite the bullet on the SDI question. Only if a strategic defense system is deployable within the next decade or so, and only if our will to deploy it is proven credible, can the United States trade it for a genuine and comprehensive arms control agreement with the Soviets. It is essential that this system be capable of disrupting and rendering militarily useless a Soviet first strike by intercepting missiles early in flight or by knocking them out as they descend toward the United States. Anything less than that virtually guarantees that there will be no comprehensive arms control agreement.

The reason for this proposition, unpalatable though it may be to the arms control lobby, is rooted both in the changing character of nuclear weaponry and in the nature of Soviet strategic deployments. In the 1970s both sides enjoyed large strategic forces whose primary function was to pose the threat of annihilation to the other country. These systems were not susceptible to preemptive destruction. The emerging reality of the 1980s and 1990s is that both sides are deploying far more accurate weapons. These weapons are capable of a preemptive first strike that could eliminate the opponent's strategic forces-and prevent effective retaliation. For the first time it is possible to contemplate the possibility of an attack that destroys an overwhelming majority of the other side's forces while also disrupting its command and communications structures to such an extent that any response would be marginal, spasmodic, and conceivably not totally destructive. In short, as accuracy increases so does the benefit of striking first.

This is not to argue that the Soviets (or the United States) are likely or certain to launch a first strike. It is simply to say that the nuclear relationship is growing ever more precarious. This is the current danger in the American-Soviet military situation. It needs to be addressed and resolved by the arms control process, if possible; or unilaterally, if arms control remains stalemated.

But there is another problem raised by the advent of the highly accurate weaponry. The Soviet Union is now deploying such forces in large numbers; the United States is not. How can we negotiate effectively in this situation? We somehow have to convince the Soviets to limit the further deployment of their new SS-24 and SS-25 missiles, and to limit significantly the deployment of existing SS-18s and SS-19s, all of which have counterforce capability. Without such limitations, by the early 1990s the Soviets-even by conservative estimates-will have enough missiles to place the entire U.S. arsenal in jeopardy. Only our Trident and Poseidon submarines already out at sea *might* escape destruction from a Soviet first strike. And with the confusion and resulting disintegration of communications systems, the submarine forces might not be in a position to retaliate effectively.

In contrast, the United States is not likely to be able to threaten the Soviet Union in a comparable way. No ongoing or likely deployment program will enable us to Junch a disarming attack. Even if the U.S. had some form of strategic defense in order to protect its missile forces, we would still have far too few MX missiles, D-5 missiles on Trident submarines, and Midgetmen to even permit contemplation of such a disarming first-strike attack at any point between now and the end of the century.

IN THESE circumstances, the decision to go ahead with the SDI makes eminent sense. But it also means reformulating it politically and strategically. The U.S. should drop or at least de-emphasize President Reagan's idealistic hope for total nuclear defense for all our population. We should also abandon our unwillingness to consider SDI in the bargaining process. If we implement that part of the SDI program which by the mid-1990s would enable us to disrupt a Soviet first strike, we would reinforce deterrence and promote nuclear stability. That means concentrating on terminal defense and boost-phase interception.

Once we establish our determination to act on the SDI, we are in a better position to strike a bargain. We can say to the Soviets that we both face essentially two choices, one mutually beneficial, the other especially costly to them, but both stabilizing. The first choice is to renegotiate the 1972 ABM treaty to permit deployment of strategic missile defense, but without either side improving its ability to carry out a first strike. Then, in return for significant reductions in SS-24s, SS-25s, SS-18s, and SS-19s, the United States would not deploy its strategic defense system. The second option would be pursued if Soviets were unwilling to accept such a bargain. The United States would unilaterally terminate the ABM treaty and proceed with the SDI. This would render the Soviets' new generation of accurate

missiles useless and wipe out their multibillion ruble investment in them.

Some critics of the SDI argue that the Soviets could respond by vastly increasing their offensive deployments. There are two problems with this line of thinking. First, if the Soviets do respond by building up, they will confirm the ominous suspicion that they are intent on preserving a first-strike capability against the United States; if so, the urgency of negating that threat is all the greater.

Second, if the Soviets expand their offensive forces, the strategic defense could be expanded proportionally. Remember that such a system would not need to be foolproof since it would not be designed to defend populations; it would only need to be capable of significantly disrupting an attack on U.S. strategic forces. In such a competition we would have the advantage. It would be far cheaper for us to add defensive missiles than for them to add highly accurate offensive missiles. (Those who make the most ambitious claims for the SDI should bear in mind that we could not compete so well if we were seeking to build a foolproof defense of our cities. If our defense had to be 100 percent effective, it would cost us far more to expand it than it would cost the Soviets to expand their offensive forces.)

To shape such an effective U.S. defense strategy and a meaningful negotiating posture, President Reagan's SDI needs to be redefined. We must show the Soviets both that we can deploy a strategic defense system soon and that we will negotiate over its deployment if they are willing to make stabilizing reductions in their offensive missile forces. In the event of Soviet unwillingness to accept such an arrangement, we would be in position unilaterally to achieve strategic security for ourselves. And because the SDI would not be accompanied by a massive deployment of disarming first-strike offensive U.S. systems, we would in no way increase our strategic threat to the Soviets. Either way SDI promises a genuinely stabilized nuclear equilibrium between the United States and the Soviet Union. It is time to act.

ZBIGNIEW BRZEZINSKI

Zbigniew Brzezinski was assistant to the president for national security from 1977 to 1981.

Betty Ford ministers to the rich and famous.

By P. J. CORKERY

Los Angeles

N

IN A CITY that already regards chefs, hairdressers, and lawyers as acceptable playmates, the flowering of yet another exotic social type can't be regarded as particularly noteworthy. But in Los Angeles this season there's a new species of personal companion on the rialto that is not only positively orchidaceous but that demonstrates just how chic addiction has become. The hottest companion here is a "disenabler."

A "disenabler" (also known as a "key voice") is a person who keeps you from doing drugs or from drinking. I saw my first disenabler at a party given by a producer last February in honor of his new mountainside home in Beverly Hills, an eccentric 35-room pile that looks like Mount Vernon descending Benedict Canyon. As the producer's wife was showing me around, I watched my host, a dapper fellow in his 50s, being followed around by a weather-beaten guy about the same age dressed in jeans, jersey, and a baseball jacket that had the

P. J. Corkery, a Hollywood writer, is addicted to California.

initials "S.O.B." sewn on the back.

The producer and his follower eventually came by and the producer said to me, "Great place isn't it? Meet Charlie." I shook hands with Charlie. The two strolled away. "Is Charlie somebody I should know?" I asked the producer's wife, fearing that I might have insulted some studio face card or other local figure of consequence.

"No," trilled the producer's wife, "Charlie is just here to keep Leo from doing any drugs."

"I didn't know Leo had a problem."

"The worst. Leo just got out of Betty Ford's," she explained. "While I was down at the fat farm in La Costa, Leo checked into Betty Ford's."

"I thought that was a drying-out place."

"Yeah, but everyone goes there. Leo went there for his coke problem. They told him after he got out to go down to the Cocaine Anonymous meetings at Cedars-Sinai. Paul, you should see the women at those meetings. And the men! Primo! All great-looking. Well, anyway, Leo's been going. And Leo talked at one meeting about how hard it is to stay off the stuff at parties.

A Statement of Aims

In sponsoring Commentary, the American Jewish Committee aims to meet the need for a journal of significant thought and opinion on Jewish affairs and contemporary issues. The opinions and views expressed by Com-MENTARY's contributors and editors are their own, and do not necessarily express the Committee's viewpoint or position. The sponsorship of COMMEN-TARY by the Committee is in line with its general program to enlighten and clarify public opinion on problems of Jewish concern, to fight bigotry and protect human rights, and to promote Jewish cultural interest and creative achievement in America.

AMERICAN JEWISH COMMITTEE

Howard I. Friedman, President

The Commentary Publication Committee

Frederick P. Rose, Chairman

Morris B. Abram Norman E. Alexander Donald M. Blinken Theodore Ellenoff Edward E. Elson **Richard C. Ernst** Maurice Glinert Lawrence Goldmuntz Mark Goodson Robert H. Haines Lewis J. Laventhol **Bess Myerson** Robert L. Pelz Ned Pines **Richard Schifter** Nanette Scofield Henry Sherman John Slawson Alan M. Stroock* Laurence A. Tisch

*Honorary Member

Letters from Readers

Strategic Superiority

TO THE EDITOR OF COMMENTARY: Robert Jastrow's otherwise excellent article, "Why Strategic Superiority Matters" [March], has two serious flaws. The first and foremost is his contention that the policy of Mutual Assured Destruction (MAD) is based on the as-sumption that "both the U.S. and the USSR will freely offer up their populations for massacre"-a policy he says the Soviets have repudiated. In fact, all that MAD requires, from our point of view, is that the Russians are assured that after a (surprise) first strike by them on us, we retain the capacity and the will to destroy their homeland utterly. And this is indeed the case. Even if the USSR demolished all landbased U.S. ICBM's, all U.S. bomb-ers, and all U.S. submarines in port (which is virtually impossible with present technology), the U.S. would have about 2,400 nuclear warheads on submarines at sea, essentially invulnerable to such preemptive attack. Mr. Jastrow claims that these could be used only to attack cities and soft targets, i.e., not hardened silos. In this he is correct and that is exactly what the function of our counterforce should be. What meaningful gain could be derived from striking at the remaining Soviet missile force after its primary echelons had already done the job? The very purpose of a retaliatorystrike capability in the context of MAD is to convince the aggressor that any strategic nuclear attack will bring certain and lasting destruction on himself. Clearly 2,400 warheads, each with at least several times the destructive power of those dropped on Japan, would eliminate from the map every large city and town in the USSR, in addition to destroying industrial, commercial, transportation, and communication facilities.

Mr. Jastrow asks what American President would order such retaliation faced with the certain knowledge of further Soviet strikes against our cities? A corollary question is what President would *not* order such a strike after 2,000 Soviet thermonuclear warheads had impacted on our territory? Such an attack, even directed only at our military facilities, would kill millions of Americans, both directly and via the effects of long-term fallout. The

2

Russians must be convinced that instant retaliation—especially directed at their soft targets—would be the immediate consequence of a strategic first strike.

The second flaw is Mr. Jastrow's implication that civil, air, and missile defense would significantly mitigate the effects of a U.S. counterstrike. Most experts agree that civil defense would at best shield only a small fraction of the targeted population from the immediate blast, radiation, and thermal effects of the explosion. Even to accomplish this there would have to be widespread movement away from the population centers and/or into shelters, a process that would take considerable time and therefore give a clear warning of Soviet in-tentions. This would be more than sufficient for us to place our missile forces on alert status and would obviate a surprise attack. As for missile defense, Mr. Jastrow knows well that present Soviet capabilities don't come close to meeting the threat; very few of our counterstrike missiles would be stopped in this manner. Even the Russian defenses against skillfully piloted aircraft are imperfect, as has been art-fully demonstrated by Israel in Lebanon.

The above having been said, I do not mean to imply that Mr. Jastrow's conclusion that the U.S. needs to improve and modernize, rather than dismantle, its nuclear arsenal is incorrect. Our present retaliatory capability will not last if we do not continue to develop newer technologies. The Soviets will eventually improve their ability to track and attack our submarines. Their weapons will become more accurate and they may. develop an effective anti-missile capability. If we do nothing, or worse, dismantle our forces, we will eventually become vulnerable. But it is relatively easy for us to prevent this. By concentrating on small, mobile ICBM's (not superhardened MX's), by improving our strategic submarine fleet, and by keeping at the forefront of research on third-generation systems (spacebased, anti-missile weapons), we can retain what Paul Nitze has referred to as Situation Q, i.e., "a situation in which the strategic nuclear deployments and capabilities of the two sides are such that neither side can hope to gain in

relativ initia clear

> Lawre Lał Liver

Тот

self u

in th

of the

Ro

ably Amei the N to th the v be fo do n thou in ac fields missi facili comi ment tiona Air rent gets, tary few and A man base sand terri clud dead nati tern a c hist cata tory tho tor lite der

> a c tac ou as R Sc

abı

doe

mi

are

wh

а

Uı

relative enduring capabilities by initiating a strike against the nuclear forces of the other side."

LEWIS A. GLENN Lawrence Livermore National Laboratory Livermore, California

TO THE EDITOR OF COMMENTARY: Robert Jastrow has alarmed himself unnecessarily. He is quite right in thinking that the latest version of the Soviet SS-18 missile is probably accurate enough to destroy American Minuteman missiles in the Midwest. But he is quite wrong to think that the United States, in the wake of such an attack, would be forced to shoot at Soviet cities, or do nothing at all. There are many thousands of Soviet military targets in addition to hardened silos-air fields, tank parks, submarine bases, missile and warhead production facilities, warhead storage depots, communication centers, transshipment points, and so on. The National Strategic Target List at Offat Air Force Base near Omaha currently includes about 40,000 targets, the vast majority of them military in nature, and all but a very few vulnerable to attack by SLBM's and other delivery systems.

A Soviet attack on U.S. Minuteman silos, air bases, and submarine bases would involve several thousand nuclear explosions on U.S. territory. U.S. casualties would include from three to twenty million dead, depending on the exact. nature of the attack, weather patterns, and the like. This would be a catastrophic event in American history. It would be followed by a catastrophic event in Russian history-the detonation of several thousand warheads on Soviet territory, but not including cities. The literature on NSDM 242 and Presidential Directive 59 makes this fact abundantly clear. If Mr. Jastrow doesn't believe what he reads, he might try a few phone calls. There are many officials in Washington who would be glad to tell him that a Soviet nuclear attack on the United States would be followed by a comparable American nuclear attack on the Soviet Union, and that our attack would hurt just as much as their attack.

If strategic superiority matters, Robert Jastrow does not know why. THOMAS POWERS

South Royalton, Vermont

To the Editor of Commentary: While in general agreement with

Robert Jastrow's historical review in the first part of his "Why Strategic Superiority Matters," I believe his subsequent analysis of whether the Soviet Union has a preemptive first-strike capability against the United States could have profited by addressing some additional issues....

First, Mr. Jastrow fails to address explicitly the usefulness of a launchon-warning posture by the United States. . . . Mr. Jastrow's analysis assumes that after the Soviet Union launches some 2,000 warheads in a preemptive-strike attempt, the U.S. response would be simply to leave its 1,000 Minutemen in their silos to suffer the full brunt of such an all-out attack. If the Minutemen were instead launched on warning, the United States would have up to 1,000 MIRV-ed missiles (about 3,000 warheads) with which to strike "hard" military targets in the Soviet Union. . . . Do the benefits of a launch-on-warning posture offset the presumably increased risks of a false warning precipitating a thermonuclear exchange? ...

Second, Mr. Jastrow concludes, and I agree, that the United States can no longer threaten the use of its strategic weapons to make up for the inadequacies of its conventional-force capabilities. ("Twenty years ago, or even ten years ago, the American nuclear arsenal would have been sufficient to deter a Soviet attack on Western Europe, but that is no longer the case.") But . . . Mr. Jastrow begs the question of what the United States should do about this situation. . .

Even with respect to nuclear weapons, he gives no clear-cut prescriptions. . . . He fails to tell us what, if anything, the United States can do to improve its strategic posture in the short term, through the 1980's. Furthermore, given his condemnation of MAD, Mr. Jastrow is curiously silent about U.S. efforts to move away from the MAD doctrine, such as Presidential Directive 59 (set forth in the Carter administration and the goal of which is the implementation of a survivable, highly flexible counterforce strategy).

Finally, Mr. Jastrow implies that the U.S. would be in a good position if only it had more accurate and survivable missiles than the Soviet Union. Still, such efforts may fall short of providing stable *strategic* deterrence. Even a clearcut U.S. numerical superiority in missiles would not prevent the So-

viet Union from attempting a preemptive strike if, by striking first, it could destroy the U.S. military command's ability to conduct an effective retaliation. The Achilles heel of U.S. strategic posture is the strategic-command system, at least according to John D. Steinbruner ("Nuclear Decapitation," Foreign Policy, Winter 1982). Steinbruner claims: "Fewer than 100 judiciously targeted nuclear weapons could so severely damage U.S. communications facilities and command centers . . . that the actions of individual weapons commanders could no longer be controlled or coordinated. . .

Steinbruner believes there is no technological solution to the problem of command-structure vulnerability and consequently that profound changes in U.S. strategic doctrine are necessary. I would welcome an informed discussion of whether this command-structure vulnerability really is a challenge to some of the fundamental assumptions on which national security rests.

WILLIAM E. HEWITT Chicago, Illinois

To THE EDITOR OF COMMENTARY: ... I find the belief in our nation's vulnerability to a Soviet counterforce or emasculation missile strike to be completely implausible.

Soviet missiles are not now nor could they ever realistically be accurate enough to accomplish the sort of strike against America's land-based missiles that Robert Jastrow and a number of defense analysts fear. I admit that under *ideal* test conditions, Soviet rocket scientists have achieved a CEP (Circular Error Probability) of 450 meters with warheads, an accuracy which, if accomplished under actual wartime conditions on a vast scale, would, be sufficient to knock out our land-based missiles in their silos. However, it should be kept in mind that a CEP of 450 meters does not mean that every warhead is guaranteed to hit within 150 meters of a target. Rather, it means that 50 percent of the warheads will fall within a circle whose radius is 150 meters-and 50 percent of the warheads will fall anywhere outside the circle. Under actual wartime conditions, however, it would be realistically impossible to achieve such deadly accuracy 50 percent of the time. The Soviets would be lucky to achieve

hat diuld of a

w's

nis-

itly

un-

hat

eld

ted

ate

ects)mbe om nto ake ore inian sile uld for DWS ties the terin deairartin l, I as-J**.S**. ize, ear

re-

if

lop

ets

sil-

٦Þ-

be-

lay

ile

or

ill

ut

re-

on

er-

ur

by

ch

:e-

ve

e-

'a

u-

es

at

n

such accuracy on a wide scale 25 percent of the time....

This means that Soviet warheads would be falling all over our country, many unintentionally on or near civilian population centers. Even with an ideal level of accuracy, the Soviets would have to allot three (not the two that Mr. Jastrow claims in his article) warheads to each of our 1,054 land-based missiles to knock out about 90 percent of our land-based missile force. America would be saturated with 1,500 nuclear warheads detonating in places other than our missile silos. In addition, many of our missile silos are in or near enough to civilian population centers so that even Soviet warheads that were precisely on target would still produce great numbers of civilian casualties. The missiles inevitably hitting off-target would produce tens of millions of civilian casualties.

Thus a Soviet counterforce strike only against our land-based missile silos would inexorably produce such a high level of civilian casualties that it would be indistinguishable from a Soviet attack deliberately intended to kill large humbers of our civilians and produce widescale civilian property damage....

Another serious flaw in Mr. Jastrow's fearful reasoning is the implicit misconception that the United States would passively ride out an enemy attack, after which our leadership would very carefully assess the damage and circumspectly consider options before deciding whether to launch a retaliatory strike. But actually, at the time of the attack, we would be operating under either a launch-under-attack policy or an attack-on-warning policy, the latter being likely in a time of great international tension. Under an attack-on-warning policy, our retaliation would be ordered when it is obvious that Soviet warheads are on the way; thus many of their warheads would explode on empty American silos whose missiles had aready been launched at the USSR.

Under the launch-under-attack policy, the policy that is usually in effect, our retaliatory forces—landbased missiles, bombers, and submarine-launched missiles—would go into action as soon as it were obvious that America was under attack. Contingency systems would insure that our retaliation would be prompt, even if the President were killed at the outset, or were out of communication, or if our military's main command-and-communication centers were destroyed. Thus the long and thoughtful pause envisaged by Mr. Jastrow after a Soviet counterforce attack, during which our leadership is supposed to decide to surrender to the Soviet Union, is, in practice, an impossibility. It does not stand up to analysis.

I think Mr. Jastrow makes far too much of the Soviet civil-defense program, a program that many Russians regard as no more than a joke. Realistically it would not save more than a handful of Soviet citizens in a nuclear attack; it would not prevent the widespread deaths from disease, famine, radiation, exposure, and civil dislocation that would follow a nuclear war; and it would do very little to preserve the USSR's industrial capacity. The Soviets know that their civil-defense measures, while perhaps enabling some of their governmental and technocratic elite to survive a nuclear war, would not be able to prevent civilian casualties, on a horrendous scale.

Mr. Jastrow is quite wrong in claiming that the Russians have "rejected" the idea of "avoiding nuclear war." The Russians have most certainly been very careful about avoiding nuclear war, for they realize that a nuclear war would destroy the USSR as a viable, modern nation. Mr. Jastrow has used some quotations and citations out of context to present a very distorted and hence highly inaccurate view of how the Soviet leadership thinks about nuclear war. In arguing against Malenkov, who believed that a nuclear war would destroy world civilization, Khrushchev did claim, from an abstract standpoint in keeping with Marxist theory, that socialism would survive a nuclear war while capitalism would not. But Mr. Jastrow does not present Khrushchev's complete statement in which he admitted that the Soviet Union would suffer very grievously from a nuclear war, and that therefore the Soviet Union should be very careful to avoid a nuclear war. . . . Mr. Jastrow ignores the fact that Khrushchev believed, as most of the Soviet leadership now believes, that socialism can and will win over capitalism without resort to nuclear war.

Mr. Jastrow also ignores the fact that Khrushchev instituted cutbacks in Soviet military strength and expressed the belief that the Soviet Union could possess only a fraction of the nuclear weapons possessed by its enemies and still be safe from a nuclear attack because enough Soviet weapons would survive the attack to be able to devastate the attacker. Yes, Khrushchev, in contrast to Mr. Jastrow's distorted view of him, was amenable to what we in the West call the idea of nuclear "sufficiency."

Mr. Jastrow, along with many other defense analysts, misperceives the function of the Soviet military and the significance of speculative statements found in various Soviet military publications.

The Soviet military does not make operative policy, and is under the control of the Soviet Communist party. The Soviet military is the obedient implementer of policy decisions of the Soviet leadership. . . . Thus various speculative opinions, essentially abstract in nature, in military publications should not be taken as irrevocably binding on the Soviet leadefship. It may be true that one opinion found in Soviet military publications is that once a nuclear war is considered inevitable, the best way to fight it would be to strike first. But it is understood that the decision to strike would not rest with the Soviet military. This idea of striking first if a strike by the enemy is considered inevitable, of "beating the enemy to the punch," as the expression goes, has also been expressed by American civilian and military thinkers-it's called "preemption." But because some American analysts have speculated on the possibility of launching a preemptive strike against the Soviet Union does not mean that the United States is implacably bent on launching such a strike and that America's strategic nuclear weapons have been built with only such a preemptive strike in mind. . . .

The Soviet leadership does, in fact, believe in deterrence. In the late 40's and early 50's, when the United States possessed a nuclear monopoly, the Soviets believed that their capability to overrun Western Europe kept them safe from an American nuclear attack, while we believed that our capability to attack the Soviet Union with nuclear weapons kept the Soviets from overrunning Western Europe with their army. From the time that both sides possessed nuclear weapons in large numbers, the Soviet Union has believed that its ability to retaliate with nuclear weapons has kept it safe from nuclear attack.

T wan lish prev Sovi pose nuc Stat

gen

tha

acc

oth

fac

of

wel exp a r cep

do

is

act

Pi

Te

see

U.

ar

so

ha

th

fo

a

(s N A

d

fa

st

tl

n

n

n

n

F

k

pons Il be cause surevaschev, disable the

nany eives itary ative oviet

not nder ímuy is poleadecuract ions irreeadóne tary lear the e to boo buld агу. rike vitathe has ican -it's use ecu-1chthe hat ent hat ons 1 a in the the ear ıat :rn an we at- : ar m th at pet

ty

15

k.

The Soviet leadership doesn't want a nuclear war and has established its strategic nuclear forces to prevent a nuclear attack upon the Soviet homeland, not for the purpose of initiating an unprovoked nuclear attack upon the United States. . .

It may be true that some Soviet generals have expressed the belief that a nuclear war is "winnable," according to some special definition of victory. But Mr. Jastrow and other defense analysts ignore the fact that other Soviet generals, as well as civilian Soviet leaders, have expressed the view that victory in a nuclear war is a meaningless concept. And even those Soviets who do believe that victory of some sort is possible in a nuclear war, don't actually want a nuclear war.

Joseph Forbes Pittsburgh, Pennsylvania

To THE EDITOR OF COMMENTARY: ... Robert Jastrow makes it seem that the USSR has left the U.S. in the dust in the nucleararms race when others cite good sources to show that the Soviets have simply reached parity, making the present a unique opportunity for both sides to accept a freeze on a further nuclear arms build-up (see Randall Forsberg, "A Bilateral Nuclear-Weapons Freeze," Scientific American, November 1982). I wonder where Mr. Jastrow gets his facts.

His assumption that counterforce. strategies can replace MAD ignores, the fact that nuclear weapons yield massive destruction and that many military installations are in or near major population centers. Tens of millions will die in either case. Furthermore, since accuracy is the key to an effective counterforce strategy, and American missiles have long been recognized as having greater accuracy, who would be more likely to use counterforce strategy? As argued by three ex-perts in the April 1983 issue of the Bulletin of Atomic Scientists, counterforce strategy would probably take out a nation's commandand-control capabilities, thus insuring escalation to all-out nuclear war. It is therefore more dangerous than MAD. . . .

Mr. Jastrow seems to assume Soviet imperialistic intentions in the nuclear arms build-up. George F. Kennan, whose credentials for understanding the Soviet mind carry far more weight than Mr. Jastrow's, explains Soviet military paranoia in a light far more congruent with history. After all, the Russians suffered terrible casualties in their own homeland in the last world war, as they have in other wars. They are surrounded by their traditional enemies, and the U.S. seems to be aggravating the situation by arming some of them with weapons of massive destruction....

JAMES H. CARLISLE Riverside, California

TO THE EDITOR OF COMMENTARY:

.... I take exception to Robert Jastrow's belief that the Soviets "reject the view, so widely held in America, that the mass detonation of nuclear weapons would mean the end of civilization. . . ." In fact, they renounce the first use of nuclear weapons, while first use is our official policy in case of an invasion of Western Europe. Our Vice President said three years ago that we could win a nuclear war, President Carter developed a plan (Presidential Directive 59) to fight one, and we talk of limiting such a war to Europe. . .

That the Soviet build-up began in 1963 should tell us something. In 1963 we had nuclear superiority and the Russians had been embarrassed by the Cuban missile crisis. Isn't it possible that what Mr. Jastrow considers a build-up in order to win a nuclear war if it broke out is only an attempt to build up an arsenal so that they need never be embarrassed again? That is how I read it, since they now want a freeze while not one expert on our side is willing to trade nuclear arsenals with the Soviet Union. . . .

Next we come to perhaps the backbone of Mr. Jastrow's case. I will not dispute his assertion that the destructive power of the Soviet nuclear arsenal is about twice as great as that of the United States. What is groundless and dangerously incorrect is his statement that "the missile forces of the Soviet Union also have a combination of accuracy, destructive power, and numbers that will enable them to destroy most of our Minuteman missiles in their silos in a preemptive first strike. We lack any such capa-

GIVE YOUR GIN AND TONIC THE SAME ADVANTAGE YOU GIVE YOUR MARTINI.



Give it crispness. Give it clarity. Give it character. Make it—as you would make your martini—only with Beefeater Gin.

And finallý; because one of America's most popular drinks would seem to deserve a first name, give it the same one you've given the martini: Beefeater.*

With a Beefeater and Tonic (as with a Beefeater Martini) the advantage will be all yours.

BEEFEATER®GIN. The Crown Jewel of England.[™]



bility. In other words, the Soviet Union has strategic superiority.' All the data that I am aware of . . . clearly show that the Soviets do not have a first-strike capability, but that the next generation of weapons (MX and Trident 2, as well as the probable Soviet weapons of the 1990's) will change that. To me, this is the reason it is imperative that we have a nuclear freeze now, before the new technology undermines MAD and gives whichever side strikes first a possible chance of "winning a nuclear war."

If the Soviet Union wants a nuclear war, the species homo sapiens will be extinct by the year 2000. If it does not, then MAD is valid and will be in effect until the next generation of strategic weapons is deployed (hence the necessity of a freeze) regardless of Soviet civil-defense measures or rhetoric to the contrary....

New York City

ROBERT DEBARE

To THE EDITOR OF COMMENTARY: Coming from the NASA area of Cleveland, as I did, I had complete faith in Robert Jastrow's "Why Strategic Superiority Matters." But a doctor relative (retired colonel) and a Common Cause associate (retired colonel) both say our Tridents know precisely where they are at all times. Who's right?

VIVIAN BENTON-RUBEL Clearwater, Florida

TO THE EDITOR OF COMMENTARY:

Robert Jastrow argues that because of its strategic superiority the Soviet Union could launch a preemptive first strike against our landbased missiles without threatening our civilian population. Our only response would be to destroy its cities from our submarines, and that would be suicidal because it would unleash a Soviet secondstrike attack against our cities.

Leaving aside the enormous risk that such a preemptive attack would inflict serious civilian casualties, and an exceedingly generous assessment of our patience while our missiles were being destroyed, what would the Soviets have gained? Our real deterrent would still be intact. Could the Soviets move on Western Europe? No more than before they destroyed our land-based missiles. This argument merely confirms the relative uselessness of our land-based missiles except as a first-strike weapon.

Later in his article, after having conceded that we can overkill the Soviet Union from our submarines alone, Mr. Jastrow then unthinkingly argues that if conventional war breaks out, Soviet nuclear superiority becomes the decisive factor. Why? If we could destroy the Soviet Union 10 times over rather than 5 times over, would that help us repel a conventional attack? Would it make the Soviets less likely to launch a conventional attack?

A nuclear response might be precluded in a conventional attack because of the retaliatory implications. But this is not an argument in favor of strategic superiority. It is an argument for building up our conventional might, not for sinking billions more into demonstrably useless equipment like the MX.

RALPH ROSKIES

Department of Physics University of Pittsburgh Pittsburgh, Pennsylvania

TO THE EDITOR OF COMMENTARY:

Robert Jastrow's article lacks completeness. It is true that . . . strategic parity is more stable than the overwhelming superiority of a ruthless adversary. But the second aspect of strategic policy is the avoidance of overwhelmingly large numbers of strategic weapons on earth. There are always some unintended consequences in the implementation of national-security systems: witness two world wars in this century. There is also the risk of accidental explosion as the absolute number of weapons on earth increases. The cost of losing influence in the world has to be measured in light of this risk as well as others.

The advocates of the nuclearfreeze political movement know that, in a simplistic sense, "strategic superiority matters" and "better Red than dead." But neither of these views solves the problem: freeze advocates are driving the governments of America and Russia to face the complicated task of negotiating a condominium of national-security interests that will reduce the risk of intentional war, semi-intentional war, and purely accidental nuclear explosion.

JOHN GELLES Ventura, California

TO THE EDITOR OF COMMENTARY: The emperor has clothes! The emperor has clothes! Strategic superiority does matter! Alas, my al-

ready battered convictions that apologists for the current massive build-up in the American nuclear arsenal are both logical and wellintentioned were dealt yet another blow by Robert Jastrow's article. ... I read the article in the hope that he could convince me that our submarine-based missiles are not sufficient to counter any Soviet nuclear threat, but it was a vain hope indeed....

ke

ทบ

ou

no

sic

tu: in

ju

₩€

er.

if

ου

sic

w

cle

ga

sa

m

it

av

cl

at

in

tie

A

nι

ar

gι

th

са

il

th

li

សា

is

se

al

tĿ

 \mathbf{T}

st

tl

d

i

N

Mr. Jastrow is apparently suggesting that if the Soviets launched 2,000 warheads targeted on our 1,054 missile silos (his figures), equivalent to an attack several million times more devastating than the one launched against Hiroshima, the American government would simply go about its business as usual, wait for the fallout to disperse, and then call everyone out of his basement. Why? To protect our cities-now lacking some of the amenities we've grown to love (like edible food, potable water, and breathable air), but the best we have, I guess.

This is absolute madness of the most incredible kind. Our submarine-based missiles are a perfect deterrent precisely because they cannot destroy the Soviet nuclear arsenal. Were they able to do so, for precisely the reasons Mr. Jastrow advances in support of his arguments, the Soviets would be tempted to develop and use their first-strike capability lest they lose their ability to respond to an American attack. Short of President Reagan's Star Wars defensive shield, the Soviets' understanding that we can destroy their society as now constituted after a first strike remains the best deterrent against such an attack.

Washington, D.C.

TO THE EDITOR OF COMMENTARY:

DAVID G. POST

Robert Jastrow's plea for nuclear superiority seems logical and convincing—until one realizes that Mr. Jastrow has finessed the issue of adequate nuclear defense and is really advocating a strategy for a limited nuclear war.

Mr. Jastrow's whole argument rests on the idea that the policy of Mutual Assured Destruction (which he concedes will prevent war so long as both sides believe in it) has been undermined by the Soviets' ability to destroy our ICBM's; the Soviets could thus wage war on us while avoiding the large-scale destruction of their own society. . . . that sive lear ellher icle. ope our not nuope sughed our res), milhan lirolent ness disit of our the like and we the marfect they lear so, Jashis be heir lose mer-Reaield, : we now reinst 'OST RY: lear :on-Mr. of is r a ent of ich mg

en:

bil-

So-

us

de-

According to Mr. Jastrow, the key to our supposed lack of nuclear deterrence is the fact that our submarines can only hit cities, not missile silos. But this conclusion represents a complete departure from logic. Mr. Jastrow has, in fact, inadvertently confirmed just the opposite proposition: since we do have the capability to obliterate Soviet population centers even if all our ICBM's were knocked out, Soviet superiority is a delusion. The Soviets' only advantage would be in waging a limited nuclear war, which they can only engage in with our cooperation; the safeguard of MAD can be undermined only if we ourselves allow it to be, by abandoning it as our avowed policy. As long as we make it clear to the Russians that a nuclear attack, even a "limited" one, would instantly bring on massive retaliation, they will never dare attack. As mad as MAD is, it has prevented nuclear war for the past generation and remains our only sure safeguard against nuclear war until that day when all nuclear weapons

can be eliminated. The true danger lies not in the illusory Soviet "superiority" but in the willingness of the U.S. to adopt limited nuclear war (including a first-strike capability) as a policy. It is people like Mr. Jastrow who, in seeking to make nuclear war "thinkable" and "winnable," bring us that much closer to its happening. LAWRENCE AUSTER #

New York City

Robert Jastrow bases his case for strategic superiority on the belief that deterrence, which involves a devastating American counterattack, is essentially flawed. He is wrong. Nuclear weapons have no military value beyond deterrence. Strategic superiority is impossible for three reasons. There is no way to defend either our military forces or civilian population against a nuclear at-tack. We do not have weapons with sufficient reliability and accuracy to eliminate all the missiles of the Soviet Union. Finally, we do not have the command, control, and communication capability to fight a prolonged nuclear war. These factors also prevent the Soviet Union from obtaining strategic superiority.

Like it or not, we must accept the fact that the only purpose nuclear weapons serve is as a deterrent. The best deterrent is a nu-

clear weapon that can survive an attack and have the capability to respond. The submarine armed with ballistic missiles fills this need. These missiles now have the accuracy to attack targets that are valued by the Soviet leadership. They do not have to be fired indiscriminately on Soviet cities. This adds to the credibility of our deterrence doctrine. At the same time, the submarine-launched missile is not a first-strike threat since it would be virtually impossible to coordinate a sustained counterforce attack using only submarines.

A search for strategic superiority is a dangerous undertaking. It will lead to an ever-escalating and destabilizing arms race. It is a goal that can never be reached. Yet once we begin to believe that nuclear weapons have military value, the chance that they will be used in a crisis increases.

W. E. CORNELIUS

St. Louis, Missouri

ROBERT JASTROW Writes:

The main current of criticism running through these interesting letters is that a Soviet nuclear attack on American ICBM's and military strong points would be almost certain to trigger a devastating American counterattack against Russian cities, with massive loss of life. In the opinion of the correspondents, this is sufficient to deter the Russians from a first strike. (The American attack would have to be directed against Russian cities because our submarine missiles, which TO THE EDITOR OF COMMENTARY:) would carry the attack to the enemy, are not sufficiently accurate to destroy hardened military targets.)

This is the premise on which American strategy has been based for many years. The trouble with it is that the Russians have now built up their strategic forces to such an extraordinary level of destructive power that if we should counterattack after a Russian first strike, as the American theory of deterrence envisions, it would be in the certain knowledge that the Soviet Union could direct against us a third strike so devastating that America would never rise from the ashes. Faced with this prospect, the American government might well be deterred from using our deterrent.

The correspondents seem to be saying that this doesn't matter. In order to deter the Russians, we only need the capability for carrying out a retaliatory counterattack;

and the second se

we only need to threaten reprisal. But Soviet strategic superiority makes that threat far less credible than it was, say, ten years ago. Because of the huge stockpile of missiles and bombs in the Soviet nuclear arsenal, the Russians can initiate a powerful attack on our military installations and still have enough bombs in reserve to reduce the United States to charred rubble if we attempt to strike back. It seems clear to me that this circumstance diminishes the value of our strategic deterrent. If the Soviet Union can destroy a sufficient fraction of our nuclear arsenal in its initial attack, or limit the effectiveness of the arsenal by destroying the military-command links to our bombers and missile submarines, the value of the American nuclear deterrent will disappear entirely.

So now a series of quantitative questions arises for the Soviet military planners. How many B-52's can they catch on the ground? How many American missiles in their silos? How many submarines in port? How many B-52's and cruise missiles can be shot down in flight? How many submarines at sea tracked and destroyed? And how successfully can communication links be broken between submarine commanders and the President or his surrogate?

Military communication links are the Achilles heel in our strategic deterrent, as William E. Hewitt points out. Communication links with submarines are a particular problem, as the recent report of the Scowcroft Commission notes. Submerged submarines are hard to contact by radio because radio wavelengths now in use do not penetrate sea water. Moreover, all military communications-land, sea, and air-are vulnerable to EMP, the Electromagnetic Pulse. EMP is a destructive surge of voltage across the entire North American continent, which the Soviets can generate by exploding an H-bomb high above the United States. The new silicon circuit chips, which pack hundreds of thousands of electronic components into a tiny space, are particularly vulnerable to EMP. One large Soviet H-bomb, exploded above the atmosphere at the start of a Soviet surprise attack, could blind all our early-warning satellites and radars. EMP could also erase the memories of computers, burn out radio receivers, and damage telephone lines across the country. Our military communications satellites, which relay messages to U.S. bombers and submarines, could also be knocked out.

With military communications' disrupted, the commanders of our missile submarines would be on their own. Would a submarine commander, cruising underseas, be willing to take responsibility for starting World War III, merely on the suspicion that something is amiss up there? How confident can we be that our submarines will remain the ultimate deterrent, in the light of these circumstances?

There are other problems with the submarine deterrent. The Scowcroft Report observes that our submarine force, "consisting solely of a few very large submarines, each carrying on the order of 200 nuclear bombs, presents a small number of valuable targets to the Soviets." This circumstance is any inducement to the Soviet Union to pour enormous resources into research on anti-submarine warfare. Although submerged submarines are the least vulnerable element in our strategic triad today, they may not remain so much longer. The Scowcroft Report concludes: "Over the long run it would be unwise to rely so heavily on submarines as our only ballistic-missile force.'

The survivability of our ICBM's is also decreasing steadily, because of the deployment of hundreds of monster Soviet SS-18's, each twice the size of an MX. These SS-18's are accurate as well as destructive; contrary to the suggestion in James H. Carlisle's letter, their accuracy is roughly a tenth of a nautical mile, or 600 feet, comparable to the accuracy of American missiles. As a result, only 15 percent of our Minuteman ICBM's can survive a Soviet attack today, and that number will decline to 7 percent in 1985 and 3 percent in 1988. The Scowcroft Report confirms this weakness also; it states that the Soviets "probably possess the necessary combination of ICBM numbers, reliability, accuracy, and warhead yield to destroy almost all of the 1,047 U.S. ICBM silos, using only a portion of their own ICBM force. The U.S. ICBM force now deployed cannot inflict similar damage." Joseph Forbes finds these facts "implausible," but they must be reckoned with.

At the same time the USSR has invested, and continues to invest, enormous sums in all elements of defense—civil, air, and ballistic-missile. Mr. Forbes says that Russians

regard their government's civil-defense program as a "joke," but the USSR is spending \$3-billion a year on civil defense and employs 150,000 Soviet workers full-time in the effort. The U.S. has essentially no air defense, but Soviet air defenses are gargantuan in magnitude-7.000 radars, 12,000 surfaceto-air missiles, and 3,000 fighter interceptors. A Department of Defense report states that within a few years our aging B-52's will be unable to penetrate the heavy Soviet air defenses. Our cruise missiles are supposed to bridge the gap until the B-1's and Stealth bombers are ready, but penetration of Soviet air space by these slow-moving, subsonic, pilotless craft is an uncertain matter at best.

The Soviet Union is also active ballistic-missile defense. Our reconnaissance satellites have discovered five mammoth phasedarray radars under construction in the USSR, suitable for tracking, in-. coming nuclear warheads and fatgeting them for interception by anti-ballistic missiles. These radars take years to construct and are the long-lead-time items in an ABM system. The USSR has also tested its interceptor missiles-SAM 5's and SAM 10's-in ABM modes at altitudes above 100,000 feet. The Soviets appear to be moving toward deployment of a large ABM defense.

On top of all these developments, the Soviets continue to build up their nuclear arsenal. Soviet destructive power is augmented each year by 5 new nuclear-missile submarines, 175 ICBM's, and 100 SS-20's. The Soviet margin of destructive power, now at least twice ours, is going up steadily. The USSR has also been investing heavily in the hardening of its silos and commandand-control centers. All late-model Soviet ICBM's are now protected by the world's hardest silos against the American counterattack that we envision as the backbone of our deterrence.

The trends are well-defined and the outcome is clear. If not next year, then in the year after, and if not in that year, then by 1986, we will perceive our capability for inflicting damage on the Soviets to be so diminished, and their capability for inflicting damage on us to be so enhanced, that a nuclear war would be lost without a missile being fired.

TURNING to specific points of fact, Mr. Forbes is correct in saying that a missile accuracy of, say, 1,000 feet means that half the missiles in a salvo will land within a circle of that radius, and half will land outside the circle. However, the half that land outside the circle will still be clustered in the neighborhood of the aiming point; very few will miss their target by more than two or three times the stated accuracy, i.e., a fraction of a mile. In the case above, 99.9 percent would fall within a mile of their target. Thus, it is not correct to conclude, as Mr. Forbes does, that "Soviet warheads would be falling all over our country" during an attack on our military strong points. With the accuracy Soviet missiles are now achieving-and, according to the Scowcroft Report, accuracies as good as a few hundred feet are now in prospect with the aid of terminal guidance-it will soon be possible for the Soviet Union to execute a surgically clean strike, with relatively few civilian casualties, against key military installations in the United States.

Robert DeBare states that available data "clearly show that the Soviets do not have a first-strike capability," but the Scowcroft Report confirms earlier judgments that the Soviets do have a first-strike capability, as I noted above.

Mr. Forbes suggests that our ICBM's would not be vulnerable to a Soviet first strike because we would follow the policy either of launch-on-warning or launch-onattack, and thus the Soviet warheads would only fall on empty silos. It seems to me that the discussion of strategies of launch-on-warning or launch-on-attack is academic because the Soviet Union will never contemplate a nuclear strike until it possesses the certain means of blinding our early-warning satellites and radars by EMP or other methods.

Vivian Benton-Rubel says that, according to her sources, our Trident submarines know "precisely where they are at all times." "Precisely" is a relative term; in the case of the Tridents, it means within about 500 yards, which is pinpoint accuracy in the vast expanse of the ocean, but not good enough to destroy a hardened silo.

Thomas Powers, Robert DeBare, and William E. Hewitt ask why I did not take account of Carter's Presidential Directive 59 of July 25, 1980 and other recent policy changes that indicate we are now more interested in targeting Russian mili-

tary installations than in killing the Russian civilian population. The trouble is that we cannot im-, plement PD-59 because we are stuck with a strategic arsenal dominated by submarine missiles—an arsenal that reflects the thinking of the years of Mutual Assured Destruction, and is therefore good for little else than killing civilians. Our most accurate missile, the Minuteman III, although accurate, is, according to the Scowcroft Report, "inadequate to put at serious risk more than a small share of the many hardened [i.e., military] targets in the Soviet Union." Initiatives taken in the Reagan administration will create a strategic arsenal that can back up PD-59, but not before the end of this decade.

Ralph Roskies asks how American nuclear superiority would help repel a conventional attack by the Soviet Union. It seems to me the answer is that when we possessed nuclear superiority, its threatened use effectively deterred Soviet action in Berlin, in Cuba, and in the 1973 Yom Kippur war. By 1978, when we had lost that superiority, the Russians were able to act with impunity in Afghanistan, and, as Richard DeLauer, Pentagon chief scientist, said, "What the hell was the best thing we could do? We withdrew from their goddamn Olympics."

Gandhi

To THE EDITOR OF COMMENTARY: Three cheers for Richard Grenier ["The Gandhi Nobody Knows," March]. I always wish his articles were longer. The late Dwight Macdonald was right when he said that Mr. Grenier is "our best practicing movie critic/historian" [Letters from Readers, August 1981]....

I expect Mr. Grenier will find the response to his article heatedcharges of racism, cultural imperialism, and character assassination, if not of having personally introduced cobras to the subcontinent. A pity, since the essential point, as I read it, was not that Gandhi was an offensive villain, but simply that he was . . . someone whose character and ideas-and influence-grew out of a specific culture and historical situation, and who cannot, honestly, be isolated from them. Or, more generally, that he deserved the dignity of being dealt with as an individual, not as an empty human shell into which the film-maker Richard Attenborough could pour

an expedient, contextless, prettiedup idealism. . . .

CHRISTOPHER DUNN Potsdam, New York

To the Editor of Commentary:

I did not see the movie Gandhi, nor do I intend to. As a recent emigrant from the Soviet Union, I do not actually have to see propaganda to know it. Reviews are quite enough. However, I did have to listen to my liberal American friends raving about the movie, the man, and, most importantly, the "lesson" -the applicability of Gandhi's teaching to real life. I then reminded my friends of Gandhi's notorious letter to Martin Buber in which, as Mr. Grenier points out, Gandhi preached that German Jews had the moral obligation to stay in Germany and, by willingly submitting to Nazi atrocities, teach mankind a moral lesson. The amazing thing is the answer I received: "Well, it might have worked." What has happened to American liberals? How and when did they lose any semblance of moral discernment so that they can no longer distinguish between democratic Britain and Nazi Germany (or, for that matter, between the United States and the Soviet Union)?

If anything, Gandhi's record of passive resistance and civil disobedience should serve as a glorious monument to Western civilization at its best—because it worked. How can anyone ignore the fact that it could only have worked because Gandhi was dealing with a decent and moral society?

I know the Russians are going to like this movie—if they are smart they will be showing it all over Afghanistan in no time.

LENA MANDEL

New York City

TO THE EDITOR OF COMMENTARY:

After reading "The Gandhi Nobody Knows" I was reduced to the kind of admiration that is usually reserved for the high points of dazzling scholarship. Richard Grenier's research, his marshaling of data, his general writing skill all make me wonder what peaks he can leap to next. . . The article on Gandhi is even more fun than his leveling of *Reds* ["Bolshevism for the 80's," March 1982] and *Missing* ["The Curious Career of Costa-Gavras," April 1982]. . . .

Ainarillo, Texas

ROY TRABAND

To THE EDITOR OF COMMENTARY: I admire Richard Grenier for being so knowledgeable, but I admire him even more for his talent in thoroughly documenting the historical background and thus exposing a completely unhistorical film. For saying "J'Accuse" to all distortions, he certainly merits an Oscar.

JOHANNA B. ANGEL New York City

To the EDITOR OF COMMENTARY: Richard Grenier's article on Gandhi is illuminating, elucidating, brilliant. Not only does he tell us about the movie, but about the man, and, indeed, the entire culture and religion that the movie purports to represent....

ROBERT CARLEN Stony Brook, New York

TO THE EDITOR OF COMMENTARY:

Richard Grenier undertook the much-needed job of debunking Gandhi. I applaud his effort. At the same time, some small points need to be corrected and I would like to add something to strengthen his argument.

When Gandhi supported the Khilafat movement of the Indian Muslims after World War I, he opposed the creation of new states for the subject peoples of the Ottoman empire, which had been envisioned by the treaty of Sèvres (1920). One of the new states called for by the victors in World War I was an Armenian state to be set up in eastern Anatolia in part of historic Armenia. The Armenians had just suffered the first modern genocide at the hands of the Turks. The massacre continued after the end of World War I in areas which France and the Russian Bolsheviks handed over to the new Muslim Turkish government of Ataturk, as well as in Smyrna, conquered from Greece.

By his support of the Khilafat movement, Gandhi was disregarding the national rights of the Ottoman subject peoples and especially those of the Armenians. He was saying in effect that mass murder did not bother him. Genocide, he implied, was OK. Let me add that the Armenian massacres were not an obscure event. In fact, they received worldwide attention. Surely Gandhi was aware of them from the British papers. These facts strengthen Mr. Grenier's argument.

Where Mr. Grenier is mistaken, I believe, is in attributing to the Arabs in general the desire to separate fr and fr Sultan The E Howan that the the O War I the Ca Islam, Elie

> same j Phila

Тот

I d

ment tion only writt my c movi was 1 ians viole "Bri and was tive pen app W the and and rael liev wer stir Sca To ier Ga tui be giv it in in m

in m trata W Ir P Pass

n

i

С

1