OPERANT LEARNING THEORY

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HISTORICAL AND CONCEPTUAL ORIGINS

The earliest studies of operant learning can be traced back to the research of psychologist E. L. Thorndike with cats in puzzle boxes (Kimble, 1961). In Thorndike's experiments, hungry cats had to escape from boxes fastened shut in different ways to obtain food. Thorndike observed that after being placed in the boxes, the cats engaged in various behaviors such as pacing, visually exploring, and scratching at the walls. The animals performed these responses until they accidentally pressed the latch, pulled the string, or did something else that opened the box. On successive trials, the cats spent more time examining and scratching at the latch or the string, while the other responses gradually dropped out. Finally, the animal would perform the correct behavior as soon as it was placed in the box. Thorndike explained the learning of this new behavior with his "law of effect": In situations where responses are followed by events that give satisfaction, those responses become associated with and are more likely to recur in that situation.

B. F. Skinner, another American psychologist, greatly refined the experimental apparatus that permitted the study and conceptualization of operant learning. The "Skinner Box," a chamber with a lever that could be programmed to deliver food following lever presses, provided several improvements over Thorndike's puzzle boxes. One advantage was that the relationship between lever presses and food delivery was arbitrary and could be readily manipulated by the experimenter. This allowed for the study of a wide range of variables, such as the ratio of responses to food deliveries, the time interval between responses that would produce food, and variations in stimuli that signaled the previous and other contingencies. A second advantage of Skinner's apparatus was that it permitted the use of response rate as a measure of response strength or response probability. Response rate is a continuous variable that can fluctuate over time, and it is more sensitive to subtle variations in environmental conditions than latency until escape (i.e., from a puzzle box), or duration of maze-running, or other early measures of learning. A third advantage of the operant chamber and its measure of response rate was that it allowed the study of histories of reinforcement and other variables that affect learned behavior, such as those influencing extinction and maintenance (Skinner, 1966).

Skinner drew an important distinction between operant behavior, which operated on the environment to change it and which was affected by stimuli that followed it, and respondent behavior, an earlier discovered form of learning. Respondent behavior, elucidated by the Russian physiologist Ivan P. Pavlov, involved reflexive responses (e.g., salivation, eye
blinks) to certain potent stimuli that preceded the response (e.g., food, bright light, or loud noise). If neutral stimuli (e.g., sound of a bell) were repeatedly presented shortly before these potent stimuli, they could be conditioned, and they themselves would elicit a weaker form of the reflexive response. Thus, respondent conditioning was a different form of learning based on antecedent stimuli that triggered anticipatory responses to other antecedent stimuli. In contrast, operand behavior was controlled by both consequent stimuli (such as those producing "satisfaction," mentioned earlier) and antecedent stimuli that were consistently associated with those consequent stimuli (e.g., the sight of the latch, which prompts latch-scratching behavior). In addition, operand behavior was not limited to a relatively small number of phylogenetically determined, reflex-like responses, but instead was a virtually infinite number of behaviors that could be acquired during the individual's lifetime (e.g., speech, operating a computer, driving a car, break dancing).

Although B. F. Skinner conducted his early research almost exclusively with animals in laboratories, he quickly saw the implications of his work for understanding and improving human behavior. Some of his most influential (Skinner, 1953) and controversial (Skinner, 1948, 1971) writings utilized the laboratory-derived principles of operand learning to analyze complex human behavior in society. Skinner's students and other researchers provided support for these theoretical analyses with successful demonstrations that applied operand principles to ameliorate various psychological and clinical problems. Lindsey and Skinner (1954) and Lindsey (1960) first showed that the behavior of psychotic mental patients could be studied within an operand framework. This paved the way for investigators such as Ayllon and Michael (1959) and Ayllon and Azrin (1965, 1968) to prove that psychotic behavior could be reduced and functional behavior could be increased in chronic mental patients through the use of reinforcement contingencies and structured therapeutic environments, such as the token economy.

In the decades that followed, a sufficient number of psychologists joined to form behaviorally oriented psychology departments at institutions such as Western Michigan University, Drake University, and West Virginia University and a similarly inclined rehabilitation department at Southern Illinois University at Carbondale. An especially visionary and prolific band of psychologists, including Donald Baer, Montrose Wolf, and Todd Risley, established an academic stronghold in the Department of Human Development at the University of Kansas. At KU they recruited other colleagues with operand leanings to join their department; they devised a new methodology for intensive small-n research that they applied to problems in child development, developmental disabilities, family relations, and community organization; they founded the Journal of Applied Behavior Analysis in 1968, which became the flagship journal for the expanding field whose name they coined (Baer, Wolf, & Risley, 1968); and they taught generations of doctoral students, many of whom went on to distinguished research and teaching careers.

Behavioral approaches continued to spread to other disciplines, and Edwin J. Thomas and his doctoral students at the University of Michigan were among the first to apply these methods to social work practice in the United States (Reid, 2004). Many of Thomas's early students, including Eileen Gambrill, William Butterfield, Clayton Shokey, and Martin Sundel, took teaching positions at major universities and further disseminated this approach through their students and their school's program curricula. Course textbooks provided another medium for the transmission of learning principles to newly trained social workers, and numerous books on this subject appeared in print (e.g., Fischer & Gochros, 1977; Gambrill, 1977; Wodarski, 1977).
Reinforcement

In the operant learning paradigm, reinforcement is a fundamental process closely related to Thorndike's law of effect. Reinforcement occurs when a stimulus follows a behavior that increases its future probability. Certain favorable consequences make responses more likely and strengthen that behavior under similar circumstances. Putting the proper number of coins in a vending machine and pressing a button is reinforced by the delivery of a chilled soft drink. The next time one is thirsty and in proximity of that vending machine, one is more likely to buy a soda from it. Waving at a neighbor across the street and seeing him smile and wave back reinforces the initial behavior of waving. Unfortunately, because reinforcement is merely a biological process, socially undesirable behavior as well as desirable behavior can be reinforced. An adolescent's cruel act of tripping and ridiculing a smaller youth can be reinforced by the laughter of nearby peers.

Reinforcement is often thought to mean the same as reward, but using these terms synonymously is misleading. Rewards, such as achievement awards (e.g., Employee of the Month), bonuses, or other prizes, are often given with the intent of promoting excellence. However, these rewards might not function as reinforcement in that the performance of workers might not improve after receiving the reward. These employees could already have been working at a high level because they were well trained and derived satisfaction from doing their job well or from receiving good annual evaluations. They might place little value on a piece of paper that they are supposed to frame and hang on their wall. Reinforcement is defined solely by the effect of the consequent stimulus in increasing the probability of the behavior that it follows.

Subjective pleasure or liking is another factor that can obscure the concept of reinforcement. Reinforcement is often experienced as pleasurable (e.g., eating an ice cream sundae, watching a beautiful sunset, sexual foreplay), but not always. A person might complain about dissatisfaction at wasted hours watching old TV reruns or talking with rude and self-centered friends, but if these activities occupy a large portion of the person's time they are probably functioning as reinforcers. Reinforcing events increase the likelihood of the behavior that they follow, but the person consuming the reinforcer may not report these events as rewarding or pleasurable.

Reinforcement through Stimulus Presentation or Removal

The preceding examples represent a certain type of reinforcement in which a stimulus is presented that increases the probability of a behavior. This type is referred to as positive reinforcement. Another type of reinforcement operates through the withdrawal or cessation of stimuli, typically aversive or noxious in nature, which increases the probability of a behavior. This second type of reinforcement is referred to as negative reinforcement. Asking a family member to turn down the volume on his stereo system is negatively
reinforced by the termination or reduction of the loud noise. In a parallel manner, rubbing hydrocortisone ointment on an itchy mosquito bite is negatively reinforced by the cessation of the skin irritation. As with positive reinforcement, negative reinforcement can follow socially inappropriate behavior and sustain it, as when a child fabricates reasons for not doing her chores and then is freed from having to do that work.

In real life the distinction between positive and negative reinforcement is not always clear (Baron & Galizio, 2005; Michael, 1975). For example, when a person in a hot, stuffy room opens the window, his response could be positively reinforced by the addition of cool, fresh air or negatively reinforced by the removal of the overheated, stale air. In this situation, it may not be possible to separate out the two processes; the significant point is that reinforcing stimulus change has occurred. In clinical work, however, the distinction between positively and negatively reinforced behaviors may be useful because it suggests different intervention strategies (Carr, 1977; Iwata, 1987, 2006). Consider the case of a youth in a residential treatment center who refuses to comply with staff instructions or physically assaults other people. In the youth’s problem behavior being positively reinforced by attention from staff members who try to convince her to do the right thing, or is it being negatively reinforced by her being restricted to the living unit and being held back from school (where classmates tease her or she does poorly on her assignments)?

The two suspected causes call for two different treatment approaches. If the youth is acting out to obtain attention from staff, interventions should be used that prompt some alternative, appropriate behavior (e.g., assisting staff with unit chores) and provide ample staff recognition for it. Conversely, if the youth is misbehaving to avoid school, interventions should be aimed at making school less aversive and more gratifying (e.g., separating the youth from peers that tease her, assigning more engaging or academically suited class work). Observing the youth’s behavior over time and in other situations can reveal the potent reinforcers for this individual and can suggest underlying motives for her problem behavior.

Factors Affecting the Effectiveness of Reinforcement

Several factors modulate the effectiveness of reinforcers, making them potent or eliminating their potency when these factors reach certain levels. One of these factors is the probabilistic strength of the contingency, or the consistency with which the reinforcement is obtained after the desired response and only after the desired response. The stronger the relationship is between a response and reinforcement, the more effective the reinforcer will be, particularly when learning a new behavior. For example, token reinforcement can be an effective consequence for motivating study behavior in an elementary school child, but not if it is administered irregularly or if the child can obtain the same tokens by merely sitting in his chair, bartering with other children for tokens, or stealing tokens.

A second factor is the immediacy of reinforcement or the length of time between performance of the behavior and delivery of the reinforcer. Generally speaking, the closer the reinforcement follows the behavior, the more effective it will be. Given two machines that produce the same result (e.g., two computers, two video games, two microwave ovens), we usually choose the faster one. Quick feedback from teachers on homework assignments and tests promotes learning better than delayed feedback. Delayed consequences can be effective in sustaining behavior; however, if the response has been well established, the delay for feedback is likely to be long.

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delay has been gradually increased, or the delay has been explained to the person who must wait for reinforcement.

A third factor affecting reinforcer effectiveness is the amount of reinforcement. A larger quantity of reinforcement can be more effective than a lesser quantity (Cooper, Heron, & Heward, 2007; Miller, 1997). A teenager might be willing to mow the lawn for $10, but not for $2. A person might be agreeable to driving across town to see a friend for 4 hours, but not for only 40 minutes.

**Extinction**

Effects of reinforcement are not permanent. Extinction is the natural decline in behavior that is no longer reinforced. A person will stop using a computer that will not start or that always crashes. A caller gives up dialing a cell phone number that is never answered. A student who does all of his homework but who nevertheless fails all of his assignments and exams will no longer do his homework. Extinction demonstrates that behavior is functional or ordinarily has some payoff for the person performing the behavior. Organisms do not continue to respond in ways that do not benefit them, and when reinforcers cease, the behavior that fails to produce them eventually disappears too. The time required for extinction to occur depends partly on the schedule of reinforcement currently maintaining the behavior, a topic to be covered later.

**Secondary or Conditioned Reinforcement**

Our susceptibility to certain reinforcing or punishing stimuli is part of our genetic endowment and is often significant for survival. The biological functions of being reinforced by food, water, sleep, and sex and by avoiding bodily injury and extreme heat and cold are obvious. However, other reinforcers and punishers are themselves established through learning or are conditioned during the individual's lifetime. Some people's preference for spicy food is due not to spicy food being more nutritious than bland food, but to their history of repeated pairing of those spicy tastes with satisfying meals. Many sorts of garments will protect our bodies from the sun and wind, but our preference for stylish fashions of the day is guided by the reactions of friends and family members to our appearance. Likewise, many young people value good grades and other forms of academic achievement, but some youth groups ridicule high achievers as being "bookworms" or "nerds," turning good grades into a repulsive trait. It is important to recognize that certain reinforcers are conditioned or secondary reinforcers, because this conditioning varies greatly depending on individual history and cultural background. Some people will go through considerable effort to hear their favorite country music, which puts them in a good mood and relaxes them; yet, that same music might be extremely annoying to someone else. The same could be said for rap or classical music. Recognizing that childhood upbringing and personal history can infuse objects and activities with disparate or even opposite motivational value can heighten appreciation of human diversity.

*Generalized reinforcers*, such as money, tokens, and praise, are a particularly dependable form of secondary reinforcer that can be used to gain access to a variety of primary and secondary reinforcers. The broad purchasing power and consistent reinforcing capacity of money is well known to all. However, praise—or positive regard and the goodwill of
others—has similar worth in that it can be exchanged for favors, special consideration, material objects, and even money. Generalized reinforcers are more reliable reinforcers because they are associated with multiple primary and secondary reinforcers, and their reinforcing capacity is not linked to a specific state of deprivation or motivation. For example, although a cheeseburger and fries may be positively reinforcing when one is hungry, they lose much of that value once one has eaten and is full. However, money will have reinforcing value when one is hungry and when one is full because it can be used to acquire other desired goods unrelated to one’s current state of hunger.

Schedules of Reinforcement

Under most conditions, behavior is reinforced intermittently rather than after each occurrence. Buying and dressing up in a new outfit will sometimes garner a compliment, but not always. If you hold a door open for another person entering a building after you, often the person will say “Thank you,” but not every time. In sporting events, basketballs, footballs, and soccer balls are frequently thrown and kicked, but no one expects a goal to be scored with each attempt. The timing and regularity of reinforcement affects the temporal pattern and frequency of the behavior.

A fixed-interval schedule of reinforcement makes reinforcement available after a certain fixed period of time and affects the temporal distribution of behavior. An example of an ordinary situation involving a fixed-interval schedule would be a person whose mail is delivered every day at around 1:00 PM. If we were to observe this person throughout the day we might see that she shows little interest in her mailbox in the early hours of the morning. However, as the time approaches 1:00 PM she begins looking out the window at her mailbox, especially whenever she hears a vehicle pass by. After 1:00 PM, she begins leaving her house to check her mailbox and continues doing so until she finally picks up her mail. After picking up her mail, she stops looking for mail delivery until the next day, when the whole pattern of checking starts over again. Thus, we would see a gradual increase in response rate as the time for reinforcement approaches and a cessation of responding immediately after reinforcement (which signals a period of time in which reinforcement is unavailable).

Instead of being based on time, reinforcement schedules can be based on the ratio of reinforcements delivered to responses performed. These are referred to as fixed-ratio schedules of reinforcement. An example in everyday life is piecework wages, such as one dollar earned for every 50 apples picked or every 50 envelopes stuffed. In such schedules, the amount of reinforcement gained (or money earned) bears a direct relationship to the number of responses performed. If the ratio is not too high, this type of schedule can generate high work rates because the worker earns more by working faster. Piecework wages based on high fixed-ratio schedules of reinforcement may be profitable for owners, but are exhausting for workers. If the ratio is extremely high (e.g., 1:500) “ratio strain” occurs and performance can break down, especially right after delivery of a reinforcer. Disruption usually occurs at this time because delivery of a reinforcer signals a lengthy period in which reinforcement is unavailable, and thus there is a lessened tendency to respond. The subjective experience of working under high-ratio schedules of reinforcement is unpleasant, and people working under these conditions are likely to become irritable or depressed. Conversely, working under low-ratio schedules of reinforcement, where the density of reinforcement is higher,
is associated with pleasant sensations and higher levels of satisfaction. So schedules of reinforcement not only influence work rate and other performance measures, but also overall mood and affect.

Reinforcement can be scheduled to occur after varying periods of time, known as a variable-interval schedule, or after a varying number of responses, known as a variable-ratio schedule. Variable-interval schedules of reinforcement produce a more steady response rate than fixed-interval schedules, without the postreinforcement pause seen in the latter. Variable-ratio schedules of reinforcement produce an even quicker and steadier response rate than fixed-ratio schedules (Miller, 1997). In addition, variable-ratio schedules are notoriously resistant to extinction, as witnessed by some people's addiction to gambling. Despite the loss of cash, life savings, possessions, and credit, gamblers are lured back by the variable-ratio schedule in their card game, slot machine, or lottery and the chance that their next bet will hit a big jackpot.

The previous paragraphs discussed simple schedules of reinforcement involving a single schedule and a single response. Operant research has also investigated complex schedules involving more than one reinforcement schedule and one response. A multiple schedule of reinforcement is one such complex schedule; it entails the successive presentation of two or more independent simple schedules, each accompanied by its own discriminative stimulus. Multiple schedules of reinforcement are common in everyday life and may take the form of different people or settings. Complaints about one's daily job irritations are likely to be received differently by close friends and family members, strangers on the street, and one's boss. A child throwing a tantrum may get concerned questions from his mother, verbal and physical comforting from his grandparents, ridicule from his siblings, and a spanking from his father. Choosing not to shave and wearing grubby clothes and sandals will generate dissimilar reactions depending on whether one stays at home, visits the corner store, attempts to get a table at a fine restaurant, or goes to a business meeting.

As we know from experience, different consequences for the same behavior in different contexts changes the probability of that behavior; thus employees learn not to complain about their job to their boss and to dress properly for business engagements. In this way, people appear to develop separate facets or multiple personae, but a better understanding of this complexity comes from seeing that contingencies in particular situations gain control over differentiated performances.

Concurrent schedules of reinforcement are another complex schedule; they involve two or more schedules of reinforcement operating on two or more responses at the same time. Concurrent schedules of reinforcement also describe a wide variety of situations that humans encounter. Most of the time, a person chooses from an array of responses that are available simultaneously (e.g., work at home, read a newspaper, watch TV, call a friend), with varying types and schedules of reinforcement associated with each response. Matching theory (discussed later under "Advanced Theoretical Principles") can help to predict which of these alternatives will draw most of that person's behavior and occupy most of his or her time.

Recent Research on Schedules of Reinforcement with Humans

Schedules of reinforcement held a prominent position in early operant research with nonhuman organisms (Ferster & Skinner, 1957; Zeiler, 1977). The influence of schedules...
of reinforcement on human behavior in laboratory studies, however, has been shown to be complicated by the presence of instructions and situational demand characteristics that can override schedule effects. The tendency of humans to respond to instructions rather than prevailing reinforcement schedules is strong in situations where the instructions produce behavior patterns that cause the person not to come into contact with the actual schedule contingencies. For example, if a person is instructed to respond at a high rate to avoid computerized fines, even though the programmed schedule permits him or her to avoid all fines by responding at a lower rate, the person will usually follow the inaccurate instructions and respond at the higher rate (Galizio, 1979). More significantly, instructions can also modulate or override the effects of reinforcement schedules when people have direct contact with the existing reinforcement contingencies, causing them to lose available reinforcement or to respond unnecessarily (Hayes, Brownstein, Haas, & Greenway, 1986; Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986). The beneficial and detrimental effects of humans’ propensity to follow instructions rather than to respond to prevailing reinforcement contingencies is discussed later in the section on rule-governed behavior.

Stimulus Control

The previous sections have focused primarily on stimuli that are consequences of behavior; however, stimuli present prior to the performance of behavior that are correlated with reinforcing and punishing stimuli also gain control over behavior. Stimulus control refers to the effect of these antecedent stimuli on the probability of a response.

Discrimination

Stimuli that are present when a behavior is reinforced gain control over that response, and the behavior becomes more likely when these stimuli are present. A child is likely to approach and talk to a group of children who have accepted him as a playmate. Conversely, this child is less likely to approach and talk with another group of children who have ignored him. A woman is likely to return to a restaurant that has served her delicious and inexpensive food. In contrast, that woman is unlikely to frequent restaurants that have served her unappealing and overpriced dishes. Seeing the front door to one’s house brings on a search for one’s house keys rather than office or car keys. Discrimination is a term that refers to differentiated response patterns that develop in the presence of antecedent stimuli tied to different consequences. Antecedent stimuli, or discriminative stimuli, allow us to anticipate consequences before they happen and as such control a large portion of human behavior. The words “Men” and “Women” or the international picture-symbols for male and female painted on a door allow a customer to enter the appropriate restroom of an unfamiliar restaurant and avoid an embarrassing incident. Complex discriminative stimuli obtained from reading maps and street signs, using personal digital assistants to keep appointments, and listening to advice from friends about romantic relationships govern more challenging responses in modern life.

Generalization

Whereas stimulus control involves bringing behavior under the control of specific stimuli, generalization refers to the opposite process: bringing the same behavior under the control of a broader range of stimuli. The success of clinical interventions often hinges on producing
some form of generalization. Therapy usually is provided in a particular location, such as a clinic or office, and initial therapeutic change may first appear in these circumscribed settings. However, therapy usually aims for the carryover of change to extratherapy settings, such as the client's home, school, workplace, or other settings where therapy was not directly applied. Responding in the presence of stimuli different from those in which the behavior change was previously reinforced is known as stimulus generalization. There are empirically validated techniques for promoting stimulus generalization in clinical work (Stokes & Baer, 1977; Stokes & Osnes, 1989), such as bringing elements of the extratherapy setting (e.g., family members) into the therapy setting and varying aspects of the therapy setting so that it more closely resembles extratherapy settings (e.g., training with noise and interruptions like those at home). Using procedures to promote generalization improves the chances that behavioral gains produced by therapy will transfer to relevant situations in the client's living environment.

Building Behavior by Shaping and Chaining

Shaping produces new behavior by differential reinforcement of successive approximations to the terminal response, or, in simpler terms, by reinforcing small steps in the direction of the ultimately desired behavior. In most teaching situations, shaping is combined with verbal instructions, modeling, physical guidance, and other prompts, and so its sole effects are rarely seen. Gradual shaping can be used to teach extraordinary physical performances that might even be considered "unnatural" for the human body. Gymnastics coaches are particularly adroit at this technique. For example, a back handspring is taught using progression, with reinforcement (i.e., praise) given for advancements along the way:

1. First, the student stretches and loosens up by bending back as far as she can (this step may take a considerable period of time).
2. Next, the student bends backward and tries to touch the floor behind her (with the coach manually "spotting" the student by holding her lower back to support her weight).
3. Then the student bends backward and touches the ground, supporting most of her weight (with the coach manually spotting the student by helping her to maintain her balance).
4. Next, the student bends backward and practices a partial push-off and kick that will propel her body through the handspring (with the coach manually spotting the student in case she loses her balance).
5. Then the student practices the entire back handspring at partial speed (with the coach manually spotting the student by helping her to maintain her balance, and perhaps giving her a boost to get her through the maneuver).
6. Next, the student practices the back handspring at full speed (with the coach visually spotting the student, catching her if she loses her balance).
7. Finally, the student practices the back handspring at full speed on her own.

A multitude of athletic movements and other skills can be taught through similar procedures involving reinforcement for incremental progress toward the terminal response.
Shaping and successive approximation also have numerous clinical applications, such as in the treatment of phobias by reinforcing a client’s increasingly closer physical approach toward a feared object (e.g., Thyer, 1981; 1983).

Chaining

A chain is made up of two or more behaviors that each produce a stimulus change and that are performed in a particular sequence. Many complex human activities, such as getting dressed, cooking a meal, driving a car, and operating a computer, are behavioral chains. Learning a new behavioral chain (such as when learning to drive a car with a manual transmission) requires the person’s close attention and can be quite difficult. However, after the skill is well practiced and mastered, it can be performed automatically with little thought or effort.

Conducting a task analysis (Cooper et al., 2007) lays the foundation for teaching a chain by identifying the individual responses composing the chain and the sequence in which they must be performed. Teaching a chain begins by verbally prompting, modeling, or manually guiding the first response in the sequence, and then providing reinforcement for its performance. After several trials in which the first response is performed consistently, the second response is prompted or guided, and its performance is reinforced. When the second response occurs consistently, it should be prompted immediately after performance of the first response, and then reinforcement should be given only after completion of the first and second response. After the first and second responses occur together reliably, with reinforcement delivered only after the second response, these two responses may be said to be linked. Next, the third response can be prompted or guided after the second response, and its performance reinforced. When the third response is performed consistently, it can be prompted immediately after the second response; then reinforcement should be delivered only after the first, second, and third response have been performed. This procedure, known as forward chaining, is continued until all responses in the chain are linked. Teaching a chain can also be done by starting from the end of the chain and proceeding to the front, known as backward chaining.

Modeling and Imitative Behavior

A child entering an activity room and seeing other children playing with a colorful new toy is presented with an opportunity to learn by example, a way in which one individual can rapidly acquire behavior from another. During such encounters, the behavior of the model serves as discriminative stimuli for the behavior of the observer. The observer watches the model displaying the desired behavior, and then responds to match the behavior of the model. Imitation is more or less likely, depending on what consequences the observer sees the model receiving. If the observer sees the model obtaining reinforcement for performing the behavior (e.g., a child watches a peer getting a toy to operate properly), then the observer is inclined to imitate that behavior. By contrast, if the observer sees the model failing to obtain reinforcement or being punished for performing a behavior (e.g., the child watches the peer using the toy in a way that does not work or getting hurt while using the toy), then the observer is disinclined to imitate that behavior. Much imitative behavior is probably generalized imitation, in that individuals copy the actions of others due to a history of previous reinforcement for imitative behavior (Baer & Sherman, 1964; Pierce & Cheney, 2007).
2004). Following the lead of others is an effective way to obtain desired outcomes and to avoid aversive stimulation, especially in novel situations wherein one does not know how to act.

Other factors that influence modeling effectiveness and the tendency to imitate are related to characteristics of the model. Models that are similar to the observer based on past experience, appearance, sex, age, and other variables are more likely to be imitated (Bandura, Ross, & Ross, 1963). For example, guidance from a domestic abuse counselor who herself has survived an abusive relationship is more likely to be followed than recommendations of a domestic abuse counselor without such personal experience. Models with high social status and prestige are more likely to be imitated than models of low social standing (Bandura et al., 1963). Hence, high school students are likely to adopt the manner of dress, speech, and even leisure activities of high-status individuals rather than the habits of social outcasts. Social workers should take these factors into account when selecting positive models for public education campaigns, primary prevention programs, and therapy groups.

The common expression “Do as I say, not as I do” refers to the fact that modeling effects occur even when unintended. Performance of socially inappropriate or maladaptive behavior (e.g., aggressive behavior, recreational drug use) can promote that same behavior in others who witness those acts. Perhaps the best example of this is Albert Bandura’s (1965) classic Bobo doll experiment, in which modeling prompted physical aggression in children. In Bandura’s study, children watched a film in which an adult hit, kicked, or otherwise exhibited physical aggression toward an inflated Bobo doll. In one version of the film, the adult was rewarded with praise, soda, and candy after being aggressive toward the doll; in a second version of the film, the adult was scolded and spanked for hitting or kicking the doll; and in yet a third version, no consequences were given for being aggressive toward the doll. Bandura found that children who observed the adult model being punished were less likely to imitate aggression than children who observed the model being rewarded. However, both the children observing the model being rewarded and those observing the model receiving no consequences were more likely to exhibit aggression than those observing the punished model, with no differences between the former two groups. This study suggested that problem behavior can be generated by models and be contagious, and it also has profound implications for the sorts of behavior that is frequently modeled in film, television, and video games.

ADVANCED THEORETICAL PRINCIPLES

Rule-Governed Behavior

Skinner (1969) posited that a sizable amount of human behavior is controlled by rules rather than by direct reinforcement contingencies. Rules are viewed as “contingency-specifying stimuli” that describe particular responses and the consequences that follow them. Usually, the rules are verbal, such as the oral instructions “Go down this street for three blocks, then take a right and go another block, and you will find a gas station,” or the written instructions “Turn the handle counter-clockwise.” However, rules also can be conveyed nonverbally (e.g., by demonstrating the proper twisting motions) or can take the form of pictures, diagrams, or even mathematical formulae. Rules can operate as complex discriminative stimuli (p. 143) that generate even more intricate response patterns, but without a personal
Operant Learning Theory

The history of reinforcement, such as when a reader follows the directions given in a map to reach a destination he or she has never visited before.

Rule-governed behavior is useful for groups and societies because it allows people to benefit from the experience of others. The transmission of rules permits people to respond to dire consequences that have a low probability ("Buckle your seatbelt when you drive") or that may occur in the distant future ("Smoking causes lung cancer"). Many preventive programs currently being developed and evaluated by social worker researchers can be seen as forms of public education aimed at providing youth and adults with rules to protect them from dangers for which personal experience provides inadequate preparation.

While human reliance on rules allows us to more successfully navigate our social and physical environment and avoid harm without the tedious and haphazard process of individual learning, it also has disadvantages. Rules and verbal instructions can overpower the actual reinforcement contingencies currently in place (Hayes, Brownstein, Zettle, et al., 1986; Hayes, Zettle, & Rosenfarb, 1989). Unlike lower organisms that respond to subtle temporal features or response frequency requirements of the prevailing reinforcement schedule, humans will follow explicit or implicit instructions and forgo available reinforcement or make many unreinforced responses (behave inefficiently). In addition, rules are not merely information entered into a computer; these verbal stimuli possess their own motivational properties (Hayes et al., 1989). The words "We must be on alert for the next terrorist attack" may evoke emotional responses similar to those of being physically injured or having family members killed during guerrilla warfare (e.g., staying indoors, viewing people of certain ethnicities with fear and suspicion, voting for politicians who go to war against "terrorist states"). At a societal level, our susceptibility to verbal stimuli and insensitivity to the discrepancy between faulty rules and actual reinforcement contingencies is reflected in our vulnerability to mass media campaigns, commercial advertising, and political propaganda.

Self-Control

Operant learning is usually associated with external controls, such as those captured in the image of a behavioral psychologist working with an animal in a Skinner Box. However, B. F. Skinner was acutely aware of the self-regulatory capability of humans and wrote about it at length in Science and Human Behavior (Skinner, 1953). He observed that people can exert self-control by applying the same behavior control procedures to themselves that they use to alter the behavior of animals and other people. Skinner also listed and described self-control techniques in an account that is still timely and unsurpassed in its abundant, everyday-life examples. Skinner first observed that instances of self-control arise in situations in which people are affected by conflicting consequences, such as those that follow excessive eating. Excessive eating is associated with the reinforcing events of gustatory pleasure and relief from hunger as well as the punishing events of becoming overweight, being unhappy with one's appearance, and suffering from numerous health problems. In such conflictive situations, individuals can perform controlling responses to alter the probability of controlled responses (e.g., excessive eating), with the controlling responses taking as many forms as there are methods of behavioral control.

People can use physical restraint as a self-controlling response by refraining from purchasing high-caloric foods (e.g., ice cream) or by buying these foods only in small
quantities. (One is most likely to do this when one is satiated and capable of "self-control," which fits with contemporary advice not to shop for groceries while one is hungry.) They can also dispose of food items with high fat and high sugar content or lock them in a closet or cabinet and give the key to a strong family member. People can choose to patronize only restaurants that have appealing low-calorie entrees on their menu. If one is going to a party where fattening food will be served, one can change the stimulus properties of the available food by snacking freely on healthier food before the gathering. People trying to manage their food intake can surround themselves with other people with similar intentions, join official weight-loss groups, and read articles and books on the subject (exposing themselves to discriminative stimuli for eating the proper amounts of the right foods). Conversely, people should avoid cooking instruction and cuisine programs on TV, as well as food and restaurant commercials. People can substitute alternative responses to eating fattening foods, such as exercise (e.g., going for a walk), getting involved in a hobby, drinking water, or eating low-calorie snacks and meals. They can also self-monitor (Kanfer & Gaelick-Buys, 1991; Stuart & Davis, 1972) their food intake with daily logs and data sheets so that they become more aware of their eating patterns (and thereby facilitate positive reactivity) as well as devise better strategies to modify their behavior. The present list only scratches the surface in terms of available self-control strategies and is limited to eating behavior merely to make the examples more coherent.

RECENT THEORETICAL DEVELOPMENTS

Although operant learning is a mature scientific topic, it is far from calcified. Research in the experimental analysis of behavior and applied behavior analysis have both extended the reach of operant learning principles and made discoveries requiring substantial realignment of those principles. In this section I briefly review three of the latter developments that are particularly relevant to social work practice: functional analysis, matching law, and stimulus equivalence and relational frame theory.

Functional Analysis of Problem Behaviors

Functional analysis (Carr, 1977; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982) is an assessment procedure that seeks to identify the reinforcement contingencies that maintain a problem behavior, whether that behavior is self-injury, physical aggression, disruptive behavior, bizarre speech, or some other socially undesirable response. Before functional analyses, behavior therapists and behavior analysts selected interventions without investigating what consequences might have been currently reinforcing the problem behavior. For example, a middle-aged man diagnosed with Schizophrenia who exhibited delusional statements might be treated with social skills training, token reinforcement for accurate statements, and response cost (token fines) for delusional statements. The reinforcement and response-cost procedures would be applied to override whatever unknown sources of reinforcement were sustaining the inappropriate behavior (Mace, Lalli, Lalli, & Shea, 1993). Such a traditional behavior modification approach might be effective in reducing delusional speech, but its therapeutic effects would be based solely on the superior potency of extrinsic reinforcers introduced by the therapists. Because preexisting reinforcement
operant learning theory

contingencies that supported the bizarre speech in this setting were neither identified nor systematically altered, these contingencies would remain to threaten the client’s improvements whenever the behavioral program was faded or removed. In contrast, a functional analysis attempts to isolate the specific reinforcers currently maintaining the problem behavior, and this information is then used to design procedures that remove or block those reinforcers for problem behavior and instead make them contingent on appropriate behavior. Theoretically, this approach should produce better outcomes and a higher probability of generalization and long-term maintenance.

The hallmark of a functional analysis is an empirical test utilizing a series of brief (5-15-minute) sessions during which various contingencies that are hypothesized to maintain the problem behavior are simulated and the client’s behavior is recorded. These conditions are alternated in random order (forming a multiple schedule of reinforcement), and the amount of problem behavior occurring in each of these conditions is then compared. For example, Wilder, Masuda, O’Connor, and Baham (2001) assessed the contingencies that were maintaining delusional speech in a middle-aged man with Schizophrenia by presenting alternating conditions of the following four types: (1) escape from demand (the therapist asked the client to work on a task, e.g., a simple household chore, until the client made a bizarre statement, after which the therapist allowed the client to take a 30-second response break from the task); (2) attention (the therapist pretended to be preoccupied and ignored the client until the client made a bizarre statement, after which the therapist made eye contact and told the client that he “shouldn’t talk” like that); (3) alone (the client was left alone in the room and observed to see if the bizarre statements would occur without any social consequences, and thus were self-stimulatory or self-reinforcing); (4) control (the therapist interacted with the client until he made a bizarre statement, after which the therapist broke eye contact and terminated all conversation for 10 seconds). Because these four conditions were presented in random order and the only difference between them was the social contingency, differences in the amount of delusional behavior observed in the four conditions logically should have been due to the type of reinforcement obtained for delusional speech in the various conditions.

In the study by Wilder et al. (2001), bizarre speech occurred in a substantially greater percentage of the scored intervals with attention (mean = 26%) as compared to escape from demand (mean = 2%), alone (mean = 0%), and control (mean = 5%) conditions. Utilizing this data, an intervention consisting of differential reinforcement of alternative vocalizations (attention for appropriate speech) plus extinction for bizarre vocalizations was designed. When this invention was applied and evaluated in a reversal design, it was shown to nearly eliminate the client’s psychotic speech. Results of this study were later replicated with a second client also diagnosed with Schizophrenia who displayed bizarre vocalizations in the form of tangential remarks (Wilder, White, & Yu, 2003).

This clinical assessment methodology has been used successfully with expanding numbers of clients, predominantly children with developmental disabilities residing in hospitals or institutions (Hanley, Iwata, & McCord, 2003; Iwata et al., 1994). However, functional analyses have also been utilized effectively with developmentally disabled youth in an outpatient clinic (Derby et al., 1992) and with clients of normal intelligence (14% of the clients) who underwent brief stays (average = 10 days) in an inpatient setting (Asmus et al., 2004). Thus, functional analysis is a clinical assessment tool whose validity has been repeatedly established with numerous clients in various settings, and which yields interventions that harness motives underlying problem behavior.
Matching Law

Herrnstein (1961, 1970) formulated the matching law based on his research with pigeons in a two-response apparatus where responses were reinforced with food on concurrent variable interval/variable interval (VI VI) schedules. Herrnstein noted that his subjects “matched” or allocated their responses to the two alternative schedules in proportion to the reinforcements obtained from them. For example, if one third of the reinforcements were obtained from the first alternative and two thirds from the second, then approximately one third of the animal’s responses would be directed toward the first alternative and two thirds to the second. This discovery was important because it showed that responding is affected by its overall context and the relative amount of reinforcement for each response alternative. This also meant that the frequency and duration of one response would change when reinforcement for a concurrent response was varied. For example, if the frequency or density of reinforcement for the second alternative response were increased from two thirds to four fifths of all available reinforcement, then four fifths of all responses would be directed toward that alternative. Consequently, the proportion of responses that would be directed toward the first alternative would drop from one third to one fifth, even though there was no change in the absolute number of reinforcements available for that choice. Thus, responding cannot be predicted solely on the basis of the amount of reinforcement provided for a response, but rather on the basis of the relative payoff for that response as compared to its alternatives. While this law was first demonstrated with pigeons in the laboratory under specific concurrent VI VI schedules, its generality has since been established with a wide variety of species, including humans, in naturalistic and clinical situations, and with different combinations of reinforcement schedules (McDowell, 1982, 1988; Pierce & Epling, 1983; Plaud, 1992).

McDowell (1982, 1988) elucidated how this law could be applied to ameliorate various clinical disorders. Problem behaviors are usually treated with extinction or mild punishment, but the matching law suggests that they can also be reduced by either increasing the rate of reinforcement for concurrent alternative responses or by increasing the rate of “free” or noncontingent reinforcement. Ayllon and Roberts (1974) implemented the former strategy in a fifth-grade class with students who frequently exhibited disruptive behavior. These investigators erected a token economy that reinforced reading in the classroom, and they recorded large increases in reading behavior and simultaneously large decreases in disruptive behavior. Improvements in both desired and undesired behavior were reversed during a withdrawal phase and then restored during the final treatment phase in an ABAB design. This study demonstrated how problem behavior can be effectively treated in an indirect manner by reinforcing alternative, appropriate behavior occurring in the same context. Although matching law has been applied in only a handful of clinical studies, it provides an empirical and theoretical foundation for positive interventions with a wide array of social problems, such as aggressive behavior, crime, addictive behavior, and psychotic disorders, just to name a few.

Stimulus Equivalence and Relational Frame Theory

These two areas of research examine the development of stimulus-stimulus associations and investigate how symbols and words acquire their meanings. Stimulus equivalence was originally discovered while teaching developmentally disabled students how to read
In a study demonstrating one form of stimulus equivalence known as *transitivity*, students were first prompted to match spoken words, such as the word “car” (A), with the corresponding picture of a car (B) by reinforcing subjects for pointing to the appropriate picture after hearing the spoken word. Next, students were taught to match spoken words, for example, the word “car” (A) with the corresponding written text, for example, “CAR” printed on a card (C), by reinforcing subjects for pointing to the correct set of letters after hearing the spoken word. After the students were taught to consistently match these two pairs of stimuli (A = B, and A = C), the instructor performed a test presenting B and C together along with a number of other stimuli. Subjects who received the training matched B with C and C with B, even though they had never received direct training associating these two stimuli. The emergence of stimulus equivalence B = C and C = B indirectly from training A = B and A = C is an anomaly for operant learning and has required the proposal of new theoretical schema (Sidman, 2000b). Aside from its theoretical significance, being able to match pictures of objects with their corresponding written and spoken names has practical significance because it constitutes a form of reading comprehension and demonstrates partial understanding of the meaning of words. Stimulus equivalence is usually connected with a history of verbal learning, and this capacity for abstraction is rarely observed in nonhumans (Hayes, 1989; Schusterman & Kastak, 1993).

Relational frame theory (Hayes & Hayes, 1992; Hayes & Wilson, 1993) extends this paradigm by noting that stimulus equivalence is only one of a seemingly endless variety of stimulus relations that can be taught with formats like the one just described. For example, if subjects are taught that “A is greater than B” and “B is greater than C,” subjects are likely to respond that “A is greater than C” without any direct training involving A and C. In this case, the relational frame controlling behavior is greater than rather than the equivalence of paired stimuli. Such relations are arbitrarily defined (the subject could have taught that “X is greater than Y” and “Y is greater than Z,” leaving the subject to infer that “X is greater than Z”), and they may or may not accurately reflect relationships between objects and events in the real world. With verbal symbols and their relational frames, humans are able to evoke past, future, distant, and nonexistent events (e.g., childhood memories, anticipation of one’s own death, the Tooth Fairy), as well as to manipulate and transform these stimuli by placing them in different relational frames. This enables people to conduct complex analyses and engage in long-term planning, but it can also make them susceptible to faulty rationalizations and debilitating thoughts.

Acceptance and commitment therapy (Hayes & Wilson, 1994) is a new psychotherapy that has sprung from relational frame theory. This approach proposes that certain problematic behaviors and emotional reactions persist due to clients’ verbal behavior (overt and covert) that supports patterns of avoidance. For example, a person may rationalize his missing an appointment with the statement, “I was too anxious to go to the job interview.” This verbal statement adds to the problem in two ways: (1) The client reifies “anxiety” as an emotional condition that he cannot tolerate or overcome, and (2) the client presents an understandable, if not completely socially acceptable, explanation for his avoidance. Therapists attempt to undermine relational frames that support problematic avoidance patterns through the use of paradoxical parables (showing the futility of attempting to avoid all anxiety-provoking situations), experiential exercises, deconstruction of the meaning of words (e.g., “anxiety”), and other techniques. They also strive to heighten clients’ awareness of the present moment and help them select the best course of action for that situation.
Acceptance and commitment therapy has been described as part of “the third wave of behavioral and cognitive therapy” and has produced positive preliminary outcomes with such diverse clinical problems as anxiety, depression, psychosis, substance disorders, chronic pain, eating disorders, and work-related stress (Hayes, 2004a, 2004b).

RELEVANCE TO SOCIAL WORK PRACTICE

Probably the greatest benefit that operant learning offers to social work practice is that it is a comprehensive framework for understanding and changing human behavior in the social environment (Thyer, 1987). It could be argued that there is no other biological, psychological, or social science theory that can provide such a broad, exacting, and data-based account of human behavior as the principles of operant learning. This approach also can be utilized to analyze and treat a wide spectrum of human problems, ranging from relatively narrow disorders such as phobias and anxieties to pervasive disturbances such as antisocial behavior, psychoses, and mental retardation. It can also be used to study and ameliorate seemingly macrolevel problems, such as differences in intellectual and academic ability correlated with socioeconomic status, by changing patterns of daily parent-child interactions in the home (Hart & Risley, 1995; see Pelaez, Gerwirtz, & Wong, this volume, for a more detailed discussion of this application).

The following sections review some of the direct applications of operant learning methodology to social work practice, including assessment, intervention, and prevention.

Uses in Assessment

The data of operant learning are observable behaviors qualified with clear descriptions of the target behaviors and quantified along parameters such as frequency, duration, intensity, and latency. Many forms of socially significant behavior can be precisely measured along these dimensions, such as frequency of initiating conversations or pursuing job leads, duration of engaging in school homework or household chores, force applied when kicking a soccer ball, or latency before making an assertive reply. Socially problematic or clinical behaviors also can be quantified by these dimensions, such as frequency of heavy drinking or self-deprecating remarks, duration of arguments or obsessive rituals, voice volume while screaming at others, or latency before complying with parental requests. Certain complex performances might exist as behavioral chains, and measuring these performances requires checking for completion of component responses in the correct order. Assessing the complete and proper sequencing of such performances is facilitated by a task analysis and a structured data sheet (e.g., a task analysis checklist). The precision and objectivity of these multifarious behavioral measures can help to clarify social work concerns and goals, which otherwise might remain vague and nebulous.

Quantification and precision of behavioral measures do not, however, guarantee their social validity, clinical validity, or practical utility. Increases in the frequency of positive comments or in the duration of eye contact during casual conversations are measurable, but they may not have substantial impact on listeners’ evaluations of the speaker’s social competence or attractiveness. The social validity of behavioral measures should be established by showing their relationship to primary concerns of clients, clients’ family members,
referral and funding sources, and significant persons in the clients' community (e.g., teachers, prospective employers, police officers; J. S. Schwartz & Baer, 1991; Wolf, 1978). The clinical validity of behavioral measures should be established by showing their relationship to clients' subjective distress, level of functioning, ability to fulfill role demands, capacity to engage in desired activities, and overall quality of life (Kazdin, 1999).

Uses in Intervention

Evidence-based applications of operant learning principles are very extensive and have been the subject of enough textbooks to fill a small library. So this chapter merely offers a sample of empirically validated applications of operant learning approaches with particular relevance to social work practice. This section briefly covers evidence-based foundations in four areas: parent and staff training, social skills training, safety and prevention, and interventions with clinical disorders.

Parent and Staff Training

Because parents and staff members control many aspects of clients' environment and are authority figures, training parents and staff in behavioral techniques has been a prime strategy for structuring contingencies to foster desired behavior. Parents and staff have been taught to set reasonable performance expectations, to prompt adaptive behavior with verbal instructions or modeling, and to reinforce this performance with attention, praise, and tangible reinforcers. They also have been trained in the sometimes difficult technique of ignoring minor misbehavior as a means of extinguishing it. Using this approach, parents have been taught how to deal with children's problematic behavior, such as non-compliance (Briggs, Leary, Briggs, Cox, & Shibano, 2005; O'Reilly & Dillenburger, 2000; Stein & Gambrill, 1976), temper tantrums (Pinkston, Polster, Friedman, & Lynch, 1982), bizarre verbalizations (Pinkston & Herbert-Jackson, 1975), failure to thrive (Koepke & Thyer, 1985), and sleep disturbances (Brophy, 2000). Court-mandated parents in the child welfare system (Smagner & Sullivan, 2005) and parents with a developmentally disabled child (Gammon & Rose, 1991) have been taught a variety of skills to cope with the special needs of their families.

In an analogous fashion, staff members in institutions have been trained to use reinforcement contingencies to manage urinary incontinence in elderly residents (Pinkston, Howe, & Blackman, 1987) and to reduce delusional verbalizations and disruptive behavior (Wong, Woolsey, & Gallegos, 1987), to restore appropriate conversational speech (Wong & Woolsey, 1989), and to improve grooming skills and personal hygiene (Wong, Flanagan, et al., 1988) in chronic mental patients. Behavioral procedures have also been utilized to teach technical skills to professional staff or interns such as facilitative and supportive utterances during family therapy (Galant, Thyer, & Bailey, 1991), clinical interviewing skills (Iwata, Wong, Riordan, Dorse, & Lau, 1982; Schinke, Gilchrist, Smith, & Wong, 1978), management of visits between parents and children in foster care (Kessler & Greene, 1999), behavior management skills to staff in group homes for persons with mental retardation (Schinke & Wong, 1977) and adult day care centers (DeRoos & Pinkston, 1997), and behavior analysis skills to graduate social work students (Dillenburger, Godina, & Burton, 1997).
Social Skills Training

Social skills training (SST) can improve clients' competence in a variety of important interpersonal encounters, such as initiating conversations, dealing with conflict, and conducting successful job interviews. Coming from social learning theory rather than an operant learning perspective, Richard M. McFall (1976) developed a versatile technique for teaching interpersonal skills as well as noninteractive behavior. Although inspired by social learning theory (Bandura, 1969, 1976), this format embodies operant learning principles in its main procedures of (a) giving instructions that describe and explain the skill to be taught; (b) demonstrating or modeling the skill for the student; (c) having the student practice or rehearse the desired response, usually in role-play situations; and (d) giving the student positive or negative feedback on his or her performance. A major difference between SST and other operant learning procedures is that prompts and reinforcement are delivered in simulated encounters and not in the actual interactions in which the behavior typically occurs. It was generally assumed that cognitive mediation would lead to the transfer or generalization of skills learned in the role-play simulations to extratherapy settings. However, this assumption was often not empirically confirmed.

Utilizing the SST protocol, social workers have taught interpersonal skills for initiating and maintaining positive interactions with peers to fifth-grade students (Hepler, 1994), for maintaining social support to women at risk of child maltreatment (Richey, Lovell, & Reid, 1991), for facilitating vocational and community adjustment to mentally retarded clients (Hall, Schlesinger, & Dineen, 1997; S. S. Sundel, 1994), for carrying out appropriate conversations to persons with severe mental disorders (Wong et al., 1993), for increasing assertiveness and drug avoidance to drug users in residential treatment (Hawkins, Catalano, & Wells, 1986), and for problem solving and avoiding future acts of delinquency to youths in detention (Hawkins, Jensen, Catalano, & Wells, 1991). The range of client populations and concerns to which SST procedures have been effectively applied gives some indication of their flexibility and robustness.

Safety and Prevention

Operant learning and SST procedures have been successfully used to instill safe practices that avert accidents or reduce dangers that arise in familiar places, such as the home and family car. Besides preventing possible injury or death, these interventions can also head off the emotional harm that is a frequent aftermath of these traumatic events. Some self-protective skills that have been taught are automobile safety belt usage to youth (Sowers-Hoag, Thyer, & Bailey, 1987; M. Williams, Thyer, Bailey, & Harrison, 1989), safe responses when finding a gun in a house (M. B. Himle, Miltenberger, Flessner, & Gatheridge, 2004; Miltenberger et al., 2005), skills for young children to avoid abduction (Johnson et al., 2005, 2006; Miltenberger & Thiesse-Duffy, 1988), steps for identifying and treating children's illnesses for parents at risk of child abuse and neglect (Bigelow & Lutzker, 2000), ways to reduce home safety hazards for parents reported for child neglect (Metchikian, Mink, Bigelow, Lutzker, & Doctor, 1999), and self-preservation and emergency responses for battered families (Lund & Greene, 2003).

One of the most promising applications of social and operant learning procedures has been in the area of prevention. Prevention programs seek to reduce high-risk behavior and the development of clinical disorders by building adaptive strengths and coping skills.
Operant Learning Theory

(Gilchrist, Schinke, & Maxwell, 1987; Task Panel on Prevention, 1988). Social work researchers have employed an expanded form of the SST procedure to transmit information and teach skills to prevent unplanned pregnancy in high school students (Schinke, Blythe, & Gilchrist, 1981), cigarette smoking in middle school students (Schinke & Gilchrist, 1985), drinking and driving in adolescents (Wodarski, 1987; Wodarski & Bordenick, 1994), drinking and substance abuse in minority adolescents (Botvin, Schinke, Epstein, Diaz, & Botvin, 1995; Schinke et al., 1988), and to improve self-image and social competence in adolescent girls (Lecroy, 2004, 2005).

Combining strategies of prevention and early intervention, Fraser and his colleagues evaluated multicomponent training programs aimed at preventing the development of aggressive behavior in third-grade children. One component of their program, Making Choices, consisted of teaching children social problem solving, social information processing, and social skills during 25 to 30 45-minute group sessions (Fraser, Day, Galinsky, Hodges, & Smokowski, 2004; Smokowski, Fraser, Day, Galinsky, & Bacallao, 2004). A second component was Strong Families, a parent training curriculum covering topics of limit setting, problem solving, and rewarding of prosocial behavior, delivered during 15 1- to 2-hour sessions conducted in the parents’ home (Fraser et al., 2004). In a series of controlled studies with hundreds of subjects, these interventions were shown to produce statistically significant improvements for trained groups over comparison groups on teacher ratings of social aggression (i.e., verbal aggression, teasing, hostility) and overt aggression (i.e., threats, physical attack), with effect sizes for the different studies ranging from small to large (Fraser et al., 2004, 2005; Smokowski et al., 2004). All of the previous studies reported success in accomplishing at least some of their goals; however, effect sizes associated with these interventions were not always large, measurement of generalization varied considerably across studies, and improvements were often assessed by self-report data. The impact of these preventive interventions might be amplified in future research by taking greater pains to objectively measure generalization of desired behavior to extratherapy settings, considering strategies for promoting generalization across stimuli and responses extrapolated from operant learning principles (Rzepnicki, 1991; Stokes & Baer, 1977; Stokes & Osnes, 1989), and modifying antecedent and consequent environmental stimuli more proximal to the target behaviors.

Another area of prevention research with potentially far-reaching ramifications is the reduction of television viewing and exposure to its words and images encouraging “violence, rampant consumerism, sedentary lifestyles and early sexual activity” and its dulling of “intellectual and social development” (Jason & Fries, 2004, p. 129). Jason and his colleagues have developed devices and techniques (e.g., television locks, televisions operated by token meters, and contingency contracts between parents and their children) for regulating exposure to this ubiquitous mass media that promotes sensationalism, materialism, and immediate gratification. By utilizing such devices and techniques, millions of parents can regain control over the unwanted messages that are broadcast directly into their homes and viewed by their families.

Clinical Disorders

Evidence-based foundations of operant learning principles come from the fields of behavior therapy, applied behavior analysis, and behavioral social work in effectively treating mental disorders delineated in the Diagnostic and Statistical Manual of Mental Disorders, fourth
These myriad disorders are associated with personal suffering, functional impairments, and risks to health and life; therefore, the success of operant and behavioral interventions in ameliorating these problems is strong evidence of their utility. Because the literature on applying operant learning procedures with clinical disorders is vast, the present section focuses on the research of social workers addressing these problems.

**Phobic Disorders** Excessive, crippling fears and avoidance responses have been a major target of behavior therapy, and a few social work researchers have been active in this area. Treatments based on learning theory often entail **prolonged exposure** to the feared stimuli, thereby habituating clients to conditioned aversive properties of the stimulus and extinguishing their avoidance behavior. In an archetypal study of this approach, Thyer (1981) used graduated and prolonged in vivo exposure to dogs of various sizes and breeds to eliminate extreme fear of dogs in a 70-year-old woman. Thyer (1983) also successfully treated morbid fear of frogs in a 26-year-old woman by having the client gradually approach and eventually touch a live frog. Working with a situation causing distress in a nonclinical population, Thyer et al. (1981) reduced test anxiety in a group of 19 college students by teaching a combination of cognitive restructuring and muscle relaxation techniques (responses incompatible with fear). Finally, Vonk and Thyer (1995) utilized sex education and graduated exposure therapy to successfully treat fear of vaginal penetration in a 25-year-old heterosexual woman who was unable to have sexual intercourse.

**Obsessive-Compulsive Disorder** Persistent and distressing thoughts, images, or impulses that are often accompanied by repetitive rituals that clients enact to reduce anxiety have also been the target of behavioral interventions. Behavioral treatment often involves prolonged exposure to the objects or situations that provoke the obsessional fears and **response prevention** or persuading clients not to engage in the rituals that they usually perform to reduce their anxiety (e.g., washing or checking; Steketee, 1987). Thyer (1985a) treated a 36-year-old woman with homicidal obsessions of stabbing family members with sharp objects that were unaccompanied by compulsive rituals with repeated exposure to tape recordings of herself reading detailed accounts of her disturbing thoughts. J. Himle and Thyer (1989) later reported the successful use of exposure in eliminating obsessive thoughts in a 50-year-old man. This client’s obsessions were blasphemous thoughts about religious figures and sex (“The Virgin Mary is a whore”), which were treated by having the client listen to tape recordings of himself repeating these repugnant phrases and having him repeatedly write out these phrases on paper. K. E. Williams, Chambless, and Steketee (1998) described the treatment of two African American women, one obsessed with fears of contamination and the second obsessed with hoarding beer. Both clients showed dramatic improvements after exposure exercises; the former client was able to touch grimy trash and the latter was able to give away beer or pour perfectly good beer down the drain. Exposure and response prevention have also been applied with larger groups of clients with obsessive-compulsive behavior, showing that outcomes are generally better when these procedures are applied in combination (Foa, Steketee, Grayson, Turner, & Latimer, 1984).

**Schizophrenic Disorders** Operant learning principles have been applied with some of the most severe behavior disorders in adults involving the emergence of bizarre or grossly
disorganized behavior and the associated deterioration in social functioning, vocational performance, and self-care. Wong and his colleagues (Wong, 1996; Wong, Wilder, Schock, & Clay, 2004) have recommended that the treatment of these disorders be multifaceted and address the specific behavioral excesses and deficits exhibited by the individual client. In an early study, Patterson and Teigen (1973) used token reinforcement and verbal feedback to reestablish factual statements about personal background in a 60-year-old woman with a long history of delusional speech. Wong, Woolsey, et al. (1987) later applied positive reinforcement to increase accurate verbalizations and response cost (removal of positive reinforcement for inappropriate behavior) to reduce delusional speech in a 24-year-old woman with the diagnosis of Paranoid Schizophrenia. In a series of studies that examined the relationship between psychotic behavior and appropriate alternative behavior, Wong and his colleagues (Corrigan, Liberman, & Wong, 1993; Wong, Terranova, et al., 1987; Wong, Wright, Terranova, Bowen, & Zarate, 1988) demonstrated that a broad array of bizarre and repetitive responses could be displaced by both sedentary and strenuous recreational activities in 14 persons with severe mental disorders bearing varied diagnoses.

Beginning the lengthy process of restoring functional repertoires in clients with long histories of severe mental disturbances, Wong and Woolsey (1989) used a highly structured, discrete trials format to teach rudimentary conversational skills (e.g., saying "Hi" or "Hello") to four actively psychotic patients with Schizophrenia. Working with three higher functioning patients with Schizophrenia, Wong et al. (1993) applied traditional social skills training procedures to teach more sophisticated conversational skills (e.g., conversational questions such as "How is the weather outside?"). Addressing the common problem of clients' poor self-care and appearance, Wong, Flanagan, et al. (1988) utilized verbal prompts, modeling, praise, and consumable reinforcement to improve grooming and personal hygiene skills in a group of 50 regressed mental patients residing in a state hospital. Finally, focusing on clients' fitness and productive use of leisure time, Thyer, Irvine, and Santa (1984) used consumable reinforcement to motivate two former mental patients in a group home to increase activity on a stationary bicycle.

More recently, Bradshaw (1997) applied a combination of cognitive and behavioral techniques over an 18-month period to reduce symptoms and to improve functioning in four outpatients with Schizophrenia. After spending a month to establish empathetic and supportive relationships with clients, the investigator taught them stress-reduction techniques (e.g., progressive relaxation, exercise) and social skills. Clients were also instructed in three cognitive techniques: negative thought stopping, empirical testing and invalidation of negative thoughts, and generating positive self-statements. Outcome data analyzed in four AB, single-subject designs showed that treatment was associated with substantial reductions in ratings of symptoms and gains in ratings of role functioning. Using a larger participant sample, Bradshaw and Roseborough (2004) applied a similar combination of cognitive and behavioral treatment procedures during 18 months of treatment with 22 outpatients diagnosed with Schizophrenia. Outcome measures consisted of clinical ratings of symptoms and adaptive functioning, and aggregated group data were evaluated within a multiple-baseline design. This study also documented significant improvements in symptoms and adaptive functioning that resulted from treatment.

**Aggressive Behavior** Although not linked to any specific diagnosis, aggression is a serious problem behavior and one that is frequently treated with techniques derived from
Critiques of the Operant Learning Approach

Operant learning principles. Persons with developmental disabilities are a population that exhibits a variety of challenging behaviors, including physical aggression. Wong, Slama, and Liberman (1985) outlined skill acquisition and response reduction procedures available for persons with developmental disabilities or mental disorders, and they also presented case illustrations with positive outcome data. Wong, Floyd, Innocent, and Woolsey (1991) applied brief compliance training and differential reinforcement of other behavior (DRO) schedule to reduce physically aggressive behavior in an autistic man. The DRO schedule stipulated that if the client did not display aggressive behavior for a certain interval (e.g., 15 minutes), positive reinforcement (i.e., praise and a small piece of candy) would be delivered. As the duration of appropriate behavior increased and the frequency of aggressive behavior lessened, the DRO interval was gradually lengthened (e.g., to 30 minutes, to 45 minutes). Figueroa, Thyner, and Thyner (1992) employed extinction and a DRO schedule to reduce physical aggression in a 7-year-old boy with severe mental retardation. Extinction in this case involved a burly therapist who were heavy, protective clothing and gloves and who ignored, blocked, or otherwise neutralized the boy's physical attacks until they gradually subsided.

Youth in residential or psychiatric treatment are another population with difficult-to-manage behavior, including verbal and physical aggression. Dangel, Deschner, and Rasp (1989) described a cognitive-behavioral anger control program used to decrease the verbal aggression of adolescents in residential treatment. The training program included cognitive retraining in identifying triggers for anger, considering alternatives to aggressive behavior, and increasing self-awareness of feelings and self-statements associated with anger buildup. Subjects were also taught alternative behaviors to aggression, including thought-stopping, muscle relaxation, and walking away from the situation. Rates of daily verbal aggression were recorded, and results evaluated within a multiple-baseline across-groups design showed modest declines in verbal aggression in the treatment phase and substantial declines in the follow-up phase. Finally, Wong (1999) showed that long-term treatment with a modified Achievement Place program (Phillips, Phillips, Fixsen, & Wolf, 1974) with response-cost procedures was associated with substantial decreases in aggression and other severe antisocial behavior in a group of 29 adolescent inpatients with histories of treatment failure. In addition to being linked to behavioral improvements, program components received generally high consumer satisfaction ratings by the youth in its care.

Critiques of the Operant Learning Approach

The operant learning model is frequently misrepresented and misunderstood (Thyer, 2004). In earlier times, a common criticism of this approach was that the model was too simplistic and mechanistic. Human behavior was characterized as being inherently too complex to be analyzed in terms of mere stimulus-response units. This criticism has fallen silent in the present era of biomedical and pharmacological treatments, wherein synaptic-neurotransmitter activity is boldly asserted to cause specific human behavior, while psychotropic drugs are simultaneously advanced as solutions for a host of psychological and interpersonal problems (see, e.g., Wong, 2006). Another factor that has tended to quell this criticism is the growing body of research that has produced more advanced and elegant operant theory and techniques, some of which were discussed in this chapter.
It has also been suggested that operant learning theory overemphasizes the external control of behavior, and its principles may eventually result in mind/behavior control technologies that will be used by authoritarian or punitive agents, such as those artistically portrayed in the film *A Clockwork Orange*. However, with rare exception, behavioral researchers and practitioners are keenly aware of their position as human service professionals and their ethical responsibilities as behavior change agents. Furthermore, because behavioral practitioners’ attempts to control behavior are open and recognizable, they are probably less prone to use this influence in authoritarian and self-serving ways than other groups, such as religious or business organizations, whose behavioral control activities are less obvious and less subject to public censure. Thyer’s (2004) comment regarding the misreading or failure to read behavioral literature is also pertinent here. Leading behavioral researchers have written extensively about the shortcomings of punishment and reasons not to apply it as a behavioral control procedure, including its long-term ineffectiveness, its lack of teaching desired behavior, its negative emotional side effects, its tendency to produce escape or countercontrol behavior, and its modeling of aversive control that the student is later predisposed to use against the teacher (Sidman, 2000a; Skinner, 1953).

Another criticism of the operant learning approach is that because it changes behavior by engineering environmental stimuli, it is suited only for tightly controlled environments such as laboratories or closed institutions (e.g., hospitals, prisons, schools). This impression might have arisen due to the many early applications of operant principles in these types of settings. However, recent research reviewed in this chapter should help to correct this misconception, demonstrating that these principles can be utilized as educational techniques in prevention and early intervention programs applied in open organizations and communities. Contrary to these criticisms, operant learning’s focus on the malleability of behavior within the environment speaks for a progressive view of human nature and society. Because this approach sees behavior as largely the product of environmental stimuli and individual experience, it predicts that human potential will be optimized by making the most of these factors. Thus, operant theorists strive to expand people’s opportunities and to provide them with nurturant and supportive environments, positive learning experiences, and skills for self-sufficiency and responsible citizenship. These are essentially humanitarian goals that are mirrored in the primary values of social work.

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94 Operant Learning Theory


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98 Operant Learning Theory


