

## BOOK REVIEWS

WILLIAM L. HAYS. *Statistics for Psychologists*. New York: Holt, Rinehart and Winston, Inc., 1963. Pp. xvi + 719. \$10.75.

For some time a textbook-gap has existed between the elementary, nonmathematical presentations of basic statistical methods and good presentations of the theory of mathematical statistics.

As more well-prepared students appear in departments of sociology, educational psychology, and psychology, the gap becomes a matter of concern. Hays (a professor of psychology at the University of Michigan) has placed a monumental work in the breach; *Statistics for Psychologists* should be carefully examined by anyone choosing a moderately difficult text for a two-semester intermediate level statistics course. Knowledge of college algebra is a prerequisite, plus a quantity once described by a mathematics professor, pointing to his head, as "a little something up here." There are no exercises and very few references, so that the instructor will be required to have a little something "up there" as well.

The author's introduction is an admirable attempt to orient the reader for what is to come. One goal of the text is to prepare the student to profit from consultation with statistics and design specialists, and a welcome warning is given to consult on the design *before* taking the data.

The general effect of the discussion, however, is to elevate experimentation, mathematics, and mathematical models to unreal heights. Assumptions are stressed and statistics described within logical "if . . . then" systems. "There is no guarantee that a statistical method will give the answer the experimenter is seeking unless the mathematical conditions used to derive that method are truly met" (p. 9).

Within logical "if . . . then" systems the foregoing statement is certainly true. But the analysis of experimental data does not take place within logical systems. Using his prior knowledge and experience the experimenter "tentatively entertains" a model, knowing the model will not fit exactly. Perhaps the fit is adequate for present purposes, and in case it is not, the experimenter looks at the departures for possible explanations of deficiencies in his theory. Experimentation and analysis have more in common with an exciting treasure hunt than with a cut-and-dried mathematics exercise.

On pages 321-322 and subsequently (e.g., p. 408) the author notes (without references, unfortunately) the robustness of various procedures with regard to departures from the assumptions. Not until page 521 is any doubt entertained that assumed mathematical models might not fit. Perhaps discipline is required of neophytes, freedom to be gained with maturity, but it seems distinctly possible for any student to acquire early in the book a stifling pseudosophistication.

The first five chapters present elementary probability theory and distribution theory. Discrete distributions are emphasized, especially the binomial, and continuous distributions are presented as useful idealizations of the "real" situations." This material, especially the sections on conditional probability, requires considerable ability to understand and manipulate formulas and symbols.

Chapter 6 begins with definitions of old faithful descriptive statistics, but quickly (10 pages) moves to expectations, properties of estimators, and sampling and estimation. As he promised, Hays emphasizes theory over methods.

The normal distribution is presented in Chapter 8, hypothesis testing and interval estimation in Chapter 9, and inferences about population means in Chapter 10. The author's lengthy discussion of hypothesis testing (especially p. 299, "Significance tests and common

sense") is the finest that we know of at the application level. Utilizing a decision theory framework, Hays emphasizes the necessity to specify exactly the hypotheses to be tested. The limitations of decision theory are carefully pointed out. The location (after hypothesis testing) and space allotted (4 pages) reflect more accurately than do Hays' words the attitudes of most researchers toward interval estimation. Theories and measures have not yet developed to the point that individual parameters merit primary attention.

The concept of power of tests of hypotheses is discussed carefully, but for judging the importance of observed differences the statistic  $\omega$  (a variant of the intraclass correlation coefficient) is calculated in various forms, representing the amount of variance in the response accounted for by the independent variable. Amount of variance accounted for seems a poor substitute for thoughtful consideration of the implications of certain differences in the size of population means, but perhaps both points need attention. Many experimenters have certainly been shocked when shown the power of their  $F$  and  $t$  tests against large departures from equality of means.

Chapters 11-13 present the chi-square and  $F$  distributions, analysis of variance for fixed, mixed, and random effects, and Chapter 14 is devoted to a lengthy discussion of Scheffé's method for comparisons among means. The first one-way analysis of variance example (p. 373) has unequal numbers in the cells so that the procedure is not oversimplified. The rest of the discussion is confined to the equal  $n$  case, except on page 373, where the proportionality-of-subclass-frequencies case is briefly mentioned, i.e., "... in this circumstance the ordinary computation procedures for the analysis of variance must be modified somewhat." It is true that Hays' computation procedures would have to be modified, but other "ordinary" computation procedures (cf. Ferguson, *Statistical Analysis in Psychology and Education*) require no change. No discussion is given about rounding errors in computation, and the lamentable recommendation is given to obtain the interaction sum of squares by subtraction. With this casual approach to practical computation problems it is amusing to note (p. 405) that while rounding all other terms in the MS column of his ANOVA table to one decimal place the author leaves one figure at 2497.05. Apparently he could not bear to round it to 2497.0.

It is regrettable that analysis of covariance is omitted without citing a single reference. "Most advanced texts in statistics and experimental design consider simple analysis of covariance" (p. 564).

Chapters 15-16 deal with regression and correlation, both linear and nonlinear cases. This material is not useful in learning how to do regression analysis, but careful study of the two chapters should help one to understand the applications of regression analysis and particularly to know what is happening if the topic is studied in detail later in a mathematical statistics course.

Nonparametric techniques receive their dutiful mention in the final two chapters, the location and amount of space allotted again revealing an implicit judgment of importance with which the reviewers agree.

*Statistics for Psychologists* is not an introductory text; it is not a text to be placed in the hands of a poorly trained instructor. The inadequacy of the index (11 pages) is exemplified well by omission there of any reference to randomized blocks, though in the Table of Contents (8 pages) we find it under 13.24. Since the Table of Contents lists section rather than page numbers, one has to search to find that 13.24 begins on page 452. These problems along with the sparse citation of supplementary sources lessen its value as a reference. The book is a fine model for a year course designed to teach good students to understand and appreciate common statistical techniques.

LESLIE D. McLEAN  
Teachers College,  
Columbia University

JULIAN C. STANLEY  
University of Wisconsin

GEORGE A. MILLER (Ed.). *Mathematics and Psychology*. New York: John Wiley and Sons, Inc., 1964. Pp. 295 + x. \$5.50 cloth, \$3.45 paper.

This is a book of readings covering the history of the application of mathematics to psychological problems, from 1738, represented by Daniel Bernoulli's paper on the measurement of risk, to 1961, represented by the Swets, Tanner, and Birdsall paper on decision processes in perception. The book is organized topically rather than chronologically, however. Twenty-three of the 27 papers are post-1900.

D. J. FINNEY, R. LATSCHA, B. M. BENNETT, AND P. HSU. *Tables for Testing Significance in a  $2 \times 2$  Contingency Table*. New York: Cambridge University Press, 1963. Pp. 102 + vi. \$3.25.

Table 1 includes the 1948 Finney<sup>1</sup> tables, Latscha's<sup>2</sup> 1953 extension of them, and a further extension by Bennett and Hsu. The coverage is therefore from marginals of 3 and 1 to 30 and 30, with .05, .025, .01, and .005 probability levels. In Table 2 are the .05 and .01 probability values for marginals up to 40 and 40. Additional calculations, by Bennett and Hsu, for marginals up to 45 and 45 have been deposited in the UMT File of the *Mathematics of Computation* at the David Taylor Model Basin, Washington, D. C.

<sup>1</sup>Finney, D. J. The Fisher-Yates test in  $2 \times 2$  contingency tables. *Biometrika*, 1948, 35, 145-156.

<sup>2</sup>Latscha, R. Tests of significance in a  $2 \times 2$  contingency table: extension of Finney's Tables. *Biometrika*, 1953, 40, 74-86.

JOAN H. CRISWELL, HERBERT SOLOMON, AND PATRICK SUPPES (Eds.). *Mathematical Methods in Small Group Processes*. Stanford: Stanford University Press, 1962. Pp. viii + 361. \$9.75.

This volume—the eighth of the “Stanford Mathematical Studies in the Social Sciences” series—is a collection of 22 papers presented at the Symposium on Mathematical Methods in Small Group Processes, held at Stanford University in June 1961. In the introduction Joan Criswell presents such a concise and well-organized overview and integration of the wide variety of topics covered that a review of this book would seem almost superfluous.

It is impossible, within the limits of a short review, to give a chapter-by-chapter review and come even close to doing justice to the multifarious contributions represented. It is also difficult to group the chapters into a small number of categories, each of which is sufficiently homogeneous to be discussed as a unit. (Perhaps this is why the editors chose to arrange the chapters in alphabetical order by authors' names, instead of dividing the volume into parts by topics.)

Hard put for an organizing principle (a good one having been pre-empted by Mrs. Criswell), I decided to make a double dichotomy of the chapters on the basis of two “bipolar attributes,” thus assigning each chapter to one of the four cells of a  $2 \times 2$  table. The bases for classification are as follows: (i) a “Reductionist-Nonreductionist” dimension—by which I mean the extent to which the contents of a chapter suggest that its author holds or rejects the view that laws of social psychology can be “reduced to” (i.e., derived solely from) those of individual psychology; (ii) an “Experimental-Theoretical” dichotomy—by which I mean (since all the chapters are theoretical in framework) whether or not experimental results constituting a test of the proposed theory or model are given in the chapter.

The resulting two-way classification is shown in the table below, where the numerals in the cells refer to the chapter numbers. Those in parentheses indicate chapters that are, in my judgment, almost neutral with respect to the reductionist-nonreductionist dimension;

those followed by an asterisk denote chapters which mention experiments underway to test the model presented.

	Experimental (E)	Theoretical (T)
Reductionist (R)	2, 6, 9, 12, 15, 17, 19, 22	4*, 10*, (21)
Nonreductionist (NR)	8, (11), 14	1, 3, 5, 7, 13, 16, 18*, 20

Two things are immediately evident from this table: (i) that the chapters are evenly split on both of the bipolar attributes under consideration here; and (ii) that there is a fairly strong association between the two attributes.

The foregoing observations should give not only the flavor of the book but also a general impression of the state of the field of research to which the book is devoted. That the field is in a state of foment is clear; there is no consensus among the researchers as to whether mathematical treatment of small-group processes should, or should not, pattern itself on mathematical models developed in the realm of individual psychology, especially in learning theory. It would also seem that theorists holding a "reductionist" view are more willing to subject their theories to an empirical test than are their "nonreductionist" colleagues. However, there are other possible interpretations of the correlation noted above, and one of these will be indicated later.

As might be expected, the classification we have made does not produce groups of chapters that are homogeneous in respects other than our bases of classification. However, those in the (R, E)-cell are relatively more homogeneous than are those in the other three. To be sure, the topics are quite varied; e.g., two studies of conformity behavior under Asch-type social-pressure conditions, one involving signal detection against background noise (Carterette and Wyman, Ch. 6), and the other, judgment of the order of extinction of two lights (Suppes and Schlag-Rey, Ch. 22); binary prediction by interdependent pairs of subjects (R. L. Hall, Ch. 12); and verbal learning and problem-solving in groups (Chs. 15 and 17). But the general theoretical framework is the same for five of the eight (R, E)-chapters, and also for Burke's (Ch. 4) on two-person interactive learning (tentatively classified in the (R, T)-cell). Namely, the framework is that of *stochastic learning models* in either the linear or Markovian form, with certain modifications. Most of these modifications are ones already introduced in earlier publications, but there are two new ones, both made in connection with differential reward experiments. The first is a modification of the conditioning axioms by introducing a distinction between *weak* and *strong* states of conditioning (Atkinson, Ch. 2). The second leaves the conditioning axioms unaltered, but introduces a mediating implicit response whereby the subject scans the set of response alternatives and predicts the outcome for each (Estes, Ch. 9). Thus, learning proceeds at two levels: predicting the outcomes, and "developing a scale of reward values for different outcomes."

Of those three chapters whose theoretical orientations do not fall under the rubric of stochastic learning models, two are closely related. One of these (Lorge and Solomon, Ch. 15) uses the familiar "pooling of abilities" model first proposed by the same authors in 1955. The other (Restle, Ch. 17) superimposes onto the pooling model a *waiting-time* assumption (viz., that the probability of success on trial  $n$  follows the negative binomial distribution). These two chapters exemplify the extreme "reductionist" position, for they do not introduce any sociopsychological variable, such as interaction, even in rudimentary form. The third chapter describing a model not in the stochastic-models category deals with two-person interactions in tasks permitting a continuum of responses, followed each time by a feedback indicating the magnitude and direction of error (Rosenberg, Ch. 19).

Going now to the (R, T)-cell, Burke's paper (Ch. 4) compares the linear and Markovian forms of stochastic learning models as applied to two-person interactive prediction experiments. Flament (Ch. 10) presents a model for analyzing the processes that intervene between stimulus and response in Asch-type social-influence experiments. His model introduces quasi-probability measures called "plausibilities," and subjects are supposed to utilize a Bayesian strategy in terms of these measures. Smoke and Zajonc (Ch. 21) make theoretical comparisons of the reliabilities of group decisions under various decision schemes such as oligarchy, unanimity, quorum, etc. Their analysis, however, has the limitation that all group members are assumed to have the same probability for individually making the "correct" response.

Next, the three "nonreductionist" chapters which report experimental data differ considerably among themselves in theoretical approach. Coleman (Ch. 8) examines the differential effects of "mutual reward" versus "mutual punishment" structures on the effort spent by group members in the rewarded or punished activity. In the mutual reward situation, according to Coleman's model, each group member engaged in the activity in question adds a fixed increment to a "variable member's" transition rate toward that activity. Equilibrium probabilities are obtained as functions of parameters relating to individual tendencies toward the activity, and to the relative strength of social reward. The model predicts that the behavior of a group with this reward structure "differs sharply from that of the aggregate of independent persons."

Foa (Ch. 11) analyzes the structure of behavior in a dyadic relationship in terms of three facets: *content* (acceptance-rejection); *object* (self-other); and *mode* (emotional-social). Eight types of relationship are thus defined, and Foa arranges these in a circular order by use of the contiguity principle and a newly proposed concept of "semantic principal component." This arrangement implies a prediction that a matrix of intercorrelations between scales for the eight relationship types will show a circumplex pattern. The prediction was borne out in an experiment in which a large number of married couples responded to questionnaires designed to produce such scales.

Lieberman (Ch. 14) describes three experimental studies involving a variety of two- and three-person zero-sum games. The purpose was to compare actual behavior with behavior prescribed by game theory. Agreement was sometimes found, but only in the case of games for which pure minimax strategies existed.

In the last cell, the eight "nonreductionist-theoretical" chapters may be subdivided as follows: three chapters dealing with substantive problems; two chapters presenting analytical tools and approaches; and three metatheoretical discourses on the nature of models and theories of interactive behavior.

In the first subgroup, Cohen's paper (Ch. 7) presents a new approach to reference group theory, in terms of a probability model and an experimental paradigm. The probability model is based on a distinction between "being influenced by a group" (temporary conformity) and "choosing that group as a reference group" (long-term conformity). Karlsson (Ch. 13) presents an explication of the concept of social power, and thereby develops expressions characterizing different kinds of power structures of groups with and without coalitions. Roby (Ch. 18) treats the problem of subtask phasing—i.e., division of labor with the added requirement of temporal coordination—by considering, among other things, the information measure for tasks with varying degrees of strictness of ordering.

In one of the two "tools-and-approaches" papers, Anderson (Ch. 1) discusses the usefulness of deontic logic (i.e., the logic of normative or "ought to" statements) in clarifying sociological concepts like *rights*, *duties*, *privileges*, etc. He proves formally that the two statements: 'x is privileged to do p' and 'x has no duty to do not-p' are *not* mutually equivalent as an earlier deontologist claimed them to be. Shelly (Ch. 20) describes a topological approach to sociological measurement, based on a very general notion of "elementary

measures," which are functions mapping a set of "states" onto a set of symbols. From composites of elementary measures is defined an elementary scale, and topologies are established on the space of states on the basis of partial or complete distinguishability of states by means of such scales.

Going now to the "metatheoretical" chapters, Back (Ch. 3) argues—rather unconvincingly, it seems to me—that the difference between stimulus and communication all but precludes mathematical analysis of sociopsychological phenomena. Stochastic models are cited as embodying all the evils stemming from mathematization through a failure to distinguish between stimulus and communication; whereas equilibrium theories are said to possess various merits as a result of carefully making this distinction. Curiously enough, at one point we are told that these theories, too, "draw hardly any distinction between . . . communication and stimuli" (p. 38). The comparisons made between stochastic and equilibrium theories are couched in such emotionally loaded terms, and contain so many *non sequiturs*, that they detract from whatever merit the rest of the chapter may have.

Moore and Anderson (Ch. 16) are also dissatisfied with current mathematical methods in social psychology. Most of these are appropriate, they contend, only to impersonal "puzzle" situations, and not to social-interaction or "game" situations. Furthermore, even with appropriate mathematics (e.g., the theory of games), the result is a treatment of games as "autotelic cultural objects," rather than a treatment of human behavior *per se*. To the extent that such cultural objects (including plays and novels) constitute "folk-models" of actual social life, it is held that their continued construction (in the tradition of Homer and Hesiod) should be one of the main activities of social scientists.

It may come as a surprise that the paper by Bush (Ch. 5), one of the originators of stochastic learning models, should fall into the "nonreductionist" fold. Quite possibly, Bush's standpoint is not so completely nonreductionist as that of the other authors of chapters appearing in this cell. Nevertheless, he does explicitly say that stochastic models, as they now stand, do not seem to have "the slightest prayer of a chance" of adequately describing even two-person binary prediction experiments, let alone more complex interactive behavior. The program he recommends is "to find an interesting phenomenon and a clean experimental paradigm" before attempting to build mathematical models in this area. The scantness of experimental results presented by the "nonreductionist" contributors to this volume is perhaps a testimony to the difficulty of doing just this.

*University of Illinois*

MAURICE M. TATSUOKA

WILLIAM A. SCOTT AND MICHAEL WERTHEIMER. *Introduction to Psychological Research*. New York: John Wiley and Sons, Inc., 1962. Pp. xiii + 445. \$7.95.

In the science (or profession, or vocation) of psychology, almost everyone does research, some because they are forced to, some because they feel that they should, and some because curiosity impels them. Regardless of his motivation, however, the young psychologist finds that it is not enough simply to sally forth to "do" research; he soon finds out that scientific ideals must be shaped by the practicalities of the situation. Part of the training of any researcher is getting to know the ropes, the art of coping with the common, and often mundane, problems of turning an idea into a finished research product.

In recognition of this, the authors of this book set out to discuss the process of doing psychological research in a down-to-earth, practical fashion, reflecting the way research problems are actually attacked by experimentalists. The topics discussed range over virtually all of the mechanics of planning and executing psychological research, from formulation of the original line of inquiry to publication of the final report. Treated along the way are matters of development of measuring instruments, choice of a particular population of

subjects for study, experimental instrumentation, choice of sample size, and selection of an experimental design.

Although the authors specifically disclaim any intention of writing a text in statistics, numerous statistical measures and tests are scattered in "supplements" throughout the book, along with brief treatments of sampling theory, test theory, and statistical inference. The arrangement follows the chronology of an actual study; first the development of a research idea and the review of the literature, then questions of the desirable amount and generality of information as opposed to costs, variables that should be manipulated or controlled, and so on through the analysis of the data and the preparation of a report. Very little of interest to the fledgling researcher is not mentioned, at least in passing, and a great deal of useful information and sound opinion has been packed into this relatively small volume.

To a very large extent the authors have succeeded in conveying their own experience with and enthusiasm for research. It is particularly refreshing to read of the process of research as the creative, extemporaneous, almost free-wheeling enterprise it actually is in almost any well-run laboratory, rather than the formal and antiseptic demonstration that many reports and authors seem to imply. Production of a really good piece of research is a creative act of high order, and this tone informs most of the Scott and Wertheimer book. On the other hand, it is obvious that on occasion the authors are torn, even as the science of psychology is sometimes torn, by the confrontation of native curiosity with the more or less arbitrary rules of the scientific game (including, alas, statistics), which presumably make research findings convincing, not to say publishable. Thus, we find the authors' caveat that "Science involves a complex set of rituals, which must be learned by the novice before he can perform convincing research. The aim of this book is to provide a step by step introduction to some of these rituals, following the course of the typical research project." Happily, most of the book belies the authors' statement, and sheer mechanical ritual is subordinated to clear good sense in almost all of the discussion.

An extensive *vade mecum* to the mechanics of psychological research would be a very large order indeed, and naturally the authors have had to limit themselves to only the most elementary (and occasionally superficial) aspects of each topic they take up. Aside from a few admonitory phrases, it is unlikely that the serious student will learn very much about experimental equipment, scaling techniques, or data analysis and interpretation from the overgeneral and sketchy sections devoted to these topics; obviously, these are highly technical matters which are very specific to particular research settings. On the other hand, the sections on obtaining and dealing with subjects, on general arrangements for data collection, and on report writing and publication are clear, appropriately general, and full of good advice for the beginner. The authors have thoughtfully provided a large and generally excellent set of references following each chapter, and this does much to enhance the value of their book for the beginning researcher.

Although the authors clearly intend this book as a text for first-year graduate students working toward the Ph.D., this reviewer feels that the very elementary and sketchy nature of most of the topics discussed make the text far more appropriate for the undergraduate beginning research than for the graduate student. At many universities solid research experience and training is now provided very early to budding psychologists, and most of the matters discussed in this text may be very old stuff indeed to a student who has done undergraduate research. Furthermore, a great many graduate students seem to be involved in special areas of research during their first year of study, and the better graduate student may well be impatient with the general, overview character of this text while under pressure to learn the specific research technology of his own area of study. There is very little in this text (with the possible exception of some statistical tests) that should prove difficult for the student in or beyond his sophomore year of study in psychology.

The statistical sections of this book contrast sharply with the well-organized and informal style of most of the discussion. A fairly large number of miscellaneous statistical techniques are represented in the supplements to the chapters, ranging from indices of test homogeneity and the intraclass correlation following the chapter on verbal measures, through  $t$  tests between means and a selection of measures of association. Unfortunately, it is by no means uniformly clear how the technique pertains to the discussion (e.g., the information measure of Table 5-1) nor when and how to use it. Each technique is presented in a step-by-step cookbook fashion, followed by an appropriate worked example, but very little in the way of explanation of the rationale for or uses of each technique is given.

The number of methods is so varied, and the notions of distribution theory and of significance testing seem so implicit, that the authors must have presupposed some working acquaintance by the student with inferential statistics. However, it is difficult to see why a student with this kind of background would need the cursory introduction to statistical concepts provided, even though a few of the techniques (homogeneity measures, measure of ordinal relations, measures based on information theory, etc.) might be unfamiliar to him. Certainly there is not enough exposition of simple statistical theory to make the methods comprehensible to the uninitiated.

There is an attempt to introduce the notion of a random sample and randomization early in the book, although here the idea of the "representativeness" of a sample is needlessly confused with the idea of random selection. Very brief sections on estimation and simple random and stratified sampling are followed by supplements on sampling variances, the  $t$  distribution, and sample size determination (in terms of the critical ratio). By and large, these sections are accurate, but so telegraphic in style that they do little to clarify matters. Supplements following the chapter on experimental design show  $t$  tests employed in simple examples of the various designs; the  $F$  test is introduced only later in connection with the correlation ratio.

Finally, the chapter on "Analyzing the Results" and its supplements contain a mixed bag of measures and tests for bivariate relations, plus a section on the Fisher chi-square method for combining results of significance tests. All of these discussions are quite short on rationale for the techniques demonstrated and the assumptions involved in the use of most of the techniques (normal distributions with equal variances in the case of the  $F$  test for the correlation ratio, independent events in the Pearson chi-square tests, the bivariate normal assumption for the Fisher  $r$  to  $Z$  transformation) are omitted altogether. As one reads the statistical sections, the impression grows that the authors did not have a clear picture in mind of the statistical background of their readers; surely, given the statistical acumen demanded by the proper application of many of these tests, the inclusion of the very elementary materials on the critical ratio, sampling theory, and linear relations should hardly be necessary. Only in these statistical sections does the authors' phrase "a complex set of rituals" seem to stick in one's mind.

All in all, this book should provide a useful and interesting supplement to a course in psychological research or laboratory practice for advanced undergraduates who have had a course in statistics. On the other hand, its use with graduate students should be considerably more limited. Its major strength is its authors' obvious enthusiasm for, and experience with, the practicalities of psychological research.

*The University of Michigan*

WILLIAM L. HAYS

S. S. TOMKINS AND S. MESSICK (Eds.). *Computer Simulation of Personality. Frontier of Psychological Theory*. New York: John Wiley and Sons, Inc., 1963. Pp. 325 + x. \$5.00.

This book contains the papers and formal discussions presented at a conference on computer simulation and personality theory held at the Educational Testing Service and

Princeton University in June, 1962. The seven major papers, each with one or two formal discussions, cover all aspects of the use of computers in constructing and testing theories of personalities. All of the attitudes towards computer simulation are discussed, all of the pitfalls are recognized, all of the potentialities are touted, and, so far as I know, all of the existing computer models of personality are presented. Moreover, the philosophers and cyberneticists are missing. None of the contributors learned psychology by the ardent study of Aristotle and Astounding Science Fiction—all are solid, full-fledged psychologists. Here, then, in one short volume, is most of what is worth saying about the computer simulation of personality.

The papers by Tomkins and by W. R. Reitman, as well as the final résumé by Messick, and many of the discussions, are concerned with problems and prospects for simulation in personality theory. Tomkins makes some provocative suggestions about the areas of personality theory in which simulation seems feasible and specifies some requirements for a suitable theory. In his view, the affects are the primary human motives, and a computer model, to be suitable, must simulate affect as well as the learning process. Tomkins seems to be asking too much, and the reader is likely to despair of programming a computer to have such properties until reading W. R. Reitman's paper "Personality as a Problem-Solving Coalition." Reitman argues that a program could be produced with feelings and conflicts, as well as intellectual abilities, by combining a problem-solver with a simulation of behavior in an organization. The idea is close enough to present realities to be convincing. Reitman presents a cogent discussion of the issues raised by computer models of psychological processes and urges us to "think small," attacking parts of the problem rather than assaying a total personality in one big program. Reitman, Tomkins, and the others are all sensitive to the need for psychology to keep firm control of simulation. Colby says, "The first law of the instrument states that if you give a boy a hammer, he suddenly finds that everything needs pounding." The conferees are intent on building wisely with their new toy, but they are not afraid to pound.

Three particular models of personality are exhibited in the book. J. C. Loehlin describes a simple simulation program, called Aldous, that perceives stimuli and reacts emotionally according to the fear, anger, and attraction associated with the stimulus, and expresses its feelings in action. The model uses numerical values for fear, anger, and attraction associated with a stimulus to determine a response, which may be to approach positively, to attack, or to withdraw. The consequences of the act are changes in the numerical values for that stimulus. The model is limited in scope and complexity, but shows how much can be done with a small program. K. M. Colby and R. P. Abelson present theories about the dynamics of belief systems. Colby's work is in the context of neurosis, Abelson's in attitude change, but the programs have much in common. Colby codifies the material in a psychotherapeutic interview in terms of the beliefs voiced by the patient and the anxiety expressed or shown. His model contains processes for modifying anxiety-producing beliefs by defense mechanisms such as deflection, substitution, and the like. Abelson models a person assimilating new facts into his belief structure, possibly changing the fact or the earlier beliefs if affective imbalance occurs. Processes like rationalization and denial are available. These processes are defined explicitly in terms of their actions on beliefs and statements. The models presented by both Colby and Abelson are extremely interesting concrete theories of an affective process.

The remaining two papers are tangentially related to personality simulation. G. S. Blum's model of personality is expressed as a flow-diagram and would seem to be a natural basis for a computer program, but Blum eschews computers. He disavows the purpose of the conference, for which he is cleverly chided by J. H. Handlon. Blum gives a brief description of his flow chart, but to know whether the details of the theory have been stated with sufficient clarity to specify a computer program, one must read Blum's book. Blum describes experiments in which subjects are taught under hypnosis to respond affectively to specific

stimuli. L. Uhr discusses his model of pattern recognition, and suggests its possible applications to language learning. The program learns to translate simple sentences of the "See John run" variety from one language to another. The mechanisms in Uhr's program will serve Tomkins in modeling early learning, but the extent to which the model can learn structure remains moot. J. Kagan complains that Uhr's program does not make sufficient contact with the data on human perception.

The writing is uniformly excellent. The authors are all fluent, inventive communicators, with a flair for the felicitous phrase. Tomkins and Abelson are especially delightful to read, and not one of the papers is dull or opaque. This is a remarkable, possibly unique achievement in a conference book, for which the editors surely deserve special praise. When a skillfully written book crosses an important frontier boldly, imaginatively, and sensibly, it is a pleasure to read.

*Carnegie Institute of Technology*

BERT. F. GREEN, JR.

ANNE ANASTASI. *Psychological Testing*. (2nd ed.) New York: Macmillan Company, 1961. Pp. vii + 657. \$7.50.

Among the three giants in the area of introductory books in psychological measurement—those by Cronbach, Thorndike and Hagen, and Anastasi—the second edition of *Psychological Testing* by Anne Anastasi does carry on in much the same pattern and tradition as did the first edition published in 1954. An attempt has been made to place relatively greater emphasis on the principles of psychological testing than in the earlier edition. The author has stated in the preface that the frequent consideration of particular issues as well as of interpretative and methodological problems throughout the text along with an expansion of Part I ("Principles of Psychological Testing") was the means of achieving her important objective of developing an understanding of basic principles of psychological testing. The addition of new sections on statistics in Chapters 4 and 5 was also intended to strengthen the background of the reader and to prepare him for subsequent consideration of the material on validity, which has been increased to two chapters.

Several new topics have been introduced in both the cognitive and noncognitive domains. Perhaps among the most important new contents are (i) discussion of the influence of many variables such as anxiety, coaching, and behavior of the examiner on test performance (in Chapter 3); (ii) an evaluation of statistical versus clinical approaches to the use of test results (in Chapter 7); (iii) the exposition on research findings in the currently popular area of creativity (in Chapter 15); (iv) a consideration of the changing relationship between achievement and aptitude tests (in Chapters 16 and 17); (v) a description of how teacher-made classroom tests can be improved (in Chapter 16); (vi) an exposition regarding the nature of the social desirability variable in personality inventories (in Chapter 18); (vii) a revised evaluation of projective techniques with reference to recent studies; and (viii) an overview of several of the more recent approaches to the assessment of personality.

Consistent with the reviewer's expectations from use of the earlier edition in a number of classes, the revised edition is a beautifully written book—lucid in its explanations, flowing and smooth in the style of writing, and systematic in organization and treatment. For example, the discussion upon validity in Chapter 6 is one of the most comprehensive and explicit to be found anywhere. The use of the logical framework furnished by the *Technical Recommendations for Psychological Tests and Diagnostic Techniques* is a most welcome feature. Well-documented research evidence is repeatedly cited to illustrate concepts and to support basic principles set forth in the text.

Relative to the presentations in the two other competitive volumes cited in the first

paragraph, one of the major differences is in Anastasi's inclusion of an extensive amount of information about each of several well-known standardized tests that are frequently used in testing programs. For the student who is taking a course that might be termed "Group Testing," "Tests for the Pupil Personnel Program," or "Standardized Tests in Counseling and Guidance," Anastasi's volume is probably without an equal. For the classroom teacher who is primarily interested in making achievement tests centered about content and process objectives in the learning situation, there are other books that will be more useful than this one, although there is a substantial amount of pertinent material in Chapter 16. The text, as its title suggests, is primarily oriented, however, toward psychological tests rather than toward educational tests.

Attention probably should be called to certain errors of omission and commission in the section on pages 40 and 41 that is devoted to sources of information about tests. Omitted, for example, is any reference to the inclusion of test reviews in issues of the *Personnel and Guidance Journal* or the *Journal of Counseling Psychology*, to the publication of validity studies in the Summer and Winter issues of *Educational and Psychological Measurement*, or to Buros' *Tests in Print*, although it is possible that the 1961 date of publication may have prevented a citation of Buros' important new book. Errors of commission include (i) statement that *Educational and Psychological Measurement* and *Consulting Psychology* feature test reviews—a practice that has not been followed for several years, and (ii) mention that a chapter on individual differences is included in each issue of the *Annual Review of Psychology* (although, in fairness, the change of policy of the editorial board of the *Annual Review of Psychology* might not have been known at the time Anastasi published her book).

The principal reservation which the reviewer holds is with respect to the level of intellectual maturity expected of students—particularly in relation to the sections on statistics, one of which includes a useful treatment of factor analysis. The chapters on statistical topics place demands upon the reader considerably above those found in several of the other chapters. The book is excellent reading for one who has a prior introductory course in statistics and in elementary measurement and evaluation. The beginning student will need to be exceptionally able if he is to comprehend in depth the important substantive and methodological contributions in Anastasi's revision. Despite this reservation concerning the existence of possibly too high a level of difficulty in the text itself, the reviewer commends the author and the publisher of the second edition of *Psychological Testing* for a job well done.

*University of California, Santa Barbara*

WILLIAM B. MICHAEL