Learning

Overview

- Classical conditioning
- Classical conditioning in real life
- Operant conditioning
- Operant conditioning in real life
- Learning and the mind

Definitions

Learning
A relatively permanent change in behavior due to experience

Behaviorism
An approach to psychology that emphasizes the study of observable behavior and the role of the environment as a determinant of behavior

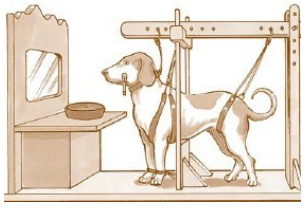
Conditioning
The association between environmental stimuli and the organism's responses

Watson's extreme environmentalism

"Give me a dozen healthy infants, well-formed, and my own special world to bring them up in, and I'll guarantee to take any one at random and train him to be any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and yes, beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors."

Classical conditioning

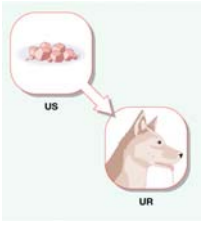
The process by which a previously neutral stimulus acquires the capacity to elicit a response through association with a stimulus that already elicits a similar response *(S-R association)*



New reflexes from old

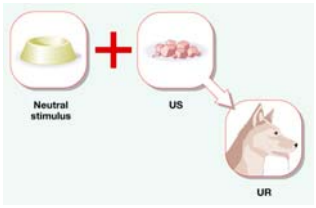
Unconditioned stimulus (US)
Elicits a response in the absence of learning

Unconditioned response (UR)
The reflexive response to a stimulus in the absence of learning



New reflexes from old

A neutral stimulus is then regularly paired with an unconditioned stimulus.



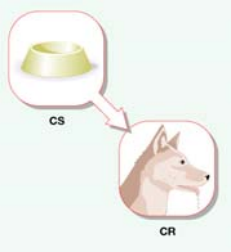
New reflexes from old

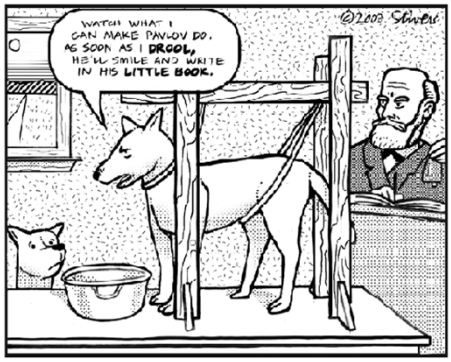
Conditioned stimulus (CS)

An initially neutral stimulus that comes to elicit a conditioned response after being paired with an unconditioned stimulus

Conditioned response (CR)

- A response that is elicited by the conditioned stimulus
- Occurs after the CS has been associated with the US
- Is usually similar to the US





Principles of classical conditioning

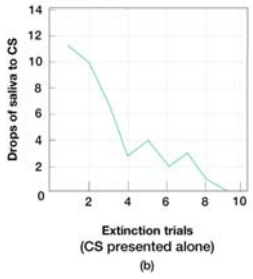
1. **Extinction**
2. **Higher-order conditioning**
3. **Stimulus generalization**
4. **Stimulus discrimination**

Extinction

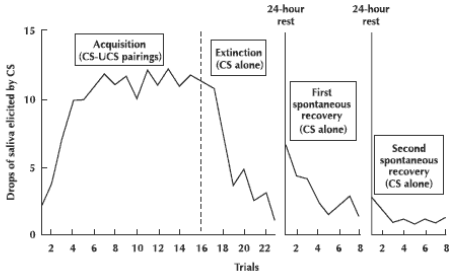
The weakening and eventual disappearance of a learned response

In classical conditioning, it occurs when the conditioned stimulus is no longer paired with the unconditioned stimulus.

Spontaneous recovery, or response reappearance, can occur following a delay

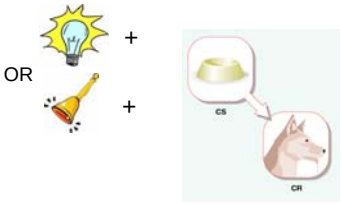


CS learning curves



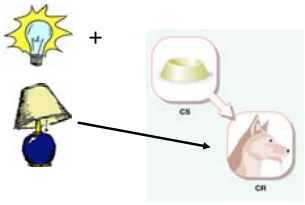
Higher-order conditioning

A neutral stimulus can become a conditioned stimulus by being paired with an existing conditioned stimulus.



Stimulus generalization

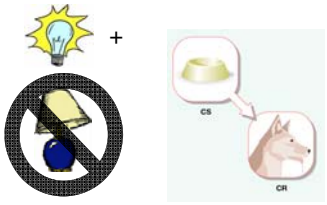
In classical conditioning, occurs when a new stimulus that resembles the conditioned stimulus elicits the conditioned response



Stimulus discrimination

The tendency to respond differently to two or more similar stimuli

In classical conditioning, occurs when a stimulus similar to the conditioned stimulus fails to evoke a conditioned response



What is learned in classical conditioning?

For classical conditioning to be most effective, the stimulus to be conditioned should precede the unconditioned stimulus.

We learn that the first stimulus *predicts* the second.

Strict behaviorists believed that this is just an association, but most modern scientists generally believe that thought is often involved.

Learning to like

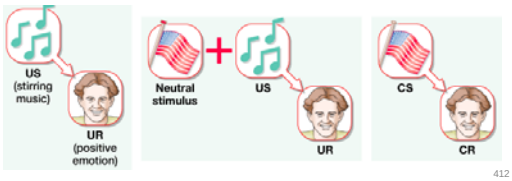
Where do sentimental feelings come from?

Objects have been associated in the past with positive feelings.

Marketing Psychology takes advantage of such CS development:

http://blog.lib.umn.edu/huber195/psy1001spring12/2012/02/coca-colas-happiness-machine.html

http://www.psychpost.org/2012/02/classical-conditioning-super-bowl-2012.html



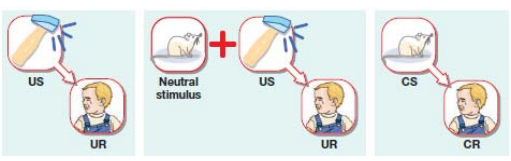
Learning to fear

Research suggests we can learn fear through association.

Watson and Raynor conditioned "Little Albert" to be afraid of white rats by pairing the neutral stimulus (rats) with an unconditioned stimulus (loud noise).

Within days, Albert was afraid of rats, and his fear generalized to other furry objects.

http://www.youtube.com/watch?v=MIc9ijXukho&list=TLCd4s6OfOpi5GMN5ddjtLr-fKTtwJB20s



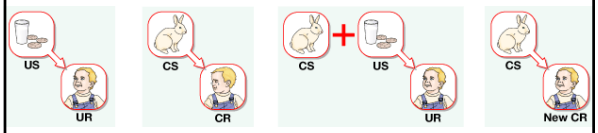
Unlearning fear

Counter conditioning

The process of pairing a conditioned stimulus with a stimulus that elicits an incompatible response.

Another child's fear of rabbits was removed by pairing rabbits with a stimulus that elicited happiness.

Phobias can be treated with related approaches (note that phobias can have a more complex cause including genetic predispositions).



Application: Accounting for taste

Slugs learned an aversion to the smell of carrots, which they normally like, after the smell of carrots was paired with a bitter-tasting chemical.

Learned food dislike can sometimes be related to unrelated illness which followed eating the food

(note how such aversions would generally be quite adaptive)

Application: Predation control

- Because they like to eat sheep, coyotes are a problem to sheep farmers.
- Gustavson and Gustavson (1985) described a study in which they conditioned some coyotes not to eat the sheep.
- They took sheep meat (CS) and sprinkled it with a chemical (US) that would produce a stomachache (UR) in the coyotes. After the coyotes ate the treated meat, they avoided the live sheep (CR).
- This humane application of conditioned taste aversion might be used to control other predators as well.

Application: Reacting to medical treatments

Some cancer patients react to waiting rooms with nausea, because the waiting room has been associated with chemotherapy, which chemically causes nausea.

Placebos—inert substances presented as medications—sometimes give patients real relief.

Patient expectations might influence mechanisms such as immunity and psychological coping

What are the US, UR, CS, and CR?

Application: Bedwetting

- Mowrer and Mowrer (1938) developed a treatment for enuresis, or bed-wetting.
- A child with this problem sleeps on a pad into which a wire mesh connected to a bell. Should the child wet the bed, an electrical circuit is completed causing the bell to ring (US).
- This in turn awakens the child (UR). After several repetitions of this cycle, in which bed-wetting has caused him to be awakened by the bell, the child begins to associate the sensation of pressure in his bladder (a previously neutral stimulus) with waking up.
- In a short time, the need to urinate (now a CS) becomes sufficient in itself to awaken the child (now a CR) so he or she can get up and go to the bathroom.

Operant conditioning

The process by which a response becomes more or less likely to occur depending on its consequences

Differs from classical conditioning in that ***behavior is controlled by consequences***

Typically involves complex rather than reflexive behaviors.

Consequences of behavior

A *neutral consequence* neither increases nor decreases the probability that the response will recur.

Reinforcement:
***strengthens* the response or makes it more likely to recur**

Punishment:
***weakens* a response or makes it less likely to recur**

reinforcement

punishment

Reinforcement

A stimulus strengthens or increases the probability of the response that it follows.

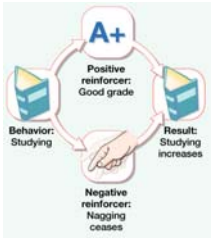
Primary reinforcers are inherently reinforcing and typically satisfy an inherent physiological need. *(such as food)*

Secondary reinforcers are stimuli that have acquired reinforcing properties through associations with other reinforcers. *(such as money)*

Types of reinforcement

Positive reinforcement
When a pleasant consequence follows a response, making the response more likely to recur.

Negative reinforcement
When an unpleasant consequence is removed following a response, making the response more likely to recur.



Punishment

The process by which a stimulus weakens or reduces the probability of the response that it follows.

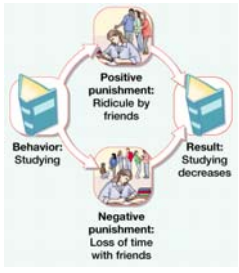
Primary punishers are inherently punishing. *(such as pain)*

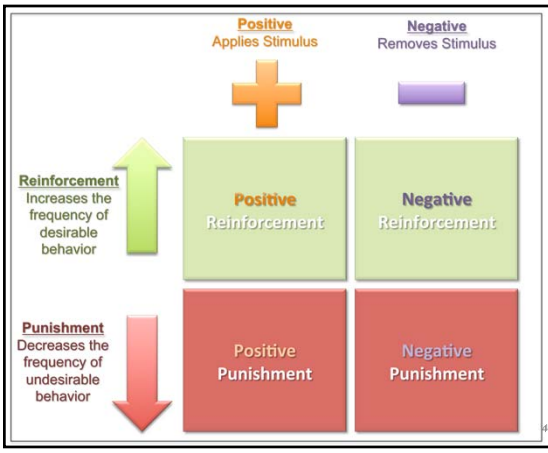
Secondary punishers are stimuli that have acquired punishing properties through associations with other punishers. *(such as fines)*

Types of punishment

Positive punishment
When an **unpleasant** consequence follows a response, making the response less likely to recur.

Negative punishment
When a **pleasant** consequence is removed following a response, making the response less likely to recur.

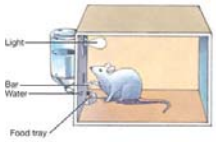




The Skinner box

•Delivers food or water when a desired response occurs

•B.F. Skinner was an important radical Behaviorist who objected to the study of internal processes as explanations of behavior.



Principles of operant conditioning

Extinction

In operant conditioning, occurs when a response is no longer followed by a reinforcer (as in classical conditioning, **spontaneous recovery** can occur after a delay)

Stimulus generalization

Stimuli that are similar to the original stimulus are more likely to trigger a response. *(trying similar behaviors to get rewards, etc.)*

Stimulus discrimination

The tendency of responses to occur in the presence of one stimulus but not another

Schedules of reinforcement

Continuous

Every occurrence of a response is reinforced.

Leads to rapid learning

Intermittent

Only some occurrences of a response are reinforced.

4 classes: Fixed-ratio, fixed-interval, variable-ratio, variable-interval

Best choice for continuation of response

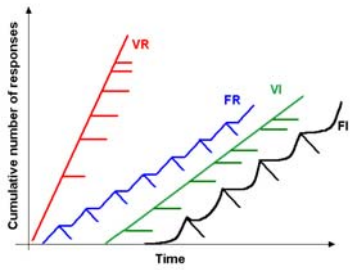
Intermittent schedules of reinforcement

- Based on the passage of **time** (*interval*) or the **number** of correct responses (*ratio*).
- Based on the **same** passage of time or the same number of correct responses (*fixed*) or it on **varying** time or number of correct responses (*variable*).
- This results in the four classes of intermittent schedules.
  - **Fixed-ratio, fixed-interval, variable-ratio, variable-interval**

Reinforcement outcomes

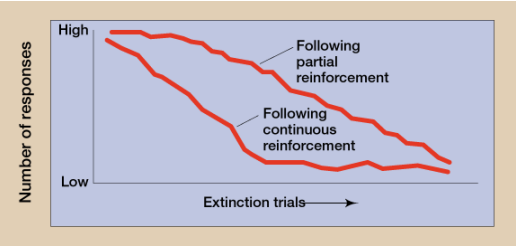
Reinforcement schedules produce characteristic response patterns.

Reinforcement by response ratios is more effective than reinforcement at intervals.



- Fixed-ratio schedules are those where a response is reinforced only after a specified number of responses. This schedule produces a high, steady rate of responding with only a brief pause after the delivery of the reinforcer.
- Variable-ratio schedules occur when a response is reinforced after an unpredictable number of responses. This schedule creates a high steady rate of responding. Gambling and lottery games are good examples of a reward based on a variable ratio schedule. (like slot machines)
- Fixed-interval schedules are those where the first response is rewarded only after a specified amount of time has elapsed. This schedule causes high amounts of responding near the end of the interval, but much slower responding immediately after the delivery of the reinforcer.
- Variable-interval schedules occur when a response is rewarded after an unpredictable amount of time has passed. This schedule produces a slow, steady rate of response. (like doing homework which is only collected sometimes)

Intermittent reinforcement is more persistent.

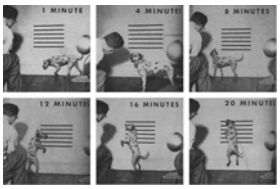


If you want to extinguish a behavior, DO NOT partially reinforce it!
(for example, rewarding kids' tantrums)

Shaping

To teach complex behaviors, may need to reinforce *successive approximations* of a desired response

For example, training animals to do tricks, getting children to make their beds



When punishment works

When it immediately follows the behavior

When it is mild rather than harsh

When it is consistent
(note that this is different from reinforcement)

When punishment fails

When the recipient responds with anxiety, fear, or rage

When it does not immediately follow the behavior

When it does not inform the recipient how it might be avoided in the future

When a consequence thought to be a punishment proves to be reinforcing

When administered mindlessly

Alternatives to punishment

Describe appropriate behavior

Reinforce desirable behavior as soon as possible

Combine extinction of undesirable behavior with the reinforcement of desirable behavior

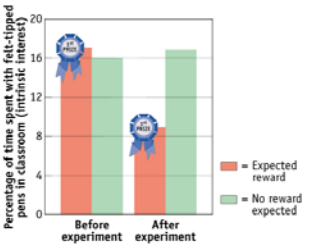
Corporal punishment has been shown to create problems rather than solve them

Rewards can backfire

Preschoolers played with felt-tipped markers.

Divided into groups

1. Given markers again and asked to draw
2. Promised a reward for playing with markers
3. Played markers, then rewarded *(outcome like no-reward group)*



External and internal reinforcers

External reinforcers
Reinforcers not inherently related to the behavior being reinforced

Internal reinforcers
Reinforcers inherently related to the behavior being reinforced

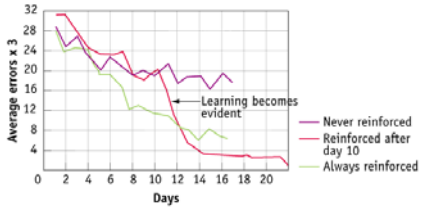
External reinforcers may undermine internal reinforcers.

Whether an activity is externally or internally reinforced can vary by person *(cooking, reading, jogging)*

Learning and the mind: **Latent Learning**

Rats received one maze trial per day

Learning can occur without reinforcement and isn't the same as performance.



Social learning

Social cognitive theories emphasize how behavior is learned and maintained.

Through observation and imitation of others

Cognitive processes such as plans, expectations, and beliefs

***Observational learning* involves learning new responses by observing the behavior of another rather than through direct experience.**

Bandura's Bobo doll study

Children watched a film of two men (Johnny and Rocky) playing with toys.

Johnny refuses to share, and Rocky hits him, getting all the toys.

Children who watched the video were more violent afterward than children in a control group.

Media violence

Hundreds of experimental studies have corroborated the basic findings.

Greater exposure to violence is related to more aggressive behavior when controlled for social class, intelligence, and other factors.

Some researchers are unconcerned because they believe that media violence does not cause most to become aggressive.

Aggressive individuals may be drawn to violent programming.