Ranch. Mr. Allman was an early settler in the West, had been a government guide, and had shipped tons of fossils to the Smithsonian Institution. He was a very observing man and spent hours recounting to me conditions of wild-life in the early West.

He told me that it was the general custom of the early cattlemen to place poison at all the undevoured buffalo carcasses to destroy the wolves. It was his observation that the little swift foxes were always the first to take the poison. He stated that the gray wolf had not been seen in Kansas since 1879.

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SCIENTIFIC BOOKS

THE SOCIAL ORDER

Human Nature and the Social Order. By E. L. THORNDIKE. xx + 1019 pp. New York: The Macmillan Company. 1940.

THE desirability of bringing the methods and results of the natural sciences to bear on important social problems, though often emphasized, is seldom acted on by the natural scientist in any thoroughgoing way. It takes time and courage to do so. Thorndike's new book shows courage and proves that its author has devoted much time to the study of social problems. Some of them, touching on his own special fields of psychology and education, he has attacked in original investigations. The general aim of the present book is to show how what we already know of biological psychology can be applied to social problems, and how a natural-science background enables us at least to plan an attack upon these problems. Courage is needed when existing knowledge is insufficient to furnish a direct answer. The author often ventures a well-considered judgment even when admittedly unable to offer a fully scientific solution.

The book consists of two main parts, the first, presenting certain accepted findings of psychology (and of genetics) which are especially pertinent to social problems, and the second, considering these problems in some detail. The first part, running to 400 pages, will be welcomed as a systematic account of Thorndike's main contributions to psychology. It treats of the native equipment of man, of the laws of learning, of abilities and motives and their measurement, of individual differences in ability and motivation, and of a projected science of human values.

An ability is best defined in terms of results accomplished under given conditions. So defined, abilities are very specific and particularized. The ability to add 6 and 9 is not completely identical with the ability to add 8 and 7, for an individual may show full mastery of one of these sums and still be quite shaky as regards the other. Instead then of assuming a few great "faculties of the mind," Thorndike starts with these numerous specific abilities and inquires how they can *legitimately* be grouped. The best empirical principle is to place together abilities that are found to exist together in the same individuals, as indicated by the correlation method.

In any sort of ability there are several variables that can be measured, such as speed, quality of work, difficulty of tasks accomplished and width or extent of the ability. In arithmetic, for instance, one person is quicker than another, one is more accurate than another, one can handle examples of greater difficulty, and one can handle a greater variety of easy examples or of examples at any level of difficulty. Since these variables can be measured, ability can be measured, though not always easily or simply.

Motives, or "wants," are treated in the same general way as abilities. In neither case is it possible at present to define and distinguish most of them in terms of the cerebral and other intraorganic operations by which external results are accomplished. Wants are necessarily defined in terms of results wanted under given conditions. We have to start our science of wants by recognizing a great multiplicity of particular wants and we find it difficult to go behind this multiplicity and discover any adequate system of fundamental or inclusive wants. Relatively few concrete human desires belong strictly under the traditional needs for self-preservation and propagation of the species. Many wants have certainly been acquired by the individual in dealing with his physical and social environment. The relative strength of various wants can be estimated from the individual's use of his leisure time and from his expenditure of his money earnings (representing his working time). On the basis of information collected on these two points, the author estimates (p. 135) that

> the 16 hours of the waking day of adults in the United States are spent roughly as follows:
>
> 25 per cent. for subsistence and perpetuation.
> 2 " " to avoid or reduce sensory pain.
> 7 " " for security.
> 8 " " " the welfare of others.
> 30 " " " entertainment.
> 10 " " " companionship and affection.
> 10 " " " approval.
> 4 " " " intellectual activity.
> 2 " " " dominance over others.
> 2 " " " other wants.

But are psychological variables such as ability and

the strength of a motive susceptible of true measurement? Some critics deny it, but Thorndike has consistently stood for measurability. He would insist "that any want or satisfaction which exists at all exists in some amount and is therefore measurable, how exactly and how commensurably with others, we can not tell till we have tried" (p. 152). Measurement of wants has one advantage over measurement of abilities, because a true zero can easily be determined. Indifference, the condition of neither seeking nor avoiding a certain result, is a true zero of want intensity. If one positive want can be fairly estimated to lie twice as far above zero as another want, we have a start toward measurement. With suitable precautions, the time the individual devotes to securing a satisfaction (in comparison with other satisfactions), the amount of hardship he will undergo or the amount of money he will spend to secure a satisfaction, can be used as indirect measures of the strength of a want. In principle, then, a quantitative science of motivation is possible.

In proportion as wants are known and measured, an empirical science of values, a naturalistic ethics, becomes possible. Values are relative to wants. The value of any human action depends on its consequences, so far as they satisfy or annoy human beings or other sentient beings. Thus, the value of an act or of a thing is a natural fact—not transcendental nor absolute—and this fact is, in principle, observable and measurable. Measurement is difficult, to be sure, since different wants of the individual, and the wants of all the individuals affected by an act, must be considered and properly weighted before the most correct valuation is reached. The wants of different individuals require very unequal weights in some instances. The want of a creative artist to produce has much more far-reaching consequences in the lives of men, and therefore deserves much more weight, than the want of one ordinary man for a good dinner.

The existence of large differences between men both in wants and in abilities is a fundamental fact for social psychology. The actual distribution of ability in the population and the correlation of one trait with another are among the basic facts, even without regard to the ultimate causes of these variations. The causes also are of great importance, especially when the future welfare of mankind receives the serious consideration that it deserves. The author is convinced that hereditary factors, the genes, are responsible for a large share of the variation in intelligence that we find in a community—perhaps 80 per cent. of it, the remainder of the variation being mostly attributable to differences of training. Certainly ability of a high order is impossible without a favorable combination of genes. Hence, the great importance of eugenics for conserving and increasing human resources. "Improvement of the human genes, though much slower than some enthusiasts have represented it, is the surest means of fostering the good life; it operates at the source by producing better people. It also produces indirectly better customs and institutions" (p. 453).

Improvement of the human stock by eugenic measures is bound to be slow because the genic determination of important human traits is highly complex. But the average can be raised by measures that prevent propagation of the most unfit or favor that of the most fit. There is no prospect of raising the upper limit and producing a race of supermen, but what is most essential is to insure a plentiful supply of men and women in the upper brackets of ability, character and personality, since it is on these high-class individuals that the whole population depends for all kinds of progress and even for operating our civilization at its present level. A scientific program of eugenics must avoid any narrow definition of fit and unfit, and it demands much preliminary research into the correlations of desirable traits. But even to-day it is quite feasible by sane and moderate measures to combat the visible tendency of civilization toward elimination of the most promising strains. One measure would consist in "marriage allowances and allowances for children to men of very high intelligence and achievement during the period from 21 to 30," when most of them now receive very low wages, and another measure would be the provision of 10,000 college scholarships for children of proved ability. This last measure "would probably cause a considerable number of promising babies to be born, by removing the fear of the very definite and large costs of college education" (pp. 458, 459).

The psychology of learning has been one of Thorndike's favorite research fields since the beginning of his career. His main findings are incorporated in his celebrated "law of effect" or, more recently, in his concept of the "confirming reaction." Mere repetition of an act establishes it to a slight degree, but the immediate consequences of the act to the doer of it are the most important factor in learning. If the immediate consequences are satisfying, they release a confirming reaction in the brain. The confirming reaction reinforces the act in one way or another, causing it to be continued, immediately repeated or, if this is impossible, causing it to be "stamped in," impressed on the nervous system so as to be more readily executed on a later occasion. If the immediate consequences of an act are annoying to the doer, we might expect something opposite to the confirming reaction. We do find a cessation of the act and a shifting to some other act, but we get no evidence of a direct process of "stamping out." There is no inhibitory reaction commensurate with the confirming reaction. Reward, then, is a more powerful instrument than punishment. Such

is the outcome of recent experiments by Thorndike and others. Formerly, the theory of learning treated the two as on a par.

> The traditional doctrine of common sense and of all the sciences of man was that rewards and punishments were the positive and negative halves of one same scale or gradient, closely alike in potency. . . . This doctrine is false in certain important respects. . . . Except when and as it causes the person to shift to the right behavior and receive a reward therefor, the punishment has no beneficial effect comparable to the strengthening by a reward. . . . Psychology recommends that punishment be used only when and as it can be proved to be effective. . . . In the case of government, psychology emphasizes the importance of making a community attractive to the able and good rather than unpleasant for those who are incompetent and vicious. . . . The law is rightly skeptical about restrictive and punitive activities, but has not yet progressed far with alternatives. . . . Its voice is threatening and its acts are punitive. . . . Business, in contrast to government, has operated largely by rewards. . . . In general, the maxim "Reward good behavior" is as nearly a golden rule as any that psychology has to offer human society (pp. 199–207).

Labor is often conceived as pure punishment or annoyance, its only rewards lying in the pay envelope. Such a view overlooks the genuine rewards that spring directly from bodily and mental activity, from achievement and mastery, from companionship and participation, from the approval of one's fellows and even from loyal submission to the right sort of boss. Management, then, should take account of the whole man and not simply of the abstract "economic man," and it should see the man in his total life situation rather than simply while on the job.

Many other problems of industry, government and human welfare are approached in the author's characteristically candid and freethinking spirit, and the net effect is to leave the reader with a hope of ultimate solution. Perhaps the main contention of the whole book is that science is the best guide for human life. "The acceptance of impartial scientific truth as the guide in life is certainly a safe and sane policy, and can be a very idealistic one" (p. 390). "The social sciences are still weak and insecure; the doctors often disagree. Some can be found to support fantastic schemes. But it is surely better on the average to take their medicine than that of ignoramuses. The scientific method is dependable. Proposed treatments to cure political, economic, or other social ailments should be studied as far as possible by the impartial methods of science" (p. 958). Governments are constantly making experiments which would have scientific value if provision were made for tracing the consequences of any given legislative or administrative measure. "Our consideration of human nature in relation to human welfare has brought forth no panacea, and promises no miracles of any description. But it has shown that man has the possibility of almost complete control of his fate, and that if he fails it will be by the ignorance or folly of men" (p. 957). Even now we can see certain dependable guiding principles, looking toward the improving of the population and the provision of suitable education and opportunity for those who are able to render public service. Able and good men must not rest content with inferior positions in the world's councils. They must acquire power so as to make their ability and good-will count heavily in social affairs.

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SOCIETIES AND MEETINGS

THE CELEBRATION OF THE OHIO ACADEMY OF SCIENCE

JUST fifty years ago, some fifty-four serious-minded, forward-looking seekers after truth (scientists) gathered in a small room of the old Central High School, in Columbus, Ohio, for the avowed purpose of forming an organization that would be "an inspiration and a stimulus to original research and investigation." And so the infant *Ohio Academy of Science* was born and during the fifty years of its existence has grown in size and usefulness, fully justifying, we believe, the prophecy made by Professor William R. Lazenby, the first secretary, namely, that "Once organized, I am sure the Ohio Academy would be a signal and all-inspiring success, and could scarcely fail to secure an honored position among the scientific organizations of our country." In fact, the academy had attained such influence and importance that four years ago, in anticipation of the approaching fiftieth anniversary, and at the suggestion of Dr. F. C. Waite, of Western Reserve University, it resolved: "That the incoming President appoint a preliminary committee of five on plans for the celebration and that this committee be charged to make a definite report on plans at the meeting next year."

Accordingly, a committee of which the writer was made chairman was appointed and did make a report at the annual meeting in 1937, the report heartily approving the idea of a celebration and suggesting that "it be done in a distinctive and comprehensive manner that will not only commemorate what has been accomplished in the past fifty years, but will also stimulate yet greater endeavor in the future."

The plan was unanimously approved and action taken at once to carry it out. It was enthusiastically agreed that our late honored and highly esteemed