EDUCATIONAL PSYCHOLOGY
The instructional endeavor

C. M. Charles

Second edition

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Foreword for first edition

This is truly a new kind of textbook in educational psychology. The approach makes crystal clear that the primary concern of teaching psychology to preservice teachers is that of *changing behavior,* not that of covering a preconceived outline of subject matter.

Trainers of teachers for the public schools are correctly concerned with the complicated problem of what *teaching* is. Probably it would be best if we would stop *teaching* in the traditional sense and stop using the word "teaching." Then we might be better able to provide for students those appropriate learning experiences that are motivating, that meet their needs for growth, and that *do change their behavior.*

A beginning course in educational psychology must provide the same types of learning experiences that young teachers must provide for the boys and girls in their classes. Dr. Charles has arranged the content of this text to easily establish behavioral objectives that the teacher expects to achieve. The movement from *telling,* which has proved to be woefully inadequate, to promoting the *doing* of inherently worthwhile exercises that provide for learning is a welcome modification in textbook preparation. The principles of psychology have not been omitted; innovative ways of presenting them have been added so that new teachers will be able to apply them in their own classrooms.

The exercises provided in this text will be most useful in integrating theory and practice if they are incorporated into teacher training programs that utilize professional semester plans. The excellent writing style in the text helps to accent in a cogent manner the very point of view that Dr. Charles is emphasizing.

A beginning course obviously does not give a teacher comprehensive mastery of learning theory or of the psychology of teaching. But this text can serve as an excellent introduction to the problems that are encountered by classroom teachers. For those who continue to grow, additional courses and seminars are readily available.

I believe that this text provides a badly needed, novel way of involving undergraduate students in crucial subject matter that, far too often, we have only abstractly discussed.

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Preface

Educational psychology is a field of study that has to do with learning, remembering, and applying knowledge. It began taking its present form about seventy-five years ago. For many of those years, its great thinkers strove to find out how people learned, remembered, and transferred—or used—knowledge. Despite their efforts, no satisfactory explanations came forth to explain how learning, retention, and transfer occurred.

Educational psychologists no longer concern themselves with theories of *how* learning and transfer occur. Instead, they give attention to the *conditions* that affect learning and transfer.

These conditions fall into the following categories:

maturation the changes that occur with growth and development, that set individuals' limitations and potentialities.

motivation the kinds and degrees of purposes, incentives, and desires that cause people to act.

physical environment the physical space within which learning occurs, including objects it contains and the manipulations made on those objects.

social environment the persons involved in the setting in which learning occurs, including groupings, communication, and interactions.

climate the feeling tone within the learning environment, including emotions, attitudes, values, acceptance, and rejection.

reinforcement the rewards, payoffs, and satisfactions that learners experience in association with their efforts in the learning environment.

Clustered around and within these categories are other activities that play important roles in educational psychology. Those activities include the following:

measurement and evaluation the testing, diagnosing, appraising, and judging of learners, teachers, and educational programs.

psychological services the identification and correction of personal problems that interfere with learning and adequate functioning.

Educational psychologists concentrate on these conditions and activities because they are known to affect learning—how quickly it occurs, how long it lasts, and how useful it remains for the learner. Most important, their findings help teachers do a better job with students. Specifically, educational psychology helps teachers to

1. Know what to expect, and not expect, of learners at different stages of physical, intellectual, social, and emotional development
2. Arrange physical environments that interest learners, attract their involvement, and maximize their intellectual functioning
3. Arrange social interactions that enhance communication and interpersonal relations

4. Establish emotional climates that attend to learners' feelings, interests, attitudes, values, and self-concept
5. Establish success environments that, though challenging, maximize success while removing the stigma from failure
6. Put into effect behavior management systems that increase the amount of on-task, productive activity of learners while decreasing the amount of off-task, disruptive, or counterproductive behavior
7. Diagnose learner needs to prescribe learning situations best suited to each individual
8. Monitor and evaluate learner progress and instructional effectiveness

Whether your interests lie in teaching, educational research, or school psychological services, you will find that educational psychology plays a crucial role. For education today, educational psychology is where the action is.

C. M. Charles

Acknowledgments

The contributions of many people shaped this book. It seems unjust that each one of them cannot be named here, for their numbers include great writers, fine professors, stimulating colleagues, and bracingly frank students. I am in the debt of them all.

Yet, while most must go unnamed, it would be inexcusable not to acknowledge the particular contributions of five colleagues whose critical insights made this book significantly more than it would otherwise have been: Dr. Miles V. Zintz, University of New Mexico, Albuquerque, New Mexico; Dr. Peter C. Gega, San Diego State University, San Diego, California; Dr. George Kaluger, Shippensburg State College, Shippensburg, Pennsylvania; Dr. Richard O. Davis, Edinboro State College, Edinboro, Pennsylvania; and Dr. Joel Macht, University of Denver, Denver, Colorado. My gratitude to them is deep and heartfelt.

Contents

Part I

Psychology and education

explains the development, assumptions, and practices of **behaviorism** and **humanism,** shows how they affect the practice of **education,** and presents an overview of intellectual and psychosocial processes in **human development,** accomplished through chapters

1. Behaviorism and its stars
2. Humanism in psychology
3. Behaviorism, humanism, and teaching
4. Human development

Chapter 1

Behaviorism and its stars

behaviorism the school of thought, especially in psychology, that holds that observable actions of animals (including man) are the only proper source of information for studying behavior, learning processes, personality. . . .

associationists

Philosophers like to bedevil psychologists with cute tricks. For example, whenever psychologists come up with a new idea in human behavior, philosophers quickly name a half dozen people out of the past who have already considered the idea. They usually begin with Plato or Aristotle, who seem to have thought of almost everything, and then they touch on a few Sophists, Scholastics, Thomists, and what have you, who fill in the spaces between 400 BC and the present.

So it is with most aspects of psychology's great twentieth-century invention—behaviorism. It is true that J. B. Watson pulled behavioristic thought together and gave impetus and respectability to it. He is rightly remembered for doing so. Yet, seeking out the origins of behaviorism sends one leapfrogging back to Aristotle, whose essay "Memory" shows strong attention to *associationism*, a predecessor of behaviorism.

Aristotle pondered over phenomena such as: Suppose you see a stack of hay and you think immediately of a cow, which is not present. What is the nature of the relationship, in one's thought, between the hay and the cow? Or, in a similar vein, between a peach and a pear or a pond and an ocean? Such associations are made, Aristotle believed, because the objects being associated are similar, or opposite, or near to each other.

A curious fact of Western thought is that with the advent of the post-Renaissance Age of Reason, philosophers turned to the ancient Greeks for inspiration and logic. Thomas Hobbes (c. 1650) followed Aristotle's ideas, attempting to reduce human behavior to physical terms. He wrote of fundamental elements of thought—sensation, recall, and sequence—and used terms such as motion, communication of motion, and inertia.

John Locke (c. 1690) introduced the concept of "association of ideas." He believed that ideas come from two sources: sensory experience and mental operations (carried out by each individual).*

George Berkeley (c. 1709) contributed the concept of sign-meaning association. He explained that a sound, for example, might be much more that a simple sensory experience. The sound might have meaning if the individual previously had had experience with it.†

David Hume (c. 1740) added to Berkeley's concept of meaning through association by stressing the importance of contiguity, that is, the "nearness" in time of one senation to another.‡ He felt that associations occurring frequently become firm and habituated and that whenever the antecedent occurs, the consequent is bound to follow.

David Hartley, in his book *Observations on Man, His Frame, His Duty, and His Expectations* (1749), built a theory of associationism that incorporated the ideas of his predecessors. He felt that all mental functioning could be explained in terms of associations, either simultaneous or successive.

Thomas Brown (c. 1820) made contributions that expanded Hartley's theory of associationism. He puzzled over the observation that *A* will remind you of *B* at one time, but perhaps of *C* or *D* at another time. That is, a haystack may remind you of a cow today, but it might remind you of a frosty morning on another day. Brown added the concepts of

*Note the similarity between Locke's idea and those of the great contemporary psychologist Piaget, whose work is discussed in Chapter 4. They did not agree, however, on the role of the mind in motivating behavior.

†The notion of sign-meaning played a crucial role in the learning theory of the contemporary behaviorist Edward Tolman, whose work is described later in this chapter.

‡Temporal contiguity was assigned a major status in the learning theory of Edwin R. Guthrie, whose work is described later in this chapter.

frequency, recency, and vividness in associations to explain the relative strengths, life spans, and occurrences of different associations. James Mill followed with *Analysis of the Phenomena of the Human Mind* (1829), in which he brought the theory of associationism to its highest level of development.

With the works of Alexander Bain (c. 1855), associationism took on new dimensions. Bain pointed out that not all sensory experiences that occur together become associated. Rather, factors such as likeness, difference, and cause-effect play crucial roles in association. This notion holds that one must discriminate among sensory items before they are associated. Bain also showed that all motor behavior cannot be explained from the basis of associations, citing as an example the innate reflex movements shown by infants.

The work of Herman Ebbinghaus added yet another dimension to associationism and gave it an experimental, modernistic look. Previous associationists started with associations that they had established in their own minds and then tried to reason backward to determine how they became established. Their approach was logical and philosophical. Ebbinghaus initiated the procedure of forming new associations and later testing their strength. To avoid preestablished associations, Ebbinghaus used nonsense syllables, had subjects associate them, and checked to see how strong the associations remained over periods of time.

From such experiments, Ebbinghaus formulated a "law of frequency," which held that learning (association) increased in proportion to the frequency with which a particular association was made.* He also formulated a "law of recency," which held that recently made associations were strongest and that they decayed over periods of time. The graphic representations of the frequency and recency data became famous as "the learning curve" and "the forgetting curve," both of which still receive attention today.

*This law of frequency is similar to the law of exercise that held such an important place in the learning theory put forth by Edward L. Thorndike some thirty years later.

Just prior to the work of Ebbinghaus, biologists had become interested in the motor activity of animals, motivated in large part by Darwin's pronouncements on origins of species through natural selection. That interest resulted in a number of animal study reports. Chief among them was George Romanes's *Animal Intelligence* (1883), which dealt with mental evolution. This work was soundly criticized for explaining animal behavior in terms of higher mental processes. Also important at that time were L. T. Hobhouse's summaries of experiments on animal behavior; those experiments were conducted with animals ranging from cats to elephants.

Animal studies played a key role in the development of the field of psychology, changing its emphasis from what had been a primarily philosophical one to the experimental direction it took in the first half of the twentieth century. This new direction stressed physiological processes and focused on the overt behaviors of animals, both human and infrahuman.

Pavlov

The behavioristic movement in psychology began to crystalize with the landmark discoveries of the Russian physiologist Ivan Petrovich Pavlov. Working in the Institute for Experimental Medicine in St. Petersburg (now Leningrad), Pavlov won a Nobel Prize in 1904 for his studies on the nerves and reflexes of digestive glands. However, it was an accidental discovery in 1902 that im-

mortalized Pavlov in the annals of psychology.

Pavlov had been studying the salivary responses of dogs. In that work, he had constructed a device that permitted the collection and measurement of saliva secreted in response to food placed in the dog's mouth. Pavlov noted that after a few trials, saliva began to flow from the dog's mouth before the food, a meat powder, was actually presented. The salivation occurred when the dog saw the food container, and later when the dog heard the attendant's footsteps.

Pavlov called the salivation response that occurred before the food presentation a *conditioned reflex,* and he used the term *conditioned stimulus* to refer to the stimulus—whether food dish, footsteps, or whatever—that elicited the conditioned reflex. Those concepts continue in use today, except that conditioned reflex is now called *conditioned response.*

Pavlov pursued this new direction in his research with a great deal of interest, attempting to determine how conditioned responses could be established, maintained, and removed. He showed that conditioned responses could be made to occur following a wide variety of conditioned stimuli and that they could be strong and persistent. He found that their formation could be *inhibited* by presenting distracting stimuli simultaneously and that once established they could be removed, *extinguished,* by merely withholding the unconditioned stimulus, the food, for several trials.

In addition to these discoveries, Pavlov established that stimuli could be *generalized* and *differentiated.* As an example of stimulus generalization, suppose that the dog had been conditioned to salivate at the sound of a high-pitched tone; it would also salivate, though not so much, at the sound of a low-pitched tone. Thus, the dog would have generalized the original conditioned stimulus to other similar stimuli.

Stimuli are differentiated in this manner: suppose that several conditioned stimuli produce a conditioned response (salivation). The desired conditioned stimulus can be maintained by following it with the unconditioned stimulus (food). Meanwhile, the undesired conditioned stimuli are not followed with food, and they gradually cease producing the conditioned response.

Pavlov concluded from his research that the key to understanding behavior lay wholly within the realm of physiology. Although he did not formulate an acceptable theory of learning, he nonetheless turned scientific attention strongly toward experimentation with animal behavior, made several discoveries that shaped the development of theories of learning, and added terminology that is still widely used in psychology. Because of this influence, Pavlov is rightly considered a giant in the history of psychology.

Watson

The behavioristic movement in psychology grew with sudden energy in the first decade of the twentieth century. Pavlov's work gave it vitality, but it was J. B. Watson who, more than any other, gave it form and direction.

John Broadus Watson was born on a South Carolina farm in 1878. He failed to distinguish himself academically until he entered Furman University, where he became a scholar of the classics and received a master's degree in 1900. His interest in philosophy took him to the University of Chicago, to study with John Dewey. There his interest in philosophy waned as be became intrigued with the new work taking place in animal psychology. He established an animal psychology laboratory at the University of Chicago and then moved as a professor to Johns Hopkins University in 1908 to continue his work.

To understand the importance of Wat-

son's contributions, we must recognize the nature of psychology at that period in its development. Generally speaking, psychology was still considered to be the science of conscious experience; introspection, or looking within oneself, was the principal means of gathering data. Watson saw two great problems with that situation. First, he considered introspection to be nonscientific, since the data were accessible only to the person looking within himself and thus not open to scrutiny by impartial observers who could be more free from error-producing biases and blind spots. Second, it was obvious to him that introspection and consciousness were not available as techniques for investigating animal behavior. He considered that animal researchers conducted the only truly scientific work in psychology, since they based their conclusions on the behavior of the animals—evidence available to all observers.

Watson popularized this view of psychology in lectures and writings between 1912 and 1914. In his book *Behavior* (cited in Woodworth 1948, p. 68), he wrote:

> Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods.

Unlike most of his predecessors, Watson believed that the study of animal behavior could lead to the establishment of all the fundamental principles of behavior and learning, essential to psychology. He recognized that additional concepts might be needed to explain human mental functioning, but felt that those concepts would fit naturally into the basic framework resulting from animal studies.

Watson's ideas made a strong impression on younger psychologists of the day. The current of prevailing thought quickly swung from the concept of consciousness to the concept of behavior, which for Watson and his followers included these ideas (cited in Woodworth 1948, p. 71):

1. Psychology is defined as the science of *behavior,* not as the science of consciousness.
2. The proper scope of psychology includes both animal and human behavior.
3. The method of psychology rests on wholly objective data—data available to all observers.
4. Concepts fundamental in psychology include those established through observation of behavior, such as stimulus, response, and habit formation.
5. The application of psychological work lies in the practical prediction and control of behavior.

Following World War I, Watson conducted pioneer experimental studies of young children's behavior. He showed how fear, for example, could be associated with objects "not dangerous" to young children through a process of presenting a loud noise in conjunction with an object such as a white rat. He then showed how that fear was generalized to a human face wearing a false white beard. By 1924, he had concluded that such conditioned responses could explain all habit formation. He stimulated great discussion by his claim that given a normal infant and complete control over its environment, he could train the child to become outstanding in any field of endeavor—music, art, languages, mathematics, and the various professions. He wrote:

> Give me a dozen healthy infants, well formed, to bring them up in any way I choose and I'll guarantee you to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. [Watson 1919, p. 10]

Few of Watson's specific ideas are accepted today. Yet, he is considered a monumental figure in the development of psychology. This lasting reputation remains because of his boldness of thought, tough-mindedness, rejection of the mystical, insistence on scientific procedures, and an abiding faith in the

power of psychology to contribute to the betterment of human affairs.

Thorndike

Application of psychological inquiry into matters of school learning and education was purely incidental before the time of Edward L. Thorndike. Thorndike, a contemporary of Watson and a student of the Harvard psychologist William James, was one of the first to see the great applicability that psychological research could have for matters of learning in the school setting. He turned his energies in that direction, and within two decades, he almost single handedly remade eductional practice. Because of Thorndike the classical "mind training" curriculum was swept aside in favor of a curriculum consisting of practical studies. Because of him, objective achievement and aptitude testing replaced subjective oral and written examinations. And because of him, great research activity welled up in the pursuit of scientific theories of learning—of its nature, its occurrence, and its transfer to other situations.

Thorndike, born in 1874, was an established writer and authority in psychology by the age of 25. Encouraged by James, he had conducted significant early experiments in learning. From those experiments and numerous others he conducted while a long-time professor at Teachers College Columbia University, Thorndike formulated his theory of learning, which he called "connectionism," and his theory of transfer of learning, which he called the theory of "identical elements."

Thorndike's early experiments were done with animals, mainly cats. He would place a hungry cat inside a box that could be opened by pulling a string or pressing a button or lever. The cat would move about energetically and would sooner or later hit the escape key by accident. Replaced in the box, the cat would again go through numerous movements until hitting the escape mechanism. In this manner the animal learned to avoid acts that were not successful in escaping, while repeating the act that led to escape.

Thorndike noted that the cat would repeat the movement that led to success. If the cat triggered the escape mechanism by accidentally backing into it, that was the procedure that it repeated—it opened the door by backing into the release mechanism.

Such experiments led Thorndike to propose his "law of effect," a crucial part of his theory of learning. The law of effect held that:

> Any act which in a given situation produces satisfaction becomes associated with that situation, so that when the situation recurs the act is more likely than before to recur also. Conversely, any act which in a given situation produces discomfort becomes dissociated from that situation, so that when the situation recurs the act is less likely than before to recur. [1905, p. 203]

But obviously for an act to become associated, whether pleasantly or unpleasantly, with a situation, the act had to be repeated in that situation. Thorndike stipulated this phenomenon in a second law, called the "law of exercise." The law of exercise and its sublaws, "use" and "disuse," stated that the more times a response was made in a given situation the stronger it became (law of use). Conversely, prolonged disuse weakened the likelihood of the reoccurrence of the response.

Thorndike turned his attention to human learning in attempts to further define and clarify his theories of learning. The results of this work caused him to make minor modifications in some of his laws. Chief among those modifications was a revision of the law of effect, so that greater emphasis was placed on reward and less on punishment. He felt

that reward had a strong positive effect on human learning but that punishment had little or no effect in extinguishing learning.

In short, Thorndike's theory of learning maintained that learning was merely connecting stimuli and responses, hence the name *connectionism.* He considered the mind to be man's connecting system (analogous to a telephone switchboard), but his theory gave no attention to the processes that might occur in the mind. Instead, he focused on the conditions, exercise and effect, that comprise the learning situation. In Thorndike's words:

> A good simple definition or description of a man's mind is that it is his connection system, adapting the responses of thought, feeling, and action that he makes to the situation that he meets. [1943, p. 22]

For a good thirty years no serious challenge was mounted against Thorndike's ideas on learning. True, psychoanalytic theory developed by Freud and his followers was causing great excitement in psychological circles, but those ideas never formed into an explanation of learning. Essentially the same was true for Gestalt psychology, which blossomed in the early 1900s, though it provided great insights into the phenomena of perception and perceptual organization. The apex of the Gestalt movement came with Lewin's attempts to develop a "cognitive field" theory of learning, somewhat analogous to the electromagnetic field theory in physics. Lewin used the concept of life space, combined with topological drawings to explain human purposive behavior. Although this notion attracted considerable attention, it too failed to explain learning in an adaquate way. Thus, it remained for later behavioral psychologists to develop theories of learning and transfer that moved significantly beyond the contributions made by the greatest of all educational psychologists, Edward L. Thorndike.

Thorndike to Skinner

When Thorndike died in 1949, there was general feeling that an educational psychologist of his omnipresent stature might never appear again. Indeed, there is still good reason to believe that such will be the case, for the diverse areas of the psychology of human learning have become so complex and sophisticated that any one person can hardly hope to exert significant influence in more than one or two of them.

Nevertheless, we find ourselves with a modern day giant in our midst. Although he has in no way been dominant in the breadth of school learning and curriculum matters that were reconstituted under Thorndike, he has nonetheless provided a simple theoretical explanation for the conditions under which learning occurs. He has carefully amassed incredible quantities of data that support his ideas, he has made direct application of his ideas to matters of school learning, and he has seen his ideas exert powerful influence on virtually all areas of school curriculum and teaching practice. The person responsible for these innovations, B. F. Skinner, is today generally considered to be the world's most influential psychologist.

Before examining Skinner's contributions, let us take a moment to note a few of the significant contributions made by other behavioral psychologists spanning the interval between the peak years of Thorndike and Skinner. We must recognize that in truth a great number of psychologists made important contributions to the development of behavioristic thought. Only four of the most outstanding will be mentioned here – Karl Lashley, Edwin Guthrie, Clark Hull, and Edward Tolman.

Lashley

Karl Lashley, born in 1890, was one of Watson's students who later became