

**Figure 6.13 Will work for tokens.** Poker chips normally have little or no value for chimpanzees, but this chimp will work hard to earn them once he learns that the "Chimp-O-Mat" will dispense food in exchange for them.

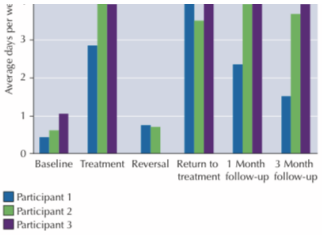



**Figure 6.14 Reinforcement in a token economy.** Children with cystic fibrosis (a hereditary lung disease) benefit from exercise that clears blocked airways. This graph shows the effects of using tokens to reward aerobic exercise in three children with cystic fibrosis. The number of minutes of aerobic exercise each day was measured. Tokens earned could be exchanged for rewards such as going to see a movie or staying up past bedtime. The graph shows that all three children exercised relatively infrequently without the reinforcement (*baseline* and *reversal* phases) and relatively more when the reinforcement was in place (*training* and return to *treatment* phases). It is encouraging to note that exercise rates remained heightened for months after the token economy was first implemented. (Adapted from Bernard, Cohen, & Moffett, 2009.)

raisins. Once the animals had learned to exchange tokens for food, they would learn new tasks to earn the chips. To maintain the value of the tokens, the chimps were occasionally allowed to use the "Chimp-O-Mat" (Cowles, 1937).

A major advantage of tokens is that they don't lose reinforcing value as quickly as primary reinforcers. For instance, if you use candy to reinforce a developmentally disabled child for correctly naming things, the child might lose interest when he or she is no longer hungry. It would be better to use tokens as immediate rewards for learning. Later, the child can exchange tokens for candy, toys, or other treats.

*Token economies*, systems for managing and altering behavior through reinforcement of selected responses, have been used with troubled children and adults in special programs and even in ordinary school classrooms (Alberto & Troutman, 2013; Maggin et al., 2011; Figure 6.14). In each case, the goal is to provide an immediate reward for learning. Tokens may typically be exchanged for food, special privileges, or trips to movies, amusement parks, and so forth. Many parents find that tokens greatly reduce discipline problems with younger children. For example, children can earn points or gold stars during the week for good behavior. If they earn enough tokens, they are allowed on the weekend to choose one item out of a grab bag of small prizes. A *token economy* is a system for managing and altering behavior through reinforcement of selected responses. (See Chapter 15.5, for more information on the uses of token economies in behavior therapy.)

### Social Reinforcement

As we have noted, secondary reinforcers such as learned desires for attention and approval (also called **social reinforcers**) often influence human behavior. This fact can be used in a classic, if somewhat mischievous, demonstration:

**Shaping a Teacher**

For this activity, about one-half (or more) of the students in a classroom must participate. First, select a target behavior. This should be something like "lecturing from the right side of the room." (Keep it simple, in case your teacher is a slow learner.) Begin training in this way: Each time the instructor turns toward the right or takes a step in that direction, participating students should look *really* interested. Also, smile, ask questions, lean forward, and make eye contact. If the teacher turns to the left or takes a step in that direction, participating students should lean back, yawn, check out their split ends, close their eyes, or generally look bored. Soon, without being aware of why, the instructor should be spending most of his or her time each class period lecturing from the right side of the classroom.

This trick has been a favorite of psychology graduate students for decades. For a time, one of your author's professors delivered all her lectures from the right side of the room while toying with the cords on the window shades. (The students added the cords the second week!) The point to remember from this example is that



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attention and approval can change the behavior of children, family members, friends, roommates, and coworkers. Be aware of what you are reinforcing. Also be aware that you may be *unaware* of some of the reinforcers that are changing your own behavior! (In fact, such automatic associative learning is a hallmark of experiential processing, but more about that is included in Chapter 8.1.)

## 6.7 Partial Reinforcement—Las Vegas, a Human Skinner Box?

**GATEWAY QUESTION 6.7:** How are we influenced by patterns of reward?

Until now, we have treated reinforcement as if it were continuous. **Continuous reinforcement** means that a reward follows every correct response. At the start, continuous reinforcement is useful for learning new responses (Chance, 2014). To teach your dog to come to you, it is best to reinforce your dog every time that it comes when called. Curiously, once your dog has learned to come when called, it is best to shift to **partial reinforcement**, in which reinforcers do not follow every response. Responses acquired by partial reinforcement are highly resistant to extinction, a phenomenon known as the **partial reinforcement effect** (Horsley et al., 2012; Powell, Honey, & Symbaluk, 2017).

*How does getting reinforced part of the time make a habit stronger?* If you have ever visited a casino, you have probably seen row after row of people playing slot machines. To gain insight into the distinction between continuous and partial reinforcement, imagine that you put a dollar in a slot machine and pull the handle. As a result, $10 spills into the tray. Let's say that this continues for several minutes. Every pull is followed by a payoff. Because you are being reinforced on a continuous schedule, you quickly "get hooked" (and begin to plan your retirement). But, alas, suddenly each pull is followed by nothing. Obviously, you would respond several times more before giving up. However, when continuous reinforcement is followed by extinction, the message quickly becomes clear: No more payoffs (or early retirement).

Contrast this with partial reinforcement. This time, imagine that you put a dollar in a slot machine five times without a payoff. You are just about to quit, but decide to play once more. Bingo! The machine returns $20. After this, payoffs continue on a partial schedule; some are large, and some are small. All are unpredictable. Sometimes you hit two in a row, and sometimes 20 or 30 pulls go unrewarded. Now let's say the payoff mechanism is turned off again. How many times do you think you would respond this time before your handle-pulling behavior is extinguished? Because you have developed the expectation that any play may be "the one," it will be hard to resist just one more play . . . and then one more . . . and one more. Also, because partial reinforcement might include long periods of nonreward, it will be harder to distinguish between periods of reinforcement and extinction. It is no exaggeration to say that the partial reinforcement effect has left many people penniless. Even psychologists visiting a casino may get "cleaned out." (Not your authors, of course!)

To return to our examples, after using continuous reinforcement to teach a child to turn off the lights or a dog to come when called, it is best to shift to partial reinforcement. That way, the new behavior will become more *resistant to extinction* (Horsley et al., 2012).

### Schedules of Partial Reinforcement

Partial reinforcement can be given in several patterns. A **schedule of reinforcement** is a protocol for determining when and how often responses will be rewarded (Chance, 2014). Let's consider the four most basic, which have some interesting effects on us. Typical responses to each pattern are shown in Figure 6.15. Results such as these are obtained when a recorder is connected to a Skinner box. Rapid responding results in a steep line; a horizontal line indicates no response. Small tick marks on the lines show when a reinforcer was given.

#### Fixed Ratio (FR)

What would happen if a reinforcer followed only every other response? What if we followed every third, fourth, fifth, or other number of responses with reinforcement? Each of these patterns is a **fixed ratio (FR) schedule**—the number of correct responses



The one-armed bandit (slot machine) is a dispenser of partial reinforcement.

**Social reinforcer (reinforcement)** Reinforcement based on receiving attention, approval, or affection from another person.

**Continuous reinforcement** Pattern in which a reinforcer follows every correct response.

**Partial reinforcement** Pattern in which only a portion of all responses are reinforced.

**Partial reinforcement effect** Responses acquired with partial reinforcement are more resistant to extinction.

**Schedule of reinforcement** Protocol for determining when and how often responses will be rewarded.

**Fixed ratio (FR) schedule** Rule specifying the number of correct responses a subject must give to receive reinforcement.



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