

LESSON

16

Stimulus Discrimination and Everyday Behavior

Introduction to Unit Three

This unit looks at the principles of how stimulus situations affect behavior. These principles govern the development and maintenance of stimulus control. What is stimulus control? Let me contrast it with another major factor controlling behavior. In Unit Two, you learned that reinforcement control is the increase in behaviors from an event that follows the behavior. By contrast, stimulus control is the increase in behavior from an event that precedes the behavior. Some events that might precede a behavior and influence the person's behavior include questions, commands, the sight of a person or object, or being present in a room or at a football game. Behavior analysts call the effect of such events on behavior *stimulus control*. Sidman suggests that the term *cognitive* refers to behavior under stimulus control (Sidman, 1978).

The emphasis in this unit changes from looking at what happens after you behave—reinforcement or extinction—to looking at what happens before you behave. The concept of stimulus is cen-

tral. A **stimulus** is any physical event, or object, related to a person's behavior. The plural of *stimulus* is *stimuli*. Stimuli might be objects such as doors, windows, other people, parts of one's own body, clothing, or hair. They might be vocal sounds such as words, sighs, or laughter, or visible configurations such as words on a page, colors, length, and width. The term also refers to broader situations such as an entire room. In that case, we then often use the term *stimulus situation*. As you can see from this definition, reinforcers are also stimuli. A reinforcing stimulus is one that follows a behavior. This unit will deal primarily with stimuli that precede a behavior.

2. A stimulus is any physical event, or object, related to a person's _____.

This unit deals with how people learn to behave in ways that work for their current stimulus situation. The lessons in this unit teach concepts relating to the influence of the stimulus situation on behavior. This lesson deals with distinguishing among different situations, a process known as *discrimination*. The next lesson deals with grouping similar situations into general categories, a process known as *generalization*. Future lessons deal with simple aspects of verbal behavior. In general, this unit describes a behavioral approach to intellectual behavior.

Stimulus control is present in everyday situations. By understanding stimulus control, you can better understand your own behavior as well as that of friends, family, and coworkers.

Behavior analysts use stimulus control to solve people's problems. They turn to it when the behavioral strategy and the reinforcement strategy aren't enough. Behavior analysts may be able to define the problem in behavioral terms and differentially reinforce desirable behavior, but the behavior may not occur in the appropriate situa-

Behavioral Approach to Cognition

"Behavior under stimulus control is essentially the field of cognition.... Terms like cognition or knowledge refer to the control of behavior by its environmental context, by events which, unlike consequences, precede or accompany the behavior; here, it is sometimes said that our behavior expresses meaning or comprehension" (Sidman, 1978: p. 265).

1. The field of cognition involves behavior under _____ (reinforcement, stimulus) control.

ons. They may then turn to the stimulus control strategy. I have placed the unit on stimulus control third to suggest that behavior analysts turn first to the other strategies.

This unit will describe five tactics in using the stimulus control strategy. They include using discrimination and generalization training; fading and programming; imitation and instruction; and conditioned or generalized reinforcers. This lesson introduces Tactic #1, using discrimination training. The first tactic in using the stimulus control strategy is to narrow stimulus control through discrimination training.

3. The first tactic in using the stimulus control strategy is to narrow stimulus control through _____ training.

Discrimination Training

People act differently in the presence of different stimulus situations. They act differently toward the friendly professor than they do toward the pompous one, differently in a library than in a car, and differently when driving toward a red light than toward a green light. There is a basic process at work in developing these behavioral differences. The process involves reinforcement of a behavior in the presence of one stimulus and extinction of the same behavior in the presence of another stimulus. Behavior analysts call this procedure *discrimination training*.

Discrimination training consists of reinforcing a behavior in the presence of a particular stimulus and extinguishing it in the presence of another stimulus. Examples of discrimination training in everyday life are common. Consider the story of Sam, a professor's 6-year-old son. Sam visits his Mom in the large campus building where she teaches. He often leaves without his Mom so he can get home for dinner. How did he learn to get out of the building? Each time Sam went through a door with the sign "Exit" over it, he got out. Each time he went through doors marked with signs such as "Women," "Library," or "223," he did not. He soon learned to look for doors with "Exit" signs over them. In this example, Sam's response of going through doors with an "Exit" sign was reinforced by getting out. His response of going through other doors was extinguished. Therefore, this is an example of discrimination training.

4. Discrimination training consists of _____ a behavior in the presence of a particular stimulus and _____ it in the presence of another stimulus.

Behavior analysts call the stimulus associated with reinforcement the *discriminative stimulus*. They abbreviate it SD. The D stands for *discriminative* and the S stands for *stimulus*. A **discriminative stimulus** (or SD) is a stimulus in whose presence a particular behavior produces reinforcement. For example, the sign "Exit" indicates that the behavior of going through the door will be reinforced by getting out of the building.

5. A stimulus in whose presence the behavior produces reinforcement is called a _____.

Behavior analysts call the stimulus associated with extinction the *S-delta*. An **S-delta** is a stimulus in whose presence the behavior will be extinguished. For example, the sign "Library" would indicate that the behavior of going through that door will not be reinforced by getting out of the building.

6. A stimulus in whose presence the behavior will be extinguished is called the _____.

If discrimination training is successful, it will cause a behavior to occur more frequently in the presence of the SD than in the presence of the S-deltas. Behavior analysts call that behavior *discriminated behavior*. **Discriminated behavior** is a behavior that is more likely to occur in the presence of the SD than in the presence of the S-delta. Sam's behavior of going through doors marked "Exit" is discriminated behavior. Before he learned to go through exit doors, his behavior was not discriminated behavior. We would call a single instance of the behavior a *discriminated response*. Thus, when Sam went through the exit door last Sunday, he made a discriminated response.

7. A behavior that is more likely to occur in the presence of the SD than in the presence of the S-delta is called a _____ behavior.

Behavior analysts refer to the effect of the SD on the behavior as *stimulus control*. **Stimulus**

control is the increased probability of a discriminated behavior produced by a stimulus (SD). Thus, behavior analysts call the increased probability that Sam will go through a door marked "Exit" *stimulus control*. The "Exit" sign literally controls his behavior. We usually say that the stimulus exerts stimulus control over the behavior.

8. Stimulus control is the increased probability of a discriminated behavior produced by a _____.

Thus, if you wish to refer to the behavior that results from discrimination training, you would designate it as discriminated behavior. A single instance of the behavior is a discriminated response. If you wish to talk about the effect of the stimulus involved in discrimination training, you would call it stimulus control.

Simple Examples of Discrimination Training

Many everyday examples of discrimination training are easy to analyze. For example, history teachers use discrimination training to increase the probability of their students giving the correct answers. They will reinforce students for answering, "December 7, 1941" when asked, "When did the Japanese bomb Pearl Harbor?" However, they will attempt to extinguish that response when asking, "When did the Japanese formally surrender in World War II?" Behavior analysts call the question "When did the Japanese bomb Pearl Harbor?" the discriminative stimulus (SD), or cue, for "December 7, 1941." They call most other questions the S-delta for that response. They call the correct answer a discriminated behavior. If a student is more likely to answer "December 7, 1941" in response to the question, they say that the question exerts stimulus control over that answer.

Here are some other simple examples based on discrimination training. You might learn to call the blonde person "Laverne" but not the brunette person. The blonde person reinforces you by looking at you when you call her Laverne. She is a discriminative stimulus, or SD, for that name, because she will reinforce you for calling her by that name. The brunette person ignores you if you call her Laverne. She is an S-delta for that name, be-

cause she will extinguish you if you call her Laverne. When you learn the difference, your use of "Laverne" is a discriminated response. Your increased probability of calling the blonde person "Laverne" is called *stimulus control*. You might say that the blonde person exerts stimulus control over your use of her name.

You might learn to yell at a football game but not in a library. Other people join you when you yell at the football game but not when you yell in the library. If having others yell with you is reinforcing, then what would you call the stimulus situation of the football game? You would call it an SD, because yelling is reinforced at the game. If having others not yell with you is extinguishing, what would you call the stimulus situation of the library? You would call it an S-delta, because yelling is extinguished in the library. Thus, the library is the S-delta, and the game is the SD. What would you call the process of having yells reinforced at the game and extinguished in the library? It is discrimination training, because yelling is reinforced at the game and extinguished in the library. What would you call the effect of being at the game on your probability of yelling? It is stimulus control. What would you call the behavior of yelling? It is discriminated behavior, because it is more likely to occur at the game than in the library.

Suppose that the question, "What is 9×9 ?" has come to exert stimulus control over your behavior. That means that you are more likely to answer "81" when the teacher asks you that question than when she asks you another question. Other questions, such as "What is 8×8 ?", will serve as S-deltas for that answer. You will be less likely to answer "81" when asked, "What is 8×8 ?" The answer has become a discriminated behavior. Presumably this happens because the teacher uses a form of discrimination training to teach you the difference. She may smile and say, "That's right" when you answer "81" to "What is 9×9 ?" but not when you answer "81" to "What is 8×8 ?"

These examples share two basic components. First, the training is for only one behavior (saying "Laverne," yelling, or answering "81"). Second, the behavior is reinforced in the presence of only one stimulus situation (the blonde person, a football game, or "What is 9×9 ?"). It is not reinforced in the presence of other stimulus situations (brunette persons, libraries, or other questions).

You may feel a bit overwhelmed by all the new

terminology that I have introduced. I have done so because I need the new terms to talk about the elements of discrimination training. I need to talk about the behavior that results from discrimination training. You know by now that behavior analysts call the resulting behavior *discriminated behavior*. I also need to talk about the stimulus associated with reinforcement for the discriminated behavior. You know by now that behavior analysts call the stimulus associated with reinforcement the *discriminative stimulus*. But it is easier just to call it the SD. I also need to talk about the stimulus associated with extinction for the discriminated behavior, which behavior analysts call the S-delta. Finally, I need to talk about the whole process by which some stimuli increase the probability of certain behaviors. Behavior analysts call that increased probability *stimulus control*. I need each term. So hang in there; you will soon find using them as natural as using *reinforcement* and *extinction*.

Sometimes you may be tempted to confuse the behavior with the stimulus. For example, reading Freud's *Interpretation of Dreams* may seem like a different behavior from reading Skinner's *Walden Two*. However, reading is the same behavior, no matter what you read. You hold a book open, look at the page, and move your eyes to the next word or phrase. Therefore, learning to read historical novels instead of science fiction is an example of developing a discriminated behavior. Reading behavior is occurring in the presence of one kind of book but not the other. The same analysis applies to watching TV or movies. The same looking behavior occurs in the presence of different stimulus situations.

Realistic Examples of Discrimination Training

Discrimination training is usually more complex than the preceding examples imply. It usually involves some modification of the stimuli. Suppose you show Nan two pictures: The one on the right is a cat, and the one on the left is a dog. If you always ask Nan to point to the cat, all she has to remember is to point to the picture on the right. She doesn't even have to look at it. However, if you switch the sides on which the cat and dog appear, Nan must look at the pictures to point to

the cat. Even simple discrimination training requires that you switch the order of the stimuli.

Discrimination training usually involves more than switching the order of the stimuli. It usually involves learning multiple discriminations at the same time. For example, the teacher wants you to answer "81" to "What is 9x9?" But she wants you to do more than *not* answer "81" to the other question. She wants you to give the correct answer to every question. You learn the whole times table, not just one correct answer. Likewise, you not only learn the blonde person's name; you also learn other people's names. Similarly, you not only learn not to yell in the library; you learn what to do there.

One study provides a behavior analysis example. Two researchers taught a 4-year-old child to discriminate four industrial objects (Mann & Baer, 1971). The researchers named one object and asked the child to point to it. When correct, the child earned chips that could later be exchanged for a toy. When wrong, the child lost a chip. The researchers did not repeatedly name one object. Rather, they randomly named each of the four objects. Thus, the child was learning the name of four objects rather than just one, undergoing four discrimination training programs at the same time. When the researchers named object #1, it became an SD for that name. But it was also an S-delta for the other three names. Thus, this training situation was no longer a simple discrimination training procedure. Even so, the child learned the four discriminations in about 300 trials.

Researchers have used similar methods to teach other discriminations. They have taught 4-year-old children to discriminate letters (Tawney, 1972). They have taught teachers to discriminate correct use of behavior analysis in their teaching (Koegel, Russo, & Rincover, 1977). They have taught baseball players to discriminate curveballs and thus hit them better (Osborne, Rudrud, & Zezoney, 1990). They have even taught individuals with severe retardation to discriminate complex forms (Rodgers & Iwata, 1991). In each case, the researchers taught multiple discriminations at the same time.

Two researchers taught male trainees to discriminate females' level of interest (Azrin & Hayes, 1984). They trained the males with films of couples conversing. They might show a conversation where the female later said she was "very interested." They asked the trainee to guess her level of inter-

Helping Batters Discriminate Curveballs

Researchers guessed that a batter must discriminate the spin of a pitched baseball for effective batting. Seeing the spin allows batters to adjust the speed and location of their swing. "Different types of pitches have differing rates and directions of spin. A curveball spins in a downward direction.... A batter must decide whether or not to swing within 0.13 seconds after the delivery of the pitch." The researchers taught hitters to discriminate the spin on a curveball by adding ¼-inch-wide orange highlighting to the seams of the ball. This made it easier for the hitters to see the spin on the ball. The percentage of well-hit curveballs increased from about 40% to about 50% with the addition of the orange highlighting. (Based on Osborne, Rudrud, & Zezoney, 1990.)

9. When a batter adjusts his or her swing depending on the spin of the ball, we say that the spin is exerting _____ (reinforcement, stimulus) control.

est and then informed him of her true level of interest. Presumably, if the trainee guessed "very interested," the feedback that she was indeed very interested would reinforce his guess. If he guessed "uninterested," the feedback that she was very interested would extinguish his guess. The training consisted of 24 conversations. The trainees improved in the accuracy of their guesses by 50% as a result of the feedback. They thus became more socially sensitive. Using the new terminology, you could say that this sensitivity has become discriminated behavior. The subtle cues of the females were now exerting stimulus control over the males' guesses about the females' level of interest.

Researchers have taught several health-related discriminations. One researcher taught a woman to discriminate the temperature of her hand (Gainer, 1978). A lower temperature is a warning of an impending migraine headache. This training led to a marked reduction in migraine headaches. Another research team taught college students to discriminate their blood pressure (Cinciripini, Epstein, & Martin, 1979). The re-

searchers asked the students to guess their blood pressure. They then measured it and gave them feedback. This led to improved guesses. The researchers suggest that this skill might improve the ability of individuals with high blood pressure to manage their disease better. Another team taught diabetics to discriminate their blood-sugar level (Gross et al., 1983). They asked diabetics to guess their level and then provided feedback. This may help diabetics to manage their disease better. Each example illustrates that internal events can become SD's for people.

Behavior analysts often use discrimination training. They use it with educational behaviors, particularly in programmed instruction. They use it to teach simple skills to children with retardation and autism, such as imitation and following instructions. They use it to get behaviors to occur outside the training situation. The methods used to teach these skills involve the basic discrimination-training procedure. I will describe them in greater detail in succeeding lessons.

Improving Supervision with Marked Items

Cities often hire youths to pick up the litter in an area. They pay them for each bag of trash that they turn in. Unfortunately, their supervisor can't tell whether the youths picked up the trash from the ground or from a garbage can. One solution is to place marked pieces of trash on the ground in the target area. If the youths don't know which items are marked, they must pick up all litter to be sure of getting the marked items. Three researchers tried this procedure. They paid the youths 25 cents for each marked item. This approach reduced litter as much as 90%, resulting in a much cleaner neighborhood. The marked items permitted the supervisors to discriminate when the youths were actually picking up litter from the area. (Based on Hayes, Johnson, & Cone, 1975.)

10. Because the supervisor's seeing a marked item comes before paying the youth, a marked item is called a(n) _____ (reinforcer, SD) for the supervisor to pay the youth.

Establishing Stimulus Control

Sometimes behavior analysts can create stimulus control without explicit training. The procedures seek to establish a “right” time and place to emit problematic behaviors. When the procedures are successful, the behaviors become discriminated behaviors and occur at a more functional rate in this more restricted situation. The “right” situation becomes the SD that controls the behavior.

For example, researchers helped a group of worriers decrease their worrying (Borkovec et al., 1983). They told the worriers to note but otherwise ignore their worries during most of the day. The worriers were then to do all their worrying during a half-hour “worry period” once a day. The worriers reported considerably less worrying as a result.

Researchers helped overweight people lose weight (Carroll & Yates, 1981). They told these

Intelligence Can Be Taught

Educators test for “intelligence” by giving students analogies, jumbled sentences, and verbal math problems. Recently educators have begun teaching “intelligence” by teaching the behaviors involved in solving such problems. Xavier, a small black college, has increased the number of its graduates going to medical school from 5 to 74 a year by teaching “intelligence” behaviors. Washington, DC schools increased their Merit Scholars from none in 1988 to four in 1995 by teaching the steps in solving problems. Intelligence is knowing how to take these steps when faced with a problem. Being faced with a problem is the SD for taking the steps. Taking the steps when faced with a problem has become a discriminated behavior. Being able to define low intelligence as a behavioral problem may mean that we don’t have to “condemn the educationally disadvantaged to a life of wretchedness” (Cose, 1995).

11. The increased probability of taking the right steps when faced with a problem is called _____ (reinforcement, stimulus) control.

people to eat in only one room, use only one chair, and eat at the same times each day. They told them to do nothing else while eating—no reading or watching TV. They told them to keep food out of sight—no fruit or candy in bowls. They even told them to store food in the refrigerator in opaque bowls. These rules greatly reduced the stimuli that would lead to eating. They led to better maintenance of weight loss.

Researchers have used similar methods to combat insomnia (Espie et al., 1989). Other researchers have helped normal adults maintain exercise programs (Keefe & Blumenthal, 1980).

Summary

Everyday people frequently use discrimination training. Behavior analysts often use it to help people. It involves reinforcing a behavior in the presence of one stimulus and extinguishing it in the presence of other stimuli. Behavior analysts call the stimulus associated with reinforcement a *discriminative stimulus* or SD. They call the stimulus associated with extinction the S-delta. When the behavior occurs with the SD but not the S-delta, they call it *discriminated behavior*. They say that the SD exerts stimulus control. Tactic #1 of the stimulus control strategy is to narrow stimulus control through discrimination training.

Behavior Analysis Examples

Teaching Reading to a Culturally Deprived Chicano

Carlos was a 14-year-old Chicano boy who read at a second-grade level. He had a long history of school failure; he had never passed a course in school. Carlos was a persistent behavioral problem for his teachers.

Staats and Butterfield (1965) used behavior analysis to help Carlos learn to read. They gave him training consisting of four stages. First, they taught him new words; second, they had him read stories out loud using those words; third, they had him read the same stories to himself and then answer questions about them; and fourth, they reviewed his new words every 20 lessons.

They used a set of stories starting at the first-

grade reading level and progressing to a higher level. Each story ended with a set of test questions. They reinforced reading behavior with toys, special events, and money.

For stage one, they taught Carlos any new words appearing in the next story. They gave him a reinforcer when he read a new word correctly. When he did not, they corrected him and gave him another chance.

For stage two, they had Carlos read the story out loud after he had mastered the new words. They gave him a reinforcer each time he read a paragraph with no errors. When he made an error, they corrected him and gave him another chance later.

For stage three, they gave him the whole story on a single page, along with the test questions. They instructed him to read it silently and answer the questions. They reinforced him on a variable-interval schedule averaging 15 seconds when he was looking at the story, gave him a reinforcer when he completed the questions, and told him of his errors and let him reread the story.

For stage four, they presented him with a review of all his newly learned words after every 20 stories. They gave him a reinforcer for each correct answer on the review.

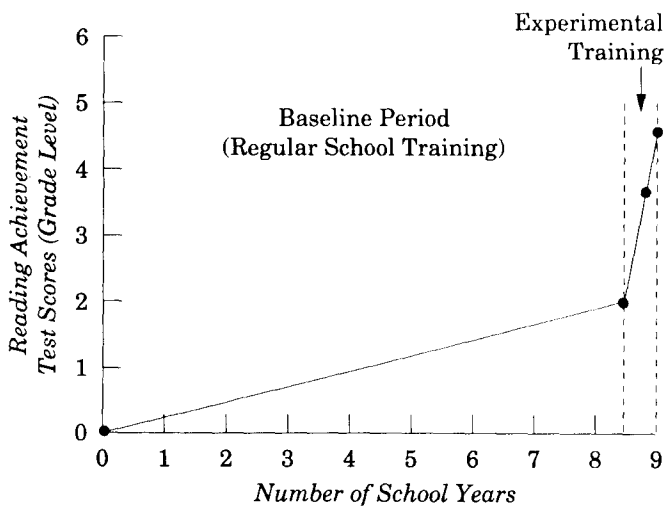


Figure 16-1. The reading achievement level of Carlos with regular school training and special training using discrimination training methods. Adapted from "Treatment of Non-reading in a Culturally Deprived Juvenile Delinquent: An Application of Reinforcement Principles," by A. W. Staats and W. H. Butterfield, *Child Development*, 1965, 36, 925-942. Copyright 1965 by The Society for Research in Child Development, Inc. Used by permission.

The training resulted in remarkable improvement in his reading. Figure 16-1 shows the results of reading achievement tests given to him. Carlos had attained a second-grade reading level after 8½ years in public school. In just six months of special training, he improved to a grade level of 4.3. During that term, he passed all of his courses—the first time that he had passed even one course! Also, his misbehavior in the classroom had decreased to near zero. Behavior analysis helped Carlos more in 40 hours than had public school methods in more than 8 years.

As mentioned earlier, Skinner guessed that at least 50,000 responses must be reinforced to learn basic arithmetic. Carlos made a total of about 65,000 oral responses to words during his training period. This experiment shows that Carlos was not stupid; he couldn't read because his parents and teachers had not reinforced enough reading responses. When behavior analysts reinforced his reading responses, he learned to read.

12. The first stage of teaching Carlos involved showing him a written word and asking him to say that word. For example, if Carlos said "car" when they showed him the word *car*, they reinforced him. If he said "car" when they showed him the word *cat*, they did not reinforce him but rather corrected him. Because they reinforced a behavior in the presence of one stimulus and extinguished it in the presence of another stimulus, the researchers were using discrimination (behavior, training).

The Effects of Different Adults on a Child's Behavior

Redd and Birnbrauer (1969) studied the effects of Bill and Bob on the cooperative play behavior of Paul, a 14-year-old boy with retardation. The researchers selected Paul because he did not engage in cooperative play. They had Bill reinforce cooperative play, while Bob did not. They studied whether Paul would play differently around Bob than around Bill.

The researchers brought Paul and four other children into a playroom containing a wide variety of toys. Two observers sat behind a one-way mirror. They recorded whether Paul engaged in cooperative play every 2½ seconds. With no adults in the room, Paul engaged in no cooperative play.

Bill then proceeded to shape cooperative play. He gave Paul reinforcers contingent upon approximations to cooperative play. The reinforcers consisted of saying "Good boy" plus an M&M, a bite of ice cream, or a sip of Coke. Paul learned to play cooperatively. Bill then gradually reduced the reinforcement to a fixed-interval schedule of 45 seconds. That schedule maintained cooperative play.

Bob came into the room at times when Bill was not there. He gave as many reinforcers as did Bill, but not contingent on cooperative play.

Paul soon adopted a very distinctive pattern of cooperative play. If neither adult was in the room, he did not engage in cooperative play. If Bill came into the room, he immediately started playing cooperatively and continued as long as Bill remained. If Bill left the room, Paul stopped playing cooperatively. When Bob came into the room, Paul did not play cooperatively. Thus, Bill became a "signal" to play cooperatively.

The researchers wanted to make sure that this finding was not the result of some personality difference between Bill and Bob. So they had them exchange roles. Bob now awarded reinforcers contingently for cooperative play, while Bill did not. With this reversal, Paul started to play cooperatively the moment Bob entered the room. He stopped when Bill entered the room.

This study shows that the cooperative play behavior of Paul underwent only a very limited change. Paul's behavior changed only in the presence of the adult who reinforced him; it did not change more generally than that. Paul had not learned to play cooperatively with other children in general. The next lesson will discuss procedures for producing such general changes.

This study has everyday implications for all of us. Suppose your friend Stanley never compliments you but often compliments Kay. You might conclude that he doesn't like you very much, or that he isn't a very positive person. But it may be that you simply don't reinforce his compliments. You may act shy or look embarrassed. Giving compliments is like any other behavior. If others stop reinforcing your giving compliments, you will stop doing it.

13. If Bob's presence prompted Paul to play cooperatively, then his presence exerted _____ (reinforcement, stimulus) control over Paul's cooperative play.

Notes

Note #1

The ability of humans to use language may explain our extraordinary success as a species. Sidman may have discovered the behavioral foundation for language. He found that "stimulus equivalence" may emerge from discrimination training (Sidman, 1971). It works this way. A discrimination based on a visual stimulus may become equivalent without training to an auditory stimulus. For example, suppose you teach Pat to point to the picture of a cat when you say the word. Suppose you then teach Pat to point to the written word *cat* when she sees the picture. Without further training, she may also point to the written word *cat* when you say the word. Further, she may even say the word when you show her the written word. Numerous experiments have demonstrated that spoken and written words and the objects or pictures that they stand for become equivalent with the right kind of training (e.g., Sidman & Tailby, 1982; Saunders & Spradlin, 1990; Hayes, Kohlenberg, & Hayes, 1991).

14. The term *stimulus equivalence* refers to people responding as though one stimulus is _____ (different from, equivalent to) another unrelated stimulus.

Note #2

The SD, or discriminative stimulus, is sometimes confused with a reinforcer. For any specific response, they are different. The SD is present before the response is made. It is associated with reinforcement, but it is not reinforcement. You should view it as a cue to what behavior will be reinforced. To hear "Please pass the butter" is not a reinforcer. It is a discriminative stimulus (SD) indicating that you will be reinforced (thanked) for passing the butter but not for passing anything else. The request is the SD, and the thanks is the reinforcer. The SD always occurs before the behavior. The reinforcer always occurs after the behavior.

15. The SD always occurs _____ (after, before) the behavior.