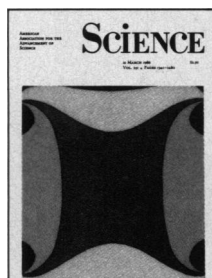


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COVER Electric power dissipation levels in a vertical slit with finite electrodes. Joule heating is greatest near the electrode tips (black semicircles) and decreases by roughly half with each color change, from blue to green to red. Temperature gradients produced by Joule heating drive unstable nature convection. The picture was generated numerically using Laplace's equation for the potential. See page 58. [William A. Gobie, Department of Chemical Engineering, Washington State University, Pullman, WA 99164]

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Arms and the Men

The news of the arms control agreement shone like the proverbial candle in the night. It was not the end of the arms race—only a few thousand missiles removed in a sea of many thousands more—but the symbolism was enormous. At least the direction was down, not up; and the manner in which the agreement was concluded had a degree of professionalism as well as an absence of the political grandstanding that had marred previous attempts. Each of the two national leaders could rightfully claim substantial credit and, at the same time, each was pushed by historical forces to adjust to positions that were a long way from what he had initially demanded.

No one will claim that this first step will by itself bring permanent peace, but it is reassuring that the two leaders are not talking just about this agreement but also about the next steps needed to exploit the positive atmosphere. In this development, however, some realism in regard to the limitations of arms control and the true causes of wars had better be introduced.

One horror in the nuclear age, improbable but realistic enough to cause millions of dollars to be spent and to require eternal vigilance, is the preemptive strike. A plethora of arms widely dispersed decreases the likelihood of success for a first strike; therefore, one could argue that reducing arms increases the temptation for such an act. However, there are still so many arms so widely deployed that the surgical strike is likely to fail. Even the most hardened military professional could not expect his glistening hardware to operate perfectly when a German youth flies into Red Square or the U.S.S. *Stark* fails to defend itself against a routine attack.

The second and more probable scenario is a step-by-step escalation to Armageddon. The Falklands war was a model and warning of this danger: Country A grabs a little real estate, reasoning that Country B could not possibly care about some acres of farmland and a few sheep; Country B replies with diplomatic thunder, "Get out or else!" reasoning that tiny Country A will buckle under to threatening words from a larger military power. From that point on, the rhetoric becomes louder and fleets mobilize until both sides discover to their horror that they must act out their words or lose all credibility at home and with allies. Such an escalation could easily occur in the Middle East, Europe, or Central America. The fact that it has not happened so far between major powers may be because of the prospect of a nuclear holocaust, which has kept the peace among such powers for the longest period of modern times. Those living on a precipice become more cautious about a misstep. Ironically, arms control may enhance the chance of war if nations conclude that they can be more reckless now that we have returned to what might be called the comfortable old world of conventional warfare.

Arms control, therefore, offers a step back from the precipice that we cannot afford to waste. It will be valuable only if we seek to understand and defuse the causes of war. One of the problems of our times is the fact that designing military hardware presents such intriguing intellectual challenges: cruise missiles, satellite photography, submarine detection—marvelous scientific challenges with elegant solutions. Understanding aggressive behavior, global economic pressure, and nationalistic pride is far more difficult and less likely to lead to clean, brilliant solutions. Yet studies on those topics must be attempted if we are to maintain and enlarge our fragile peace.

A penetrating economic analysis might well show that mutual reduction in the number of troops together with a guarantee of open markets gives a far better bottom-line return than any conquest of territories. In-depth psychological studies could possibly tell us that proper education can direct national pride from jingoistic competition to constructive cooperation. A treaty of the future, therefore, might require the exchange of information between peoples, perhaps through television programs, just as the countries of the world now exchange ambassadors.

Utopian? Yes. But no more fantastic than sending photographs back from Mars, synthesizing cholesterol in the laboratory, or diagramming genes. We might even learn to understand ourselves, once it becomes clear that it is the only way that we are going to survive.—DANIEL E. KOSHLAND, JR.