both the general reader and a diverse audience of specialists should be attracted by it. Regrettably, it is overpriced.

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Shaping a Discipline

Clinical Psychology as Science and Profession. A Forty-Year Odyssey. DAVID SHAKOW. Aldine, Chicago, 1969. xiv + 354 pp. $12.50. Modern Applications in Psychology.

For two decades almost all candidates for the Ph.D. in clinical psychology in this country have followed a four- or five-year graduate curriculum designed to prepare them for *both* research and clinical service. This basic educational design, the result of a unique attempt to affect the character of a burgeoning postwar discipline, is to a large extent the brainchild of the author of these collected essays. Shakow is a senior research scientist at the National Institute of Mental Health and erstwhile chief of its Laboratory of Psychology; prior to his service with the federal government, he was chief psychologist and director of psychological research at Worcester State Hospital and held research and teaching positions at the University of Illinois and the University of Chicago. He is not only a major architect in the shaping of clinical psychology but also a major investigator of psychopathology and a major contributor to the evaluation of Freud, having co-authored with David Rapaport *The Influence of Freud on American Psychology* (1964).

The present volume is a collection of 27 of Shakow's papers, the earliest—"An internship year for psychologists"—dated 1938, the latest a perceptive and only gently barbed 1968 paper "On the rewards (and, alas, frustrations) of public service." His 60 or so research papers are published elsewhere.

Those who are familiar with the development of clinical psychology are likely to appreciate the high drama and frequent audacity represented in this collection. Over the years, Shakow successively took on institutional psychiatry, the research-oriented university departments of psychology, and the American Psychoanalytic Association, among others. His weapons were of a piece with his principles. Although he was constantly arguing for clinical psychology, exactly the same principles he fought for could be applied with profit to the other mental health disciplines. With calm logic and candor, he espouses a clinical psychology devoted to the welfare of the patient, to the imperative need for more knowledge, and to the ultimate improvement of society. It is the quality of the research, the quality of the student, and the quality of the practitioner, not the aggrandizement of his own discipline, that occupy him in these essays.

The occasion for drama lay in the attempts of clinical psychology, encouraged by its wartime expansion, to intrude into some parts of the mental health field which until then had largely been the property of psychiatry. No entrenched profession, and perhaps least of all medicine with its proprietary albeit genuine concern for the health of its patients, welcomes competition from an untested stranger. Shakow's papers describing the qualifications of the clinical psychologist for both research and practice informed many psychologists as well as psychiatrists about the rapidly developing new discipline.

His interest in educating clinical Ph.D.'s for both research and service first appears in his 1938 paper and continues through his evaluation of a national conference held in 1965. That conference again reaffirmed the need for such double preparation. Many academic psychologists had been anything but happy when a committee of the American Psychological Association, chaired by Shakow, issued a report in 1947 recommending the combined training. Nonetheless, the principle was adopted officially by the APA in 1949, and it has been followed in one fashion or another by most of the major American universities which offer Ph.D.'s in psychology (now numbering over 70). The principle is still under attack, but its opponents encounter difficulty trying to outline a curriculum for any kind of psychologist in the latter half of the 20th century which omits a background in research.

The great need for research in psychoanalysis was the basis for Shakow's 1962 paper, "Psychoanalytic education of behavioral and social scientists for research," in which he challenged an earlier edict of the psychoanalysts that excluded all but M.D.'s from training analyses in their institutes. He won.

In order to forestall some chiding from the author, I must hasten to insist that his battles were not fought single-handed but with considerable help from psychiatrists and psychoanalysts, as well as his fellow psychologists. He may also object to the word "audacity" as used above. The only impassioned word in his book is "illegitimati," which Shakow refuses to apply to government bureaucrats on the grounds that it accurately describes only bureaucratic *settings* and *acts*.

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Numerals and Languages

Number Words and Number Symbols. A Cultural History of Numbers. KARL MENNINGER. Translated from the revised German edition (Göttingen, 1958) by Paul Broneer. M.I.T. Press, Cambridge, Mass., 1969. xiv + 482 pp., illus. $15.

Menninger's *Zahlwort und Ziffer* was first published at Breslau in 1934. A much expanded and more lavishly illustrated revised edition appeared in two volumes at Göttingen in 1957–1958 (it was reviewed by D. J. Struik in *Mathematical Reviews* **19**, 517–18 [1958] and **20**, 804 [1959]). The first volume, subtitled "Number Sequence and Number Language," is devoted primarily to a linguistic analysis of counting and numerical word formations somewhat similar to, but broader than, the article by A. Seidenberg on "The ritual origin of counting" (*Archive for History of Exact Sciences* **2**, 1–40 [1962]). The second and stouter volume, with subtitle "Number Symbols and Calculation," describes the origins of systems of numerals and computational methods. Calculations involve integers almost exclusively, and not even the oddities of Egyptian manipulations of unit fractions are included. These two absorbing volumes now have been combined into an English version in a single oversized volume which is as attractive to the eye as to the mind. The typography is excellent, and the wide margins accommodate many of the almost 300 illustrations that grace the text. One regrets, however, that the bibliographies and the chronological table which added to the usefulness of the German edition have not been reproduced here.

The author's evident enthusiasm for his subject is well tempered by sound-

ness of judgment, and only an occasional touch of hyperbole appears. Referring to the role of the history of language, of culture, and of politics in the development of numeration, he writes, "There are few things in this world in which these branches of research meet each other in such an exciting and fertile manner as the concept of number." Politics does not loom large in the account, but the affinity of language as evidenced by number words is the leitmotif of the first portion of the volume. It is pointed out that there is no special stress in Latin on grouping by 20's, a characteristic strongly rooted in northern Europe—in Iceland, Denmark, and England. A vigesimal terminology appeared, probably under Norman influence, in northern France, whence it spread southward; but in the 17th and 18th centuries it virtually disappeared, leaving behind only the word "quatre-vingt." The author is fascinated by the origins of words, and he calls attention, for example, to the relation of "diploma" to two, of "trivial" to three, of "squadron" to four, of "semester" to six, and of "noon" to nine. He speculates that the word "abacus" comes from the Greek for "a table without legs," rather than from the Semitic word for "dust."

The second portion of the volume, on symbols and calculations, is the more substantial of the two parts, yet we are reminded that "a people's formal written numerals do not weigh as heavily in the scales of culture as spoken numbers do. The written numerals are usually foreign imports; only seldom, as in the case of Egyptian and Chinese, do they grow out of the same native soil as the spoken numbers." As a result, language and symbolism sometimes were sharply divergent. The Mayan number system, based on 20, made use linguistically of a decimal interruption, whereas in symbolic representations the interruption of gradation was quinary. The longest section of the book (pp. 297–388) concerns the counting board, and here it is pointed out that operations on the abacus were based in thought on number words, symbols being used only in recording the numerical results. It is quite likely that our own numerals, adopted from the Hindus by way of the Arabs, originated in India as an indigenous invention suggested by the abacus. One cannot, however, rule out the possibility that the origin of our system was influenced by the Greco-Babylonian sexagesimal positional principle, including Ptolemy's symbol for zero. Incidentally, it appears that this zero symbol was not the Greek letter omicron, as Menninger too categorically indicates; nor is it accurate to say, as the author does, that "prior to the advent of the Arabs the Persians wrote in cuneiform characters." Minor lapses, inevitable in a work of this size and scope, are exceptionally few, and the book should be in the library of everyone for whom English is the primary language and for whom the origin of number words and symbols holds appeal. The account, unencumbered by scholarly apparatus, is nonetheless commendably accurate, as well as exceptionally easy to read with profit.

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Chinese Accomplishments

The Grand Titration. Science and Society in East and West. JOSEPH NEEDHAM. Allen and Unwin, London, 1969. 352 pp. + plates. 63 s.

This book is a collection of essays, thrown off at various times between 1944 and 1964, all of them previously published, some in more than one version. Repetition and overlap are the natural result, and the essays add very little to Needham's major work *Science and Civilisation in China.*

As in the case of his important study, Needham is right in the main thrust of this work: to bring to Western attention the richness and complexity of Chinese accomplishments in science and technology. Many interesting examples and assertions abound in these pages. For beginners, who might be overawed by his multivolumed main work, these essays may serve as a useful introduction to the facts.

But in another sense, Needham seems altogether wrongheaded. His title borrows from the language of chemistry to suggest how he wants to "titrate" Chinese against European accomplishments by discovering who deserves credit for first discovering or inventing scientific ideas or techniques. The trouble with such an agonistic approach is the difficulty of establishing real equivalences. When, for example, Needham suggests that ancient Taoist authors adumbrated "the idea of natural selection in passages which point out the 'advantage of being useless' " (p. 250), he is surely talking nonsense. The fact is that the Chinese and English languages have such different thought systems built into their terminology and grammar that translation of abstract texts is supremely difficult. It simply will not do to clothe Chinese thought in English terms—"natural selection"—and then triumphantly point out how clever the Chinese were to anticipate Darwin by 2000 years.

Needham's other hobby horse, how capitalism unleashed modern science in western Europe, while "bureaucratism" first stimulated and then checked scientific and technological advance in China, shows interesting signs of evolution across the years, from a naive Marxist determinism in 1944 to a much more tolerant recognition of the limited autonomy of ideas, as suggested by his treatment of "Time and Eastern man" and "Human law and the laws of nature."

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Books Received

Absorption of Gases. V. M. Ramm. Translated from the Russian edition (Moscow, 1966) by R. Kondor. D. Slutzkin, Transl. Ed. Israel Program for Scientific Translations, Jerusalem, 1968 (U.S. distributor, Davey, Hartford, Conn.). viii + 648 pp., illus. $20.

Addison-Wesley Series on Organization Development. Six volumes. Organization Development: Its Nature, Origins, and Prospects. Warren G. Bennis. viii + 88 pp., illus.; Organization Development: Strategies and Models. Richard Beckhard. viii + 120 pp.; Building a Dynamic Corporation through Grid Organization Development. Robert R. Blake and Jane Srygley Mouton. viii + 120 pp., illus.; Developing Organizations: Diagnosis and Action. Paul R. Lawrence and Jay W. Lorsch. x + 102 pp., illus.; Interpersonal Peacemaking: Confrontations and Third-Party Consultation. Richard E. Walton. viii + 152 pp., illus.; Process Consultation: Its Role in Organization Development. Edgar H. Schein. x + 150 pp. Addison-Wesley, Reading, Mass., 1969. Paper, $3.50 per volume; the set, boxed, $17.50.

Adhesion of Dust and Powder. Anatolii D. Zimon. Translated from the Russian. Morton Corn, Transl. Ed. Plenum, New York, 1969. xii + 428 pp., illus. $32.50.

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