grated with the teaching assistance structure in such a way as to afford a consistent educational and work experience to the majority of graduate students and a better quality of instruction to undergraduates.

This unification will be much more easily effected in a system with a large preponderance of traineeships. It should be possible to develop an arrangement under which the university and the government contribute jointly to an overall traineeship stipend budget with the trainees participating in undergraduate instruction and with the university contribution to the budget determined according to the total teaching load carried by all trainees together.

Difficulties

A major practical obstacle to such transformations lies in the fact that the programs involved are administered by perhaps ten different federal agencies, and some of their features are legislatively prescribed. A very high degree of interagency and legislative cooperation is therefore necessary if we are to approach the ideal. However the problem is one for which it seems relatively easy to establish broad areas of agreement, and worthwhile beginnings can be made by administrative accommodation within and between agencies.

Summary

The situation of graduate students in physics is profoundly influenced by federal support, which has been applied with mixed, and occasionally contradictory, purpose.

There are five important goals in the provision of graduate student stipends: (i) maintenance of "distinction for excellence"; (ii) rational distribution over scientific fields and subfields; (iii) constructive involvement of graduate students in undergraduate teaching; (iv) rational geographic and institutional distribution; and (v) administrative simplicity.

These goals may be approached by making several adjustments of the present system.

1) The preeminence of individual predoctoral fellowships should be restored. They should be awarded sparingly to at most five percent of the graduate student population.

2) The great majority of stipends should take the form of traineeships. They should be assigned to departments according to rational criteria.

3) Research assistantships should be continued at a reduced level. Their maintenance will protect research activities of specific public interest when necessary.

4) Teaching should be incorporated into the normal responsibilities of fellows, trainees, and research assistants. Teaching *assistance* should be regarded as a budgeting category and not as an identifying characteristic of a particular group of students.

Changes in these directions could lead to some semblance of a "system" which would duplicate all positive achievements of our present haphazard arrangements, would honor the basic motives, and would realize substantial advantages. The principal advantage, I have argued, would be more purposeful management of the graduate students themselves. Collateral advantages would include both simplified administration and much enhanced economic and demographic awareness on the part of officials responsible for policy decisions. In short, the degree of inadvertence in federal actions affecting graduate education would be lessened.

NEWS AND COMMENT

Scientists and Engineers for L.B.J.: A War and Three Years Later

It appears that the war in Vietnam has sharply diminished support for Lyndon Johnson among the leaders of the American scientific and engineering communities who campaigned for him vigorously in 1964. Results of discussions by *Science* with 30 of the 42 members of the founding committee of Scientists and Engineers for Johnson indicate that the leadership of that remarkable coalition has divided into three camps of nearly equal size—one opposing President Johnson, one supporting him, and one unhappy but uncertain.* The remaining members of the committee could not be reached. Most of those who were contacted requested anonymity as a condition of candor, and *Science* has accordingly withheld names throughout; however, a list of the founders of Scientists and Engineers for Johnson appears on page 1535.

The codification of complex reactions of sophisticated individuals into the simple categories of "pro," "anti," and "uncertain" is obviously not highly precise. Within the categories, feelings and perceptions may overlap even where judgments differ. Nonetheless, the groups do cluster around those simple poles, and a number of observations may be made about each group.

First, the anti-Johnson group includes perhaps the most influential members of the original committee—some of the leading figures in government advisory circles—as well as academic researchers and a miscellany of other denizens of the scientific community. They have kept an increasingly troubled silence because they are still active in the government advisory apparatus or because they play key roles in important public and private institutions and are fearful of the consequences an open break might have. Privately, however, they are full of anguish, depression, and anger. "I burned my Johnson button several months ago," one member of the founding committee remarked.

There is one exception to the pattern of private agony—General James M. Gavin, a former chief of Army research and development who served as Kennedy's ambassador to France and is now the chief executive officer of Arthur D. Little Company in Cambridge. Gavin has made no secret of his dismay over the acceleration of the war—he has testified before the Senate

* For a study of the role of Scientists and Engineers for Johnson in the 1964 campaign, see *Science*, 11 and 18 December 1964.

Foreign Relations Committee and written openly about it—and in August he took the additional step of resigning from the Massachusetts Democratic Advisory Council. "I simply will not support Johnson for reelection in 1968 and obviously anyone on the council should be ready to do so," he was quoted as saying at that time. Gavin has since become the object of a presidential "boomlet," with support for a "draft Gavin" movement centering around Boston and New York.

The other dissenters, while keeping their dissent among friends, express feelings which range from cautious dissociation to a degree of alienation remarkable for those so close to political power. "I would be attracted to any group that would be free from past commitments in a personal, if not an official, sense," one government advisor reported, "though I would not affiliate with any extreme group." Others go even further. "Johnson turned out very differently from what I hoped," said another advisor; "If Reagan were the alternative, I would now throw away my vote on a third party candidate rather than vote for either." Support for a third party appears conceivable even to people who must be described as traditional, moderate, Republican, "mainstream" Americans. "I'd love to vote against Johnson in '68," commented one scientific community statesman, "and would vote for a third party even though it's an ineffectual protest." One academic researcher reported, "If I had it to do all over again, this time I'd vote for Goldwater." Among those who, for pragmatic reasons, would not vote for a third party, disenchantment is equally great and extends beyond Johnson himself to the political process. "I'm totally frustrated," said one East Coast researcher, "but I cannot believe we are going to have a choice in 1968 between Johnson and some man of sense."

The Uncommitted

The chief links between those former members of Scientists and Engineers for Johnson who are clearly opposed to the President and those who are uncertain about their allegiance are a shared concern about the war and a lack of confidence in alternative candidates. The uncommitted group, composed chiefly of academicians and a few industrial executives, is relatively easy to categorize on the subject of the war. Here are some typical comments. A West Coast administrator: "I feel terrible about the war." A West Coast researcher: "I'm against the war." An East Coast medical researcher: "I wish for peace in Vietnam." An industrial executive: "I wish we weren't there." Another medical researcher: "I'm in agony about it."

But the political consequences of their unhappiness are by no means clear-cut. These people are not committed to the President but they are more sympathetic than hostile. A number have written him privately expressing their doubts and offering their own solutions. Most are anxious to keep up the appearance of allegiance. "Don't write anything that would put me in disfavor with the President," one medical researcher implored. Some claim to be too knowledgeable about the complexity of the world to experience anger or a sense of "betrayal," and they see their angrier colleagues as naive to have expected politics in general, and Johnson in particular, to have created anything better. Others feel deeply troubled by their own ignorance. "I don't know what to think when men I respected so much, like Johnson and Fulbright, disagree so much," commented one medical researcher. "I just can't get the data to formulate a rational opinion," he added.

Nonetheless, beneath all the doubt, confusion, and despair, most of those who describe themselves as uncertain are on the lookout for attractive Republican alternatives, and it appears that if Nelson Rockefeller were the Republican candidate he might attract many of their votes. The mention of Ronald Reagan or Richard Nixon, on the other hand, rekindles some of the old anti-Goldwater spirit of the original alliance, and, if either of these men were to run, the support of the middle group would probably go to Johnson.

There are also in the middle group a few people who are simply cagey about 1968—"it's too early to tell"—and a few individualists who don't fit in anywhere, such as the Republican aerospace executive who thinks the war is all right but finds the Johnson administration "too socialistic" in its domestic programs. Questioned about his opposition to Goldwater in 1964, he said "I have conservative tendencies—I'm just not that conservative." But he is concerned about finding an attractive alternative, too.

Supporters of President Johnson in the original group include "Democrats forever," aerospace executives, Negroes, and some academic researchers, with some individuals falling into more than one of these categories. Distress over Vietnam ripples through this group, too, but they share with the noncommittal group a sensitivity to the complexity of the issues and to Johnson's problems in handling them. "I'm unhappy about the way things are but don't blame Johnson," said one researcher. A Negro educator commented, "I don't hold these unpredictable events as chargeable to him." Particularly among the Negroes, enthusiasm for Johnson's domestic program overrides the war as the issue around which judgments are made, and this is true as well—though to a lesser degree—for some academic researchers who believe Johnson has been good to science and good to research. In some cases there is a kind of detachment from the war, as in the reaction of the Negro leader who remarked, "Of course I don't agree with every one of his policies; but then my wife and I don't agree on everything and we're not going to get a divorce." An academic administrator who said he would actively support Johnson in 1968 stated, "On the whole he's doing as good a job as you can expect under the circumstances"; then he said he was against bombing North Vietnam and had always been against it.

Satisfaction Rare

Characteristic of Johnson's supporters is a confused and helpless "there but for the grace of God" feeling. "Who could do the job better?" is a common question. "What would you do?" "I don't know what to do." But expressions of profound satisfaction are rare, and unequivocal support comes mainly from true Democrats, long-term friends and associates, and the former career military officer, now an aerospace executive, who said, "Johnson has done superbly well; I will give him unquestionable, enthusiastic, emphatic support in 1968." Of the dropouts among his former colleagues on the founding committee, this executive commented, "Well, we've lost some people and attracted some people and, you know, sometimes you lose people that ought to get lost."

A number of other points also emerged from these inquiries. First, it is clear now—and was apparent in '64—that Scientists and Engineers for Johnson reflected unanimous opposition to Goldwater and not unanimous relish for Lyndon Johnson. Even more positive coalitions are subject to defec-

tions; the collapse of this one should come as no surprise. Some of the founders were skeptical of Johnson from the beginning and were drawn into elective politics—many for the first time—because of what they perceived as the overwhelming menace of Barry Goldwater. But even during the campaign they attempted to keep paeans to Johnson to a minimum.

Second, only a few of the leaders express regret about their participation in 1964. Where there is regret, it grows not out of doubts about the propriety of partisanship but out of unhappiness about the way it turned out—out of the feeling that, as one researcher put it, "We elected Johnson and got Goldwater policies." Most, however, agree with the industrial executive who believes the political activity was appropriate and commented, "Based on the facts we knew in 1964, the effort was justified."

Third, some of the founders of Scientists and Engineers for Johnson express a timidity about publicly speaking out that confirms the worst fears of those who predicted that federal support for science would create inhibitions. One science administrator, a much respected elder statesman of science, was referred to by a close colleague as "the one you should talk to if you want to hear someone who is really ready to make a break." Queried, he became cagey and stated that his role in government advisory circles created some "restraints." Another university administrator said he was fearful that speaking out on the war might have adverse effects on his institution's relations with Washington.

Finally, it is clear that the issues of 1968 are not those of 1964. With a few exceptions, many members of the scientific community who opposed Goldwater in 1964 recollect now that they did so with domestic policy in mind. The war was a factor but it was not primary. Now it has become, as one industrial executive put it, "issue number one," and the war is divisive on a fundamental moral level not always touched by the political process. Some still judge the President by his handling of other issues—his attitude toward civil rights, research, science, or education—and, on the whole, they give him very high marks in these areas. To some extent class and professional interests continue to influence responses and they certainly affect the openness—or lack of it—with which feelings are expressed, let alone trans-

1964 Founding Committee, Scientists and Engineers for Johnson

Luis W. Alvarez, professor of physics, University of California, Berkeley

Detlev W. Bronk, president, Rockefeller University

Harrison S. Brown, professor of geochemistry, Caltech

Owen Chamberlain, professor of physics, University of California, Berkeley

Kenneth B. Clark, professor of psychology, City College of New York

Rufus Clements, president, Atlanta University

W. Montague Cobb, professor of anatomy, Howard University

Michael E. De Bakey, professor of surgery, Baylor University

Sidney Farber, founder and scientific director, Childrens' Cancer Research Foundation

R. Buckminster Fuller, research professor of design science, Southern Illinois University

Michael Ference, Jr., vice president for scientific research, Ford Motor Company

General James M. Gavin, U.S. Army (ret.), president, Arthur D. Little, Inc.

Peter C. Goldmark, vice president for engineering, CBS

William J. Halligan, chairman of board, Hallicrafters Company

Milton Harris, vice president, Gillette Corporation

Richard E. Horner, senior vice president/technical, Northrop Corporation

Kelly Johnson, vice president, Lockheed Aircraft Corporation

Dan A. Kimball, chairman of board, Aerojet-General Corporation

George Kistiakowsky, professor of chemistry, Harvard University

Polykarp Kusch, professor of physics, Columbia University

Charles C. Lauritsen, professor emeritus of physics, Caltech

Russell Z. Lee, president, Palo Alto Medical Research Foundation

Katherine McBride, president, Bryn Mawr College

George A. Miller, visiting professor, Rockefeller University

Clark B. Millikan, director, Guggenheim Aeronautics Laboratory, Caltech (deceased)

Samuel M. Nabrit, executive director, Foundation for Aid and Development of Universities in the South

William A. Nierenberg, director, Scripps Institution of Oceanography

Gerard Piel, editor and publisher, *Scientific American*

Emanuel R. Piore, vice president, IBM

Kenneth S. Pitzer, president, Rice University

Admiral W. F. Raborn, U.S. Navy (ret.), vice president, Aerojet-General Corporation

Roger Revelle, director, Center for Population Studies, Harvard University

John H. Rubel, vice president, Litton Industries

Chauncey Starr, dean of engineering, University of California, Los Angeles

Helen B. Taussig, professor of pediatrics, Johns Hopkins University

George S. Trimble, Jr., former vice president, Martin Company, now director, Advanced Manned Missions Program, Office of Manned Space Flight, NASA

Ralph W. Tyler, retired director, Institute for Advanced Study in the Behavioral Sciences, Palo Alto

Harold C. Urey, professor of chemistry at large, University of California, San Diego

Warren Weaver, consultant, Alfred P. Sloan Foundation

Paul Dudley White, professor emeritus, Harvard Medical School, and consulting physician, Massachusetts General Hospital

Jerome Wiesner, dean of science, M.I.T.

Vladimir K. Zworykin, honorary vice president, RCA Laboratories

lated into action. But to a surprising extent the war is getting to these leaders of the scientific establishment as individuals answerable to their own consciences.

This growth of internal anguish among some of the most influential and productive leaders of the scientific community is significant in itself. "The social compact is being broken," one researcher observed. "You have to obey society but you don't expect it to make you behave immorally. Now people are making private judgments."

What this means for politics is another question. These are not men and women who will join the hippies; they are not of the new or old left or right; they are in the mainstream of American politics where power is great but the range of action is defined more narrowly. At this writing it seems that the differences are too great to produce a unified Scientists and Engineers for anything in 1968. But a Nixon or a Reagan candidacy might stir a revival, on the one hand, and there is also the possibility, as one industrial administrator put it, that "Johnson might begin negotiations tomorrow." If he did, the mood would surely change. But it seems more likely that the individuals who led Scientists and Engineers for Johnson will find private ways of dealing with their own convictions. And the question remains: If they feel helpless, who feel in control?

—ELINOR LANGER

The Smale Case: Tracing the Path That Led to NSF's Decision

"I have hardly ever known a mathematician who was capable of reasoning." That line comes from Plato's *Republic*. But, as the controversy involving Stephen Smale, the left-wing Berkeley mathematician, simmers on, it is not unlikely that similar thoughts have occurred in the governing councils of the National Science Foundation.

For the fact is that the Foundation's elders, full-time and advisory, apparently don't quite understand why their decision on Smale's grant application is stirring up small, but significant and growing, numbers of academics across the country; why, for example, letters of inquiry are coming to NSF from M.I.T., Harvard, Columbia, Berkeley, and other institutions; or why, in this period of financial dearth for academic research, some 50 faculty members at the University of Pennsylvania, in and out of the mathematics department, affixed their names last week to a statement that reads as follows: "Unless there is an acceptable explanation of the rejection of Stephen Smale's contract application the undersigned cannot accept for personal use any funds from the National Science Foundation." The statement added, "This is not an endorsement of Smale, it is not a protest about Vietnam, and it is not intended to prevent others from receiving funds through the National Science Foundation." About half of the signatories indicated that at present they neither hold nor are in quest of NSF support. Nevertheless, the way things normally go in the academic money business, this seeming willingness to renounce NSF support, fuzzy though the wording may be, is extraordinary—in fact, it suggests a kamikaze streak that heretofore has been wholly absent from academe's dealings with the federal government. Penn president Gaylord P. Harnwell and provost David R. Goddard did not sign the mass statement. But, according to the Philadelphia *Bulletin*, they "both signed a statement that they would 'protest personally' to NSF if it developed that a 'competent individual' has been denied NSF support for political reasons."

What is going on? Did "political reasons," in fact, have anything to do with NSF's decision in the Smale case? Or is NSF perfectly justified in its contention that it gave Smale a meticulously fair shake and that neither he nor his friends have anything to kick about? The answers are worth hunting, because the quest for them not only illuminates the Smale case and the precedent implicit in the way the Foundation has handled it but, more important, reveals a good deal about NSF's image of itself in the nation's capital and its *modus operandi* in dealing with the political powers that surround it.

First of all, the agreed-upon key facts are as follows: Smale, age 37, is an outstanding topologist and a virulently outspoken opponent of the Johnson administration's policies in Vietnam. In the summer of 1966 he spent time at various academic centers in Europe; in August of that year he proceeded on to Moscow to receive the Fields award—often referred to as the Nobel prize of mathematics—at the International Congress of Mathematicians. His salary for two summer months came out of a 2-year, $91,500 grant which NSF had awarded to Berkeley for a small research group, of which Smale was principal investigator. The grant included $1000 for his travel costs to Moscow; he applied for and received another $400 in travel expenses from a fund administered by the National Academy of Sciences. While in Moscow, Smale denounced American policy in Vietnam, the Soviet suppression of the Hungarian uprising, and maltreatment of intellectuals in the U.S.S.R. While several Congressmen deplored and threatened NSF for paying for a trip that had served anti-American political purposes, Smale leisurely traveled across Europe, boarded the *France*, and took up an academic year's residence at the Institute for Advanced Study, in Princeton. NSF told Berkeley, which was administering Smale's grant, that reimbursement of funds paid out to Smale could not be assured until he clearly established that he had, in fact, devoted two summer months to scholarly purposes. Smale subsequently provided a detailed account of summer travels. NSF said it was satisfied, and Berkeley paid Smale what was due him under the grant. Informally it should be noted, NSF pointed out that Smale had violated NSF regulations by returning to the U.S. on a foreign vessel when