# Edward Lee Thorndike: 1874-1949

Robert S. Woodworth
*Columbia University, New York City*

PRESIDENT of the American Association for the Advancement of Science in 1934, Edward Thorndike had been a leader in psychology since 1898 when, after his undergraduate course at Wesleyan University and his graduate study at Harvard and Columbia, he obtained the Ph.D. from the latter institution with a dissertation entitled "Animal Intelligence." This paper proved to be immensely significant in two ways. As the pioneer laboratory study of animal learning it inaugurated one of the major psychological enterprises of the present century, for he found, as his numerous successors have continued to find, that animal behavior under experimental conditions can shed light on many difficult questions in psychology. Thorndike in this first paper of his also reached a significant conclusion, a new law of learning, additional to the old laws of association and perhaps more important than any of them. This famous "law of effect," while challenged by many of his early contemporaries, has generated a vast amount of research and has gained increasing acceptance in recent decades. The "effect" in question is the success or failure of an act, the immediate satisfaction or dissatisfaction it gives its doer. As Thorndike used to phrase it, the law stated that a satisfactory outcome of any response to a situation operated to "stamp in" its connection with that situation, while an unsatisfactory outcome tended to "stamp it out." So the unsuccessful responses were eliminated, often only gradually, and the successful responses retained.

For a single year after receiving his degree Thorndike taught at Western Reserve, but in 1899 he returned to Columbia and was assigned the task of developing a scientific educational psychology at Teachers College; and there he remained for the rest of his career. He brought to this work a firm conviction of the value of the experimental method as applied to problems of learning and teaching. The law of effect was directly applicable. Mere repetitious drill would be relatively ineffective. The child should get satisfaction from his correct responses, and his tasks should be such as would enlist his interest and arouse a zeal for achievement. On the strength of some of his experiments Thorndike rejected the then current doctrine of "formal discipline" which held that the educational value of a school subject lay in the exercise it afforded for some one or more of the mental faculties, such as the faculty of reasoning in the case of geometry. The experiments indicated, on the contrary, that the ability developed in one line of work was specific and did not spread to other lines of work except so far as what was learned could be carried over and utilized. Accordingly, he urged that school subjects should be valuable for their content and not merely as drill exercises. He applied this criterion to the detailed content of each school subject and to the curriculum as a whole. By experimental studies of children's specific difficulties in reading, arithmetic, and other subjects, he worked out procedures for meeting the child on his own ground and for individualizing education.

Besides the experimental method, Thorndike brought to the science of education a full appreciation of the value of measurement and statistical analysis. He was the great pioneer in the use of statistics in education. The correlational method, then newly developed, he found especially useful. Without being a highly trained mathematician he possessed a keen sense for realities and probabilities. These qualities appeared in his numerous studies of concrete statistical problems and in his *Mental and Social Measurements* (1904), a textbook which won many converts to this line of work. His own students also became powerful promoters of measurement in education—measurement of the individual child's capacities and readiness for school subjects, measurement of the child's progress, and measurements of the effectiveness of teaching.

Thorndike was especially active in the invention and improvement of psychological tests. He insisted on the need for tests scaled in equal units and based, if possible, on an absolute zero of achievement in each kind of ability. He worked out scales of achievement in arithmetic, handwriting, English composition, etc., so that the pupil's true progress could be known, rather than merely his relative standing in his school class. He used his improved test methods in researches on the influence of heredity and environment and on the growth of intellect up through adolescence and its slow decline after the peak in early adult life. A series of investigations convinced him of the great importance of heredity as a cause of individual differences, but also of the importance of education as a means of raising the general level of achievement and of enabling the superior individuals to make their due contribution to the world's work.

Thorndike was unwilling to admit any limits to the scope of quantitative science. As he said in 1918, "All that exists, exists in some amount and can be measured"; or, as he said in 1940, "Any want or satisfaction which exists at all exists in some amount and is therefore measurable, how exactly . . . we cannot tell until we have tried" (*Human Nature and the Social Order,* p. 152). In the book just quoted and in his AAAS presidential address, he insisted that values, being dependent on human wants and interests, were facts of nature and therefore belonged within the field of natural science, though the measurement of social values might prove to be a very complicated undertaking. He attempted with some success to apply his methods and psychological results to the study of values and social problems.

From 1921 on, he was enabled to devote his time to large scale investigations in the Institute of Educational Research at Teachers College, with assistance provided by grants from foundations. For the most part he was now free to choose his fields of work, and he chose a fundamental investigation of mental measurement and of learning. These extensive studies he regarded as quite the best work of his life. Under the head of intellectual ability, he and his collaborators worked out a remarkably thorough series of graded tests. On the basis of correlations, lower and higher, he recognized three main directions of intellectual development: abstract intelligence or the ability to deal with ideas, mechanical intelligence or the ability to deal with concrete things, and social intelligence or the ability to deal with people. He also distinguished three dimensions of any intellectual ability: the level of difficulty which one can master, the range or variety of tasks at any level which one can handle, and the speed of work.

In his later studies of the fundamentals of learning he subjected his early theory to a very careful check on the basis of a whole array of novel experiments. The law of effect he now found abundantly confirmed on the positive side but subject to an important restriction on the negative side. The "stamping in" of successful or rewarded responses was fully as important as he had ever believed, but the "stamping out" of unsatisfying or punished responses was a much less potent factor in the learning process. In his later applications of learning theory to educational and social problems, accordingly, Thorndike laid much more stress on rewards than on punishments. "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 emphasizes the importance of making a community attractive to the able and good rather than unpleasant for those who are incompetent and vicious" (*Human Nature and the Social Order,* pp. 200, 202).

Thorndike was a prodigious worker and he continued his research activity to the very last. He was a rapid worker, quick to see the possibilities in a problem and select a first line of attack, willing to shift his attack as he got further into the problem, persistent in following up his leads, prompt in coming through with a published result. He disliked unfinished jobs, and his very extensive bibliography is evidence of a vast number of scientific tasks undertaken and made to yield worth-while results. As a teacher and research director he always had the interests of his subordinates at heart and was eager to give all due credit to his devoted assistants. As a colleague, collaborator, and committee member he was always responsive to the call of duty and contributed mightily to many joint enterprises. What he disliked was mere discussion, pedantry of any sort, or unnecessary work. He was a notable example of "the able and good" and in his college, his private study, his home, and his circle of friends he furnished a fine example of the good life and the happy life.