

zational characteristics and typical policy instruments that relate the scientific to the governmental enterprise in contemporary industrial nations. In this portion of his analysis, Salomon performs a useful and overdue service in deflating the claims for "scientific decision making" exemplified by the proponents of planning, technological forecasting, and criteria for scientific choice. In the third section of the book, he considers the emerging sociopolitical consciousness of the scientist. In his view, scientists in modern society constitute a new professional category, distinct from that of the scholar whose role is contemplation. Scientists have become inextricably involved in problems of power resulting from the utilitarian priorities of industrial nations.

This book will fail to satisfy some of its American readers for reasons that are largely the result of a different set of expectations. For example, social scientists will expect a more empirical approach to the allocation of resources to science and the legitimization of science policy making structures. Salomon, however, is less concerned with specific programs of action that have expanded the public involvement of science and technology than with the philosophical question why science expresses the characteristic relations of public authority with the public interest in industrial nations.

A different sort of problem for American readers results from the author's effort to expose his European audience to a new range of literature and unfamiliar conceptual schemes. The demythification of rational decision making, and the reassertion of politics as usual, are a welcome corrective to some of the enthusiasms of the past decade. But the long synopses and detailed critiques found in the central section of the book will probably seem superfluous to those who have followed the course of the game from the sidelines, and to many who were in the thick of it. Yet as Salomon points out,

If a good part of our references are taken from the U.S., it is because this relation [between knowledge and power] achieved there an institutional form sooner, and on the scale that it is coming to have in all industrial countries, together with the problems and more acute consciousness, the greater public debate and richer effort of understanding, that reflect the same problems everywhere [p. 27].

Salomon's significant contribution to our understanding of the relation between knowledge and power is also the

source of some conceptual confusion. He begins by proposing the concept of "technonature," variously described as a condition of industrial society, the locus of action within industrial society, and an intellectual construct designed to resolve the permanent ambiguity of science seen as a value in itself and in utilitarian terms.

On the other hand, in the chapter concluding the historical section of the book, Salomon proposes that war, in the sublimated form of technological competition, had become the condition and the object of relations among advanced industrial nations. Though less elegant, this notion goes much further toward explaining and linking in historical sequence the new style and scale of relations between knowledge and power. It has the additional advantage for Salomon's argument of reducing the apparent divergence of Western and Communist governments, capitalist

and socialist market systems, and their respective ideological biases.

There is a third, implicit level of analysis that emerges from Salomon's treatment of the Manhattan Project as the signal event separating the old situation of science and scientists from the new one. At this level, the flux of events provides the major principle of organization. No serious student in the field of science and public policy should be in ignorance of the comprehensive, critical, and judicious analysis that constitutes the central chapters of this book (3 through 8). Quite apart from questions of theoretical perspective, they demonstrate subtle discrimination and insight by one who was both actor and observer.

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Literacy for the Favelas

Pedagogy of the Oppressed. PAULO FREIRE. Translated from the Portuguese (1968) by Myra Bergman Ramos. Herder and Herder, New York, 1970. 186 pp. \$5.95.

Cultural Action for Freedom. PAULO FREIRE. Harvard Educational Review and Center for the Study of Development and Social Change, Cambridge, Mass., 1970. viii, 56 pp. Paper, \$2. Reprinted from the *Harvard Educational Review*, May and August 1970.

Paulo Freire is a Brazilian revolutionary, pedagogue, and social scientist who first became known to Latin Americans in the early '60's. Working in the poorest Brazilian *favelas* and peasant villages, he was remarkably successful in teaching adults to read and write after a few weeks of participation in seminars combining linguistic technique with the "analysis of culture." When the military regime took charge in 1964, Freire was exiled from Brazil. Invited to Chile, he developed his methods of adult education further with support from Unesco and the Chilean Institute for Agrarian Reform. As far as I know, no count has been made of the educational experiments based on Freire's methods, but they are numerous throughout Latin America. In 1969 he

taught at the Harvard School of Education, and as a result his method is being tried in the United States. At the present time Freire is working with the World Council of Churches in Geneva.

Freire's method employs "generative words" chosen from the "minimal linguistic universe" of the prospective pupils. For Spanish and Portuguese he has found 17 such words to be sufficient. The first word is always trisyllabic, so that the learner can at once manipulate the syllables to form new sounds and thus new words. All the words must be relatable to "existential situations familiar to the learners," which provide the framework of their discussions in the *círculo de cultura*:

What is important is that the person learning words be concomitantly engaged in a critical analysis of the social framework in which men exist. For example, the word *favela* in Rio de Janeiro, Brazil, and the word *callampa* in Chile, represent, each with its own nuances, the same social, economic, and cultural reality of the vast numbers of slum dwellers in those countries. If *favela* and *callampa* are used as generative words for the people of Brazilian and Chilean slums, the codifications [themes for discussion] will have to represent slum situations.

Freire is critical of other adult literacy campaigns in Latin America in which the reading lessons "are almost completely alienating and alienated, having so little, if anything, to do with the student's socio-cultural reality." By way of illustration he composes a lesson which he considers typical of the primers used in those campaigns:

Peter did not know how to read. Peter was ashamed. One day, Peter went to school and registered for a night course. Peter's teacher was very good. Peter knows how to read now. Look at Peter's face. Peter is smiling. He is a happy man. He already has a good job. Everyone ought to follow his example.

Such texts are naive, false—"not authentic expressions of the world."

Merely teaching men to read and write does not work miracles; if there are not enough jobs for men able to work, teaching more men to read and write will not create them.

In fact, the peasant with work has little economic need to read and write, since his work requires only traditional methods. At most he needs a rudimentary knowledge of sums. In one rural village which has been studied in depth (E. Fromm and M. Maccoby, *Social Character in a Mexican Village*, 1970) the correlation between literacy and material prosperity was close to zero. The situation for most urban slum dwellers is similar, although there is a slightly larger chance for them to get better jobs if they know their letters.

If this is the case generally, why then should the illiterate learn to read and write? And if he did learn, how would he use his knowledge? Freire's answer is that the oppressed will learn when the motives for learning are to understand and creatively transform their world. Freire's approach is based in his concept of man's nature: Man is different from other animals because he has a drive to perfect himself and "humanize" the world. "Whereas animals adapt themselves to the world to survive, men modify the world in order to be more." This view is essentially based on Marx's concept of human nature, which conceives of the free man as one who can carry out projects of his imagination by integrating them with a realistic appraisal of the world. Related to this is the desire to express oneself to others. Such expression requires a means which must be learned. Another human tendency is the need to understand the conditions that determine one's existence. Freire points out

that these needs for freedom may be asleep in the peasant, because he has been beaten down. In the *círculo de cultura* there is an awakening and sparking of hope as the educators and the learners engage in dialogue about the "reason" of the slum reality. He calls the process "conscientization," or the development of critical awareness.

In *Pedagogy of the Oppressed*, Freire writes that the majority of Latin Americans living in economic and politically dependent part-societies feel powerless and have internalized the ruling group's view of them as unalterably stupid. Before participating in the culture groups, words and other "codifications" in movies and television are seen by them as tools that can be wielded by the rich and powerful only, while they are fated to be "objects" of culture. This attitude changes as they become conscious of their feelings and social position. Then they begin to see that their condition worsens if they submit to the seductions of the modern consumer culture, spending what little money they have for packaged entertainment and manufactured goods. They discover they are giving up their birthright as creators of culture, turning against their own art and artisan work to gain the illusion of participation in the modern society. They are further motivated as they discover that only they can codify their unique experience. Freire reports that after analyzing the unreal and sometimes contemptuous messages in many standard texts available to them, they want to create their own texts.

Pedagogy of the Oppressed is mainly theoretical and hortatory. It includes very little description of how the cultural groups operate. Most of the foregoing description is taken from the monograph *Cultural Action for Freedom*, first published as articles in the *Harvard Educational Review*. Even there, however, one learns mostly about Freire's theory, without receiving the convincing evidence that I have heard from him and many of his colleagues in discussion at CIDOC (Centro Inter-cultural de Documentación) in Cuernavaca. The teaching programs deserve a more careful and systematic study. Furthermore, the long-term effects of his method need to be evaluated.

Such an evaluation should compare the results of Freire's approach with those of other literacy programs. Freire believes that implicit in all educational theory and method is a view of man

and a sociopolitical value system which should be made explicit. In Freire's view (and my own), both pedagogy and social investigation may serve either to dominate individuals (intentionally or unintentionally) or to further their liberation by increasing their consciousness and ability to "create culture." Teachers and behavioral scientists from the industrialized world tend to see people as objects of culture to be programmed for adaptation, not as subjects who have the potential freedom to transform their mode of life. The goal of programming may be either "knowledge" or "correct values" (conservative or liberal). This approach is seen not only in behavioristic theories but also in what Freire calls the "banking" method of teaching, whereby knowledge is deposited in the student and later demanded on a test, and in the "nutritional" concept of the "humanitarians" who "introduce words into the learners' consciousness as if it were empty space."

Freire's method of teaching in the culture circle requires a technique of dialogue and of posing questions. Instead of teaching the student how things are, the pedagogue "problematizes" social reality. This requires a critical attitude toward appearances, and the consideration of alternatives. Freire adds that this method also requires a productive, nonauthoritarian attitude on the part of the investigator-pedagogue. Besides being interested in discovery, the teacher must be genuinely respectful of the people with whom he or she works. Freire states that the pedagogue must be free of the wish to impose an ideology or prove a theory, for that is another form of cultural oppression.

Freire's approach is in many ways similar to the methods and aims of psychoanalysis, although there are also important differences. Indeed, he often describes the process of conscientization as a form of social psychoanalysis, particularly similar to that of Erich Fromm, whom he cites frequently in *Pedagogy of the Oppressed*. This comparison can be useful in considering the problem of educating the teachers to apply Freire's methods. This is particularly crucial to the practice of conscientization, since Freire's method might attract many pedagogues who are seeking a new ideology. Furthermore, it is often difficult to separate ideology from a process of discovery. Every teacher does in fact have a position, and may have a need to impose it on others.

Psychoanalysis has had to face a similar problem and has done so with only partial success. At its best, psychoanalysis is a cooperative project in which two people try to learn why one of them is suffering, so that he can become whole. The process of discovery is not a mechanistic one of finding a diseased part, but rather involves an unfolding, penetrating to new layers, uncovering a hidden system in which changes must take place before the deepest elements reveal themselves. Furthermore, the analyst must be able to understand and analyze the patient's transference, and to help the patient overcome his often deep dependency on the analyst. Thus, this very special type of investigation and therapy requires exceptional self-knowledge as well as skill on the part of the analyst, and considerable attention must be paid to the analysis of psychoanalysts so that they confront their own motivation and guard against the tendency to exchange the difficult role of scientist for the seductively easier one of either ideologist or medical high priest. In fact, from the start, the science of psychoanalysis has been weakened by ideological rifts and struggles. I suspect that this danger is present also in Freire's "social psychoanalysis" and that his pedagogues or "coordinators" must themselves go through some process of conscientization or critical self-awareness as well as methodological and theoretical training, if they are to guard against becoming manipulators, oppressing others with their own demands for greater militancy, cooperation, and so forth.

To a certain degree, all pedagogues can learn from Freire, just as all therapists can learn from psychoanalysis. But there is a particular problem about the revolutionary pedagogue as proposed in *Pedagogy of the Oppressed*. Freire is not explicit about how and under what auspices such an individual would enter the teaching situation. The analytic patient experiences a need and seeks help. In contrast, Freire was originally sent by the governments of Brazil and then Chile to educate the poor. In effect, he represented the liberal-reformist governments of Goulart and Frei, which sought to liberate and increase the consciousness of forgotten citizens in order to strengthen themselves against entrenched interests. Under what auspices does the nongovernmental pedagogue enter the scene? Is he invited by the people? And how does he describe himself?

A final word should be said about the difficulties of applying Freire's methodology, developed in rural Latin America, to a highly industrialized society such as the United States. On the one hand, the method may be useful for teaching more than simple literacy. There seems to be a need for culture groups, dialogue, and conscientization, and it is possible that groups of people will wish to undergo such a process, here as well as there. On the other hand, the symptoms of suffering and the quality of the consciousness are very different in the two types of societies.

There, in the "culture of silence," command of the word is the beginning of awareness. People say and write what they experience. They do not play games or confuse themselves with their

roles. To become conscious is to wake up, as it were. Here, in the bureaucratic-organizational and multimedia society, the word tends to be made abstract and alienated from feeling and action. As a number of psychologists and analysts have pointed out, many people do not know what they feel, or have suppressed feeling in order to fit their roles. The sense of wonder has been lost. In rural Latin America, hopelessness has been caused by scarcity and oppression. Here it often comes from consumerism, anxiety about the future, and the lack of responsiveness or joy in human relations. To apply Freire's approach to our own society requires considerable study.

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A New Outline in Biology

Genetics of the Evolutionary Process. THEODOSIUS DOBZHANSKY. Columbia University Press, New York, 1970. xiv, 506 pp., illus. \$10.95.

Over 30 years ago, in *Genetics and the Origin of Species*, Dobzhansky surveyed accumulated information from a century of field studies and some 30 years of experimental laboratory work, producing a highly original synthesis of evolutionary genetics. Through three editions (1937, 1941, 1951), this book served as a guiding reference and motivating force in evolutionary biology, a field to which the author has been one of the half-dozen most important contributors of original research. Now, in the year of his 70th birthday, Dobzhansky has given us a new outline of the biological theory of evolution, with special emphasis on its genetic aspects. With regard to the quality of this work, it is perhaps sufficient to note that it fully maintains the standards set in Dobzhansky's other books and that the author has again accomplished his objectives in masterly fashion.

The merit of the new book is not that it achieves a seminal synthesis establishing a whole new discipline, as *Genetics and the Origin of Species* did, but rather that it provides a comprehensive, authoritative, balanced, and insightful account of what we know

and what we should like to know about the genetics of populations. The content is strictly up to date, and the author's concern for the historical development of ideas about evolution adds an extra dimension to the work, which is overall a model of organization and clear and concise exposition. Reading Dobzhansky's book, one becomes acutely aware of the shortcomings of books that attempt to cover a discipline by chapters written by different authors, for the thematic development and integration of ideas are outstanding.

The book opens with a critique of the reductionist approach to biology and a survey of the basic findings of molecular genetics as they relate to evolutionary theory, then turns to a consideration of mutation and normalizing selection. (Some typographical errors in the genetic code, table 1.2, and in the amino acid sequences in figure 2.2 of my review copy apparently have been corrected in later printings.) Chapter 5, in which Dobzhansky reviews recent evidence of the adaptive and coadaptive nature of inversions in *Drosophila* and of chromosomal modification in speciation, is especially outstanding. In the treatment of balancing selection and genetic load, considerable attention is properly given to new findings on the effects of mu-