

Hindsight for Progress

Less than seven percent of the \$1.5 billion being spent by the Defense Department this year on research is going for research so basic Defense can call it "undirected."

Now a DOD study—Project Hindsight—has indicated that the contribution to defense of this kind of research is so small that its allotment may get even smaller.

Project Hindsight was begun in 1964 as a massive effort to find out just what innovations and what kinds of research went into 20 selected major weapons systems. Among the report's many conclusions, the most far-reaching is likely to be that "the contribution from recent undirected science . . . appears to have been small."

The systems studied included nuclear warheads, six guided missiles, the C-141 transport plane, a navigational satellite, two torpedoes, three-dimensional radar, the 105 mm howitzer and others. Each system was studied by 5 to 10 scientists and engineers who traced its technological heritage backwards in meticulous detail, including the checks with contributors of each idea and sub-idea as well as cost, source of funds, and even motivation.

Almost 650 separate contributions were isolated, of which 95 percent were found to have come from research directed by "DOD need." Most, in fact, depended on science "that had been available for 30 years."

The study was suggested originally by Dr. Chalmers W. Sherwin, who at the time was Deputy Director of Defense Research and Engineering and is now Deputy Assistant Secretary of Commerce for Science and Technology.

No Payoff

"The scientific community is future-oriented," he says. "They're always thinking about the next billion dollars, not about what happened to the last billion dollars," as he was when he launched "Hindsight."

Basic research has its uses, Dr. Sherwin concedes, but he limits them.

It offers an incentive for new graduate scientists as well as introduction into applied research laboratories.

However, he says, no ordinary company would ever maintain an undirected research facility at its own expense.

One case of costly basic research with little to show for itself is high-energy physics, Dr. Sherwin said.



From Regulus . . . to Polaris
Evolution by Need

He cited the upcoming federal expenditure of \$375 million for a 200 billion electron volt particle accelerator; costs, he added, would be going even higher "in the next few years."

"No one I've ever heard of," he said, has any idea of applications.

Why, in general, has basic research made such a small contribution according to Project Hindsight? Expense, for one thing, said Dr. Sherwin; using new knowledge that has had relatively little time to be developed and refined is costly. Also, it is difficult to simply "plug in" new theories.

While a "need-directed" idea may take 10 or 20 years to become fully absorbed into practical use, basic research can take even longer. In fact, Dr. Sherwin said, "basic research is priceless on the 30-to-60-year time scale." He conceded, however, that the period might be shorter in fields other than weaponry. In "the biomedical area," for instance, the time may well be much shorter, he said, although medicine may share weaponry's use of predominantly practical research.

Dr. Sherwin said he did not know if Project Hindsight would produce drastic cuts in basic research budgets. If it did, he said, the cuts would probably affect research "on the fringes" and less likely to be fruitful. However, he added, "a few hundred million dollars would not make much difference in the country as a whole."

Such reports as Project Hindsight are becoming increasingly common as policymakers start to wonder about growing research expenditures.

"Looking backward" is a much more accurate way of appraising technological utilization, he said.

Sign Talk Analyzed

Sign talk used by the deaf is a distinct language with its own grammar, not simply English rendered into gestures, a California researcher told the American Speech and Hearing Association meeting last week in Washington.

An analysis of its grammar occupied 60 pages of type, said Miss Elizabeth A. McCall of the Monterey Institute for Speech and Hearing. Her description of sign as a viable language touched on a 30-year-old controversy between proponents of sign and those who believe the deaf should be taught to speak English at the earliest time.

Like any other language, sign differs from country to country and even shows changes of "dialect" within the United States, said Miss McCall.

The elements that make it distinct from English include:

- A grammatical sentence does not always require a subject.
- Tense is not in the verb, but in adverbs such as "yesterday," and "tomorrow."
- Sign has no verb like the English "to be." The deaf communicate "I tired" instead of "I am tired."
- Plurals are made by repeating gestures, which in English would be something like "big, big, dog, dog."

Miss McCall and her colleague, Dr. Cletus G. Fisher of the University of Iowa, proposed that once the deaf know the rules of sign they can more easily learn English as a "second language."

But chairman Louis M. DiCarlo of Syracuse University questioned whether sign could in any way help the deaf learn English. He said it is not yet a mature enough method of communication. Analyzing its rules would, however, be helpful in standardizing the gestures.

A major objection to sign rests on the theory that language shapes thinking processes—the more advanced an individual's grasp of language, the more sophisticated his thinking.

Since abstractions cannot easily be expressed in concrete gestures, the deaf individual suffers from poor ability to think in concepts, say the sign critics.

Similar reasoning is now being used to explain the condition of the deprived child. Because his early association with language is usually limited, he supposedly does not develop the same thinking capacity of more privileged children.