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This trainer is using operant shaping to teach tricks to these seals. Fish from a cup hanging from her waist serve as reinforcers. Notice that she is using a whistle and hand signals as discriminative stimuli to control the performance.

signaled the availability of reinforcement to your dog, it also began jumping up while you sat at other tables (generalization). If you do not feed your dog while sitting at any other tables, the jumping response that originally generalized to them will extinguish because of *nonreinforcement*. Thus, if your dog's jumping response is consistently rewarded only in the presence of a specific table, jumping at other tables will eventually be extinguished. Through **operant stimulus discrimination**, your dog has learned to differentiate between antecedent stimuli that signal reward and nonreward. As a result, the dog's response pattern will shift to match these **discriminative stimuli**—stimuli that precede reinforced and nonreinforced responses.

Operant stimulus discrimination is aptly illustrated by the training of "sniffer" dogs like URL (Concha et al., 2014). Operant stimulus discrimination was used to teach URL to recognize the scent of electronic devices. During training, he was reinforced only for approaching containers baited with electronic devices.

Operant stimulus discrimination also has a tremendous impact on human behavior. Learning to recognize different automobile brands, birds, animals, wines, types of music, and even the answers on psychology tests all depends, in part, on operant discrimination learning.

A discriminative stimulus with which most drivers are familiar is a police car on the freeway. This stimulus is a clear signal that a specific set of reinforcement contingencies applies. As you have probably observed, the presence of a police car brings about rapid reductions in driving speed, lane changes, and tailgating.

Would using different ringtones on my cellphone be an example of using discriminative stimuli? Excellent! Suppose that you use one ringtone for people you want to speak to, one for people you don't, and yet another for calls from strangers. In no time at all, you will show different telephone-answering behavior in response to different ringtones.

Knowledge Builder

Operant Conditioning

RECITE

1. Responses in operant conditioning are voluntary or _____, whereas those in classical conditioning are passive, involuntary, or _____ responses.
2. Changing the rules in small steps so that an animal (or person) is gradually trained to respond as desired is called _____.
3. Extinction in operant conditioning is also subject to _____ of a response.
   a. successive approximations
   b. shaping
   c. automation
   d. spontaneous recovery
4. Positive reinforcers increase the rate of responding, and negative reinforcers decrease it. T or F?
5. Responding tends to occur in the presence of discriminative stimuli associated with reinforcement and tends not to occur in the presence of discriminative stimuli associated with nonreinforcement. T or F?

REFLECT

Think Critically

6. Can you think of any reasons that engaging in superstitious behaviors might actually improve performance?

Self-Reflect

- A friend of yours punishes his dog all the time. What advice would you give him about how to use reinforcement, extinction, and shaping instead of punishment?
- Doors that are meant to be pushed outward have metal plates on them. Those that are meant to be pulled inward have handles. Do these discriminative stimuli affect your behavior?

Answers: 1. emitted, elicited 2. shaping 3. d 4. F 5. T 6. Even though you know that tapping your club on the ground three times is not causing a better golf shot, it might nevertheless help settle you down or help you focus your attention on your swing (Damisch, Stoberock, & Mussweiler, 2010).

6.6 Reinforcers—What's Your Pleasure?

GATEWAY QUESTION 6.6:
Are there different types of reinforcement?

For humans, learning may be reinforced by anything from a candy bar to a word of praise. In categorizing reinforcers, a useful distinction can be made between *primary reinforcers* and *secondary reinforcers*. It is also important to distinguish *continuous reinforcement* from *partial reinforcement*.

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Primary Reinforcement

A **primary reinforcer** produces comfort, ends discomfort, or fills an immediate physical need: It is natural, nonlearned, and rooted in biology. Food, water, and sex are obvious examples. Every time you open the refrigerator, walk to a drinking fountain, turn up the heat, or order a double latte, your actions reflect primary reinforcement.

Primary Reinforcement and the Brain

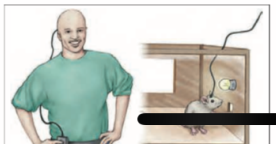
In addition to the examples just listed, there are other, less obvious, primary reinforcers, such as psychoactive drugs. One of the most powerful reinforcers is *intracranial self-stimulation*, which involves the direct activation of "pleasure centers" in the brain.

Suppose that you could have an electrode implanted in your brain and connected to a remote control. Slide the controller upward, and electrical impulses stimulate one of your brain's "pleasure centers." The few humans who have had a chance to try direct brain stimulation report feeling intense pleasure that is better than food, water, sex, drugs, or any other primary reinforcer (Heath, 1963; ● Figure 6.12).

Most of what we know about intracranial self-stimulation comes from studying rats with similar implants (Vlachou & Markou, 2011). A rat "wired for pleasure" can be trained to press the bar in a Skinner box to deliver electrical stimulation to its own limbic system (● Figure 6.12). Some rats will press the bar thousands of times per hour to obtain brain stimulation. After 15 or 20 hours of constant pressing, animals sometimes collapse from exhaustion. When they revive, they begin pressing again. If the reward circuit is not turned off, an animal will ignore food, water, and sex in favor of bar-pressing. (■ Electrical stimulation is a valuable tool for studying the functions of various brain structures. See Chapter 2.4.)

Many natural primary reinforcers activate the same pleasure pathways in the brain that make intracranial self-stimulation so powerful (Powell, Honey, & Symbaluk, 2017). So do psychoactive drugs, such as alcohol and cocaine (Lazenka, Legakis, & Negus, 2016; Prus, 2014). In fact, rats also will self-administer nicotine. When they do, they are even more likely to engage in intracranial self-stimulation (Kenny & Markou, 2006). Apparently, nicotine further increases the sensitivity of pleasure pathways in the brain.

One shudders to think what might happen if brain implants were easy and practical to do. (They are not.) Every company, from Playboy to Apple (the iTickle?), would have such a device on the market, and we would have to keep a closer watch on politicians than usual!



Secondary Reinforcement

Although human learning is still strongly tied to food, water, and other primary reinforcers, humans also respond to a much broader range of secondary reinforcers. Money, praise, attention, approval, success, affection, grades, and the like all can serve as a learned or **secondary reinforcer**.

How does a secondary reinforcer gain its ability to promote learning? Some secondary reinforcers are simply associated with a primary reinforcer. For example, if you want to train a dog to follow you ("heel") when you take a walk, you could reward the dog with small food treats for staying near you. If you praise the dog each time you give it a treat, praise will become a secondary reinforcer. In time, you will be able to skip giving treats and simply praise your pup for doing the right thing. The same principle applies to children. One reason that parents' praise becomes a secondary reinforcer is because it is frequently associated with food, candy, hugs, and other primary reinforcers.

Tokens and Token Economies

Some secondary reinforcers gain their value because they can be *exchanged* for primary reinforcers (Powell, Honey, & Symbaluk, 2017). Printed money obviously has little or no value of its own. You can't eat it, drink it, or sleep with it. However, it can be exchanged for food, water, lodging, and other necessities.

A **token reinforcer** is a tangible secondary reinforcer, such as money, a gold star, a poker chip, and the like. In a series of classic experiments, chimpanzees were taught to work for tokens. The chimps were first trained to put poker chips into a vending machine (● Figure 6.13). Each chip dispensed a few grapes or

Operant stimulus discrimination The tendency to make an operant response when stimuli previously associated with reward are present and to withhold the response when stimuli associated with nonreward are present.

Discriminative stimuli Stimuli that precede rewarded and nonrewarded responses in operant conditioning.