

applications of linear equations. In the work on the Laplace transform the subject of the Heaviside function and impulse function are mentioned, but the authors miss a golden opportunity to bring in the superposition integral. Series solutions are given adequate attention, but the special functions are treated in a very cursory manner. The chapter on graphic and numerical equations contains a brief but welcome treatment of Van der Pol's equation. The last portion of the book contains a fairly standard introduction to partial differential equations and boundary value problems.

The main criticism I have is that the authors in their efforts to keep the work elementary and understandable to the applied scientist, have not been too careful in their statements of definitions and restrictions. A good example of this is the introductory chapter where, following the bad tradition of many others, the authors use "fuzzy" expressions like "general solution," "number of distinct arbitrary constants," and the like.

On the whole the book is a good one and should find wide use in first courses for engineers and scientists.

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Psychomotor Aspects of Mental Disease. An experimental study. H. E. King. Harvard Univ. Press, Cambridge, Mass., 1954 (for the Commonwealth Fund). xiv + 185 pp. Illus. \$3.50.

In the early days of experimental psychology Kraepelin applied its methods to the study of abnormal states. King points out that the experimental study of simple processes that thus began was not really proved useless but rather was lost to view in the appearance of the more spectacular teachings of the psychoanalysts.

Encouraged by the outcome of his previous work on brain-operated patients, King undertook a comparison of several abnormal and normal groups with regard to what are called the fine psychomotor functions. Experiments of this sort require the subject to perform some simple movement or manipulation not requiring much strength on the occasion of the appropriate stimulus. It is well established that such performances, measured for speed and accuracy, do not correlate well with test intelligence in a normal group, nor indeed do they show great correlation with one another. It is usually stated that there is no general psychomotor ability, but it is possible to discern certain groupings of similar tasks from their correlations. By his choice of tasks, King has sampled three of these groupings: "Speed of single reactions," "finger, hand, and forearm speed in restricted oscillating movement," and, "precision." His subject groups are chronic schizophrenes, pseudoneurotic schizophrenes, neurotics, and normals, with the chronic schizophrenes further divided into three groups on the basis of severity of disorder.

His results show a clear, downward progression of average performance in all tasks from the normal through the most disturbed schizophrenes. The differences are quite apparent, ranging up to a 65-percent loss, and their statistical significance is demonstrated by a simple t-test. The tests discriminate well enough between groups to be useful, especially in combination, as diagnostic indicators, and, easy as they are to apply, they might be a standard aid to the clinician.

All the performances tested turn out to vary in a similar way with the severity of behavior disorder. Psychologically it is important that under such a powerful influence the discreteness of psychomotor functions is lost: fundamentally they must have much in common.

As King observes, his results generally agree with and extend the conclusions of a series of experimenters since Kraepelin. One reason that such results have received scant attention is their isolation. It is hard to see how deficiencies in simple reactions are related to the gross behavior disorders of the psychiatric patient. King has a suggestion to offer. He quotes Sperry's proposition:

The entire output of our thinking machine consists of nothing but patterns of motor coordination. Cerebration essentially serves to bring into motor behavior additional refinement.

Such a unified view of behavior would be a bold solution, but King seems unwilling to venture quite so far. His view is that for the lower organisms all behavior is motor behavior and that for human beings motor behavior remains important, although they have, in addition, something called "mentation." This persisting Cartesian division still leaves our theory in a state of schizophrenia. With good reason, therefore, King favors study of the relationship of psychomotor functions to other kinds of behavior, and his work offers proof that it would be fruitful.

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The Elementary Chemical Composition of Marine Organisms. Memoir No. 2. A. P. Vinogradov. Trans. by Julia Efron and Jane K. Setlow. Sears Foundation, Yale Univ. Press, New Haven, Conn., 1953. xiv + 647 pp. \$17.

In this monumental work, Vinogradov intended to provide a factual and theoretical basis for and to stimulate interest in the development of marine geochemistry from Vernadsky's biogeochemical point of view. In addition to surveys of the analytical data available for nonplanktonic marine algae, marine plankton, marine bacteria, marine flowering plants, and the marine representatives of each of the major invertebrate phyla, the lower chordates, and fishes, he has included separate discussions of the metal-containing respiratory pigments, of the mineralogical composition of skeletons of marine organisms, of the regulating influence of ocean salt on the chemical