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Chapter 16
Skinner: Behavioral Analysis

Learning Objectives

After reading this chapter, students should be able to accomplish the following objectives:

1. Discuss the contributions of E. L. Thorndike and J. B. Watson to Skinner's learning theory.
2. Explain Skinner's philosophy of science.
3. Discuss the effects of positive reinforcement, negative reinforcement, and punishment on behavior.
4. Explain the differences between operant and classical conditioning.
5. Describe the process of shaping, and give examples of how complex behaviors can be shaped.
6. Distinguish between conditioned and generalized reinforcers.
7. Identify and give examples of four different schedules of reinforcement.
8. Discuss ways in which natural selection influences personality.
9. Discuss Skinner's views on inner states and complex behavior.
10. List the methods of social control and self-control according to Skinner.
11. Explain Skinner's approach to understanding the unhealthy personality.

Lecture Outline

I. Overview of Behavioral Analysis

During the early years of the 20th century while Freud, Jung, and Adler were relying on clinical practice and before Eysenck and Costa and McCrae were using psychometrics to build theories of human personality, an approach called **behaviorism** emerged from laboratory studies of animals and humans. Two of the early pioneers of behaviorism were E. L. Thorndike and John Watson, but the person most often associated with the behaviorist position is B. F. Skinner, whose **behavioral analysis** is a clear departure from the highly speculative psychodynamic theories.

Skinner's strict adherence to observable behavior earned his approach the label **radical behaviorism**, a doctrine that avoids all hypothetical constructs, such as ego, traits, drives, needs, and hunger. As a *determinist*, he rejected the notion of volition or free will. He recognized that genetic factors are important, but he insisted that, because they are fixed at conception, they are of no help in the control of behavior. The *history* of the individual, rather than anatomy, provides the most useful data for predicting and controlling behavior.

II. Biography of B. F. Skinner

B. F. Skinner was born on March 20, 1904, in Susquehanna, Pennsylvania, the first child of William Skinner and Grace Mange Burrhus Skinner. As a child, Skinner was inclined toward music and literature. Although Skinner had never taken an undergraduate psychology course, Harvard accepted him as a graduate student in psychology. After he completed his PhD in 1931, Skinner received a fellowship from the National Research Council to continue his laboratory research at Harvard.

In 1936, Skinner began a teaching and research position at the University of Minnesota, where he remained for 9 years. In 1944, Skinner dramatically demonstrated to government officials the feasibility of the project by producing a live pigeon that unerringly tracked a moving target. Despite this spectacular demonstration, some observers laughed and most remained skeptical.

In 1948, Skinner returned to Harvard, where he taught mostly in the College of Education and continued with some small experiments with pigeons. After he retired from teaching in 1964, Skinner wrote several important books on human behavior that helped him attain the status of America's best-known living psychologist. In addition to *Beyond Freedom and Dignity* (1971), he published *About Behaviorism* (1974), *Reflections on Behaviorism and Society* (1978), and *Upon Further Reflection* (1987a). During this period, he also wrote a three-volume autobiography, *Particulars of My Life* (1976a), *The Shaping of a Behaviorist* (1979), and *A Matter of Consequences* (1983).

On August 18, 1990, Skinner died of leukemia. One week before his death, he delivered an emotional address to the American Psychological Association (APA) convention in which he continued his advocacy of radical behaviorism. At this convention, he received an unprecedented Citation for Outstanding Lifetime Contribution to Psychology, the only person to receive such an award in the history of APA. During his career, Skinner received other honors and awards, including serving as William James Lecturer at Harvard, being granted the 1958 APA Distinguished Scientific Award, and winning the President's Medal of Science.

III. Precursors to Skinner's Scientific Behaviorism

For centuries, observers of human behavior have known that people generally do those things that have pleasurable consequences and avoid doing those things that have punitive consequences. However, the first psychologist to systematically study the consequences of behavior was Edward L. Thorndike, who worked originally with animals (Thorndike, 1898, 1913) and then later with humans (Thorndike, 1931).

Thorndike observed that learning takes place mostly because of the effects that follow a response, and he called this observation the **law of effect**. As originally conceived by Thorndike, the law of effect had two parts. The first stated that responses to stimuli that are followed immediately by a *satisfier* tend to be "stamped in"; the second held that responses to

stimuli that are followed immediately by an *annoyer* tend to be "stamped out." Thorndike later amended the law of effect by minimizing the importance of annoyers. Whereas rewards (satisfiers) strengthen the connection between a stimulus and a response, punishments (annoyers) do not usually weaken this connection. A second and more direct influence on Skinner was the work of John B. Watson (J. B. Watson, 1913, 1925; J. B. Watson & Rayner, 1920).

In *Psychology as the Behaviorist Views It*, Watson (1913) argued that human behavior, like the behavior of animals and machines, can be studied objectively. He attacked not only consciousness and introspection but also the notions of instinct, sensation, perception, motivation, mental states, mind, and imagery. Each of these concepts, he insisted, is beyond the realm of scientific psychology.

IV. Scientific Behaviorism

Like Thorndike and Watson before him, Skinner insisted that human behavior should be studied scientifically. His scientific behaviorism holds that behavior can best be studied without reference to needs, instincts, or motives. Attributing motivation to human behavior would be like attributing a free will to natural phenomena.

Scientists can easily accept the idea that the behavior of the wind, rocks, and even birds can be studied without reference to an internal motive, but most personality theorists assume that people are motivated by internal drives and that an understanding of the drives is essential. Skinner disagreed.

This assumption clouds the issue and relegates much of psychology to that realm of philosophy known as **cosmology**, or the concern with causation. To be scientific, Skinner (1953, 1987a) insisted, psychology must avoid internal mental factors and confine itself to observable physical events. Although Skinner believed that internal states are outside the domain of science, he did not deny their existence. Such conditions as hunger, emotions, values, self-confidence, aggressive needs, religious beliefs, and spitefulness exist; but they are not explanations for behavior.

A. Philosophy of Science

Scientific behaviorism allows for an *interpretation* of behavior but not an *explanation* of its causes. Interpretation permits a scientist to generalize from a simple learning condition to a more complex one. Skinner (1978) used principles derived from laboratory studies to interpret the behavior of human beings but insisted that interpretation should not be confused with an explanation of why people behave the way they do.

B. Characteristics of Science

According to Skinner (1953), science has three main characteristics: First, science is

cumulative; second, it is an attitude that values empirical observation; and third, science is a search for order and lawful relationships.

V. Conditioning

Skinner (1953) recognized two kinds of conditioning, classical and operant. With classical conditioning (which Skinner called respondent conditioning), a response is drawn out of the organism by a specific, identifiable stimulus. With operant conditioning (also called Skinnerian conditioning), a behavior is made more likely to recur when it is immediately reinforced. One distinction between classical and operant conditioning is that, in classical conditioning, behavior is *elicited* from the organism, whereas in operant conditioning, behavior is *emitted*.

A. Classical Conditioning

In **classical conditioning**, a neutral (conditioned) stimulus is paired with—that is, immediately precedes—an unconditioned stimulus a number of times until it is capable of bringing about a previously unconditioned response, now called the conditioned response. The simplest examples include reflexive behavior.

An early example of classical conditioning with humans was described by John Watson and Rosalie Rayner in 1920 and involved a young boy—Albert B., usually referred to as Little Albert. This experiment demonstrated at least four points.

- First, infants have few, if any, innate fears of animals.
- Second, they can learn to fear an animal if it is presented in association with an aversive stimulus.
- Third, infants can *discriminate* between a furry white rat and a hard wooden block, so that fear of a rat does not generalize to fear of a block.
- Fourth, fear of a furry white rat can *generalize* to other animals as well as to other white hairy or furry objects.

B. Operant Conditioning

Although classical conditioning is responsible for some human learning, Skinner believed that most human behaviors are learned through **operant conditioning**. The key to operant conditioning is the immediate reinforcement of a response. The organism first *does* something and then is reinforced by the environment. Reinforcement, in turn, increases the probability that the same behavior will occur again. This conditioning is called operant conditioning because the organism operates on the environment to produce a specific effect.

With most cases of operant conditioning, the desired behavior is too complex to be emitted without first being shaped by the environment. **Shaping** is a procedure in which the experimenter or the environment first rewards gross approximations of the behavior, then

closer approximations, and finally the desired behavior itself. Through this process of reinforcing **successive approximations**, the experimenter or the environment gradually shapes the final complex set of behaviors (Skinner, 1953).

Operant behavior always takes place in some environment, and the environment has a selective role in shaping and maintaining behavior. This history of differential reinforcement results in **operant discrimination**. Skinner claimed that discrimination is not an ability that people possess but a consequence of their reinforcement history. A response to a similar environment in the absence of previous reinforcement is called **stimulus generalization**.

According to Skinner (1987a), **reinforcement** has two effects: It *strengthens the behavior* and it *rewards the person.* Not every behavior that is reinforced is rewarding or pleasing to the person. Any positive consequence that, when added to a situation, increases the probability that a given behavior will occur is termed a **positive reinforcer** (Skinner, 1953). Food, water, sex, money, social approval, and physical comfort usually are examples of positive reinforcers. Subtracting a negative consequence from a situation also increases the probability that the preceding behavior will occur. This removal results in **negative reinforcement** (Skinner, 1953). The reduction or avoidance of loud noises, shocks, and hunger pangs would be negatively reinforcing because they strengthen the behavior immediately preceding them.

Negative reinforcement should not be confused with punishment. Negative reinforcers remove, subtract, reduce, or help people avoid aversive consequences. **Punishment** is the presentation or addition of a negative, aversive consequence such as a hefty fine for an able-bodied driver parking in a handicapped spot ("positive punishment") or the removal of a positive one such as revoking a teenager's driving privileges for texting and driving ("negative punishment"). One effect of punishment is to *suppress behavior*. Another effect of punishment is the *conditioning of a negative feeling* by associating a strong aversive stimulus with the behavior being punished. A third outcome of punishment is the *spread of its effects*.

Food is a reinforcement for humans and animals because it removes a condition of deprivation. But how can money, which cannot directly remove a condition of deprivation, be reinforcing? The answer is that money is a **conditioned reinforcer**. Conditioned reinforcers (sometimes called secondary reinforcers) are those environmental stimuli that are not by nature satisfying but become so because they are associated with such unlearned or *primary reinforcers* as food, water, sex, or physical comfort. Money is a conditioned reinforcer because it can be exchanged for a great variety of primary reinforcers. In addition, it is a **generalized reinforcer** because it is associated with more than one primary reinforcer.

Reinforcement can follow behavior on either a continuous schedule or an intermittent one. With a **continuous schedule**, the organism is reinforced for every response. Skinner

preferred **intermittent schedules** not only because they make more efficient use of the reinforcer but because they produce responses that are more resistant to extinction. With a **fixed-ratio schedule**, the organism is reinforced intermittently according to the number of responses it makes. Ratio refers to the ratio of responses to reinforcers. With a fixed-ratio schedule, the organism is reinforced after every *n*th response. With the **variable-ratio schedule**, it is reinforced after the *n*th response *on the average.* With the **fixed-interval schedule**, the organism is reinforced for the first response following a designated period of time. A **variable-interval schedule** is one in which the organism is reinforced after the lapse of random or varied periods of time.

Once learned, responses can be lost for at least four reasons. First, they can simply be forgotten during the passage of time. Second, and more likely, they can be lost due to the interference of preceding or subsequent learning. Third, they can disappear due to punishment. A fourth cause of lost learning is **extinction**, defined as the tendency of a previously acquired response to become progressively weakened upon nonreinforcement. **Operant extinction** takes place when an experimenter systematically withholds reinforcement of a previously learned response until the probability of that response diminishes to zero.

VI. The Human Organism

Skinner (1953, 1990a) agreed with John Watson (1913) that psychology must be confined to a scientific study of observable phenomena, namely behavior.

According to Skinner (1987a), human behavior (and human personality) is shaped by the following three forces:

- Natural selection
- Cultural practices
- The individual's history of reinforcement

A. Natural Selection

As individuals, our behavior is determined by genetic composition and especially by our personal histories of reinforcement. Individual behavior that is reinforcing tends to be repeated; that which is not tends to drop out. Similarly, those behaviors that, throughout history, were beneficial to the species tended to survive, whereas those that were only idiosyncratically reinforcing tended to drop out.

B. Cultural Evolution

Selection is responsible for those cultural practices that have survived, just as selection plays a key role in humans' evolutionary history and also with the contingencies of reinforcement. "People do not observe particular practices in order that the group will be more likely to survive; they observe them because groups that induced their members to do

so survived and transmitted them" (Skinner, 1987a, p. 57).

Cultural practices such as toolmaking and verbal behavior began when an individual was reinforced for using a tool or uttering a distinctive sound. Eventually, a cultural practice evolved that was reinforcing to the group, although not necessarily to the individual. The remnants of culture, like those of natural selection, are not all adaptive.

C. Inner States

Although he rejected explanations of behavior founded on nonobservable hypothetical constructs, Skinner (1989b) did not deny the existence of internal states, such as feelings of love, anxiety, or fear. Internal states can be studied just as any other behavior, but their observation is, of course, limited. Skinner (1974) believed that humans not only have consciousness but are also aware of their consciousness; they are not only aware of their environment but are also aware of themselves as part of their environment; they not only observe external stimuli but are also aware of themselves observing that stimuli.

Behavior is a function of the environment, and part of that environment is within one's skin. This portion of the universe is peculiarly one's own and is therefore private. From the viewpoint of radical behaviorism, drives are not causes of behavior, but merely explanatory fictions. To Skinner (1953), drives simply refer to the effects of deprivation and satiation and to the corresponding probability that the organism will respond. Skinner (1974) recognized the subjective existence of emotions, of course, but he insisted that behavior must not be attributed to them. He accounted for emotions by the contingencies of survival and the contingencies of reinforcement.

Skinner (1974) also recognized the concepts of purpose and intention, but again, he cautioned against attributing behavior to them. Purpose and intention exist within the skin, but they are not subject to direct outside scrutiny. A felt, ongoing purpose may itself be reinforcing.

D. Complex Behavior

Human behavior can be exceedingly complex, yet Skinner believed that even the most abstract and complex behavior is shaped by natural selection, cultural evolution, or the individual's history of reinforcement. Once again, Skinner did not deny the existence of higher mental processes such as cognition, reason, and recall; nor did he ignore complex human endeavors like creativity, unconscious behavior, dreams, and social behavior.

Skinner (1974) admitted that human thought is the most difficult of all behaviors to analyze, but potentially, at least, it can be understood as long as one does not resort to a hypothetical fiction such as "mind." Thinking, problem-solving, and reminiscing are covert behaviors that take place within the skin but not inside the mind. Problem-solving also involves covert behavior and often requires the person to covertly manipulate the relevant

variables until the correct solution is found. The concept of mutation is crucial to both natural selection and creative behavior. In both cases, random or accidental conditions are produced that have some possibility of survival.

As a radical behaviorist, Skinner could not accept the notion of a storehouse of unconscious ideas or emotions. He did, however, accept the idea of unconscious *behavior*. In fact, because people rarely observe the relationship between genetic and environmental variables and their own behavior, nearly all our behavior is unconsciously motivated (Skinner, 1987a). In a more limited sense, behavior is labeled unconscious when people no longer think about it because it has been suppressed through punishment.

Skinner (1953) saw dreams as covert and symbolic forms of behavior that are subject to the same contingencies of reinforcement as other behaviors are. He agreed with Freud that dreams may serve a wish-fulfillment purpose. Dream behavior is reinforcing when repressed sexual or aggressive stimuli are allowed expression.

Membership in a social group is not always reinforcing; yet, for at least three reasons, some people remain a member of a group. First, people may remain in a group that abuses them because some group members are reinforcing them; second, some people, especially children, may not possess the means to leave the group; and third, reinforcement may occur on an intermittent schedule so that the abuse suffered by an individual is intermingled with occasional reward.

E. Control of Human Behavior

Ultimately, an individual's behavior is controlled by environmental contingencies. Groups, in turn, exercise control over their members by formulating written or unwritten laws, rules, and customs that have physical existence beyond the lives of individuals. Society exercises control over its members through the four principal methods of operant conditioning: positive reinforcement, negative reinforcement, and the two techniques of punishment (adding an aversive stimulus and removing a positive one).

A second technique of social control is to describe to a person the contingencies of reinforcement. Describing contingencies involves language, usually verbal, to inform people of the consequences of their not-yet-emitted behavior. Third, behavior can be controlled either by depriving people or by satiating them with reinforcers. Finally, people can be controlled through physical restraints such as holding children back from a deep ravine or putting lawbreakers in prison.

Skinner and Margaret Vaughan (Skinner & Vaughan, 1983) have discussed several techniques that people can use to exercise self-control without resorting to free choice.

- First, they can use physical aids such as tools, machines, and financial resources to alter their environment.
- Second, people can change their environment, thereby increasing the probability of

the desired behavior.

- Third, people can arrange their environment so that they can escape from an aversive stimulus only by producing the proper response.
- Fourth, people can take drugs, especially alcohol, as a means of self-control.

VII. The Unhealthy Personality

Unfortunately, the techniques of social control and self-control sometimes produce detrimental effects, which result in inappropriate behavior and unhealthy personality development.

A. Counteracting Strategies

When social control is excessive, people can use three basic strategies for counteracting it—they can escape, revolt, or use passive resistance (Skinner, 1953). With the defensive strategy of *escape*, people withdraw from the controlling agent either physically or psychologically. People who *revolt* against society's controls behave more actively, counterattacking the controlling agent. People who counteract control through *passive resistance* are more subtle than those who rebel and more irritating to the controllers than those who rely on escape.

B. Inappropriate Behaviors

Inappropriate behaviors follow from self-defeating techniques of counteracting social control or from unsuccessful attempts at self-control, especially when either of these failures is accompanied by strong emotion. Inappropriate behaviors include excessively vigorous behavior, which makes no sense in terms of the contemporary situation, but might be reasonable in terms of past history, and excessively restrained behavior, which people use as a means of avoiding the aversive stimuli associated with punishment. Another type of inappropriate behavior is blocking out reality by simply paying no attention to aversive stimuli.

A fourth form of undesirable behavior results from defective self-knowledge and is manifested in such self-deluding responses as boasting, rationalizing, or claiming to be the Messiah. Another inappropriate behavior pattern is self-punishment, exemplified either by people directly punishing themselves or by arranging environmental variables so that they are punished by others.

VIII. Psychotherapy

Skinner (1987b) believed that psychotherapy is one of the chief obstacles blocking psychology's attempt to become scientific. Nevertheless, his ideas on shaping behavior not only have had a significant impact on behavior therapy but also extend to a description of how all therapy works. Regardless of theoretical orientation, a therapist is a controlling agent.

Traditional therapists generally explain behaviors by resorting to a variety of fictional constructs such as defense mechanisms, striving for superiority, collective unconscious, and self-actualization needs. Skinner, however, believed that these and other fictional constructs are behaviors that can be accounted for by learning principles.

Behavior therapists have developed a variety of techniques over the years, most based on operant conditioning (Skinner, 1988), although some are built around the principles of classical (respondent) conditioning.

IX. Related Research

In its early history, operant conditioning was used mostly in studies with animals, then it was applied to simple human responses, but more recently, Skinner's ideas have been used in a multitude of studies dealing with complex human behaviors. Some of these studies have been concerned with the relationship between long-term behavior patterns (i.e., personality) and contingencies of reinforcement.

A. How Conditioning Affects Personality

The key elements of personality are stability of behavior over time and across different situations. By these criteria, personality change occurs when new behaviors become stable over time and/or across different situations. One domain in which personality change may be evidenced is in psychotherapy. In fact, a major goal of therapy is to change behavior, and if the changes are stable over time and situations, then one could talk about changing personality.

One systematized operant conditioning framework that has been used in countless studies to change behavior in both animals and humans is known as the "Token Economy." In this paradigm, individuals are given "tokens" for desired behaviors, which can later be traded in for meaningful rewards. Even though the technique has shown to improve learning, studying behaviors, academic achievement, and attendance (e.g., Hirst, Dozier, & Payne, 2016), it might not be far-fetched to argue that conditioning, in changing how students learn, might ultimately be changing something fundamental about who they are—from passive to active learners.

B. How Personality Affects Conditioning

Several thousand studies with both animals and humans have demonstrated the power that conditioning has to change behavior/personality. With humans in particular, however, it is clear that different people respond differently to the same reinforcers, and personality may provide an important clue about why this may be so.

Stacey Sigmon and colleagues (2003) studied the effects that d-amphetamine has on smoking using two different reinforcers: cigarettes and money. In addition to trying to

replicate the finding that psychomotor stimulants specifically increase the reinforcing value of nicotine compared to money, they wanted to examine whether there were any individual differences in the effect.

The general result was that there was a small effect of d-amphetamine on increasing smoking. However, there were significant individual differences, and when one examined the effects for responders compared to nonresponders, the effect was clear. Smoking breakpoints for the 10 responders became increasingly higher with increased dosages of d-amphetamine, and money breakpoints became increasingly lower.

C. Mutual Influence Between Personality and Conditioning

In addition to the independent evidence that conditioning affects personality and that personality affects conditioning, there is also mutual evidence for their influence on each other. A neuropsychological theory of personality has emerged within behaviorism that helps explain the mutual influence between individuals' temperaments and responses to conditioning, known as reinforcement sensitivity theory (RST; Corr, 2008). Research supports this mutual relationship between conditioning and personality. Corr and colleagues, for example, used the reinforcement sensitivity theory to help examine why people differ on a number of personality characteristics.

Results of the study supported the prediction that differences in reinforcement sensitivity (conditioning) would predict different forms of perfectionism (personality). Each of the three reinforcement sensitivities (approach, inhibition, and fight, freeze, or flight) showed positive relationships with self-oriented perfectionism, indicating that being reactive to both positive and negative reinforcers in one's environment is associated with being a self-oriented perfectionist. Research on reinforcement sensitivity shows that all people do not respond to reinforcers in the same way. Individuals' basic temperaments are key mechanisms that moderate the effects of reinforcers. In turn, individuals' habitual responses or sensitivities to reinforcements solidify into personality qualities that come to define them.

X. Critique of Skinner

The maverick psychologist Hans J. Eysenck (1988) once criticized Skinner for ignoring such concepts as individual differences, intelligence, genetic factors, and the whole realm of personality. These claims are only partly true, because Skinner did recognize genetic factors, and he did offer a somewhat unenthusiastic definition of personality, saying that it is "at best a repertoire of behavior imparted by an organized set of contingencies" (Skinner, 1974, p. 149). How does Skinner's theory meet the six criteria of a useful theory?

- First, because the theory has spawned a great quantity of research, one can rate the theory very high on its ability to *generate research*.
- Second, most of Skinner's ideas can be either falsified or verified, so one can rate the theory high on falsifiability.

- Third, on its ability to *organize all that is known about human personality*, one can give the theory only a moderate rating.
- Fourth, as a *guide to action*, one can rate Skinner's theory very high. The abundance of descriptive research turned out by Skinner and his followers has made operant conditioning an extremely practical procedure.
- The fifth criterion of a useful theory is *internal consistency*, and judged by this standard, one can rate Skinnerian theory very high.
- Is the theory *parsimonious?* On this final criterion, Skinner's theory is difficult to rate. On one hand, the theory is free from cumbersome hypothetical constructs, but on the other, it demands a novel expression of everyday phrases.

XI. Concept of Humanity

Skinner's concept of humanity is a completely deterministic and causal one that emphasizes unconscious behavior and the uniqueness of each person's history of reinforcement within a mostly social environment. Unlike many determinists, Skinner was quite optimistic in his view of humanity.