final judgment until he sees the Bureau of the Budget's proposals, told *Science* recently that he was "encouraged" by the bureau's rethinking of the safeguards question. He still believes that an independent commission should be set up to supervise the data bank continuously, instead of merely conducting periodic reviews of its operations and observance of safeguards, which is the role the Bureau of the Budget has in mind for such a commission.

The Gallagher subcommittee is a small, three-man group which in itself has little power; but it has been highly vocal, and, through its data-bank inquiry and its earlier investigation of personality testing, the subcommittee is now well identified with privacy issues. (Gallagher, though accused by *Life* magazine last August of having ties with mobsters —charges which Gallagher has denied and which are yet to lead to a grand jury indictment or any official censure —was reelected by his New Jersey constituents in November by a 63-percent majority.)

Accordingly, if the subcommittee goes along with the data-bank concept as now revised, this might brighten possibilities of Congress's authorizing a data center. Establishment of such a center under a system of privacy safeguards would be particularly significant if it led to a thorough review of the practices of all federal data-gathering agencies, including the Internal Revenue Service and the FBI.

Indeed, as Congress's Joint Economic Committee's statistics subcommittee, which favors the data-bank idea, observed in a 1967 report, establishment of the data center would "force a more explicit consideration of these pressing [privacy] issues [and] might cause us to move from the present ad hoc system to one of uniform and far-reaching principles." The Bureau of the Budget's positive response to the Gallagher subcommittee's demand for greater safeguards indicates that congressional consideration of the privacy issue has had a significant impact already.

—LUTHER J. CARTER

Education Research: Academy Cooperates in New Venture

The National Academy of Sciences (NAS) and the Office of Education (OE) are collaborating in a new program of basic research in education which, despite the stringencies of this year's budget, makes federal grant funds available to a broader research constituency.

OE, which until now has had little connection with the underwriting of basic research, is the new funding source. At OE's request, NAS, through its action arm, the National Research Council (NRC), in conjunction with the new National Academy of Education (NAE), has established in its behavioral sciences division a 13-member Committee on Basic Research in Education. The chairman is Patrick Suppes,* director of the Institute for Mathematical Studies in the Social Sciences at Stanford University.

Funds available for the new program amount to about $1 million. The source of the money is the approximately $20 million earmarked for project support in nearly $90 million budgeted for OE's Bureau of Research.

At this point the new committee is inviting researchers from a wide variety of disciplines to submit proposals for projects that "will contribute to fundamental knowledge and will deepen insight into critical problems in educational theory, policy and practice." These disciplines range through the biological, behavioral, and social sciences to such nonscientific fields as history and philosophy.

Emergence of the new program hardly means that OE has excess money to spend. Like all federal agencies concerned with R & D and social welfare programs, it is feeling the budgetary pinch this year as seldom before. The explanation for the shift in priorities lies in the peculiarities of the educational research field and the inclination of federal officials in recent years to move in new directions. Up until now, educational research has been largely the province of the professional educator, with a helping hand from the educational psychologists and the statisticians. Most of the research has been of a limited, applied nature. With a number of exceptions (Suppes's work in computer-assisted instruction is one), it enjoyed a scarcely towering reputation in the scientific community. Again with some notable exceptions, educational researchers have tended to talk only to each other and to OE, while OE has failed to build links with the most important fields of fundamental research. Consequently, few scientists have looked to OE as a likely source of funds or as a place of significant research action.

"We're hoping to draw to education as a site of inquiry the talents of a much wider array of disciplines than has been possible so far," explained Norman Boyan, who was named to head up OE's Bureau of Research a few months ago. Boyan readily concedes that OE does not have the expertise to ride herd on such a program. "We see the NAS–NAE committee as an effective screening group and as a way of providing sensible interaction between the various disciplines."

Suppes summed up his committee's purpose this way: "Until now there has not been a close relationship among the people who could conduct basic research in education. You have this kind of relationship in the health sciences, and NIH performs a key role there. What we'd like to do is stimulate something similar in the education field, to develop a broad base of support and activity for basic research in education."

OE's willingness to go in this direction began developing about 2 years ago under the leadership of Boyan's

* Other members of the committee are James S. Coleman (vice chairman), Johns Hopkins University; Ernest W. Caspari, University of Rochester; R. Taylor Cole, Duke University; Lawrence A. Cremin, Teachers College, Columbia; Bruce K. Eckland, University of North Carolina; John I. Goodlad, UCLA; Wayne H. Holtzman, University of Texas; Fritz Machlup, Princeton University; Arthur W. Melton, University of Michigan; Julius Richmond, Medical School, State University of New York, Syracuse; A. Kimball Romney, University of California, Irvine; Edgar H. Schein, M.I.T.

National Medal of Science Winners for 1968

Winners of the National Medal of Science seem to be chosen with some regard to proportional representation of major disciplines in science and engineering, and the dozen 1968 medalists, as has been the case in recent years, include some men who not only have made their mark in research but also have distinguished themselves as administrators or as statesmen of American science.

An interesting footnote to this year's selections is the fact that one medalist, Berkeley professor Jerzy Neyman, was one of the mathematicians who had continuation of support of their research projects by defense research agencies questioned last summer after being identified with public criticism of the Vietnam war (*Science*, 20 September 1968).

The Medal of Science is the highest award bestowed by the federal government for achievement in science, mathematics, and engineering. It is in effect a Presidential medal since, although an advisory committee, dominated by distinguished private citizens and working under the wing of the National Science Foundation, makes annual recommendations on who should receive the medal, the President approves the list of those to be honored.

Among this year's winners, those most clearly recognizable for services above and beyond their accomplishments in science are probably Detlev W. Bronk and Eugene P. Wigner.

In addition to having made notable research contributions in physiology, Bronk, retiring president of Rockefeller University, has been a prominent figure in postwar science councils, having served as president of the National Academy of Sciences for a 12-year period (1950–1962) and, simultaneously, during part of that time, as a member of the President's Science Advisory Committee and National Science Board.

Wigner, professor of mathematical physics at Princeton, was one of those who took the initiative in alerting American political leaders to the military implications of atomic fission, at the start of World War II, and played a major role in the wartime scientific mobilization. Since the war he has maintained his reputation as a versatile, creative scientist and has taken an active part in the discussion of important public issues such as civil defense.

Two well-known government scientists named to receive the medal are Bernard B. Brodie, head of the laboratory of chemical pharmacology at the National Institutes of Health, and Herbert Friedman, superintendent of the atmosphere and astrophysics division of the Naval Research Laboratory, and a pioneer in rocket and satellite astronomy.

Neyman's exchange with military research contract officers occurred this past summer when he was among the 345 mathematicians who signed an announcement in the *Notices* of the American Mathematical Society. The announcement urged mathematicians to "regard yourselves responsible for the uses to which your talents are put. We believe this responsibility forbids putting mathematics in the service of this cruel war."

The Office of Naval Research (ONR) wrote to Neyman, who was principal investigator on an ONR unclassified research project and a longtime ONR client, noting his signature on the protest and asking for an indication of his "intent and desire" before deciding on renewal of support for the project.

Neyman, who was out of the country at the time, promptly cabled ONR that the AMS announcement accurately reflected his feelings, but that he intended to proceed with his proposed weather-modification studies "promising benefits for nation and humanity" and would welcome continued ONR support.

This case and others had, by this time, attracted notice in the scientific community and the press, and the official response seems to have been a reassuring phone call from the Pentagon and a wire from ONR saying that the contract was to be extended. Thereupon, the matter seems to have been closed, and Pentagon sources said last week that no further correspondence discussing possible cancellations have gone out to antiwar protesters from defense research agencies.

The other 1968 winners of the medal, and citations released to the press at San Antonio on 2 January, are as follows. In the biological sciences:

► Horace A. Barker, professor of biochemistry at the University of California at Berkeley, for his study of the chemical activities of microorganisms, including the unraveling of fatty acid metabolism and the discovery of the active coenzyme form of vitamin B_{12}.

► Jay L. Lush, professor of animal breeding at Iowa State University, for bringing the science of genetics to bear upon animal breeding and thus helping to remold the flocks of America and Western Europe.

► Burrhus F. Skinner, professor of psychology at Harvard University, for contributions to the study of behavior that have influenced psychology and many related areas.

In the engineering sciences:

► John P. Eckert, vice president of the Remington Rand Univac Division of the Sperry Rand Corporation, for pioneering and continuing contributions in creating, developing, and improving the high-speed electronic digital computer.

► Nathan M. Newmark, professor of civil engineering at the University of Illinois, for contributions to the development of powerful and widely used methods for analyzing complex structural components and assemblies under a variety of conditions of loading.

In the physical sciences:

► Paul D. Bartlett, professor of chemistry at Harvard University, for leadership in advancing our understanding of mechanisms by which chemical reactions take place, and for success in training young teachers and researchers.

► Lars Onsager, professor of chemistry at Yale University, for a variety of seminal contributions to the understanding of electrolytes and other chemical systems, especially to the thermodynamics of systems in change.

—J. W

A POINT OF VIEW

Excerpts from an editorial entitled "Breeder of Anti-Intellectualism" which appeared in the New York Times *on 1 January 1969.*

Anti-intellectualism is getting an energetic assist these days through the irresponsible behavior of a noisy fringe group of academics. The antics of some dissident faculty members at the annual meeting of the Modern Language Association of America at the American Hotel did nothing to enhance public respect for the scholar. . . .

The professional associations are undoubtedly ripe for an infusion of new thinking and a greater sense of commitment to the reform of the academy and of society. But there is ample evidence that this can be accomplished without resort to public invective. A group of young political scientists last year protested what they considered their association's lack of pertinent concern for contemporary issues by planning to set up rival meetings. The selection of their topics and of the scholars invited to discuss them was so impressive that the association's leadership afforded them an official place on the program and thus sanctioned the reform movement.

Last week's adolescent public display and taunting of the police stood in sorry contrast to that effective strategy. The image of the intellectual in America is not improved by scholars who demonstrate little faith in the power of reason and ideas or by teachers who prefer confrontation to persuasion.

predecessor, R. Louis Bright. A product of industry (Westinghouse), he is now at Baylor University. From the time he took office as research director, in January 1966, Bright made clear his disenchantment with the limited scope of most educational research and his intention of holding no better than even on spending for traditional applied-research projects. As an industry man, he was suspected, for a time, of eagerness to funnel federals funds to the newly emerging complex of education technology firms. He did not do this. Rather, he took a hard look at the ability of industry to turn out more than shiny, expensive hardware for the nation's school system. Bright did stress the need for implementing the most promising results of education research, largely through the development of curriculum packages to the point where they could be delivered to the customers—classroom teachers and children. With money forthcoming from the 1965 Elementary and Secondary Education Act, much of this development work is now taking place at a network of regional labs across the country. At the same time Bright expressed the belief that more support should go to the other end of the R & D spectrum—basic research—through work not only by educators but by researchers from other disciplines. He began trading ideas with Henry David, director of NAS's division of behavioral sciences. Out of their talks came the program now being launched.

What kind of projects do Suppes, Boyan, and others connected with the program have in mind?

First, consider what the committee does not want. It does not want comparison studies—curriculum A versus curriculum B, technology X versus technology Y. OE itself is rapidly getting away from this kind of study. A good bit of current educational research is in the area of refinement of measurement, a good bit more is aimed at the development of individualized instruction. The committee is not interested in these lines of research, either. Increasingly, OE has been broadening its research strategies, encouraging studies that would investigate basic premises, and it is in this area that the federal agency is turning to other disciplines for assistance.

On what the committee does want, Suppes said this.

"Let's pick something at random, the physiological study of the eye. This kind of work could have a very definite relationship to the reading process. Now we are not interested in the classical study of the reading process, the kind designed to produce new reading materials. We would be interested, rather, in a basic analysis of the physiological process, changes in eye movement and so forth, involved in reading."

Here are several suggestions the committee has put forth to show the range of investigations the new program is designed to stimulate and support.

- Research on the molecular, biochemical, and physiological bases of memory.
- Theoretical studies of different sequencing of activities in learning a given skill or body of information.
- The development of an adequate theory of first-language learning, and of the distinguishing characteristics of second-language learning.
- Study of the organization of attention in a classroom and of the consequences of different organizations, both for learning and for social control.
- Refinement of measurements of the economic rate of return in education; investigations into the rates of return for specific population groups and specific fields of learning.
- Determination of the impact of home, community, and other factors on what are commonly called disadvantaged children.
- Research on the learning of strategies and skills which an individual uses to code information into memory.
- Studies of the possibilities of altering memory and other elements of the learning process through the use of psychoactive drugs.

The committee listed 15 fields of study it considers the likeliest source of research proposals: education, sociology, psychology, physiology, biology, biochemistry, psychobiology, human genetics, anthropology, economics, political science, history, philosophy, linguistics, and statistics. Notice of the program has gone to graduate departments in these fields, and to major independent research institutes and centers.

Proposals are now being considered, and the first set of awards will be announced 15 January. New proposals should be submitted to the Committee on Basic Research in Education, Division of Behavioral Sciences, National Academy of Sciences by 15 February.

Suppes expects a big response to the program. "I think we'll be swamped," he said. "First, I believe the idea of the program will generate real interest among researchers. And just as important, so many other sources of funding are tight this year." Suppes and his committee have Boyan's assurance that the approximately $1 million originally designated for the program will be

forthcoming. OE's research budget calls for nearly $20 million in project-support money, but even if this figure is cut, through a combination of congressional and Administration action, the new basic research program, because of the relatively high priority it has been given, is likely to survive intact.

The work of the committee will hardly be painless, for it must come to grips with a number of knotty questions. If Suppes is right about the response, $1 million will be all too little, and the problem will be to decide how much money to allot the typical grant. High amounts will mean fewer grants; low amounts, diminished chances of significant results. One source predicts that the typical grant will run between $50,000 and $75,000, and that one or two will be a good bit more. A second question concerns the large number of disciplines involved. Where will most of the money go? Suppes hopes for a wide spread, and his guess is that, if there is an emphasis, it will be on the behavioral sciences. Finally, how close a relevance to education will the committee demand in the project ideas it will judge? Suppes says, "This is something we can't quantify or spell out precisely. All we can say is that the relevance must be real, not token. We will want the results of a project to contribute to fundamental knowledge, and we will want them to have major implications for education."

NAS's David believes the program could produce real changes in OE's approach to research activities. "It may help OE settle on a strategy of fundamental research of long-range character, not so much on projects aimed at quick solutions." About the level of funding, OE and NAS earlier this year were talking in terms of a growth in expenditures on basic research in education to somewhere between $20 million and $30 million a year by 1973. Remembering this year's money squeeze and knowing full well what competition for federal funds lies ahead even if the war ends, the scientific and educational communities might be excused for harboring doubt about that. Even so, David believes this year's level of funding "can generate a fair amount of activity," and, given the high priority OE has assigned the program, he thinks the support will grow. What is more, he adds, the program promises to enlist the interest of many researchers outside the field of education and to generate ideas which can be proposed not only to OE but to agencies such as the National Institute of Mental Health.

David's division, which was given a $73,000 grant earlier this year by OE, will be administratively responsible for the committee. Sherman Ross has come from a position with the American Psychological Association to serve as chief staff officer. The committee will meet several times a year and will create small, regional, multidisciplinary groups to deal with routine screening and other work.

Legally, of course, OE is responsible for making the grants and theoretically it could reject the committee's selections and make its own. But all concerned agree that, in practice, the committee will have the last word on awards. OE could have assembled its own in-house advisory panel; instead it turned to NAS. Operation of a grant-selection panel within NAS–NRC is unusual although not unique. And the Committee on Basic Research in Education, it should be noted, is not simply a group of experts sifting grant applications; it is expected to provide broad-range advice to OE on research policy and programs and to serve as a link with researchers who might otherwise ignore OE. The new arrangement indicates that the academy and some policy makers, at least in the Office of Education, feel that it's time some tired precedents in educational research were broken.—JAMES WELSH

James Welsh is a Washington newspaperman with a special interest in education.

New Canal: What about Bioenvironmental Research?

The protests of scientists concerned about U.S. plans to build a new interoceanic Atlantic-Pacific sea-level canal seem, like television commercials, to grow louder and longer. These scientists claim that, unless thorough, extensive scientific studies are carried out before the oceans are linked, serious and irremediable ecological consequences may occur.

Since 1906 it has been recognized that eventually another canal would have to be built, as traffic through the Panama Canal increases. Some 1400 ships now plying the seas cannot pass through the existing canal because of draft and beam limitations. It is estimated that the canal will have reached capacity around 1985, with a flow of 19,000 ships a year. About 13,000 ships now pass through the canal each year.

After the outbreak of civil violence in Panama in 1964, President Johnson asked Congress to establish a five-member Canal Study Commission to lay the groundwork for a new canal project. Members of the commission are Robert Anderson (chairman), a diplomat; Robert Storey, a lawyer; Milton S. Eisenhower, a university president; Kenneth Fields, a former Army engineer; and Raymond Hill, a civilian engineer. The commission has an appropriation of $24 million and has been assigned a final reporting date of 1 December 1970. The commission's task is, among other things, to recommend a location for a second canal, to study the scope of the anticipated negotiations with the country involved, to recommend an excavation technique, to assess costs and means of support, and to consider a defense system for the canal. Some critics say that, with a multitude of political, diplomatic, engineering, military, and financial problems facing the commission, the scientific considerations tend to get lost.

Scientists find two proposals for the canal particularly controversial: a proposal that the channel should be at sea level, thus intermixing the two oceans, and a proposal that atomic energy be used to dig it. They argue that consideration of either of these proposals should be preceded by extensive research into the possible environmental