breadth of his knowledge, he has written a fascinating but ultimately unsatisfactory book. He suggests that social scientists probably have done themselves the ultimate disfavor by linking themselves terminologically with the older sciences, and certainly have stultified themselves by analogies with the "natural" sciences. He also believes, and I agree, that the social-science attitude—which he calls the sociological imagination—is the pervading *Geist* of our age.

The first half of this book, in which Mills tries to get his own position straight, is a critique in broad strokes of some features of several of the foremost schools of sociology. He makes good cases, but unfortunately he writes in a style essentially popular about matter in which there is only specialist interest. The style will alienate rather than persuade his colleagues. At the same time, it is doubtful if the general reading public cares to be edified with denigration of the particularities of system building or opinion factoring.

The second half of the book explores Mills' thesis that the sociological imagination concerns itself with the converging points of history, biography, and society, and that it should distinguish *troubles* from *issues* and face the issues of modern society squarely. This section can be read as a clarion call for a successor to Max Weber.

Mills' romp through the theoretical fields is not as giddy or as enlightening as Sorokin's. His *engagement* is not as compelling as Raymond Aron's. And what he has to say is ill-matched with the way in which he chose to say it.

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Semiconductors. N. B. Hannay, Ed. Reinhold, New York; Chapman and Hall, London, 1959. xxiii + 767 pp. Illus. $15.

This volume is the most recent addition to the American Chemical Society's "Series of Chemical Monographs." Written and edited by 17 members of the technical staff of Bell Telephone Laboratories, the volume is a happy balance of chemistry, metallurgy, physics, and electronics and should prove useful to a wide circle of readers.

Essentially, the book is a collection of authoritative and up-to-date review articles on divers aspects of semiconductor physics and chemistry. The introductory article by the editor, N. B. Hannay, summarizes the basic concepts and principles of semiconductor physics. The article by J. J. Lander provides a survey of some of the problems of semiconductor chemistry; these are dealt with in more detail in subsequent sections.

The next five contributions are concerned with the physical chemistry of semiconductor systems: M. Tanenbaum discusses semiconductor crystal growing; C. D. Thurmond describes the control of composition in semiconductors by freezing methods; C. S. Fuller considers the theory of defect interactions; H. Reiss and C. S. Fuller discuss diffusion processes in germanium and silicon and illustrate the important advantages offered by semiconductors in general for the study of diffusion processes; and D. G. Thomas concludes this section by reviewing the chemistry of some compound semiconductors.

The eight articles that follow deal with the physical properties of various semiconductors. T. H. Geballe describes the progress that has been made in understanding the physical behavior of group IV semiconductors, while J. M. Whelan does the same for other covalent semiconductors, particularly group III–V, II–IV, and V–VI compounds, boron, selenium, and tellurium.

H. J. Hrostowski discusses infrared absorption and demonstrates how our knowledge of semiconductors has been furthered by optical studies. R. G. Shulman considers trapping and recombination processes arising from nonequilibrium distributions of mobile carriers. J. N. Hobstetter examines the nature and role of structural defects, particularly dislocations, in controlling plastic deformation and other properties of semiconductors.

A. R. Hutson presents a critical survey of the semiconducting properties of some oxides and sulfides, including alkaline earth oxides, sphalerite-wurtzite compounds, and the lead sulfide family. F. J. Morin provides a most illuminating discussion of the electrical, optical, and magnetic properties of oxides of the third transition metals. In the final article on bulk properties, C. G. B. Garrett reviews most competently the subject of organic semiconductors.

The remaining two contributions are concerned with the physics and chemistry of semiconductor surfaces. J. T. Law deals primarily with solid-vapor and solid-vacuum interfaces, while J. F. Dewald treats semiconductor electrodes and hence the semiconductor-electrolyte interface. At the end of the book there is a subject index, but, surprisingly, no author index.

In my opinion this volume is the finest, best organized, and generally most useful collection of survey articles on semiconductors yet assembled. It is easier to gain an over-all picture of the present state of our knowledge of semiconductors by reading this volume than by reading scattered review articles published elsewhere. The individual articles in the present volume are comparable, with respect to quality and method of exposition, to the excellent reviews appearing in the Seitz and Turnbull "Solid State Physics" series.

It is perhaps worth mentioning that the subjects of luminescence and photoconduction, which are closely related to that of semiconduction, might have been treated in an additional chapter or two. As it is, these subjects are not given the comprehensive coverage they deserve. But this is a minor criticism of an otherwise excellent book.

To conclude, this volume is warmly recommended to graduate students and to professional scientists in the several disciplines which constitute the field of semiconductors.

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Cumulative Record. B. F. Skinner. Appleton-Century-Crofts, New York, 1959. x + 427 pp. Illus. $6.50.

When B. F. Skinner was scarcely 22 he read a series of articles in which Bertrand Russell examined John B. Watson's behaviorism. Many years later he told Russell that these articles had been responsible for his interest in behavior. "Good Heavens!" exclaimed Lord Russell, "I had always assumed that these articles had demolished behaviorism." Russell may have demolished Watson's theories—not a difficult task; but Watson's spirit is indestructible. Cleaned and purified, it breathes through the writings of B. F. Skinner. Watson rejected philosophic speculation and demanded an objective science of behavior as rigorous as Newton's science of the physical universe; Skinner defends the rejection of speculation with the sharpness of a trained philosopher and presents us with an analysis of behavior that Newton might have envied. Probably no psy-

chologist since James Mill has given us a neater, cleaner, simpler analysis of the human mind.

Among contemporary American psychologists, Skinner has perhaps the greatest appeal to those who like to think of psychology as an exact science. He has five substantial books to his credit, and a great number of articles; all of these demonstrate the importance of the stimulus-response-reinforcement principle. *Cumulative Record* is a reprint of his most important articles, carefully arranged and annotated in such a way as to make the sequence intelligible. Psychologists will be grateful that these papers are now more accessible. Scientists from other fields will find in this volume reassuring evidence that psychology can be made to conform to the Newtonian conception of science.

Some readers may find Skinner's conceptual framework a bit constricting, but none can fail to admire the skill with which he reduces the complexities of behavior to the simplest possible terms, or to envy the serenity with which he looks forward to a world in which the behavior not merely of the rat and the pigeon but also of man can be precisely predicted and expertly controlled. I recommend particularly part 2, "A case history of scientific method," and the two articles in part 3 on the technology of education. *Cumulative Record* is not quite complete enough, however, to give us a full understanding of what psychology can do with human behavior. The reader is urged to glance through Skinner's most recent substantive work, *Verbal Behavior* (Appleton-Century-Crofts, New York, 1957), and then to examine critically N. Chomsky's detailed appreciation of that book *Language* [**35**, 26 (1959)].

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Fundamental Aspects of Reactor Shielding. Herbert Goldstein. Addison-Wesley, Reading, Mass., 1959. xvi + 416 pp. $9.50.

Reactor shielding is a complicated and difficult specialty within the field of nuclear engineering which has received much attention because of its importance for military mobile reactors. The basic mathematical problems of shielding—namely, the computation of the deep penetration of gamma rays and neutrons—are, even in relatively simple cases, much more severe than the problem of computing the criticality of a simple reactor. Reactor theory centers essentially on eigenvalue problems, and there is a single, clearly defined measure of the validity of the theory—how well the computed and the experimental critical masses agree; in shielding theory there is no comparably simple criterion of validity—both the measurement and the calculation of fluxes at large distances are fraught with difficulties and uncertainties.

Because of this basic difficulty, the science of shielding has had to proceed as a blend of semirigorous calculation, experimental intuition, and even, on occasion, black magic. This essential flavor of the shielding art is admirably caught by Goldstein's book. That much of the discussion is not rigorous is surely an accurate reflection of the fundamental nature and difficulty of the shielding problem, as compared, say, with the problem of criticality of reactors.

As the author says in his preface, the book has much of the character of a review rather than of a monograph: for example, in many of the mathematical derivations reference is made to works quoted in the bibliography. The review, however, is a critical one, and the author does not hesitate to point out shortcomings in both shielding experiments and theories.

The book is divided into three major parts: first, a description of the general problem of reactor shielding and of the radiation sources against which shielding is necessary; second, a description of the experimental techniques and devices developed in the United States for carrying out shielding experiments; and third, a review of the mathematical theory of deep penetration of gamma rays and neutrons, together with experimental comparisons.

The writing is fluid and breezy. However, in some cases the cant of the shielding expert is used in a way which may prove confusing to the beginner—for instance, the build-up factor is mentioned on page 15 before it is defined, and the Bragg-Gray principle is invoked without a full explanation. Since many of the real problems of shielding are associated with mobile—that is military—reactors, much of the development described by Goldstein was classified information at the time it originated. As a result, references must sometimes be made to literature which is still classified, a certain source of annoyance to those readers who do not have access to the classified literature.

Although it is written from the point of view of reactor shielding, Goldstein's book will be useful, and can be recommended, to all who have to deal with radiation shielding—whether of isotopes, medium-energy accelerators, or reactors. As befits a review-type book, the bibliography is superb, even though confined largely to the American literature.

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Women and Work in America. Robert W. Smuts. Columbia University Press, New York, 1959. x + 180 pp. $4.50.

In this small, easy-to-read book the author contrasts women's work (chapter 1) and working women (chapter 2)—their conditions of work (chapter 3), their attitudes, and the attitudes of others toward them (chapter 4)—at the turn of the century with current mid-century practices and attitudes in the United States. He quotes extensively from contemporary sources, as he did in his earlier monograph, *European Impressions of the American Worker*—also a product of his research for Columbia University's Conservation of Human Resources Project.

Drawing heavily on Census statistics, too, the author sketches today's women workers as essentially well off by comparison with their earlier counterparts. He finds more striking than changes in their occupations in the labor market "the shift of wives and mothers from household activities to the world of paid employment." But, he observes, "Today, as always, most of the time and effort of American wives is devoted to their responsibilities within the home and family circle." He concludes that "once her children are in school, the modern mother has more freedom of choice than the single woman had in 1890." Working conditions, he reports, are better for most women workers, but barriers to training and advancement still exist, along with disagreement about legislation aimed at their removal. In the modern separation of home and work Smuts sees the origin of the dilemma of the woman of today who wants to achieve success in her work without neglecting family responsibilities. He notes that our modern economy creates a similar problem for men. Examining the "causes