

Theories of Learning

Historically, two major theories of learning have been classified: (1) behaviorism or association theories, the oldest one of which deals with various aspects of stimulus response and reinforcers, and (2) cognitive psychology, which views learners in relationship to the total environment and considers the way learners apply information. When behaviorist theories are discussed separately, learning tends to focus on conditioning, modifying, or shaping behavior through reinforcement and rewards. Many ideas about goals, objectives and standards, practice and drill, classroom management, and teacher education programs involve behaviorist theory. Behaviorists tend to be ra-tional, scientific, and technocratic; therefore, they are more inclined to support the science of teaching and to focus on the products of teaching, rather than the process.

When cognitive psychology (or cognitive information processing) theories are stressed, the learning process focuses on the student's developmental stages, environmental experiences, and problem-solving strategies. Cognitive learning theorists tend to accept both the science and the art of teaching, and both the processes and the products of teaching; however, cognitive theories have been criticized by behaviorists as subjective, vague, and unscientific. Both schools of thought consider phenomenological aspects of learning that deal with the needs, attitudes, and feelings of the learner—what some educators might call the affective domain of learning. Both theories are concerned with the relationship of the teaching-learning process, and teachers need to understand how the theories of each can contribute to this process. Questions of mutual interest to psychologists and teachers are the following: What are the most effective teaching methods for a specific group of students? How do teachers respond as they do to the efforts of students? What is the impact of prior experience on student learning? How do cultural experiences (or differences) influence student learning? How does age (or maturation) affect learning? How should curriculum and instruction be organized to enhance learning?

For the last 50 years, B. F. Skinner has been the most quoted learning psychologist. His basic principle for learning is that the teacher can modify and shape student behavior by consistently and systematically rewarding appropriate behavior and eliminating rewards (sometimes punishing) for inappropriate behavior. The use of proper rewards and punishment forms the basis of learning, as well as manipulating the surface behavior (what is called classroom management in schools) of learners. Parents, teachers, and the clergy are always modifying and shaping the behavior of the young, just like CEOs, spouses, and drill sergeants modify and shape the behavior of adults.

Within the same 50-year period, Piaget has been the second most quoted learning psychologist. He has influenced the world of environmental and cognitive psychology, espousing the idea that learning can be inhibited or enhanced by experience. During their waking hours, children and youth are always engaged in some form of learning; the

need for the teacher is to shape their environment, to help them learn particular knowledge, concepts, and skills. The central problem is for the teacher to provide proper stimuli (methods, materials, media, etc.) on which to focus students' attention and efforts to enhance learning.

Behaviorism

The behaviorists, who represent traditional psychology, are rooted in philosophical speculation about the nature of learning—the ideas of Descartes, Locke, and Rousseau. They emphasize conditioning behavior and altering the environment to elicit selected responses from the learner. This theory dominated much of twentieth-century psychology.

Classical Conditioning

The classical conditioning theory of learning emphasizes that learning consists of eliciting a response by means of previously neutral or inadequate stimuli; some neutral stimulus associated with an unconditioned stimulus at the time of response gradually acquires the ability to elicit the response. The classical conditioning experiment by Ivan Pavlov in 1903 and 1904 is widely known. In this experiment, a dog learned to salivate at the sound of a bell. The bell, a biologically neutral or inadequate stimulus, was presented simultaneously with food, a biologically nonneutral or specific stimulus. So closely were the two stimuli associated by the dog that the bell came to be substituted for the food, and the dog reacted to the bell as he originally had to the food.

The implications for human learning were important. Some neutral stimulus (bell) associated with an unconditioned stimulus (food) at the same time of the response gradually acquired the association to elicit the response (salivation). The theory has led to a wealth of laboratory investigations about learning and has become a focal point in social and political discussions—for example, Aldous Huxley's futuristic novel *Brave New World* and the movies *The Deer Hunter*, *Jacob's Ladder*, *The Silence of the Lambs*, and *Robo Cop*.

On the American scene, James Watson used Pavlov's research as a foundation for building a new science of psychology based on behaviorism. The new science emphasized that learning was based on the science of behavior, what was observable or measurable, and not on cognitive processes. The laws of behavior were derived from animal and then human studies and were expected to have all the objectivity of the laws of science.

For Watson and others, the key to learning was to condition the child in the early years of life, based on the method Pavlov had demonstrated for animals. Thus, Watson once boasted, "Give me a dozen healthy infants ... and my own specified world to bring them up and I'll guarantee to take anyone at random and train him to be any type of specialist I might select—a doctor, lawyer, artist ... and yes into beggar man and thief, regardless of his talents ... abilities, vocations and race."

Connectionism

One of the first Americans to conduct experimental testing of the learning process was Edward Thorndike, who is considered the founder of behavioral psychology. At Harvard, Thorndike began his work with animals, a course of experimentation other behaviorists adopted as well.¹ Thorndike's work focused on testing the relationship between a stimulus and a response (classical conditioning). He defined learning as habit formation—as connecting more and more habits into a complex structure. Teaching, then, was defined by Thorndike as arranging the classroom so as to enhance desirable connections as bonds.

Three major laws of learning were developed by Thorndike: (1) the law of readiness—when a “conduction” unit is ready to conduct, to do so is satisfying and not to do so is annoying; (2) the law of exercise—a connection is strengthened in proportion to the number of times it occurs, and in proportion to average intensity and duration; and (3) the law of effect—responses accompanied by discomfort weaken the connection.

The law of readiness suggests that when the nervous system is ready to conduct, it leads to a satisfying state of affairs; this has been misinterpreted by some educators as referring to educational readiness, such as readiness to read. The law of exercise provides justification for drill, repetition, and review and is best illustrated today by instruction in basic math and foreign language classes and basic skill instructional approaches. Although reward and punishments were used in schools for centuries prior to Thorndike's formulation of the law of effect (people repeat responses that on previous occasions produced satisfying effects), his theory did make it more explicit and furnished justification for what was already being done. B. F. Skinner's operant model of behavior, programmed instruction, military training, and many current ideas based on providing satisfying (and unsatisfying) experiences to the learner, as well as reinforcement in the form of prompt feedback, are rooted in this law.

Thorndike maintained that (1) behavior was influenced more likely by conditions of learning; (2) attitudes and abilities of learners could change (and improve) over time through proper stimuli; (3) instructional experiences could be designed and controlled; and (4) it was important to select appropriate stimuli or learning experiences that were integrated and consistent, and that reinforced each other. For Thorndike, no one subject was more likely than another to improve the mind; rather learning was a matter of relating new learning to previous learning (an idea that John Dewey and Ralph Tyler later adopted). According to Thorndike, the view that one particular subject is better than another subject for “improvement -of the mind . . . seems doomed to disappointment.” The fact is “good thinkers” take certain subjects, not that certain subjects result in good thinking. “If the abler pupils should all study physical education and dramatic art, these subjects would seem to make good thinkers.”

Thus, Thorndike was critical of the “psychology of mental discipline,” the dominant theory of learning during the turn of the twentieth century—advocated by traditional educators of the era. His attack meant that there was no hierarchy of subject matter and that learning involved constructs between stored knowledge, memories of experience, and new information or stimuli—a schema theory very similar to Piaget’s notions of knowledge acquisition and comprehension.

But entrenched beliefs die hard. Traditional educators argued that certain subjects—such as Latin, classical studies, rhetoric, and mathematics—were most valuable for training the mind; that such training was transferable to various mental tasks of the learner; and that such subjects (or lack of these subjects) led to “superior” and “inferior” tracks. This view was criticized not only by Thorndike but also subsequently by John Dewey and other Progressive educators who felt such a mindset was rooted in traditionalism and elitism, and that the underlying philosophy taught students “docility, receptivity, and obedience.”

The two most prominent educators of the era (Thorndike and Dewey) objected to the mental discipline approach (a learning theory that maintained that the mind could be developed by certain tough subjects, similar to the way the body could be developed through exercise). However, for the next 50 years these ideas served as a basis for formulating the standard elementary and secondary curriculum with the concurrent belief that the right of students to an education should persist as far as their intellectual capabilities. Little recognition or provision was made for the less able student—well illustrated by the fact that as late as 1950, the high school dropout rate was as high as 40 percent and only 27 percent of 18- to 21-year-olds were enrolled in college.

The 1895 Committee of Fifteen, the prestigious and conservative task force headed by Charles Eliot, then president of Harvard University, solidified this position. It was reported that “grammar, literature, arithmetic, geography and history [were] the subjects in the elementary school with the greatest value for training the mind.” This view set the tone for most of the entire twentieth century, especially during the post-Sputnik and Cold War era, when the subjects with the greatest value were considered to be math and science. Music, art, and physical education were considered secondary or unimportant, an idea that persists today in many schools where essentialist philosophy and back-to-basics have been revived under the banner of standards-based education and school reform.

Operant Conditioning

Perhaps more than any other recent behaviorist, B. Frederick Skinner attempted to apply his theories to the classroom situation. Basing a major part of his theories on experiments with mice and pigeons, Skinner distinguished two kinds of responses: elicited, a response identified with a definite stimulus, and emitted, a response that is

apparently unrelated to an identifiable stimulus. When a response is elicited, the behavior is termed respondent. When it is emitted, the behavior is operant—that is, no observable or measurable stimuli explain the appearance of the response. In operant conditioning, the role of the stimuli is less definite; often, the emitted behavior cannot be connected to a specific stimulus.

Reinforcers can be classified, also, as primary, secondary, or generalized. A primary reinforcer applies to any stimulus that helps satisfy a basic drive, such as for food, water, or sex. (This reinforcer is also paramount in classical conditioning.) A secondary reinforcer is important for students, such as getting approval from friends or teachers, receiving good grades, or winning school awards. Although secondary reinforcers do not satisfy primary drives, they can be converted into primary reinforcers, because of their choice and range, and thus Skinner refers to them as generalized reinforcers. Classroom teachers have a wide variety of secondary reinforcers at their disposal, ranging from words of praise or smiles to words of admonishment or punishment.

Operant behavior will discontinue when it is not followed by reinforcement. Skinner classifies reinforcers as positive or negative. A positive reinforcer is simply the presentation of reinforcing stimulus. A student receives positive reinforcement when a test paper is returned with a grade of A or a note that says, "Keep up the good work." A negative reinforcer is the removal or withdrawal of a stimulus. When a teacher shouts to the class "Keep quiet," and the students quiet down, the students' silence reinforces the teacher's shouting. Punishment, on the other hand, calls for the presentation of unpleasant or harmful stimuli or the withdrawal of a (positive) reinforcer, but it is not always a negative reinforcer. Although Skinner believes in both positive and negative reinforcement, he tends to reject punishment because he feels it inhibits learning.

Acquiring New Operants

Skinner's approach of selective reinforcement, whereby only desired responses are reinforced, has wide appeal to educators because he has demonstrated its application to the instructional and learning process. An essential principle in the reinforcement interpretation of learning is the variability of human behavior, which makes change possible. Individuals can acquire new operants—that is, behavior can be shaped or modified and complex concepts can be taught to students. The individual's capability for the desired response is what makes the shaping of behavior or the learning possible. Behavior and learning can be shaped through a series of successive approximations, or a sequence of responses that increasingly approximate the desired one. Thus, through a combination of reinforcing and sequencing desired responses, new behavior is shaped; this is what some people today refer to as behavior modification.

Although behavior modification approaches vary according to the student and the behavior being sought, they are widely used in conjunction with behavioral objectives, individualized instructional techniques, computerized learning, and classroom-

management techniques. Student activities are specified, structured, paced, reinforced, rewarded, and frequently assessed in terms of learning outcomes or behaviors desired. With this approach, curriculum, as defined by Popham and Baker, is "all planned outcomes for which the school is responsible and the desired consequences of instruction."

Observational Learning and Modeling

Albert Bandura has contributed extensively to what we know today about how aggressive behavior can be learned from viewing human adults acting aggressively in real situations as well as in movies and television. The same children also learn nonaggressive behavior by observing humans of subdued temperaments.

The repeated demonstration that people can learn and have their behavior shaped by observing another person or even a film (obviously, the influence of TV is immense) has tremendous implications for modifying tastes and attitudes (i.e., whether we deserve to take a break at McDonalds or Burger King), how we learn and perform, or whether as a society we want to develop soldiers or artists. For behaviorists, the idea suggests that cognitive factors are unnecessary in explaining learning; through modeling, students can learn how to perform at sophisticated levels of performance. They can learn how to ski, participate in democratic citizenry, engage in moral or caring behavior, or become the culprit in a shootout in the school cafeteria. While recognizing the value of reinforcement and reward, the learner needs mainly to attend to and acquire the necessary responses through observation and then to model the behavior later. See Teaching Tips 3.1.

Bandura is also associated with the theories of vicarious learning. Although most modeling is reinforced first by observation and then by imitating behavior, others learn by seeing other people rewarded or punished for engaging in certain behaviors. We all know that our chance for winning the lottery is perhaps one out of 10 million, but seeing or reading about others rewarded makes many of us participate. Teachers use the same principle in rewarding certain behaviors in front of the class, providing verbal praise, or displaying a student's work on the bulletin board.

Behaviorism in Classroom Learning Situations (Teaching Tips 3.1)

A wide range of behaviors can be used when applying behavioral theories in the classroom. The following suggestions have meaning for behaviorist teaching and learning situations.

1. Consider that behavior is the result of particular conditions; alter conditions to achieve desired behaviors.
2. Use reinforcement and rewards to strengthen the behavior you wish to encourage.

3. Consider extinction or forgetting by reducing the frequency of undesirable behaviors.
4. Reduce undesirable behaviors as follows:
 - a. Withhold reinforcement of ignore the behavior.
 - b. Call attention to rewards that will follow the desired behavior.
 - c. Take away a privilege or resort to punishment.
5. When students are learning factual material, provide frequent feedback; for abstract or complex material, provide delayed feedback.
6. Provide practice, drill, and review exercises; monitor learners' progress.
7. Consider workbooks, programmed materials, and computer programs that rely on sequenced approaches.
8. When students struggle with uninteresting material, use special reinforcers and rewards to motivate them.
 - a. Select a variety of reinforcers students enjoy (candy bars, bubble gum, baseball cards).
 - b. Establish a contract for work to be performed to earn a particular award or grade.
 - c. Provide frequent, immediate rewards.
9. Make use of observational learning.
 - a. Select the most appropriate model.
 - b. Model the behavior clearly and accurately.
 - c. Insist that learners attend to what is being modeled.
 - d. Provide praise when the desired behavior is exhibited.
 - e. Have the learner practice the observed behavior.
 - f. Provide corrective feedback during practice.
 - g. Repeat demonstrations when necessary.
 - h. Reinforce desired behaviors.
 - i. Model behavior in similar settings in which learners will use new skills.
10. Assess changes in learning and behavior.
 - a. Diagnose learning problems.
 - b. Establish levels of competency or mastery.
 - c. Provide feedback.
 - d. Integrate old tasks or skills with new ones.
 - e. Reteach, when necessary.
 - f. Take other actions.

Hierarchical Learning

Robert Gagné has presented a hierarchical arrangement of eight types of learning sets or behaviors that has become a classic model. In fact, the model for learning has been adapted by the education, business, and military industries. The behaviors are based on

prerequisite conditions, resulting in a cumulative process of learning. The eight types of learning and examples of each follow:

1. Signal learning. Classical conditioning, a response to a given stimulus. Example: Fear response to a rat.
2. Stimulus response. Operant conditioning (S-R), a response to a given stimulus. Example: Student's response to the command "Please sit."
3. Motor chains. Linking together two or more S-R connections to form a more complex skill. Example: Dotted the i and crossing the t to write a word with an i and a t.
4. Verbal associations. Linking together two or more words or ideas. Example: Translating a foreign word.
5. Multiple discriminations. Responding in different ways to different items of a particular set. Example: Discriminating between grass and trees.
6. Concepts. Reacting to stimuli in an abstract way. Examples: Forming and understanding words that categorize or classify other words, such as animals, grammar, and so on.
7. Rules. Chaining two or more stimulus situations or concepts. Examples: Animals have offspring. An adjective is a noun.
8. Problem solving. Combining known rules or principles into new elements to solve a problem. Example: Finding the area of a triangle given the dimensions of two sides.

Gagné's hierarchy of learning represents a transition between behaviorism and cognitive psychology; the first four behaviors are behaviorist and the last four are mainly cognitive. Learning, according to Gagné, comprises a hierarchical sequence that orders instructional materials and methods from simple to complex. The idea is that general theories, principles, and/or concepts (what Jerome Bruner would describe as the "structure" of a subject) encompass specific ideas and knowledge—which need to be learned before advanced learning. Other learning theorists (including David Ausubel and Robert Marzano) maintain that by understanding general principles and concepts (Ausubel calls them "advance organizers"), a learner is able to learn more efficiently because it is easier to assimilate new information into prior information. Whereas Gagné and Bruner represent a bottom-up theory of learning, Ausubel and Marzano represent a top-down theory. A middle position delineated by Dewey is that information is best learned and remembered when it is related to students' experiences and has direct application to their immediate environment. All three approaches to learning are acceptable and used by teachers, depending on the students' abilities (and age) and content of subject matter.

Gagné also describes five learning outcomes that can be observed and measured and encompass all the domains of learning: (1) intellectual skill, "knowing how" to categorize and using verbal and mathematical symbols, forming concepts through rules and problem solving; (2) information, which can be described as "know what" knowledge about facts, names, and dates; (3) cognitive strategies, skills needed to process and organize information, what today is called "learning strategies" or "learning skills"; (4) motor skills, the ability to coordinate movements and complex movements, which come with practice and coaching; and (5) attitudes, feelings and emotions learned through positive and negative experiences.

The five outcomes overlap with the three domains (cognitive, psychomotor, and affective) of the taxonomy of education objectives. The first three of Gagné's capabilities mainly fall within the cognitive domain, motor skills correspond with psychomotor domain, and attitudes correspond with the affective domain. The mental operations and conditions involved in each of the five outcomes are different. Writes Gagné, "Learning intellectual skills requires a different design of instructional events from those required for learning verbal information or from those required for learning motor skills and so on."

The "Shock Machine"

Much of Stanley Milgram's professional life is surrounded by controversy because of his experiments on obedience conducted while at Yale University in 1962. As many as 65 percent of his subjects, who were ordinary residents of New Haven, Connecticut (including college graduates), were willing to follow orders and give what they thought were harmful electric shocks (up to 450 volts) to loudly protesting "victims" simply because some scientific-looking authority commanded them when the victim wrongly answered a question. The victims were actors who did not actually receive the shocks, but the subjects were convinced during the experiment that they were instilling the electric shocks. At the end of the experiment, the subjects were debriefed about the real facts. Nonetheless, the experience was painfully real for most participants, and they felt enthusiastically involved.

Milgram's work does not receive attention in most psychology or learning texts because his experiment was considered highly provocative, involving questions about the ethics of the research and practices involving human subjects. He never took a single psychology course as an undergraduate and took only six graduate psychology courses at three different New York area universities in one summer in 1954. His experiment led to criticism in many newspapers, for the stress created among willing subjects, and the American Psychological Association (APA) temporarily suspended his application for membership. More than 10 years later, after a televised CBS special, Milgram received honors and awards, and his shock machine was placed on exhibit supported by the APA. His experiment has been replicated in dozens of countries over a 25-year period with

similar devastating results and with no differences between men and women, subsequently raising issues about human behavior, brain washing, and mass conformity. From Hitler's, Stalin's, and Hirohito's willing believers, to the Serbian and jihad soldiers, obedience to authority helps explain how ordinary people can blindly follow orders and commit some of the most brutal and horrific crimes (murder, torture, plunder, rape of innocent civilians), even to die doing it thinking they will be rewarded in the next life.

Implications of Obedience

Milgram's experiment is a gripping read and helps explain how people can follow orders, commit some of the worst crimes against humanity, then rationalize or defend their behavior ("We were merely following orders") and show little or no remorse. Going beyond the effects of behaviorism and stimulus response experiments, we live in a culture where individual personal memories and publicly collected memories are given increasing importance in the media, in the courts, and among policymakers. We are asked by black Americans 150 years later not to forget about slavery, as a rationale for affirmative action, and we expect the Germans not to forget 55 years after the fact, and thus pay reparations for their crimes. Indeed, obedient people must sometimes pay for their mistakes.

In a letter from Mortimer von Falkenhausen in 1948 to a Jewish friend who escaped to America four weeks before Kristallnacht, the German pogrom of November 1938, he wrote: "What I will never be able to fathom is this fact that countless Germans, without a word of protest, let themselves descend to the level of sadistic criminals who murdered and raged like wild animals—and found such behavior perfectly normal."

Of course, there is a difference between turning a blind eye or remaining silent and participating, or even worse, getting enjoyment or an adrenaline rush by giving electric shocks to people in a New Haven laboratory, Devil's Island, or Dachau. But the distinction becomes blurred when we focus on mass behavior; immorality, and the destructive consequences of blindly following orders of some leader. Why are so many people able to shed their consciences and rationalize amoral behavior? Is it peer pressure, custom, or the accidents of history? Or, is it just a matter of human frailty, an obscure genome that is embedded in 65 percent of human species (the New Haven percentage) willing to conform and show obedience?

Can human beings be programmed to operate any which way by a puppet producer or authority figure? Classical behaviorists say yes, and behaviorists might even say that with today's computerized and electronic world, we can program people and shrink-wrap them into a Microsoft-like disk with precise coded instructions on how to behave. Surely robots have no individuality, no souls, no spirit; but sometimes, individuals are programmed to behave as robots. Indeed, history makes it very clear that zealous soldiers, crusaders, cult followers, kamikaze pilots, and religious terrorists come in all sizes, shapes, and shades—and from all time periods and civilizations. The more someone

is conditioned to be a follower or puppet, the more capable the person is to commit brutal acts and atrocities. The barbarians have always been perched at the gates; failure to respond, inadequate, or irregular responses, breeds further barbarianism.

Rather than saying no, most of us permit and some participate in abuses, hypocrisy, and evil behavior. Social and moral responsibility requires a certain minimum of inner strength and self-confidence; an ability of the individual to question authority, custom, and the dominant ideology within his or her society; and to be skeptical of the workings of big business, religion, and government. During the French Revolution, in which so much blood was spilled, Robespierre was asked, "Is there a voice inside you that every so often whispers in secret—you're lying, you're lying." Fifty years later, Victor Hugo raised a similar question in *Les Misérables*, by describing the fanaticism of Inspector Javie, who hunted down Jean Val Jean for 30 years because he stole a loaf of bread. The inspector's defense was the law, or, more accurately, the perversion of law. The law was used in France to cripple the minds and spirits of the enemies of the state. During the twentieth century, prisoners were shipped to Devil's Island, some because of criminal behavior and some because they questioned political authority or challenged the law. Over time, many of these people were reduced to the status of walking, mindless zombies.

And if it happened in France where the Age of Enlightenment once flourished, in a place where Franklin and Jefferson felt more at home than in Philadelphia or Monticello, then it can happen here, there, anywhere. Yes, the law can be perverted and used as an instrument to build and justify any ugly ideology or "ism," whereby the individual succumbs to the rule of authority and remains obedient to a cult figure, philosopher-king, guru, or outright "nut." Given this diagnosis of the human condition, especially the generic appeal to authority, and that many nations throughout history have needed warlike missions to stir the populace, one can better understand the likes of Bin Laden, Idi Amin, Hussain, Quaddafi, Castro, and Mao—and their control over the herd.

Ortega y Gasset's dictum, in *The Revolt of the Masses*, rings loud in describing how easily men and women can be conditioned to behave, how "the mass man will rule as well as be ruled." The truth is, most people on planet Earth, including most Americans, can adopt more easily to Sparta than Athens, more easily to the empire than the republic. The latter requires education and critical thought. As Alan Bloom asserts, we refuse to take positions on right or wrong, based on standards of truth; rather, we welcome no-fault choices. Our media and educational institutions are marked by easy-going, flippant indifference to critical thought and standards of excellence. We avoid an engagement with the great works and great minds of the past. Our students lack educational depth and thus are prone to become docile, obedient, and conforming students in class and, later, docile, conforming, and obedient citizens. In most classrooms, right answers count, not critical thought. Pleasing the teacher (i.e., the authority figure) takes precedence over questioning the teacher—and regurgitating from the textbook,

regardless of the author's biases and social/political lens, is often expected from students and encouraged by the teacher.

Brain Circuits, Choice, and Conditioning

Do people make conscious choices? The latest theory is that humans became conditioned by habit and routine—and lose their individual consciousness. As children develop, their brains develop internal methods of identifying objects and responding to people, and thus predicting how they move and respond to their environment. As stimuli flow from the external world to the brain, humans compare it to what they already know. If things are familiar or match up, there is little conscious awareness of the surrounding environment. If there is a surprise or a detour in our daily life experiences, the brain shifts to a new state and we become more conscious of what we are doing.

According to one recent estimate, 90 percent of what people do everyday coincides with habit or predictable events, so that we usually operate on “automatic” response. To use the vernacular, we become zombies much of the time. Animals use their brain circuits to determine what to attend to, what to react to, and what to ignore. Humans have bigger, more complex brains and make decisions about what to learn, what to eat, and other decisions in life, including assessing rewards or lack of rewards. Our behavior is conditioned by a set of expectations and reward systems. The best learning, according to this theory, takes place when the person is confronted with an unexpected event or unexpected reward, thus producing a dopamine rush. Fluctuating levels of rewards make people do things outside their conscious awareness.

Money, for most people, is similar to drugs, food, or sex—or anything a person expects as a reward. Cookies and candy have a similar effect on small children. People crave it! Anything that people crave can be used as a vehicle for modifying behavior. Some people crave winning in sports because of recognition or money and will engage in unethical behavior; others crave power and will steal or kill to maintain it; still others crave martyrdom and will commit suicide for the Emperor, the Fuhrer, or Allah. Once the mind is hijacked (conditioned), where the person loses a sense of conscious awareness, he or she becomes capable of engaging in group behavior, even fanatic behavior. It can become emotionally depressing to realize what human beings are capable of doing to innocent fellow human beings. Once they lose sight of their individual thoughts or consciences and become part of group or mob behavior, then all forms of atrocities and vile deeds are possible. If it's a matter of conditioning people to commit murder, it is easier if it is fixed to some political or religious utopia. The Puritans killed witches who they believed had demonic power and were casting Satan's evil spells, and Moslem extremists want to murder Americans who they believe are the infidel. As one true believer puts it, “Nonmuslims are our enemy according to the Koran, so Americans are our enemy. We hate America. I believe in jihad” (a holy war).

Once the brain becomes conditioned to crave a stimulus, the person becomes either self-destructive or highly dangerous. Because of craving, some people may regularly gamble, knowing the chances are they will lose money. Others will smoke knowing there is a good chance they will die from it. Still others totally abdicate their individual identities and critical faculties and are willing to die for politics or religion based on faith, hope, or hatred. Nazism appealed to millions of Germans because it promised not only prosperity but also greatness, even salvation. Muslim extremism also eliminates individual thought and makes similar promises to its followers, with the end being paradise.

Hitler and the Germans believed the Jews posed a mortal threat and had to be eliminated. Bin Laden, his al-Qaeda network, and the extreme Muslim world believe America and the West's cultural messages pose a major threat and have to be destroyed. In both cases, the brain systems of political and religious followers have been short-circuited, to the extent they have lost their individual identities and consciences. What happened in Nazi Germany can be expected to happen to Moslem extremists a downward spiral of hate, rage and self-pity, a notion of victimhood and imposed oppression, and the eventual shattering of their world. It doesn't take a genius to compare the rise of Hitler with Bin Laden, and/or the sneak attack at Pearl Harbor with events of 9-11.

Human Conditioning and Biotechnology

The old world of behaviorism and human conditioning intersect with the world of biotechnology, or what one scientist calls "our post-human future." We are on the verge of discovering and implementing an alternative to thinking and behaving, based on prescribing Prozac, Ritalin, and other drugs to modify mental processes and behaviors. Even more controversial, we are about to alter normal evolution by intervening in the genetic process, designing babies, strengthening bodies, cloning, producing interspecies hybrids in food and animals, expanding stem cell research and anti-aging research. Here, science, psychology, philosophy, and politics collide as we try to establish policies in this milieu of biotechnology and medical research?

On a simple level, our national past time has been affected by this brave new world, not only in terms of the way baseball derives its statistics but also in how many dads and sons bond as they talk about baseball box scores, discuss Topps baseball cards, and compete and strategize in fantasy leagues based on real players. Reliable estimates are that possibly one-third of major leagues players, most of them "heavy hitters," have been using steroids for the last 10 or more years. Thus, baseball's records are collapsing at an astonishing rate from "beefed-up" bodies and numbers. Most fans know that Babe Ruth wasn't exactly sober every time he got up at the bat, even during Prohibition but did Hank Aaron use steroids? Mark McGuire, Sammy Sosa, and Barry Bonds, our super-baseball heroes, seem to have beefed-up bodies. Most of our athletes are faster,

stronger, smarter, and happier. Is all this improvement related only to food and exercise?

In our schools, about 26 percent of the student population is on Ritalin and other drugs to control hyperactivity and other so-called disruptive behavior. The controversy over using medication, instead of psychological conditioning or behavioral modification, is debated in the professional literature and has ethical implications. And, there are other drugs that can enhance memory and that would make present learning theory outdated and mundane. Drugs, psychological therapy, and physical changes in the school environment, which shapes one's senses and performance, have the potential to make George Leonard's vision, *Education and Ecstasy*, a reality?

On the level of society, we have reached a point that approaches Orwell's 1984 and Huxley's *Brave New World*. All our notions of human equality, human rights, and moral choices are being challenged as we develop new techniques for altering personality, behavior, the quality and growth of intellectual and physical attributes, and even the rate and vision of living. There is such a thing as the nature of man and the concept of balance (or the golden rule). I think Aristotle, and later Ruth Benedict and Kinsley Davis who wrote about *Patterns of Culture* (1934) and *Human Society* (1948), got the balance right. In this biotech work of ours, there are many philosophical and social questions that have global reach. If I was forced to bet on the optimism of Locke or the pessimism of Hobbes in terms of human nature and the future of the human species, sadly, I would opt for Hobbes's interpretation of the human condition, since I believe there is more potential for evil than good in the character of people, nation-states, empires, and spiritual institutions.

Behaviorism and Teaching

Behaviorism still exerts an impact on education, although the influence has declined in the last 20 or 30 years. Teachers who are behaviorists use many principles of behaviorism in the classroom and in the creation of new programs. Although what influences learning differs for different students, teachers can adopt procedures to increase the likelihood that each student will find learning relevant and enjoyable. When new topics or activities are introduced, connections should be built on positive experiences each student has had. Things about which each student is likely to have negative feelings about should be identified and modified, if possible, to produce positive results.

Behaviorists believe that the curriculum should be organized so students experience success in mastering the subject matter. Of course, all teachers, regardless of their psychological camps, have this view. The difference is that behaviorists are highly prescriptive and diagnostic in their approach and they rely on step-by-step, structured methods of teaching; learning is monitored and broken down into small tasks with appropriate sequencing of tasks and reinforcement of desired behaviors.

It should be noted that behaviorist theories have been criticized as describing learning too simply and mechanically—and as perhaps reflecting overreliance on classical animal experimentation. Human learning involves complex thinking processes beyond respondent conditioning (or recall and habit) and operant conditioning (or emitted and reinforced behavior). A further concern, according to Robert Travers, is that there is little justification to define learning in terms of a “collection of small bits of behavior each of which has to be learned separately.” Although behavior consists of organized sequences, it is not a collection of tiny bits of behavior. The stress on prescribed, lock-step procedures and tasks—and a “belief that a behavioral science should be definable in terms of observable events—[are] hardly justifiable today.”

The latter criticism may be an overstatement, because many behaviorists today recognize cognitive processes much more than classical or S-R theorists, and they are flexible enough to hold that learning can occur without the individual's having to act on the environment or exhibit overt behavior. To the extent that traditional behavioral theory can be faulted for having to rely on identifying all behavior, many contemporary behaviorists are willing to consider that cognitive processes partially explain aspects of learning.

But behaviorism is alive and well; it is linked to many current educational practices affecting classrooms and schools. Wrote Robert Glaser some 20-plus years ago:

Much of the application of psychological theory currently going on in schools represents the earlier behavioristic approach. The concepts of behavioral objectives and behavior modification, for example, now pervade all levels of education, including special education, elementary school instruction in basic literacy skills and personalized systems of instruction.

The same statement could be made today; and it would be appropriate to add such behavioral approaches as mastery learning, outcome-based education, and standards-based education. In general, combining behaviorism with learning includes careful analyzing and sequencing of the learners' needs and behaviors. Principles of testing, monitoring, drilling, and feedback are characteristic. The learning conditions needed for successful outcomes are carefully planned through small instructional steps and sequences of responses that increasingly approximate the desired behavior or learning. The teacher emphasizes a carefully planned lesson, clearly stated objectives, coinciding with logically organized materials with emphasis on getting the “correct” answer or achieving clearly defined outcomes. The teacher monitors the progress of students on a regular basis, using individualized materials, tutoring, and small-group projects. These basic principles tend to coincide with today's basic skill training programs in reading and literacy, as well as methods of individualized instruction, direct instruction, continuous progress, instructional design, and competency-based education. These steps and

sequences are shown in Table 3.1. Although these procedures are predetermined, linear, and planned in advance, some observers claim they have a cognitive flavor, too.

Table 3.1 – A Cognitive-Behaviorist Approach to Teaching and Learning			
Direct Instruction: Rosenshine Model	Mastery Learning: Block and Anderson Model	Guided Instruction: Hunter Model	Systematic Instruction: Good and Brophy Model
1. <i>State learning objectives.</i> Begin lesson with a short statement of objectives.	1. <i>Clarify.</i> Explain to students what they are expected to learn.	1. <i>Review.</i> Focus on previous lesson; ask students to summarize main points.	1. <i>Review.</i> Review concepts and skills related to homework; provide review exercises.
2. <i>Review.</i> Introduce short review of previous or prerequisite learning.	2. <i>Inform.</i> Teach the lesson, relying on whole-group instruction.	2. <i>Anticipatory set.</i> Focus students' attention on new lesson; stimulate interest in new materials.	2. <i>Development.</i> Promote student understanding; provide examples, explanations, and demonstrations.
3. <i>Present new materials.</i> Present new materials in small, sequenced steps.	3. <i>Pretest.</i> Give a formative quiz on a no-fault basis; students can check their own papers.	3. <i>Objective.</i> State explicitly what is to be learned; state rationale or how it will be useful.	3. <i>Assess comprehension.</i> Ask questions; provide controlled practice.
4. <i>Explain.</i> Give clear and detailed instructions and explanations.	4. <i>Group.</i> Based on results, divide the class into master and nonmastery groups (80 percent is considered mastery.)	4. <i>Input.</i> Identify needed knowledge and skills for learning new lesson; present material in sequenced steps.	4. <i>Seatwork.</i> Provide uninterrupted seatwork; get everyone involved; sustain momentum.
5. <i>Practice.</i> Provide active practice for all students.	5. <i>Enrich and correct.</i> Give enrichment instruction to mastery group; give corrective (practice/drill) to nonmastery group.	5. <i>Modeling.</i> Provide several examples or demonstrations throughout the lesson.	5. <i>Accountability.</i> Check the students' work.
6. <i>Guide.</i> Guide students during initial practice; provide seatwork activities.	6. <i>Monitor.</i> Monitor student progress; vary amount of teacher time and support for each group based on group size and performance.	6. <i>Check for understanding.</i> Monitor students' work and check to see if they understand directions or tasks.	6. <i>Homework.</i> Assign homework regularly; provide review problems.
7. <i>Check for understanding.</i> Ask several questions; assess student comprehension.	7. <i>Posttest.</i> Give a summative quiz to nonmastery group.	7. <i>Guided practice.</i> Periodically ask students questions or problems and check their answers. Again, monitor for understanding.	7. <i>Special reviews.</i> Provide weekly reviews to check and enhance learning; provide monthly reviews to further maintain and enhance learning.
8. <i>Provide feedback.</i>	8. <i>Assess performance.</i>	8. <i>Independent</i>	

Provide systematic feedback and corrections.	At least 75% of students should achieve mastery by the summative test.	<i>practice</i> . Assign independent work or practice when it is reasonably certain that students can work on their own with minimal frustration and understanding.	
9. <i>Assess performance</i> . Obtain student success rate of 80 percent or more during practice session.	9. <i>Reteach</i> . If needed, repeat procedures starting with corrective instruction (small study groups, individual tutoring, alternative instructional materials, extra homework, reading materials, practice and drill.		
10. <i>Review and test</i> . Provide for spaced review and testing.			

The contributions of behaviorists to psychology and education, as well as teaching and learning, were great during the past century, and it is likely that behaviorism will continue to influence the teaching field. However, most behaviorists are aware that, as we learn more about learners and learning, we cannot adhere to rigid doctrines. Human beings are not pigeons or mice, the subjects of early behaviorists. We are a little more complicated in terms of thinking and behavior. Perspectives that allow for investigations of the mind and psyche have been incorporated into behaviorism. Cognitive developmental theories are being integrated into some behaviorists' approaches to human learning—often called cognitive psychology or cognitive science.