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letters

of Intellectual and Ethical Development in the College Years: A Scheme (Holt, Rinehart, and Winston, New York, 1970).

I share with Meyer the hope that the awareness of our own cognitive processes will enable us to be more effective scientists and teachers. This does raise two questions for me: To what degree can I as a researcher or teacher require others to confront, rather than retreat from, disequilibrating experiences? How can I model for others creative ways to handle cognitive dissonance?

ROBERT G. FULLER

University of Nebraska
Lincoln, Nebraska

2/83

More on nuclear freeze

Every problem has one correct solution and a large number of approximations and erroneous attempts. The correct solution is not necessarily the simplest or the hardest; but at times it requires a fresh approach, different from the classical and the traditional. This is not uncommon in science, and scientists should not be tied to the traditional in discussing international problems. I am referring to the debate, "Freeze on Nuclear-Weapons..." in January (page 36).

The correct solution to excessive armaments, regardless of their nature, is complete disarmament; and that should cover all kinds of weapons down to bows and arrows, swords and clubs. Equipment whose function is to kill and destroy serves no good purpose and need not be manufactured, used or stored.

International conflicts should be resolved peacefully; involved parties, if unable to reach an agreement, should accept arbitration. The international community could exert enough pressure on involved nations until they comply. We have been moving in this direction, but not fast enough.

It is naive to think that such measures are simple and could be accomplished in a decade or two; but it is absurd to think they are impossible.

The basic requirements for such a momentous goal is a change in the mentality and stature of the world elites, political leaders and statesmen.

The notion that self-preservation requires one to fight for his family, his tribe, his city or his country does not stand to logic or reason.

Any form of self-preservation is meaningless unless it encompasses humanity as a whole.

Aside from the all-important human suffering and loss of human life, modern wars are extremely expensive in

economic terms and no nation has the right to waste our planet's resources on such absurd activities.

Scientists should shoulder the responsibility of pointing that out and should use all possible means to make it known to all; we can ill afford approximations and half-measures.

S. I. SALEM

California State University
Long Beach, California

2/83

It was fun to read the nuclear freeze articles by my friends (and colleagues) Feiveson and von Hippel; and by my colleague (and friend) Lewis. The former present a factual and reasoned argument for a freeze and some creative suggestions for making it work; Lewis wrote his article as though for PHYSICS TODAY's first joke issue.

Midway through his article, Lewis confesses that he is neither for nor against the freeze. Later, he proposes non-nuclear defense of a subset of Minuteman silos, but then refers the reader to his first paragraph which says "to every complex problem there exists a solution that is simple, appealing and wrong."

Lewis raises puzzling questions when he applauds the bombing of the Iraqi reactor. Should Syria bomb the Israeli reactor at Dimona? Should Argentina go after the Brazilian reactors? What does he have in mind when he urges that the US "put... more effort into controlling the proliferation of nuclear weapons... by encouraging and participating in the international development of nuclear power"? He expresses dismay that some Americans like neither nuclear weapons nor nuclear power—but there is a connection and he knows it very well.

While there may be a case against the freeze, it was not made in the February issue of PHYSICS TODAY.

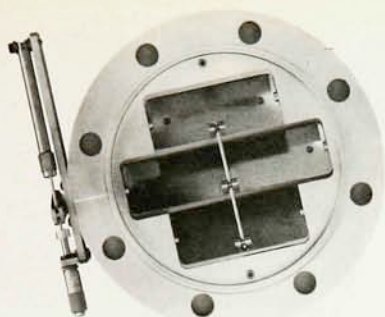
ROBERT C. AXTMANN

Princeton University
Princeton, New Jersey

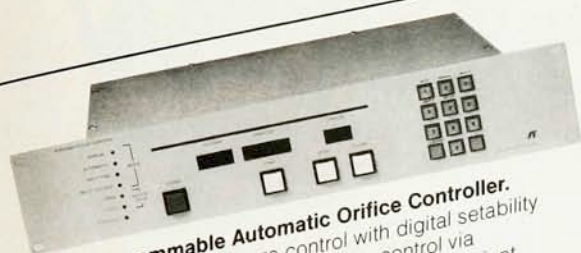
2/83

In equating the nuclear freeze with giving Laetrile to cancer patients—not helpful for solving the problem—Harold Lewis seems to be guilty of not reading his journals. The December issue of PHYSICS TODAY highlights an excellent reason for freezing nuclear weapons production—that is, the very dangerous and, so far, unmanageable radioactive wastes that are a by-product of the nuclear-weapons industry. I know that we normally think of the nuclear-power industry when discussing the problems of radioactive-waste disposal. I suspect, however, that the nuclear-weapons industry has to date furnished us and our grandchildren with a large majority of the radioactive

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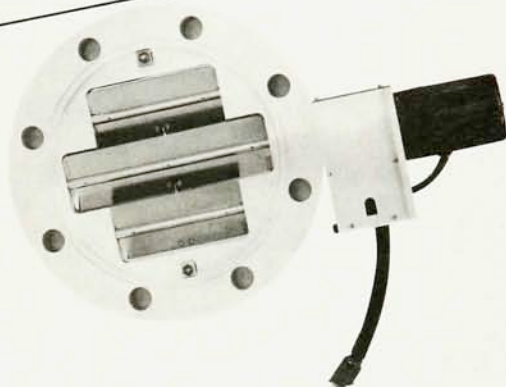
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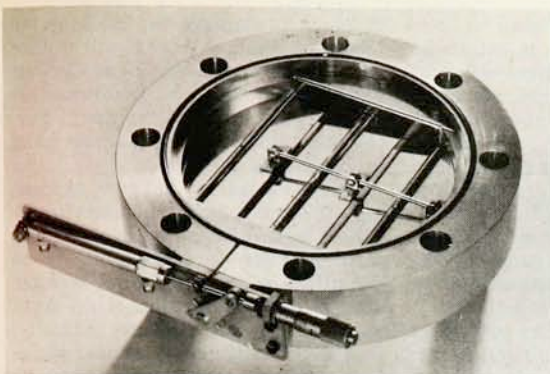
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waste we must eventually deal with. Even if that were the only reason for enforcing a nuclear-weapons freeze, it would be good enough.

WILLIAM G. LAMB
Oregon Episcopal School
Portland, Oregon

I have indeed re-read not just the first paragraph but the entire article of Harold Lewis. The world is confronted with the possibility of global destruction (I would go further than Lewis in seeing it as not just "Western civilization" that is threatened) by the continuing vertical proliferation of the nuclear arsenals of the superpowers and by the concomitant "five-minute warnings," "hair-trigger launches" and other such concepts that are even difficult to comprehend. Yet, faced with this and the call to start drawing back through the first step of a mutual freeze on further additions, what does Lewis advance? After three pages of hand-wringing about the problem, he comes up with two components of a solution. One is a non-nuclear defense of nuclear-deterrence silos, the feasibility of which I leave to experts to decide. The second component is to act to prevent horizontal proliferation to the Iraqs of this world. It used to be China, then Idi Amin, and now Iraq seems to be the convenient scapegoat for the failings of one's own actions and thinking. While I too oppose horizontal proliferation as well, I find laughable this attempt to deflect the argument from the real threat posed by the vast arsenals of the superpowers. It will not do for the superpowers to evade the responsibility of doing something about the threat posed by their arsenals by turning and pointing fingers at the few bombs not yet possessed by the near-nuclear have-nots.

Most importantly, no one else poses the kind of threat to civilizations and the globe itself that do the US and USSR. Next, I for one reject the kind of parochialism (racism?) exhibited by the words that others are "less responsible than either we or the Soviets" and that great powers can be trusted more in "preserving the peace." What evidence from history is Lewis drawing on in making these astonishing claims? Anyone who has read about the actions of the great powers on the days that led to the two World Wars would question this faith in the reasonableness of the behavior of great powers. More recently, our own two superpowers have both shown irrationality to equal that of any in their own wars in Asia and South and Central America. It is naive foolishness to believe that any country, great or otherwise, will not find reasons

to justify its actions when it gets involved in a war. Let us not forget that the only time nuclear weapons were used was when only one great power had them, and plenty of reasons have been advanced in justification. Likewise, if there is going to be a catastrophic nuclear exchange between the US and USSR one day, we can be sure that arguments will be advanced by both sides in support of the "reasonableness" and "responsibility" of their actions. The truth is that there is little to choose between the posturings and actions of the great powers or the lesser ones. No one is suicidal and all can be expected to act according to what they see as good for them. All that does differentiate the greater from the lesser powers, is that when through miscalculation they come to a crunch, there is much more damage done when big ones clash, both to the warring sides and, in these days of nuclear war, to the rest of the world.

In fact, in "applauding" the Israeli bombing of the Iraqi reactor, Lewis seems not to recognize the grim irony in what he says. For it is precisely that kind of thinking of preemptive first strikes in the context of the nuclear arsenals that gives reason for alarm and has led to the urgency of calls for a freeze. That kind of thinking on the part of another Lewis, whether in America or Russia, who is also in a position to press the buttons, is what has worried many people. This is particularly so when there are only a few minutes in which to make the decision and, as Harold Feiveson and Frank von Hippel say, preprogrammed Presidents or automatic devices may make the decision.

In the arrogance of the statement on the Iraqi reactor and others such as his "not being averse to the use of strong measures," Lewis again betrays what is part of the real problem. First of all, even as a practical matter, the international political situation is too far gone now for the rest of the nations to countenance that kind of bullying or taking orders from the big powers. Even the issue of stopping further horizontal proliferation is ill served by such attitudes. Right from the time of the negotiations for the nuclear non-proliferation treaty, a concern many have had is whether this is not merely a front for a new imperialism in which the haves deny to the rest the benefits of nuclear technology while they do not diminish their own appetites for more nuclear weapons. Many near-nuclear nations who have not signed the treaty have pointed out time and again that the other side of the coin of asking others to refrain from horizontal proliferation is that you yourselves stop further vertical proliferation. This is an essential component of the treaty.

Much as Lewis may want to deny the Iraqis the bomb, to think it will be done without reasonableness all around but just by arrogant talk is to substitute his "wishful thinking for therapy." Furthermore non-proliferation goes hand in hand with the freeze.

There is also irony in Lewis' expressing righteous indignation about branding as mad someone with a different point of view, in his quoting to us definitions of "phobia" from Webster and in his pontification about what makes "reasoned debate difficult." One might legitimately wonder whose foot the shoe is really on when he sprinkles his article with such comments about Iraq or about "the few weapons we have against oil sheiks."

Finally, Lewis ended with the exhortation to re-read his first paragraph. May I suggest some reading matter to him? First, a careful reading of the accompanying article by Feiveson and von Hippel. Second, George Kennan's recent book "The Nuclear Delusion" and related essays by Hans Bethe and Solly Zuckerman in *The New York Review of Books* (10 June and 16 December 1982, respectively).

A. RAVI PRAKASH RAU
Louisiana State University
Baton Rouge, Louisiana

1/83

THE AUTHOR COMMENTS: I am sorry Bob Axtmann took my article as a joke—I don't think any of these issues are jokes. As to the connection between nuclear weapons and nuclear power, I do indeed know it very well—well enough to wince at the tortuous logic that often confuses the two. Axtmann does raise one important issue to which, alas, I do not have a simple and easy solution. I urged strong measures, "preferably diplomatic," against those who lie about their efforts to acquire nuclear weapons. Axtmann knows perfectly well that I was not advocating a general brouhaha in which all reactors are fair game, but rather efforts to keep nuclear weapons out of irresponsible hands. I would prefer to limit the spread to what it is now, but recognize that that may not be possible in this real world. Failing that, I am not averse to making judgments about levels of responsibility, and to working harder to keep nuclear weapons out of Khadafi's hands than out of Axtmann's.

William Lamb has been overtaken by history. While it is true that the weapons program began long before the civil reactor program, and therefore military wastes exceeded civil wastes for a period, that is no longer the case. Commercial electricity-producing reactors now generate the vast majority of the radioactive waste in our country. Further, for technical reasons, a freeze on weapons production would not result in a cessation of

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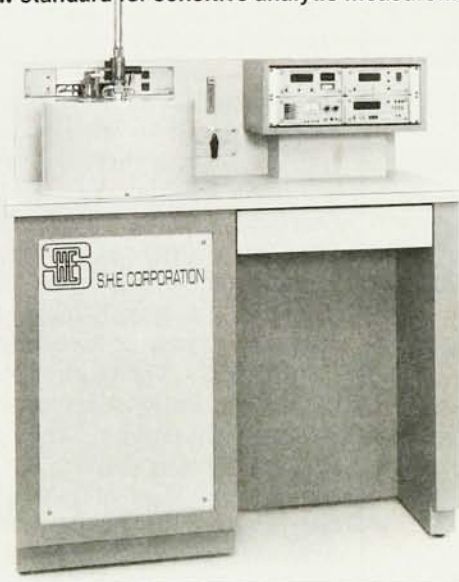
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letters

military waste production; that could only come from destruction of the weapons.

I am sorry that Ravi Rau finds me "laughable," "parochial," "racist," "astounding," "naive," "foolish," "arrogant" and "pontificating." It must be wonderful to be such a good judge of character. One misstatement does require correction. Rau equates non-proliferation with imperialism, and he states that "an essential component" of the treaty is a commitment on the part of the nuclear powers to stop production ("vertical proliferation," in his words). My copy of the treaty contains no such item to provide a convenient excuse for clandestine proliferation of nuclear weapons.

HAROLD W. LEWIS

University of California
Santa Barbara, California

2/83

Berkeley in the 1930s

Contrary to the statement by Robert Varney (October, page 24) that Gilbert Lewis terminated his experimental research career in 1937, may I point out that Lewis carried out experiments, starting in 1937, on general acids and bases (with G. T. Seaborg), the absorption and emission of light by aromatic substances (with J. Bigeleisen, M. Kasha, D. Lipkin and T. T. Magel), photochemistry in condensed media (with J. Bigeleisen, D. Lipkin and T. T. Magel), and the identification of triplet states in organic compounds (with M. Calvin and M. Kasha). Each of these research areas has flowered in the last forty years. A more detailed historical perspective of Lewis' contributions in these and other areas of chemistry, based on a symposium held at the March 1981 meeting of the American Chemical Society, will be published in the forthcoming issue of the *Journal of Chemical Education*.

JACOB BIGEISEN

State University of New York
Stony Brook, New York

2/83

More Russian refuseniks

Jacov L. Al'pert was formerly deputy director of the Institute of Terrestrial Magnetism, Ionosphere, and Radiowave Propagation of the Academy of Sciences, USSR. As a pioneer of space physics, as a major contributor to the theory of satellite-plasma interaction and of magnetospheric wave propagation, and as the author of several books that have been translated into English and published in the US, he is certainly known by name to many members of AIP. But only few are likely to have

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