tory of science has demonstrated that the human brain is most fertile in the teens. . . . How to awaken in our schools and in the general public a real appreciation not only in the results of science, but also of the great intellectual value . . . the value of this wonderful adventure of science, how to bring that home to the children and to their parents . . . is a really big problem."

Teller added that he felt the federal government should increase its investment in research and development. "I realize," he said, "that the level of expenditure has reached the extent where detailed criticisms of the big items are called for. That one has to be selective, particularly where very great chunks of money are involved, seems to me obvious. At the same time, I think that the few percent of the national income which we spend on research can be increased and should be increased . . . I am convinced that our whole future welfare and our whole future safety is involved in precisely these efforts, and I am unequivocally behind spending more money, with the only restriction that I am fully aware of the fact that to spend more money is not enough—you also have to know how to spend it. . . ."

Spread Support

Teller also joined in the plea for broader geographical distribution of research funds, pointing out, "I fully realize that to carry out such a policy there will be interests hurt with appropriate and political consequences, and decisions of this kind will have to be defended. . . . If in State X there are few government funds going on the basis of few attractions and poor performance, then I think appropriate thought should be given as to how conditions in that locality, in that State, could be improved to make that part of the Union perform better."

With the NASA budget, which is the Science and Astronautics Committee's largest responsibility, out of the way, the Daddario committee plans to continue its studies during the coming months with a continuing series of hearings. The transcripts will be published and distributed without charge, probably early next year. Copies of "Hearings before the Subcommittee on Science, Research, and Development" may be ordered from the House Science and Astronautics Committee, Washington 25, D.C.

—D. S. GREENBERG

C. P. Snow: Second Thoughts on the Two Cultures Likely To Keep the Pot Boiling

Britain's C. P. Snow, sometime scientist and now highly successful man of letters, started something with his 1959 lecture, *The Two Cultures and the Scientific Revolution,* which, he says in a recently published postscript to the lecture, makes him feel like the sorcerer's apprentice.

As Snow himself has said repeatedly, the freshet of controversy he released was somewhat surprising since the views he expressed in the lecture were by no means novel. Nevertheless, Snow's felicitous title phrase and its accompanying thesis of a gulf yawning between scientists and the rest of society has become a familiar marker buoy in discussions on science and society. Or as Snow himself said in the March 1960 issue of the London review *Encounter*, "almost by chance, a nerve has been struck."

Certainly fuel for the controversy over Snow's thesis was piled on by attacks which took a highly personal turn, notably one in 1962 by F. R. Leavis, a literary critic who delivered a scathing indictment of Snow as thinker and writer in a kind of maledictory address delivered when Leavis retired from his post as a reader at a Cambridge college [*Science* **135**, 1114 (30 Mar. 1962)].

While Snow has often written and spoken in recent years about the Two Cultures, he has up to now maintained a Buddha-like reserve toward his harshest critics. Two weeks ago, however, the *Times Literary Supplement* of London published Snow's piece called "The Two Cultures: A Second Look," which is obviously intended to be the author's authorized second thoughts. It is also to be incorporated in a new edition of the lecture. In this piece Snow obliquely, but unmistakably, replies to Leavis and other critics from the other culture.

In this *TLS* piece, Snow by and large stands by his original case. There are some clarifications and changes in emphasis, to be sure, but no major recantations. Snow is, however, somewhat more hopeful about prospects of avoiding the disaster of nuclear war. Part of the force of his original lecture derived from his pessimism about the future. Snow argued that the implications of science were not sufficiently weighed in the making of policy. Now he is encouraged by the partial test ban and says, "If I wrote the lecture again now, there would still be anxiety in it, but less dread."

To the criticism that the use of the word *culture* is misleading in the sense that he uses it and that there are more than two cultures, anyway, Snow admits that the terminology may be inexact, but quite reasonably repeats that he wanted "something a little more than a dashing metaphor, a good deal less than a cultural map."

As for his thesis, in restating it in the *TLS* piece, Snow says it goes "something like this. In our society (*i.e.*, advanced Western society) we have lost even the pretense of a common culture. Persons educated with the greatest intensity we know can no longer communicate with each other on the plane of their major intellectual concern. This is serious for our creative, intellectual, and above all, moral life. It is leading us to interpret the past wrongly, to misjudge the present, and to deny our hopes of the future. It is making it difficult or impossible for us to take good action.

"I gave the most pointed example of this lack of communication in the shape of two groups of people representing what I have christened 'the two cultures.' One of these contained the scientists, whose weight, achievement, and influence did not need stressing. The other contained the literary intellectuals. I did not mean that literary intellectuals act as the main decision makers of the western world. I meant that literary intellectuals represent, vocalize and to some extent shape and predict the mood of the non-scientific culture: they do not make the decisions, but their words seep into the minds who do. Between these two groups—the scientists and the literary intellectuals—there is little communication and instead of fellow feeling, something like hostility."

Snow avers that he regrets this state of affairs, but it is a subject to which he returns in what is really the central section of his appendix to *The Two Cultures* and in which, somewhat by indirection, he scores off Leavis.

First, Snow notes that he believes the division between the Two Cultures to be deepest in England and feels he did not emphasize this enough in the lecture. He then makes a comparison which is likely to surprise as well as flatter American academicians.

"In the United States, for example,"

writes Snow, "the divide is nothing like so unbridgeable. There are pockets of literary culture influenced by the similar cultures in England, which are as extreme in resisting communication and in ceasing to communicate: but that is not generally true over the literary culture as a whole, much less over the entire intellectual society."

Snow goes on to note the efforts being made in some American universities to give science students more education in the humanities and to bring scientists into contact with nonspecialized classes, and he compliments American higher education for its "resilience and inventiveness."

While perhaps most attention has been given to Snow's description of the schism in industrial societies like ours, Snow says that the original point of the lecture, or at least his major intention at the time, was "in sharpening the concern of the rich and privileged societies for those less lucky."

It is the closing of the gap between rich and poor which, Snow argues, the scientific revolution has made possible.

"It does not require one additional scientific discovery, though new scientific discoveries must help us," says Snow in his *TLS* piece. "It depends on the spread of the scientific revolution all over the world. There is no other way. For most human beings, this is the point of hope. It will certainly happen. It may take longer than the poor will peacefully accept. How long it takes, and the fashion in which it is done, will be a reflex of the quality of our lives, especially of the lives of those of us born lucky: as most in the western world were born. When it is achieved, then our consciences will be a little clearer; and those coming after us will at least be able to think that the elemental needs of others aren't a daily reproach to any sentient person, that for the first time some genuine dignity has come upon us all."

Central to Snow's argument is his distinction between the individual condition and the social condition. In the case of the individual, Snow says he "stressed the solitariness, the ultimate tragedy, at the core of each human life." Lord Keynes put a finer point on it when he said, "In the long run we are all dead."

But Snow's point is that the scientific revolution has made the social condition in the industrialized countries better by lessening poverty, hunger, and disease. In the underdeveloped countries, life, as Thomas Hobbes, a philosopher of pre-industrial England, put it, "is poor, nasty, brutish and short."

Snow is saying that while the individual condition is irremediable, the social condition is not. The scientific revolution is the hope of the poor, and its spread is inevitable.

Snow's fundamental argument with the literary intellectuals seems to stem from his feeling that they are enemies of this revolution.

While his indictment is diffuse and difficult to recount point by point, there is little doubt that Snow regards the leading 19th- and 20th-century writers of what can be loosely termed modern literature—and the literary intellectuals who honor them—as antagonistic to the scientific revolution which brings social change.

Among the modernists he names Dostoevski as a precursor, and Henry James, Eliot, Pound, Yeats, D. H. Lawrence, Virginia Woolf, Kafka, and Faulkner.

The charge on its face is surprising, since all these authors, in various ways, are regarded as critics of the status quo. The trouble with these writers, Snow seems to suggest, is that they blame industrial society and its values for the alienation of the individual. Snow, in turn, blames these writers for preferring conditions in pre-industrial society, which he says in fact were wretched, and for regarding present social conditions as fixed when in fact they are changing rapidly.

He then rather backs into his conclusion by asking, "how far is it possible to share the hopes of the scientific revolution, the modest difficult hopes for other lives, and at the same time participate without qualification in the kind of literature which has just been defined?"

There are obviously plenty of potentialities for argument in Snow's analysis, and it is hardly surprising that Leavis was angered, for Leavis is a passionate apostle of the kind of literature which Snow says has helped split Western society.

Leavis's main attack, however, was directed against Snow the novelist, and this sample indicates the tone of the assault. "As a novelist," said Leavis, "he doesn't exist. He can't be said to know what a novel is. The nonentity is apparent on every page of his fiction."

The Leavis attack certainly did not succeed in unhorsing Snow, who won points for imperturbability by ignoring his detractor.

Snow, though a successful novelist, has not been a favorite of the literary intellectuals in Britain. In his series of novels, *Strangers and Brothers,* he has made a unique reputation by describing old institutions in new circumstances. Snow's experience as a scientist and civil servant and his talents as an observer and writer have made him probably the best-known and best-read authority on the closed politics of the university, the laboratory, and the upper reaches of the bureaucracy. But he has not been accorded a place in the first rank of those writers he himself calls "the modernists."

Snow's position as a novelist, then, provides a rather special illustration of the literary intellectuals' hostility, and it is fair to question in just what way this affects his general theory.

It should be recognized, however, that *The Two Cultures* is not the only public pronouncement to have propelled Snow into a stiff controversy. In the Godkin Lectures delivered at Harvard in 1960, published under the title *Science and Government,* he opened another vein of international discussion when he examined the process of science policymaking in Britain in World War II in terms of the careers of Sir Henry Tizard, who is credited with a major share in bringing British radar to operational status in time for the Battle of Britain, and F. A. Lindemann, later Lord Cherwell, Churchill's confidant and chief science adviser, who Snow suggests was responsible for several bad decisions involving science and strategy. Both Snow's story and his double moral—that scientists should participate more widely in government, but that no single scientist should exercise unchecked influence—were widely noted.

Critics will no doubt continue to snipe at Snow, just as many now note, for example, that Snow's appeal for aid to the underdeveloped countries is based on conscience rather than the cold war and ask how anyone as interested in politics as Snow could be so naive about the political background for foreign aid.

But Snow's authority with the general public as a sage of science is likely to continue to grow, for he has earned credentials as a commentator and intermediary between the cultures, and he certainly has proved his power of provocative statement.

—JOHN WALSH