ulatory role for cyclic nucleotides has been demonstrated. Like the two preceding sections, this one is encyclopedic in scope. The coverage ranges from the sophisticated studies of tyrosine hydroxylase kinetics to the less precise studies of postdecapitation rise in cyclic AMP.

The monograph is by far the most extensive and complete summary of this topic currently available, and it will be of use to anyone interested in cyclic nucleotides in the central nervous system. The nonspecialist, however, may be overwhelmed by single sentences that are almost one page long and contain more than 100 citations (for example, pp. 55 and 56). Although its form and content will preclude extensive reading at any one time, the book remains an extremely useful reference tool, providing a guide to the "state of the art" for cyclic nucleotides in the nervous system.

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Hypnosis Research

Methodologies of Hypnosis. A Critical Appraisal of Contemporary Paradigms of Hypnosis. PETER W. SHEEHAN and CAMPBELL W. PERRY. Erlbaum, Hillsdale, N.J., 1976 (distributor, Halsted [Wiley], New York). xvi, 330 pp. $18.

The goal of this book is to evaluate different approaches to the study of hypnosis, a psychological phenomenon that has been difficult to define operationally and behaviorally. The central methodological problem in hypnosis research is to separate responses due to hypnosis from those due to "artifact"—systematic error that occurs because experimental subjects are influenced by expectations and subtle cues emanating from both the experimental procedure and the experimenter. Artifact is not limited to hypnosis research, and because of the generality of the methodological problems this excellent discussion can be read profitably by all scientists who conduct research in which subjective experience and verbal report provide much of the data base.

Controversy has always surrounded hypnosis, focused mainly on the issue of whether hypnosis is best conceived of as an altered state of awareness, an enduring trait or capacity of a person, a product of the situation in which the person finds himself or herself, or a spurious phenomenon. Attempts to understand hypnosis have sometimes reflected, sometimes anticipated developments in behavioral research in general.

Theories of hypnosis are traced in a provocative review covering a two-hundred-year span and providing some fascinating and previously unpublished insights into the historical antecedents of the main methodological paradigms of hypnosis. The authors then examine six paradigms of hypnosis developed by seven outstanding behavioral scientists. Each paradigm is evaluated with regard to the explicit or implicit theory of hypnosis underlying it, the methodological innovations associated with it, the evidence supporting it, and some problems associated with it vis à vis the other positions discussed. Special emphasis is placed on the issue of the validity of the inferences associated with the paradigms and the success with which they take experimental artifacts into account. Careful recognition is given both to subtle conceptual changes in the positions adopted by the investigators over the years and to the extent to which their findings can be handled by other paradigms. This approach reveals the subtleties of the issues and provides insight into the alternative ways of conceptualizing common issues, but it has the disadvantage of emphasizing disagreement rather than agreement.

Hilgard's contemporary functionalism, which stresses the role of individual differences, is presented first. To some extent Hilgard's position is done an injustice by being the first one discussed, for several digressions are necessary to discuss methodological issues that have implications for all the paradigms.

Barber's orientation is thoroughly behaviorist and operational. He has searched for the functional relations that exist between specifiable antecedent factors (for example, the wording and tone of suggestions) and the responses they bring about. The problems with Barber's unselected independent-group design and the control procedures involving task motivation instructions are thoroughly treated. Unlike other investigators, Barber views the term "hypnosis" as expendable, often placing it in quotation marks. The authors argue that the inferences Barber draws from his data are necessarily limited.

Sarbin has developed the only comprehensive theory of hypnosis, but, as the authors point out, his theory of hypnosis as role-enactment has generated little empirical work other than a few limited correlational studies. Unfortunately, the authors do not point out that this theory cannot be disconfirmed, as all behavior can be explained by the subject's definition of the role or skill in enacting it.

In attempting to distinguish between artifact and hypnotic response, Orne has devised quasi-control experimental designs. Only his real-simulating design is discussed extensively by the authors. In experiments using this design, subjects who are unresponsive to hypnosis are instructed to pretend to be hypnotized by the experimenter, who is not told which of the subjects are hypnotizable and which are faking. By being "blind," the experimenter is prevented from treating hypnotized (real) and quasi-control (simulating) subjects differently. The authors point out that this design has been widely misunderstood. It tests only the validity of operational definitions in the experiment. Differences in behavior between hypnotized and simulating subjects show only that cues in the situation (what Orne calls demand characteristics) are not sufficient to account for the behavior of hypnotized individuals.

Sutcliffe distinguishes "credulous" and "skeptical" approaches to evaluating hypnosis research. He views imagery and delusion as important components of the phenomenon. His methodology is derived from traditional multivariate design, and he advocates a systematic approach that has features similar to those of Barber's univariate system. Sutcliffe's main contribution was to plead for appropriate methodological control when interest in hypnosis was being rekindled in the early 1960's. He has not done research on hypnosis for over a decade, although the research of two of his students (the authors of this book) has extended beyond his paradigm.

The paradigm of London and Fuhrer attempts to evaluate the motivational artifacts of the hypnotic setting by comparing susceptible and insusceptible subjects. The authors point out that this paradigm has not yet been fully explored.

By way of integration the six paradigms are compared in detail. The authors cogently argue the need for investigations involving convergent validation. Their plea for research that uses multiple paradigms for delimiting validity, thereby cross-checking alternative explanations to establish the correctness of inferences, is laudable, but the implication that multiparadigmatic approaches have been ignored in the study of hypnosis must be questioned. The authors' person-oriented rather than problem-oriented approach to hypnosis research leads, paradoxically, to a limited account of

each individual's contribution and to a restricted view of the vigor with which hypnosis research is proceeding. For example, Orne is portrayed as using only the real-simulating design and Hilgard as using primarily repeated measure designs, but the last real-simulating design study conducted in Orne's laboratory was conducted in 1966 (by Sheehan), and simulating subjects have been employed quite appropriately in Hilgard's recent research. The approach adopted by Sheehan and Perry fails to reveal the very richness of much research on hypnosis.

Another limitation of the book arises from the authors' emphasis on dealing with the problem of artifact by attempting to control and minimize its sources. An alternative, though conservative, strategy is to maximize the operation of factors contributing to artifactual results. To the extent that experimental manipulations produce results that exceed those due to artifact, as measured by appropriate control procedures, valid inferences are possible. This is the logic of the double-blind placebo control in pharmacology, of the real-simulating design, and particularly of the London-Fuhrer design and its subsequent modifications.

The book discusses in a compelling manner some of the most difficult areas of behavioral research. It deserves to be studied carefully by all students of human behavior.

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Chemical Dynamics

Dynamics of Molecular Collisions. WILLIAM H. MILLER, Ed. Plenum, New York, 1976. In two parts. Part A. xiv, 318 pp., illus. $39.40. Part B. xvi, 380 pp., illus. $39.50. Modern Theoretical Chemistry, vols. 1 and 2.

Although the study of modern molecular collision dynamics began, perhaps, with the work of Polanyi in the 1930's, it is only in the last 15 years that intense theoretical and experimental studies of the details of inelastic and reactive collision processes in the gas phase have been carried out for a variety of systems. The technological impetus for this work was strong, deriving from the need to understand the atmospheric effects of nuclear weapons and reentry vehicles, the possibility that chemical lasers could be developed, the recognition of the importance of inelastic collision processes in gas lasers, and, more recently, the need to deal with the problems of photochemical smog and pollution control in combustion. The scientific challenges and rewards in the study of molecular collision dynamics have been large, and such sophisticated experimental techniques as molecular beams and laser fluorescence detection now yield a wealth of detailed information on specific relaxation rates, energy distributions in reaction products, potential energy curves, and so forth.

The quantitative and semiquantitative theoretical approaches to collision dynamics are the subject of these welcome and timely volumes. Most of the theory has been developed or greatly improved in the last decade as a result both of significant theoretical advances and of the increasing use of large and fast computers. The fact that some contributions seem dated only 18 months after submission attests to the vigor of the field.

Work on the theory of chemical dynamics is difficult because, although chemists know the laws of interaction governing such processes, they do not have the power, despite large-scale computers, to solve exactly for any but the simplest systems. Thus each of the chapters in these volumes either deals with an approximate mathematical approach to chemical dynamics or describes a particular topic qualitatively. Of the 13 chapters five are good expositions of significant and recent results, four are primarily critical reviews of subjects in which recent activity has been less intense, and four are expositions of known results in subjects of narrower scope. As with any volume of contributions, the book's goal, to "be of use for beginning research students," is attained with varying degrees of success.

The chapter by Child on semiclassical methods is a concise and beautiful exposition covering not only primitive and uniform approximations but semiclassical transformation theory and mapping techniques. Rabitz, in his chapter on effective Hamiltonians, has tied together and critically reviewed the several recent approaches to the problem of controlling the dimensionality of the quantum coupled equations. He fails to mention, however, that the applicability of partitioning theory and optical potential is highly speculative. Pechukas, in his chapter on statistical theories of chemical reactions, presents the classical theory beautifully, but his delightful questioning style occasionally obscures what has been accomplished with semiclassical and quantum theory. Levine and Bernstein, on the other hand, provide a clear exposition of the information-theoretic, or thermodynamic, approach to kinetics. Although Micha assumes a high level of preparation and sophistication on the part of the reader, his chapter on optical potentials contains a fair fraction of the known material on the formal development and phenomenological applications of optical models.

The chapters by Siebrand, Wolken, Tully, and Hase on radiationless processes, gas-surface dynamics, nonadiabatic processes, and unimolecular processes, respectively, are good introductions and reviews. The chapters by Siebrand and Hase could well have been omitted, however, for excellent reviews of these topics already exist. The chapter by Lester on the N coupled-channel problem derives only the formal coupled differential equations for heavy particle scattering, neglecting other approaches such as integral equations and recent numerical methods. Porter and Raff give more detail on the classical trajectory methods, including Monte Carlo and other sampling techniques as well as appropriate numerical integration methods. Experimentalists, in particular, may find the qualitative chapter on the effects of potential energy surfaces on dynamics by Kuntz of interest and may glean some useful formula for vibrational energy transfer from the rather long chapter by Shin. Notable omissions from the volumes are the quantum theory of reactive processes, collision-induced dissociation, and photodissociation and chemi-ionization processes.

The goals of the book are laudable, the success is moderate, and the price is a disgrace.

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