tury. Regrettably, the problems are hard to recognize from published records of the experiments in which they occur; rather, these problems are often uncovered by reports of independent skilled observers who were present during the experiment.

There have been many hundreds of serious studies of ESP, and I have certainly read and been told about events that I cannot explain. I have been able to have direct experience with more than a dozen experiments and detailed secondhand knowledge about perhaps 20 more. In every case, the details of what actually transpired prevent the experiment from being considered seriously as evidence for paranormal phenomena.

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NEWS AND COMMENT

NATO Builds a Better Battle Tank But May Still Lose the Battle

The battle tank is still the principal weapon of a modern army. Far from driving the tank into extinction, technological developments such as the antitank missile have only hastened its rate of evolution. For the past 15 years the United States has stumbled from one fiasco to another in its attempts to design a new main battle tank, but seems at last to have a winner.

Both the failure and success of the tank development program are integrally related to a central crisis of the NATO alliance, the lack of cooperation in designing, developing, and producing new weapons. Through failure to standardize, the NATO allies at present field 31 different antitank weapons and seven different tanks. Such diversity causes a formidable logistics problem. It is the product of duplicative national research programs which waste about a third of the alliance's general purpose R & D budget. It is a principal factor in the alarming paradox that the backward economies of the Warsaw Pact can outproduce advanced NATO economies in tanks by a ratio of 4 to 1. NATO has recently cut the ratio to 2 to 1 yet still has only 7000 tanks deployed in Europe against the Warsaw Pact's 19,000. Nor does the quality of NATO tanks offset the gross deficiency in numbers. Germany's Leopard 1 and America's M60 are only about as capable as the Soviet T-72, not by any means its superior.

Though everyone agrees on the importance of NATO standardization, the commonly proposed remedies often seem worse than the disease. European countries, already fretful that they buy $8 of military equipment from the United States for every $1 they sell, view calls for standardization as another pressure to buy American. To offset its lack of appetite for European weapons, the United States has tried to develop weapons jointly with its allies, but with notable lack of success. Nowhere have the inherent problems of standardization been more vividly brought to light than in the Sisyphean attempts by America, Germany, and Britain to cooperate in developing a new main battle tank.

Tank technology is one of the military arts in which the United States does not possess a commanding lead; the Soviet, German, and British traditions of tank design have probably been superior. A British designed gun, the 105-mm cannon, is used by the tanks of all three NATO nations, and a revolutionary method of tank protection, known as Chobham armor, is also a British invention. German tanks, with their superior range and accuracy, were generally predominant in World War II until outnumbered. In part because of German expertise, Secretary of Defense Robert McNamara in 1963 initiated a German-American project to build a new main battle tank for the 1970's, the MBT-70.

The designers of the MBT-70 produced a tank that could squat, so as to lower its silhouette. They put the driver in the turret, instead of the hull, and kept him facing forward when the turret turned by a counter-rotating cylinder. "It was an all singing, all dancing, thing. Everybody thought it was absolutely marvelous but far too expensive and far too complicated for any crew to handle," says one NATO observer. As the cost approached $1 million a tank, Congress killed the MBT-70 in 1969. Both sponsoring countries went their separate ways, the Germans starting work on the Leopard 2 and the American

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Germany's Leopard 2AV tank (left) entered an almost forlorn competition with the American XM-1 (right). Photos by U.S. Army.

army turning to a simplified version of the MBT-70, known as the XM-803. The Germans later started discussions with the British about building a Future Main Battle Tank, but the project petered out last year before reaching even the prototype stage.

Although the MBT-70 program was badly managed, the root of the problem with the German-American and German-British projects was a failure to agree on design objectives. Whether because of their past experiences, or perhaps even their national characters, the three nations see different desired characteristics for the future tank. "The Germans want it heavily gunned and very agile. The British also like a big 120-mm gun but will give up mobility and agility for a slower tank with heavy armor, a veritable moving pillbox. We in the United States Army are somewhere in between, believing that the current 105-mm gun is quite equal to the task: thus we like the smaller gun and opt for agility and survivability," wrote General James H. Polk, a former commander-in-chief of the U.S. Army in Europe, in a recent review.

National provincialism among NATO tank theorists has been somewhat eroded over the last decade, though not cured, by technological advances, particularly in armor and ammunition. Invention of the shaped charge round had a major impact on tank design. On detonation the explosive forms a thin, high-temperature jet stream which pierces steel, generally to a depth five times the diameter of the warhead. Thus a 5-inch warhead would penetrate 25-inches of steel plate, which is more armor than any practical tank can carry.

The inference drawn by the Germans was that since heavy armor was futile, tanks should be lightly armored and depend on extreme agility for survival. In the British view, however, a lightly armored tank had the serious disadvantage that it could be stopped not just by another tank but by any infantryman with a light weapon. The right answer to the shaped charge round was to develop better armor. Which was what the British did.

In 1964 a new principle in armor design was discovered at the Military Vehicles and Engineering Establishment at Chobham, in Surrey. Known at first as Harvey's armor, after its inventor, and then as Chobham armor, the concept was ready to be deployed by 1969. To the British, it was evident that the armor would transform the battlefield. It showed a remarkable improvement in keeping out hollow charge rounds, including all those of practical size to be mounted on antitank missiles. It was also surprisingly successful against the other principal kind of tank ammunition, the kinetic energy round.

The British described the armor in veiled terms to their NATO allies in 1969, but the Germans said it was too late to incorporate the armor into the design of their Leopard 2 tank, and the Americans "were doing something of their own at that time but didn't believe that we had got anything they hadn't got," says a British expert.

Chobham armor cannot just be hung on tanks but demands an optimum hull design. By 1972 the British Ministry of Defense had decided it could not afford to deploy Chobham armor until its Chieftain tank fleet was replaced, sometime well in the future. A new effort was made to interest the American army in the concept. This time, after a practical demonstration, the effort succeeded. The U.S. Army's XM-803, the successor to the MBT-70, had fallen into the same cost trap and had been canceled by Congress. Starting over for the third time, the U.S. Army made Chobham armor the principal new feature of XM-1, as the new design was called.

The nature of Chobham armor, or "special armor" as the Army refers to it, is still classified information, but one suggestion is that it is a composite of several materials, including a ceramic to resist the molten jet stream of the hollow charge.

Starting in 1972, the XM-1 program was kept under close scrutiny in Congress, particularly by the House investigations subcommittee under Samuel S. Stratton (D–N.Y.). "The Congress ordered a low risk tank. We didn't want to get into any highfalutin technology," says Stratton. Congress also didn't want any million dollar tanks and the Army was told to keep the unit cost down to $500,000 in 1972 dollars.

The crash program proceeded with unprecedented success. "The Army did a fantastic job, keeping within both the time and cost guidelines we set them," Stratton declares. Nevertheless, because of inflation the price tag on the XM-1's that start rolling off the assembly lines in 1980 will be at least $1.3 million a copy.

While the XM-1 was proceeding apace, the Germans were also developing the Leopard 2 along rather similar lines. Seeing a rare chance of breaking into the U.S. defense market, they persuaded Secretary of Defense James Schlesinger to consider a modified version, known as the Leopard 2AV, alongside the rival XM-1 prototypes then being developed by Chrysler and General Motors.

A rather vague memorandum of understanding was signed in 1974 in which both countries undertook to make all reasonable efforts to standardize their tanks. The memorandum did not surface until considerably later. Meanwhile, according to a recent postmortem by the General Accounting Office, there devel-

oped a "popular belief, reinforced from time to time by official statements of both Governments, . . . that both the XM-1 and the Leopard were bidding to become the Army's next main battle tank."

The situation was ripe for misunderstanding, and misunderstandings duly ensued. Europeans watched the developing tank competition with keen interest. It seemed to offer a test case of the Defense Department's oft proclaimed commitment to NATO standardization as well as to the "two-way street," the political codeword for the Europeans' desire that the United States should buy more of their military equipment.

The competition did not proceed auspiciously. As was noted before the event by a General Accounting Office report of July 1976, "The Leopard's chances for selection as the main battle tank are slim." The tank is a prestige weapon, and no army would lightly buy another's if it could build its own. In the XM-1 the U.S. Army seemed at last to have a winner, which it would have been even more reluctant to abandon. Congress, which often writes Buy American clauses into defense bills, did not embrace the idea of the competition. When it appeared that the Leopard 2AV would not be ready in time—to compete with the XM-1 it had to be fitted with the Chobham armor the Germans had declined in 1969—Congress directed that

Senate Approves a Permanent Ethics Commission

The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, which has been hard at work for almost 4 years, will be going out of business in October. However, there is a strong likelihood that it will continue its functions as a permanent presidential commission. A bill to that effect, introduced by Senator Edward M. Kennedy (D–Mass.), was passed by the Senate on 26 June and although the House has never evinced much interest in a permanent commission, a Kennedy aide says discussions with the House health czar, Paul Rogers (D–Fla.), indicate that "something can be worked out."

The national commission, established by law in 1974 to report to Congress and the Department of Health, Education, and Welfare (HEW), is generally regarded as having performed creditably. It has produced several major reports, notably on fetal research, research on children and institutionalized populations, and on psychosurgery. It is soon to publish a report on institutional review boards—which the 1974 legislation requires be formed to monitor the research ethics in all organizations that conduct HEW-funded research on human subjects. It will also be producing a handbook, called the Belmont report, containing detailed ethical guidelines to promote the three principles of "justice, beneficence, and respect for persons" in research with human subjects.

The Kennedy measure is the latest in a decade of Senate initiatives spearheaded in large part by Walter Mondale before he left the Senate for the vice presidency. The proposed commission would continue the work of the present commission, but it would cover all federal agencies and no longer be confined to looking at research sponsored by HEW. Its authority would also be expanded in that it would be allowed to look into specific research programs and not just general policies.

The commission's staff director, Michael Yesley (who will soon be leaving to become a senior social scientist at the Rand Corporation in Santa Monica), says that two of the key areas the new commission would be concerned with are the ethics of practice in government-supplied health care and the ethical implications of future research—supplying a sort of "early warning system" on DNA research, for example.

The Kennedy bill itself explicitly calls for special studies in four areas: the requirements for informed consent, the advisability of developing a uniform definition of death, the implications of genetic counseling, and an assessment of current practices designed to ensure individual privacy in medical and research records.

Budget authorization for the commission would be $6 million a year through fiscal 1982. The President has not taken a stand on the commission (although he opposes the proliferation of such bodies in principle); HEW secretary Joseph Califano is said to be personally opposed to it because he thinks each agency should take responsibility for itself. However, the Senate report says "the independence of the commission is absolutely essential in order for human subjects to be adequately protected."

The Kennedy staffer expressed confidence that the bill will become law. Kennedy has made it clear that his health subcommittee will not take up any of the pending measures under the Public Health Service Act until the commission bill has gone through Congress. This, he says, "is an exact replay" of the way Kennedy got the 1974 legislation through.

Meanwhile the commission's report on institutional review boards (IRB's) is expected to appear some time next month. IRB's have been operating in somewhat higgledy-piggledy fashion over the past 4 years, and there has been confusion over the respective responsibilities of IRB's and peer review systems in evaluating proposed research. According to a draft report issued in April, most federal IRB's adhere basically to policies established by HEW, but uniform standards would be much more efficient.

The report therefore proposes that HEW be established by law as the sole authority for determining the proper makeup of the boards, for accrediting them, and for monitoring their performance. This "would not substantially change current practice but would reduce the burden on IRB's to interpret and apply the regulations to which they are subject," says the report. According to a commission staff member, "some agencies [the Central Intelligence Agency in particular] might not like HEW reviewing their intramural research," but most agencies would welcome an arbiter to ensure uniform policies.

The proposed legislation would also significantly extend federal guidance of IRB's by requiring that federal standards apply to any agencies, public or private, that receive federal money for health care delivery—whether or not they get federal money for research.

According to Yesley, the IRB report "is perhaps the commission's single most important report" because IRB's are the mechanism through which all the new federal guidelines are put into practice.—C.H.

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production of the XM-1 should start as planned with the competition to take place later.

The Army announced Chrysler the winner over General Motors in November 1976, and awarded the company an initial $4.7 billion contract to build more than 3000 tanks. The following month the Leopard 2AV started its tests at the Aberdeen Proving Ground. The chief of the German observing team said later that overall the tests were fair and equitable. But the tests were interpreted in different ways. According to the Army Materiel Systems Analysis Agency—regarded by the General Accounting Office as the most objective of any Army group—the Leopard and the Chrysler XM-1 proved "to be about equal in mobility and firepower, but the XM-1's armor protection was judged markedly better." The difference, in the agency's opinion, was due to the haste with which the Leopard's armor had been redesigned to U.S. requirements, and could with more time perhaps be eliminated. In short, there was little to choose between the two tanks.

In January 1977, however, only 3 weeks after the Leopard's tests had been finished, the United States announced that the competition between Leopard and the XM-1 would not continue any further. A report issued by the General Accounting Office report in November 1977 observed that "it might have been wiser" to make the Secretary of Defense's office, not the Army, the judge of the competition so as to assuage the concern that the Leopard would not receive fair consideration.

Standardization received another defeat this January when the Army announced the result of a second competition, that between American, German, and British tank guns. The Germans, expecting improvements in Soviet armor, have equipped the Leopard 2 with a smoothbore, 120-mm gun. The Americans, noting the increasing penetrative power of new ammunition, are equipping at least the first thousand XM-1's with the standard 105-mm gun. (Another reason for this decision may have been the Army's desire to stay within the 58-ton weight limit imposed by Congress.) The American thesis is that the 105-mm gun and improved ammunition will be able to defeat present and expected Soviet armor. Just in case this assumption should be wrong, the XM-1's turret ring has been designed so as to accept a 120-mm gun.

At tripartite shoot-outs held in 1976 and 1977, the 120-mm guns fielded by the Germans and the British performed better than the 105-mm gun. In the second shoot-out, there was little to choose between the two 120-mm guns but the German gun was selected in part because the Germans have the larger tank fleet.

Secretary of the Army Clifford Alexander has said that the German gun, to be built under license in the United States, will be fitted on later XM-1's. The decision has pleased the Germans but is a step backward for NATO standardization since American and German tanks are at present standardized on the 105-mm gun.

The attempt at cooperative tank production that began in 1963 will bear its fruits in the early 1980's when the XM-1's and Leopard 2's start to join their respective national tank fleets. The story cannot be said to have a wholly unhappy ending, since both promise to be outstanding tanks. There is also a fair measure of "interoperability" between them, a feature which some military experts regard as the only aspect of standardization which is really worth having. Meaning common use of consumables, interoperability in the case of the new tanks will probably extend to fuel, tracks, sprockets, and other spares, as well as to ammunition for XM-1's that have the 120-mm cannon.

An incidental advantage is that the Warsaw Pact has two different tanks to defeat instead of one. It is probably also true that the Leopard 2AV, and maybe the XM-1 as well, is a better tank than if the competition had never taken place. Competitive interaction among NATO allies has also ensured that the best de-

Photo by C. Holden

Seabrook Protesters Camp Out at NRC

Hundreds of youthful members of the antinuclear movement surged into Washington last week to exert moral pressure on the Nuclear Regulatory Commission (NRC), which was expected to decide on 30 June whether to suspend the construction license for a nuclear power plant in Seabrook, New Hampshire, pending resolution of questions involving site selection and the adequacy of the plant's cooling system. Fifty-six protesters were arrested during a dramatic "die-in" that involved screaming and collapsing in a heap on the sidewalk.

Many of the protesters were fresh from a weekend camping out at the plant site in a peaceful demonstration that drew some 8000 people—which some claim is the largest demonstration so far in the nation's antinuclear movement. The Washington protest was organized by the Seabrook Natural Guard, an offshoot of the Clamshell Alliance, which is an umbrella organization for some 50 antinuclear groups.

After a rally featuring Daniel Ellsberg, about 100 of the visitors trooped over to the downtown NRC headquarters. There, equipped with sleeping bags, food, and placards, they settled down for a "nonviolent vigil" to await the Seabrook decision.

This spring has seen great sprouting of antinuclear demonstrations throughout the nation. One of the next items on the agenda is a cross-country bicycle ride, organized by the Solar Rollers of Amherst, Massachusetts, to Rocky Flats in Colorado, the center for the manufacture of plutonium for nuclear weapons. They plan to arrive by 6 August to commemorate the dropping of the first atom bombs on Hiroshima and Nagasaki.—C.H.

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sign features each nation has to offer, such as the British armor, the German 120-mm gun, and the American gas turbine engine, have at least been made available for common use.

On the debit side, however, is the fact that the two strongest members of NATO have spent many millions of dollars, as well as time and expertise, to produce essentially equivalent products. From the point of view of the alliance, the XM-1 and Leopard 2 programs represent an almost wholly useless duplication of effort.

If a single tank had been chosen, unit production costs, particularly for Germany, would have been far lower, and for the same overall budgets both countries could have built more tanks.

With a single tank, logistics would have been greatly simplified. If diversity were required, it could have been obtained far more efficiently than at present by building different models of the same basic tank, exactly as Detroit does for automobiles. Another military disadvantage is the failure to come to a clear agreement on the best size of gun, which has opened up yet another area of destandardization.

The political effects of the tank decision have not been particularly happy. Since European countries have weaker defense industries, it is not too often they emerge with a product of comparable quality to its American counterpart. The Leopard 2 was one of the few military products that clearly was competitive. To Europeans watching for a signal of American intentions toward the "two-way street," the message could not have been clearer.

If the Germans were disappointed, the British have also given vent to occasional unofficial mutterings. Although Chobham armor, according to the General Accounting Office, is "the most distinctive feature" of the XM-1, the British government is not collecting a cent. The secret of the armor was given for free in the belief that the terms of an unpublished Anglo-American research agreement left no alternative. A recent article in the London *Sunday Times* argues that in fact there was a loophole in the agreement which would have allowed the armor to be shared with NATO allies on a commercial basis. "We have been boy scouts in this affair. It is time we grew up," a British general was quoted as saying.

Department of Defense officials say the Army has developed a different version of Chobham armor; the British received data about ammunition and other research, although not on a quid pro quo basis.

The problems in achieving NATO standardization are easier to describe than the solutions. In the case of the tank, a technical success has been achieved at the expense of military, economic, and political benefits. NATO could afford these inefficiencies—once upon a time.—NICHOLAS WADE

Costs of Environmental Regulation Draw Criticism, Formal Assessment

Two months ago Robert S. Strauss, the President's counselor on inflation, caught the public's attention by naming environmental regulation as one of the top priority targets in the fight against inflation. The reaction of environmentalists and of officials such as Douglas M. Costle, administrator of the Environmental Protection Agency (EPA), was sufficiently sharp that Strauss backed off a bit, but the issue he had raised was still left front and center. Are environmental regulations really inflationary, and, if so, what can and should be done about this problem?

The economic stabilization subcommittee of the House Committee on Banking, Finance, and Urban Affairs is seeking answers to this question as well as to others bearing on the cause of inflation and the cure. On 21 June, the subcommittee, chaired by Representative William Moorhead (D–Pa.), received the testimony of Barry P. Bosworth, director of the Council on Wage and Price Stability (CWPS), and was later to hear from Barbara Blum, EPA's deputy administrator.

One thesis to emerge from these hearings was that, while government regulation is not among the major causes of inflation, it does contribute as much as 3/4 of a percent annually to the increase in the Consumer Price Index, which this year is expected to go up about 7 percent. Bosworth holds that a contribution of 3/4 of a percent is plenty significant, especially inasmuch as compensatory increases (as in prices and salaries) that stem from it "double the original impact within 2 years."

Blum, in prepared testimony which she was scheduled to give before the subcommittee on 29 June, holds in effect that the part of the increase in the CPI which can be attributed to environmental regulation does not fit the classic definition of inflation, a term that connotes paying more without getting anything more or better in return. According to Blum, such economic studies as are now available "tend to support our judgments that the benefits of our regulations outweigh the costs." Then, for emphasis, she observes that episodes such as the Kepone contamination of the James River in Virginia (where most of the fishing interest has had to be shut down) are grim evidence that the costs of pollution can vastly exceed what it would have cost to prevent it.

But Blum acknowledges, by implication if not in so many words, that to the extent that environmental regulation fails to follow the most cost-effective strategies, it adds needlessly to the costs that industry—and ultimately the public—must bear. EPA, she says, has been a leader in doing economic analysis of its regulations and in exploring ways to lower regulatory costs without significant loss of environmental protection. The CWPS has frequently praised EPA for the quality of its economic studies, she adds.

Bosworth described for the Moorhead subcommittee the elaborate mechanism which the Carter Administration has established for the review of proposed regulations from the standpoint of potential economic impact. Early in the Ford Administration, Congress, acting at the President's request, passed a law requiring an economic impact analysis of major regulatory actions. But, as things turned out, most of these impact studies did not come out until several months after final promulgation of the regulations in question.

In an effort to improve on this largely fruitless effort of his predecessor, President Carter last March issued Executive Order 12044. Among other things, this

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