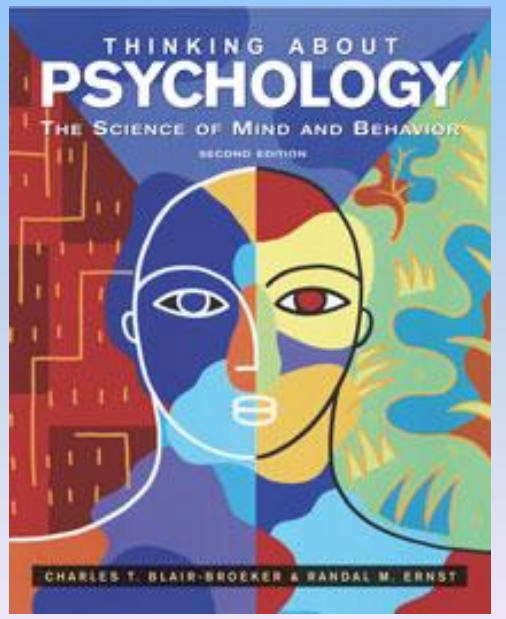
Thinking About Psychology: The Science of Mind and Behavior 2e

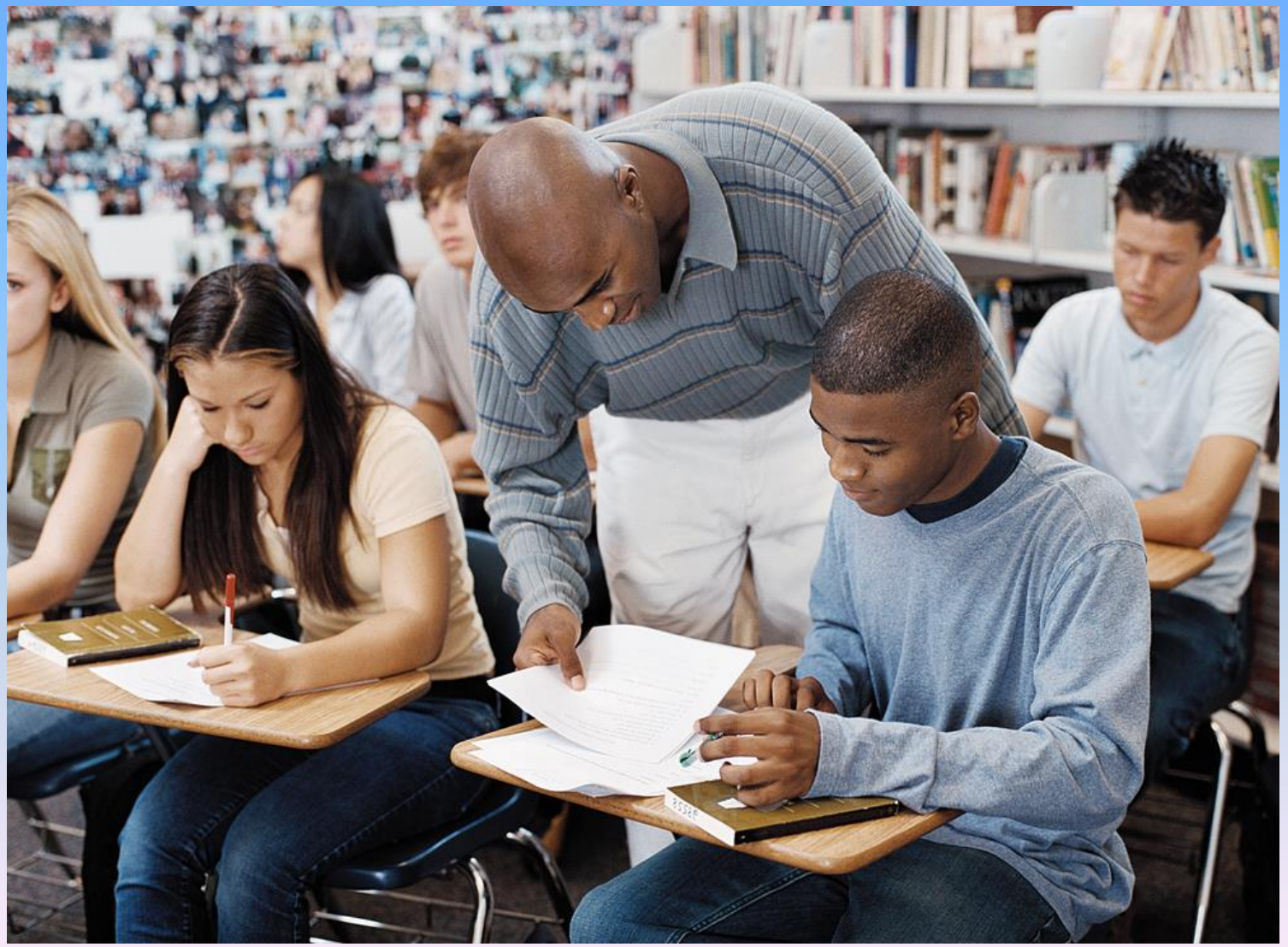


Charles T. Blair-Broeker

Randal M. Ernst

Cognitive Domain

Learning Chapter



Module 20

Operant Conditioning

What is Operant Conditioning?

Operant Conditioning

- A type of learning in which the frequency of a behavior depends on the *consequence* that follows that behavior
- The frequency will *increase* if the consequence is *reinforcing* to the subject.
- The frequency will *decrease* if the consequence is *not reinforcing* to the subject.

Operant Conditioning

Operant Conditioning

Daughter

Behavior:
Screaming tantrum

Mother

Behavior:
Giving candy

Operant Conditioning

Daughter

Behavior:
Screaming tantrum

Consequence:
Receiving a candy bar

Mother

Behavior:
Giving candy

Consequence:
Screaming tantrum ends

Operant Conditioning

Daughter	Mother
Behavior: Screaming tantrum	Behavior: Giving candy
Consequence: Receiving a candy bar	Consequence: Screaming tantrum ends
Result: More tantrums in the future	Result: More candy buying in the future

The Law of Effect

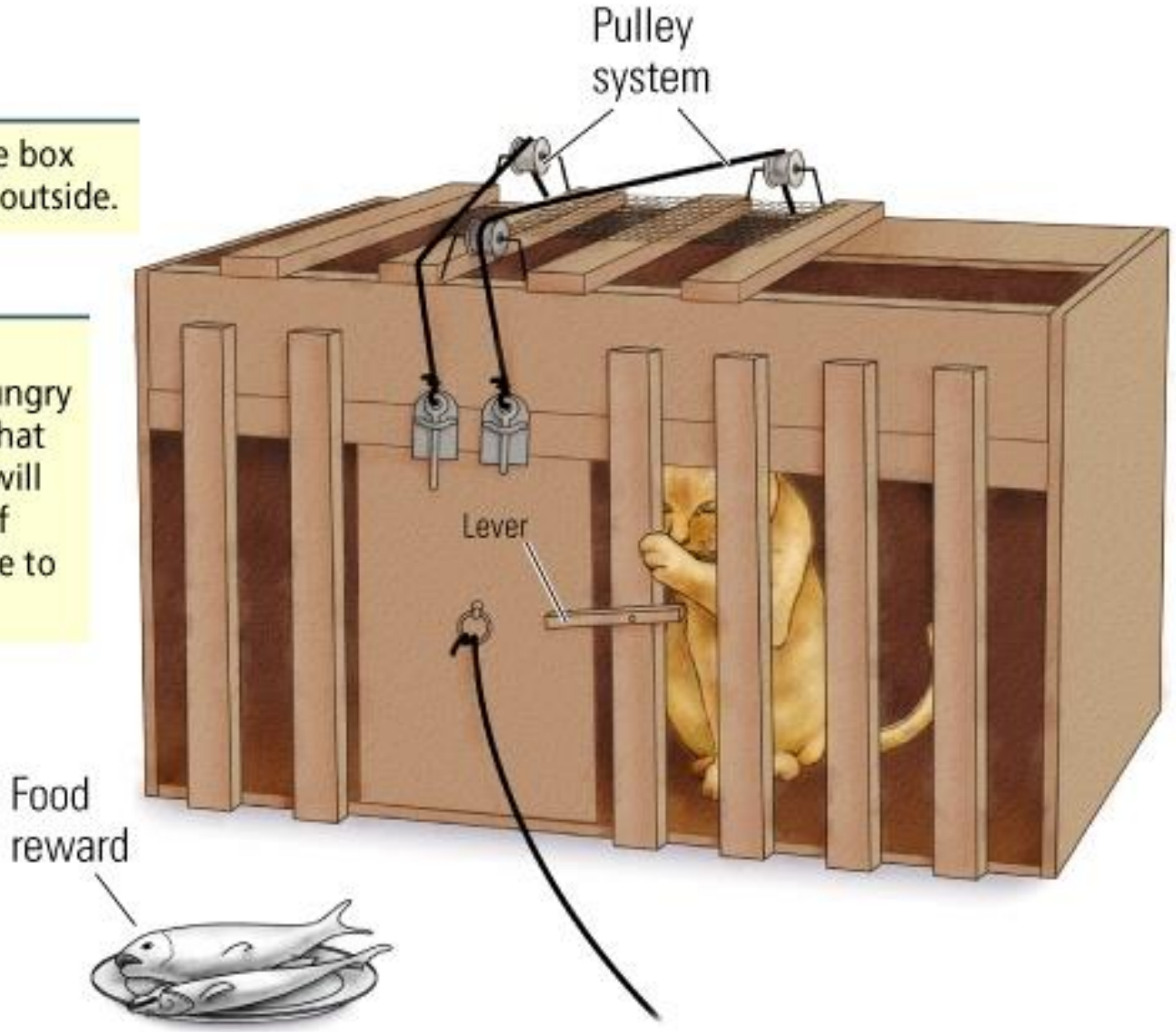
Edward Thorndike (1874-1949)

- Author of the law of effect, the principle that forms the basis of operant conditioning
- Behaviors with *favorable* consequences will occur *more frequently*.
- Behaviors with *unfavorable* consequences will occur *less frequently*.
- Created puzzle boxes for research on cats

Thorndike's Puzzle Box

The cat is placed in the box with the food reward outside.

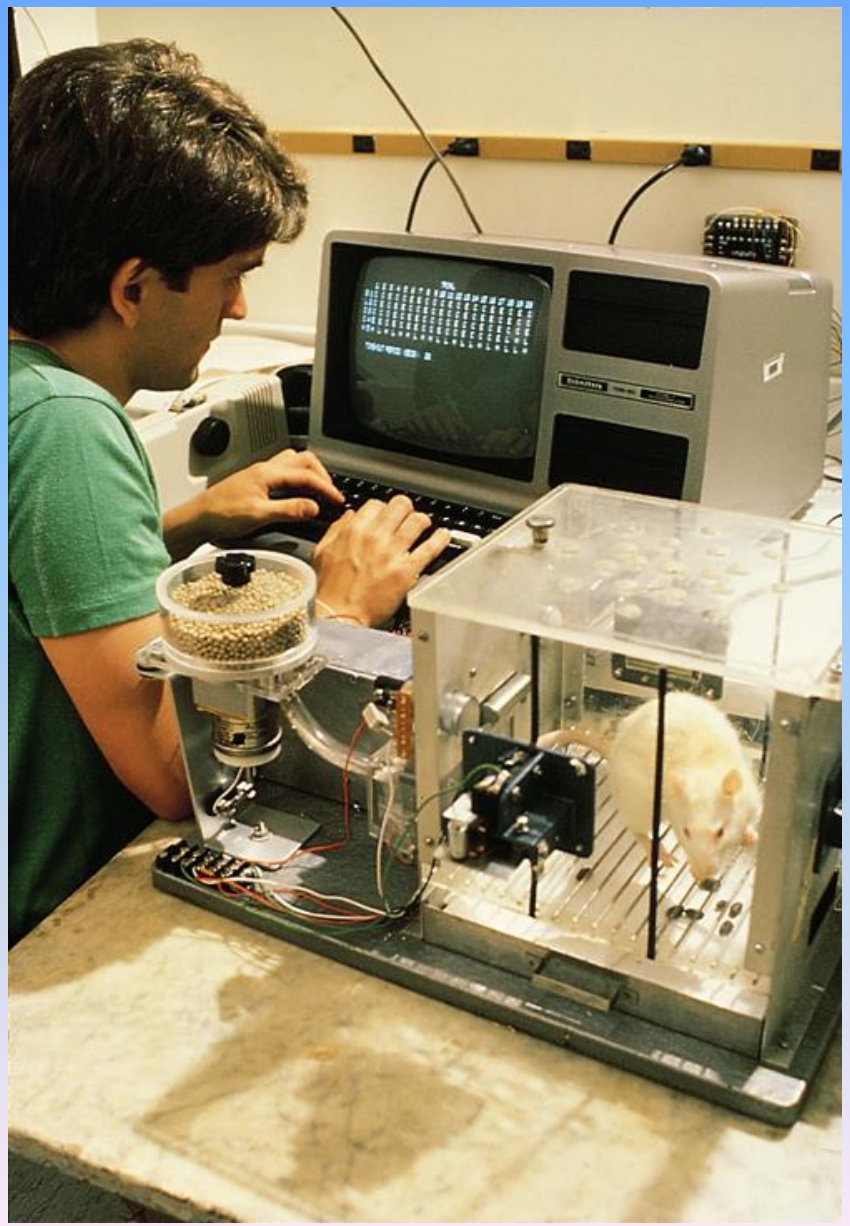
Although learning is not immediate, the hungry cat eventually learns that pressing on the lever will result in getting out of the box and being able to reach the food.



B.F. Skinner (1904-1990)

- Developed the fundamental principles and techniques of *operant conditioning* and devised ways to apply them in the real world
- Designed the *Skinner Box*, or *operant chamber* – a device in which a rat (or pigeon) is isolated and provided with a *lever* or switch that it *learns to use to obtain a reward*, such as a food pellet, or to avoid a punishment, such as an electric shock.

Skinner Box



Reinforcement/Punishment

- Reinforcement - Any consequence that *increases* the future likelihood of a behavior
- Punishment - Any consequence that *decreases* the future likelihood of a behavior
- The subject determines if a consequence is reinforcing or punishing

Reinforcement

Positive Reinforcement

- In operant conditioning, anything that *increases the likelihood of a behavior* by following it with a desirable event or state
- The subject receives something they want
- Will *strengthen* the behavior

Positive Reinforcement

POSITIVE REINFORCEMENT

Behavior is followed by a desirable event or state.

$10 for an A makes it more likely a student will earn more As.

Negative Reinforcement

- In operant conditioning, anything that *increases the likelihood of a behavior* by following it with the *removal of an undesirable event or state*
- Something the subject doesn't like is *removed*
- Will *strengthen* the behavior

Negative Reinforcement

NEGATIVE REINFORCEMENT

Behavior ends an undesirable event or state.

Taking aspirin relieves headaches and makes it more likely that aspirin will be taken in the future.

Positive/Negative Reinforcement

POSITIVE REINFORCEMENT

Behavior is followed by a desirable event or state.

$10 for an A makes it more likely a student will earn more As.

NEGATIVE REINFORCEMENT

Behavior ends an undesirable event or state.

Taking aspirin relieves headaches and makes it more likely that aspirin will be taken in the future.

Reinforcement: Immediate Versus Delayed Reinforcement

Immediate/Delayed Reinforcement

- *Immediate* reinforcement is *more effective* than delayed reinforcement
- Ability to delay gratification predicts higher achievement
- For example, *paychecks* and *grades* are given at end of pay period or grading period so require delayed gratification

Delayed vs Immediate

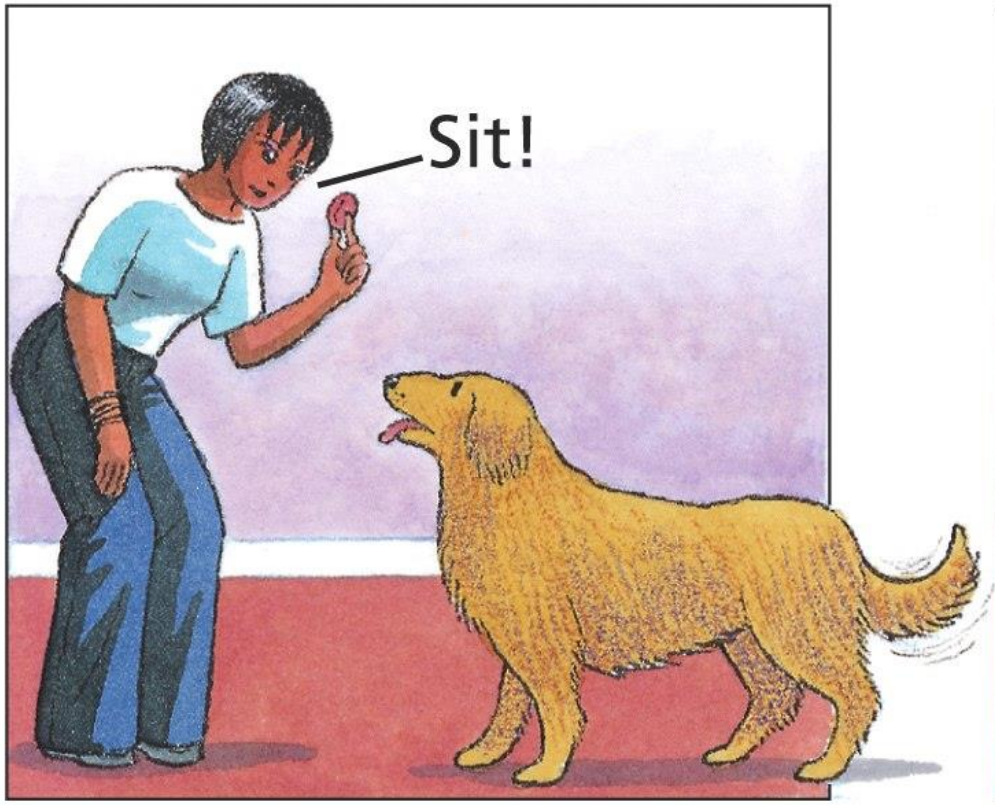
- Smoking – the "rush" from chemicals in tobacco is immediate
- The undesirable effects on the lungs and cardiovascular system are more long term
- Overeating – the taste of fattening foods provide immediate positive reinforcement
- But the effects of obesity are delayed

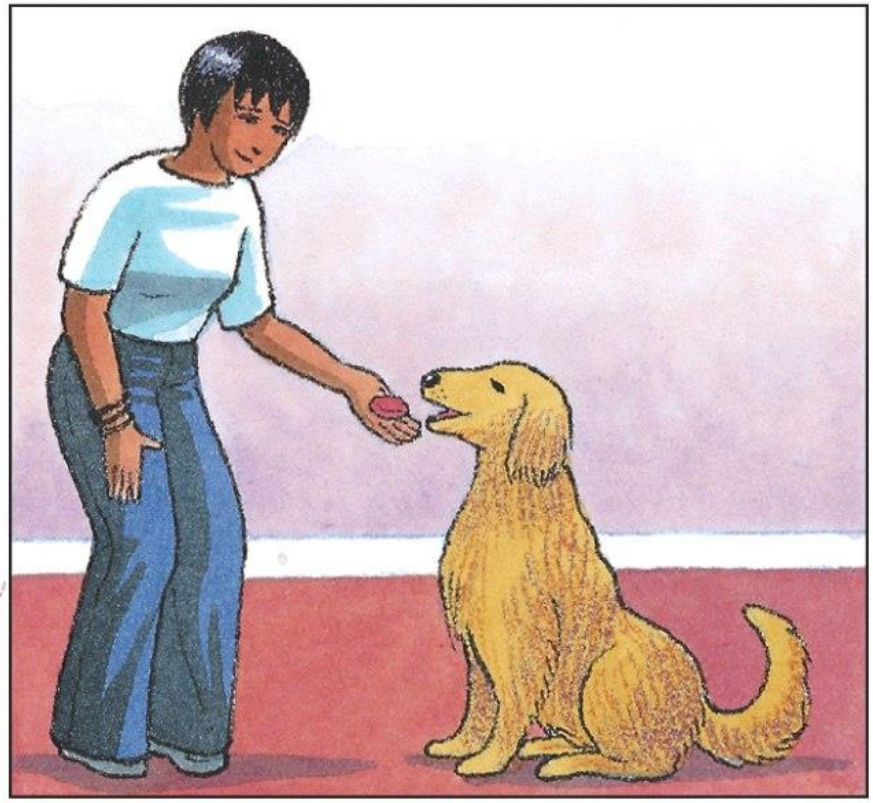
Reinforcement: Primary Versus Secondary Reinforcement

Primary Reinforcement

- Something that is *naturally* reinforcing
- Examples: food, warmth, water, etc.
- The item is reinforcing *in and of itself*

PRIMARY REINFORCEMENT





Food is a primary reinforcer for a dog.

Secondary Reinforcement

- Something that you have *learned* to value
- *Money* is a good example
- The “Baby Test” – if a baby wouldn’t value it then it is probably a secondary reinforce (like money)

SECONDARY REINFORCEMENT

An owner's words can become secondary reinforcement when they're associated with petting and approval.

Punishment: The Process of Punishment

Types of Punishment

- An *undesirable event* following a behavior

- Or

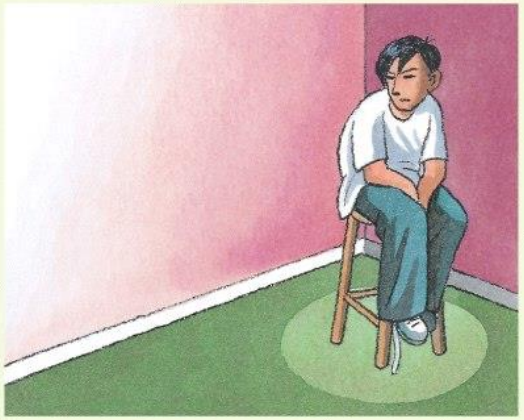
- A *desirable state* or event *ends* following a behavior

TWO FORMS OF PUNISHMENT

Behavior is followed by an undesirable event.

A toddler burned by a hot stove will be less likely to touch the stove again.

Behavior ends a desirable event or state.



A boy who loses his TV privileges for pulling his sister's hair will be less likely to pull her hair again.

Punishment: Problems With Punishment

Negative Effects of Punishment

- *Doesn't prevent the undesirable behavior* when away from the punisher
- Can lead to fear, anxiety, and lower self-esteem
- Children who are punished physically may learn to use aggression as a means to solve problems.

Positive Effects of Punishment

- Punishment can effectively control certain behaviors.
- Especially useful if teaching a child not to do a dangerous behavior
- Most still suggest reinforcing an incompatible behavior rather than using punishment (“catch them doing something right”)

Reinforcement Procedures: Shaping

Shaping

- The operant technique used to establish a new behavior
- Reinforcement of behaviors that are *increasingly similar to the desired one*

Example of Shaping

- Learning to ride a bike – giving praise after child goes a few feet and then falls
- Gradually, as their riding skills improve, trainer makes child ride farther and farther before giving a compliment.

Module 20: Operant Conditioning

Reinforcement Procedures: Discrimination and Extinction

Discrimination

- Ability to *distinguish* between two similar signals or stimuli – can tell the difference
- Learning to respond to one stimuli but not to a similar stimuli

Extinction

- In operant conditioning, the *loss of a behavior* when consequence follows it.
- The subject no longer responds since the reinforcement or punishment has stopped.

Schedules of Reinforcement

Continuous reinforcement

- In operant conditioning, a schedule of reinforcement in which *a reward follows every correct response*
- Most useful way to establish a behavior
- The behavior will extinguish quickly once the reinforcement stops.
- i.e. a vending machine

Partial Reinforcement

- In operant conditioning, a schedule of reinforcement in which *a reward follows only some correct responses*
- Includes the following types:
  - Fixed-interval and variable interval
  - Fixed-ratio and variable-ratio

Fixed-Interval Schedule

- In operant conditioning, a partial reinforcement schedule that rewards only the first correct response *after some defined period of time*
- i.e. a quiz in Psych class *every* Friday

Variable-Interval Schedule

- In operant conditioning, a partial reinforcement schedule that rewards the first correct response after *an unpredictable amount of time*
- i.e. “pop” quiz in a class

Fixed-Ratio Schedule

- In operant conditioning, a partial reinforcement schedule that rewards a response only after some *defined number of correct responses*
- The faster the subject responds, the more reinforcements they will receive.
- i.e. “buy 10, get 1 free”

Bonus:
What Reinforcement Schedule is this?

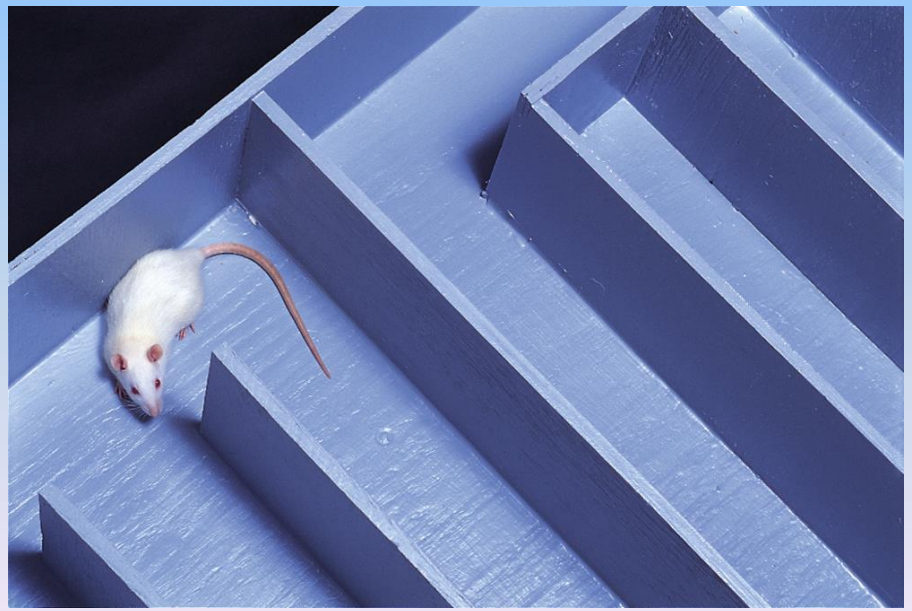
Variable-Ratio Schedule

- In operant conditioning, a partial reinforcement schedule that rewards an *unpredictable number of correct responses*
- This schedule is very resistant to extinction.
- Sometimes called the “gambler’s schedule”; similar to a *slot machine*

New Understandings of Operant Conditioning: The Role of Cognition

Latent Learning

- Learning that occurs but is *not apparent until the learner has an incentive to demonstrate it*
- Tolman and Honzik's study on maze learning



Cognitive Map

- A *mental representation* of a place
- Experiments showed rats could learn a maze without any reinforcements (food)
- They had learned, but the learning occurred cognitively before it was expressed behaviorally

Overjustification Effect

- Effect of promising a reward for doing what one already likes to do
- The reward may lessen and replace the person's original, natural motivation, so that the behavior stops if the reward is eliminated

New Understandings of Operant Conditioning: The Role of Biology

Biological Predisposition

- Research suggests some species are biologically predisposed to learn specific behaviors
- For example, pigeons easily learn to flap their wings to avoid electric shock and to peck at a disk for food
- Wing flapping is a natural defense mechanism for pigeons and thus lends itself well to avoidance behaviors. Likewise, pecking is a response naturally associated with eating, so pigeons easily learn to peck for food.

The End