emphasis placed upon action as the *only* datum upon which the innate equipment can operate. On the other hand, we cannot conceive of actions without internal guiding principles, which are themselves, crucial components for the genesis of cognitive capacities.

We owe to Piaget our bias toward a functional innateness rather than toward a preformational one. (Indeed, we have never intended to argue exclusively for innate *structure* as opposed to innate *process* which can abstract structure from experience.) Nevertheless cognitive processes (like chemical reactions) are difficult to observe directly—rather we must examine the structure of initial, intermediate, and final functioning and then describe intervening processes to account for the development of the child's performance. Piaget has devoted a great deal of attention to the operations which the child develops by age 7 to 8 and also to the absence of those operations during the preceding years. We are now attempting to expand these investigations by examining the initial strategies and heuristics that the 2-year-old child has as he *starts* this phase of his cognitive development. Whether a particular component of cognition is to be viewed as "innate" or as the result of early learning will be a question for further theoretical and empirical investigations.

References and Notes

1. J. Mehler and T. G. Bever, *Science* **158**, 141 (1967).
2. ———, *Int. J. Psychol.*, in press.
3. T. Bever, J. Mehler, V. Valian, in *Structure and Psychology of Language*, T. Bever and W. Weksel, Eds. (Holt, Rinehart and Winston, New York, in press), vol. 2.
4. T. G. Bever, J. Mehler, J. Epstein, *Science* **162**, 921 (1968).
5. The numbers (i), (ii), (iii), and (iv) follow the preceding article by Piaget.

6. Supported by Foundation Funds for Research in Psychiatry, grant G67-380, and by ARPA contract SD-187.

NEWS AND COMMENT

Philip Handler: National Academy Nominates a Worldly "High Priest"

I must remind you that a religion with naught but a priesthood, no matter how enthusiastic, devoted or dedicated, but without a laity cannot long survive.—Philip Handler, in a speech delivered earlier this year.

Philip Handler has many admirers in the scientific community and few critics. Some of those who criticize him do so because they think he is "too much of the world, and not enough of the priesthood."

Handler would be the first to agree that scientists must get out in the world to inform the "laity" and battle for the needs of science, rather than be content merely to work within the "priesthood." His skill in advocacy was one of the attributes which led the official committee of the National Academy of Sciences to nominate Handler for the Academy presidency to replace Frederick Seitz, newly designated president of Rockefeller University. (Although this nomination carries Handler a long way toward election, any 50 of the Academy's 800 members can nominate another presidential candidate. Ballots will be sent to members on 15 December, and the results will be announced 15 January. The new president will take office on 1 July.)

Handler, now 51, has taught biochemistry at Duke University for almost 30 years and, according to men in his field, has done research of note. However, as Handler said in an interview with *Science* in discussing his nomination for the Academy presidency, "I hope I've been a competent biochemist, but that's not why I've been chosen for this job."

This gregarious biochemist, who was elected to the National Academy only 4 years ago, has made his name as an organizer, administrator, adviser, and spokesman for science, especially in Washington. He began moving up in the organizational world of science when he became secretary of the American Society of Biological Chemists in 1953; he was later elected president. He has held various other positions in scientific organizations, including membership on the governing Council of the National Academy—to which he was elected earlier this year.

But it is in advising the federal government that Handler has left his largest mark, espeically in the past half dozen years. During this period, Handler estimates, he has spent from a quarter to a third of his time in Washington. From 1964 to 1967 he served as a member of the President's Science Advisory Committee (PSAC), where he is said to have urged greater attention to civilian science and technology and to the problem of adequate federal funding for the universities. PSAC's chairman, Donald F. Hornig, comments, "PSAC is made up of strong people, prima donnas in fact, and Handler held his own. He was one of the strong contributors."

Handler's most intensive governmental involvement has been with the National Science Foundation (NSF) and with its policy-making body, the National Science Board. He was appointed a member of that group in 1962; the Board elected him chairman in 1966 and reelected him chairman this year. In this role, he has helped develop the NSF reorganization bill which was enacted into law this year. Handler is said to be a talented, if sometimes loquacious, chairman by his fellow Board members.

Some scientists familiar with the NSF raise the question of whether Handler will resign from the National Science Board if elected to the presidency of the National Academy. These scientists argue that it would be more difficult for the Academy to offer independent advice to the government if its president served in a major federal post, and they also point out that the Academy receives federal funds, including some from the NSF. In an interview, Handler said he did not feel it would be necessary for him to resign from the Board if he is elected to the Academy presidency. As for his remaining as chairman, he would leave that decision to his fellow Board members. If he should become president of the Academy, Handler said, he would never let himself be reelected chairman of the Na-

NEWS IN BRIEF

• **LOWERING THE BOOM:** A federally sponsored panel of 12 scientists, chaired by John C. Calhoun, Jr., of Texas A & M University, has urged prohibiting all but experimental supersonic flights over populated inland areas until more is known about the public's response to sonic boom effects. The report, initiated by the Interior Department a year ago, estimated that regular overland supersonic flights could subject 20 to 40 million Americans to 5 to 50 severe sonic booms a day. In announcing the report, Secretary Stewart Udall said that "sonic boom should be regarded as a form of environmental pollution as serious . . . as water pollution," and panel member Roger Revelle of Harvard criticized the Federal Aviation Administration for not taking adequate steps to find out what noise levels would be acceptable to the public. The report also recommends that a presidential commission be established to hold public hearings on the sonic boom and that large-scale experiments be carried out to simulate intercity commercial SST flights to learn their effects on population groups.

• **COLLECTIVE BARGAINING FOR ENGINEERS:** A nationwide organization is being formed to initiate collective bargaining for engineers. The Council of Engineers and Scientists Organization, which now has 13 local collective bargaining member organizations, will be established nationwide to work in legislative activities, as well as to bargain for higher wages for engineers in industry. Council officials say the organization represents about 40,000 engineers.

• **COAST GUARD RESEARCH:** The Coast Guard has established an Office of Research and Development to meet future needs in marine sciences, to improve search and rescue operations, and to develop aids for navigation and marine safety. The new office will administer the National Data Buoy Project for gathering weather and meteorological information; engineering research to develop new equipment and facilities; and a human resources division to assess human behavior in a marine environment. About $4 million will be available this year from existing projects.

tional Science Board, since he thinks it important that the nation's principal science posts be filled by different people.

Squibb Directorship

A question has also been raised about whether, if elected Academy president, Handler would resign his position as a director of Squibb Beech-Nut Inc., a major producer of drugs and foods. (E. R. Squibb & Sons merged with Beech-Nut in January; Handler has been a Squibb director since 1966.) Handlers' ownership stake in the company does not seem very large; according to SEC records he owns 234 shares of common stock in Squibb Beech-Nut, which are worth about $12,000 on today's market. Because of the educational and financial advantages of his position as a director, it is understandable why Handler is reluctant to resign this post. On the other hand, there are scientists who cite the Academy's studies on the effectiveness of drugs and on foods and argue that holding such a corporate directorship might involve a real or apparent conflict of interests. Handler, in discussing this directorship, pointed out that he had informed both the Academy Council and the Academy's nominating committee of his position with Squibb Beech-Nut.

Rewards of the Academy

It is obvious that the Academy presidency is a coveted spot, and not only because it comes with a $45,000-a-year salary and a $250,000 Washington residence. In the world of science the Academy presidency offers a unique position of prestige and influence, as well as an absence of some of the problems which face other administrators, such as university presidents.

After it was announced in April that Seitz was leaving for Rockefeller, there was a flurry of activity by Academy members on behalf of their chosen candidates. It is said that nominating petitions were circulated for several Academy members, including Handler, AEC Chairman Glenn T. Seaborg, *Science* editor Philip H. Abelson, and Academy Foreign Secretary Harrison Brown. In July, Merle A. Tuve, the Academy's Home Secretary, was directed by the Council to write all Academy members urging them to send their suggestions to the nominating committee rather than submit petitions before the committee had made its choice. Apparently it was feared that a formal petition would be submitted before the committee acted, which would upset the Academy's cherished tradition of presenting an appearance of unanimity in its selection of officers. Candidates other than those mentioned above who were seriously considered by the committee (headed by Harry Eagle of Albert Einstein College of Medicine, New York) are said to have included Harvey Brooks, Harvard's dean of engineering and applied physics, and physicist Charles H. Townes of Berkeley. The committee has reportedly nominated Harvard chemist George B. Kistiakowsky for another 4-year term as vice president of the Academy.

The nominating committee had a plethora of respected men from which to choose, but, even when one considers the abundance of human resources, it is not surprising that it selected Handler. One member of the nominating committee gave *Science* five reasons for the committee's selection:

1) Handler has "a broad view of science." His interests and knowledge extend far beyond his own discipline.

2) He is a good committee chairman, with the ability "to enlist the enthusiastic hard work of people." The committee member said this was especially important in a group as large as the Academy.

3) He has "genuine administrative ability." The member explained that the Academy had grown much more active in the Bronk and Seitz presidencies and had acquired a large staff, which increases the demands for executive leadership.

4) He is well acquainted with Washington but is not identified with partisan politics. To an extent, he is associated with NSF, the member commented, "but NSF is the broadest of the science organizations and the least political."

5) He can "represent science with dignity and ability."

Handler's Views on the Academy

One of the most sensitive problems of any Academy president will be to help define the proper relationship of the Academy to the federal government. Some Academy members are troubled by the large number of studies which the Academy does for the Defense Department, including classified work. In his recent interview with *Science*, Handler indicated no desire to change the existing relationship of the Academy to the Department of Defense if elected Academy president. "The Academy has an obligation to contribute to the national defense," he

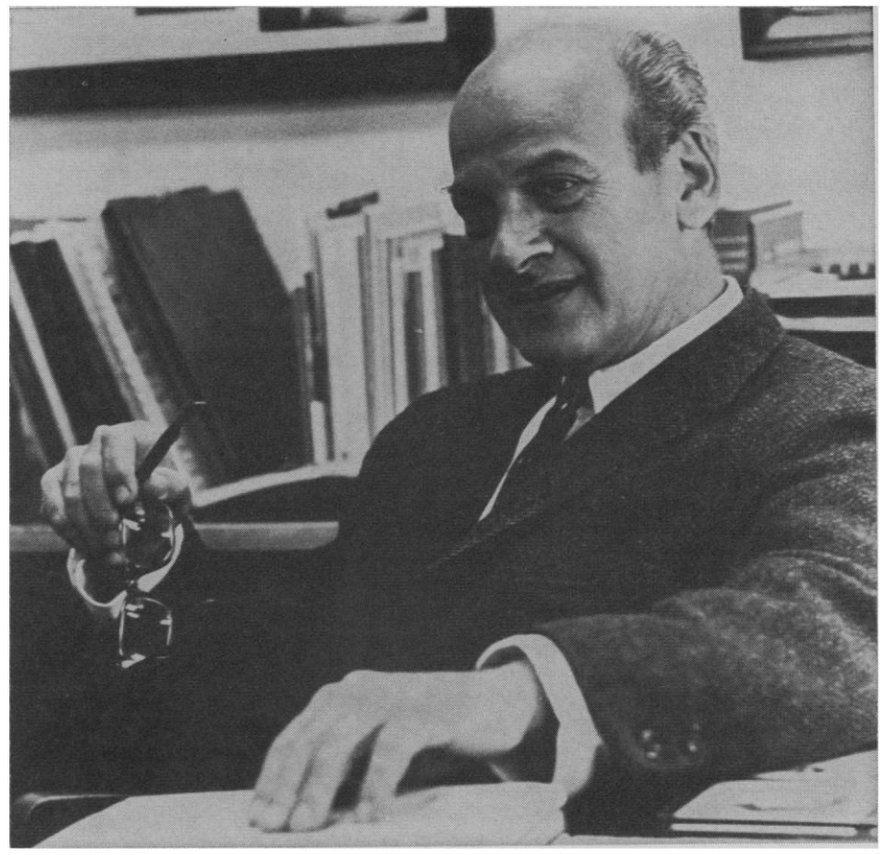
said, "I have strong feelings on this subject. On the one hand, the United States requires strong defenses and sure defenses, but, on the other hand, the generals and admirals are not always right. Scientists and engineers should keep their connection with such matters. I suppose my views are like those of the attorney in *The Caine Mutiny*—while regretting the necessity for a strong military defense, I think the lack of one would be a much more serious problem. The question is not whether the Academy should do work for the Defense Department, but how it goes about maintaining its objectivity in doing so."

In other areas, Handler feels that the Academy will take a more active role in advising the government and the society. "In the past, there has been a tendency for the Academy to speak when spoken to," he comments, "but in the future there will be an increasing number of occasions where the Academy will have to take the initiative. For instance on the problems of the cities, the Academy shouldn't sit around and wait to be asked how the knowledge of scientists is relevant to these questions." Handler has used his influence in NSF to gain attention for the social sciences, and he believes that more emphasis should be given these disciplines in the Academy to help the nation meet "these brute problems in front of us."

During the past few years, Handler notes, he has been offered the presidencies of several universities and the deanships of a number of medical schools. He says that he has "been unable to come to the moment of decision" on these offers, mostly because he has wanted to remain involved in his laboratory work. "To the extent I've been useful in Washington," he says, "it's because I have one leg back in the lab. It's been useful at Washington discussion tables to bring the gut reaction of the working scientist."

North Carolina Advantages

Handler's affiliation with a Southern university may well have speeded his ascension in the hierarchy of Washington science advising. His Duke connection has given many governmental meetings automatic "geographic distribution." And it is probably a "plus" not to come from one of the longer established universities. As one perceptive Harvard observer of the national science scene has commented, "You just couldn't have a National Academy president from Harvard."



Philip Handler, chairman of the National Science Board, who recently became a nominee for the presidency of the National Academy of Sciences.

Despite his long-term Southern "base," Philip Handler is hardly a son of the South. He was born in New York City in 1917 and grew up in Brooklyn, where he graduated from New Utrecht High School. His parents had planned a career as a physician for him, but while he was attending City College of New York, Handler's interest in research was whetted by a biochemistry professor, Benjamin Harrow. Harrow, who is now retired, remembers Handler as "one of the best half dozen students I ever had." Harrow says he urged Handler to "be a good biochemist rather than a poor M.D." Handler graduated from CCNY at 18 and thus was able to persuade his parents that he had time to do graduate work before going on to medical school. Harrow encouraged him to go to the University of Illinois at Urbana, where significant research in biochemistry was taking place.

At Illinois, Herbert E. Carter, now the university's vice-chancellor for academic affairs, was Handler's graduate supervisor; Carter has recently served with Handler on the National Science Board and on the Council of the National Academy. Handler was in the first group of graduate students taught by Carter, who says that Handler was "his own research boss" from the time he started graduate school and "displayed leadership even as a graduate student."

Teaching at Duke

Handler received his Ph.D. after 3 years at Illinois and went off to Duke in 1939, where he has remained ever since, including the years of World War II. Handler says that one of the greatest pleasures in his life has been "to share the adventure of making Duke into a great university; our medical school is now surely among the top half dozen in the United States." Handler became chairman of the biochemistry department at Duke's medical school at the age of 32 and has built what many observers agree is a "first-rate department." He has also coauthored a widely used textbook, *Principles of Biochemistry*, which is now in its fourth edition.

His laboratory has been funded by NIH, and Handler has been closely associated with advising NIH during the past dozen years. He was chairman of the NIH biochemistry study section

and is also given credit for having helped establish the Institute of General Medical Sciences, which sponsors research that is not specifically disease-related. Handler explains that he felt this Institute should be created so that his fellow scientists would not have to submit "contrived statements" to NIH in order to justify their legitimate research.

While at Duke, Handler says, one of his most difficult personal decisions has been that of how much attention he should give to his public activities. "There was a time some years ago," he says, "when I became more perceptively aware that I was giving more time to public service, and was short on time for scientific achievement. I had to come to grips with that, and make an overt decision rather than let it slide. I finally decided that whatever gifts I had (and I say 'gifts' in all self-deprecation) I could do more for science in my public role than I would accomplish for science in my laboratory."

"I've learned to live with that decision, albeit painfully," he continued. "Sometimes I wake in the middle of the night and ask myself 'What would have happened if I stayed in my laboratory?' Of course, my lab is still busy; it's doing good things but not great things."

Concern with Graduate Education

Handler's long experience at Duke has made him especially sensitive to the needs of the nation's universities. He has argued that the federal government should take financial responsibility for graduate education rather than have it partially subsidized by federal research grants and contracts and thus subject to fluctuating funding for research. At the same time, he has warned that "the university must not become subservient to or the creature of the federal government by virtue of this financial dependency." Whatever the federal budgetary situation, Handler has predicted that "those of us who would represent fundamental science in future discussions of the disposition of Federal resources will require silver tongues indeed."

Handler's "silver tongue" is envied by his colleagues. NSF Director Leland Haworth says that, in the scientific community, Handler and the late J. Robert Oppenheimer are "the most articulate men I've ever met." Handler is a good public speaker, who is said to be able to "think on his feet." Former NIH Director James A. Shannon credits Handler with being a "realist" and a "mature thinker."

Many scientists praise the quality of Handler's presentations to congressional committees. Several of the scientists interviewed thought that one of Handler's main advantages as Academy president would be his connections with Congress.

A New Kind of Leader

In many senses, Handler seems a new kind of leader in the scientific community. Not only is he from the life sciences, whereas most of the leaders have been from the physical sciences, but also he represents, to some extent, a generation different from that of many of those currently at the top of American science. Handler did not work in the weapons labs during World War II, and he has not been much involved either with weapons advising or with those working for disarmament. "As a life scientist," he notes, "I have been spared from a lot of the hard decisions my colleagues in the physical sciences have been forced to make." One of Handler's acquaintances claims that he has been "strongly motivated to break the stranglehold of the physicists on American science."

From the great number of assignments that Handler has assumed on behalf of the scientific community, it is safe to conclude that he is a public-spirited and ambitious man. There are some Academy members who believe that Handler decided a few years ago that he wanted to be president of the Academy and has worked with admirable diligence toward achieving that goal. Even to Handler's friends, the adjective "entrepreneurial" comes naturally when describing his personal qualities; one critical scientist terms him "an operator's operator."

A Political Man

Handler is a political man, and, especially by those outside Washington, he is thought to be an expert on getting things done in the government. A few of the Washington administrators who have worked with him, however, are more skeptical. "Phil thinks he knows how to manipulate things in Washington" one comments, "but he really doesn't know the inside workings."

Any deficiencies that Handler may have as a politician of science seem related to the attributes which attract people to him—his affable nature, his self-confidence, and his quick mind. Even some of Handler's staunchest backers describe him as "sometimes impulsive" and "willing to go off on tangents." In the past couple of years, Handler has been criticized for a few of his decisions. These include: (i) his defense of NSF's treatment of a grant application from Berkeley mathematician Stephen Smale (discussed in *Science* from 15 September through 3 November, 1967); and (ii) his agreement to help organize scientists and engineers for Humphrey in June and his subsequent withdrawal from his role as a Humphrey organizer (*Science*, 12 July). Some of his acquaintances think he could have avoided part of his difficulties if he had taken more time to think through his position.

But any listing of Handler's alleged imperfections should not disguise the fact that Handler is much admired by most of the scientists who know him. One of the few rumblings detected in the Academy over the Handler nomination has occurred among some physical scientists who think that one of their own breed should have the top job.

Many of the scientists interviewed did think that the Academy would be a more interesting institution during a Handler presidency than it has been for the past 6 years. "Phil Handler will make the Academy into a swinging place," one otherwise critical midwestern scientist commented. A few Academy members thought that Seitz had been a better president than Handler would be, mainly because they believed Seitz to be more thorough.

The Academy—A Secret Society?

But the question of how the Academy has been governed, as well as most other questions affecting this august body, remain shrouded in a self-imposed air of mystery and obfuscation. In an era in which science needs all the public voices it can muster and in an organization which receives sizable federal funding, the secretive and self-important attitude of some members of the Academy "priesthood" is increasingly inappropriate.

A few days ago, two routine questions from *Science* about the Academy's nomination were curtly dismissed by an Academy nominating committee member with the remark, "These are not matters for public consumption." Philip Handler (who has said "I can't conceive of the Academy as just a good club") seems to have a different and broader view of the public role of the nation's paramount scientific organization.—BRYCE NELSON