Learning 8-10%

Behaviorism

Learning = Conditioning

- The process by which experience or practice results in a relatively permanent change in behavior or potential behavior
  - As a result of experience
  - Does NOT include instincts, reflexes, and maturation.
  - Learning is inferred from a change in behavior/performance

Behaviorism

- School of psychology that focused only on observable behaviors.
- It wanted to get away from the study of the conscious mind completely. (things that are not observable)
- Conditioning

Learning

The process by which experience or practice results in a relatively permanent change in behavior or potential behavior

Classical Conditioning	Operant Conditioning	Social Cognitive Learning Theory
The type of learning in which a response naturally elicited by one stimulus becomes to be elicited by a different formally neutral stimulus	The type of learning in which behaviors are emitted to earn rewards or avoid punishments	The type of learning in which behaviors are learned by observing a model
Pavlov and Watson	B.F. Skinner	Albert Bandura
UCS, UCR, CS, CR	Reinforcement and Punishment	Modeling and Vicarious Learning

Classical Conditioning

- Simplified Definition
  - Person/animal learns to respond to a stimulus
  - Learning through association

- Ivan Pavlov
  - Dog Salivation Experiment

http://www.youtube.com/watch?v=hhqumfpxuzI

Basic terms

A stimulus is any object or event in the environment that elicits a sensory or behavioral response

- Sound
- Light

Response is a reaction to a stimulus

Classical Conditioning

- **Unconditioned Stimulus** (US/UCS) any stimulus that creates an autonomic/automatic response in an organism
- **Unconditioned Response** (UR/UCR) Response that occurs due to autonomic or reflective stimulus

Unlearned /Automatic

Example:

Food (US)  Drooling (UR)

Classical Conditioning

- **Neutral Stimulus** A stimulus that does not naturally cause a response in the organism
- **Conditioned Stimulus** (CS) Anything that can be perceived (Heard, smelled, felt, seen, tasted)
- **Conditioned Response** (CR) Anything that can be UR can become CR.
- **Pairing (Association)** Presenting the organism with the CS and then the UCS multiple times.

Classical Conditioning

Unlearned S-R (Relationship)

US  UR

+ (Association formed / Pairing Made)

CS  CR

Learned S-R

Classical Conditioning
Pavlov's Experiment

Unlearned S-R (Relationship)

US  UR

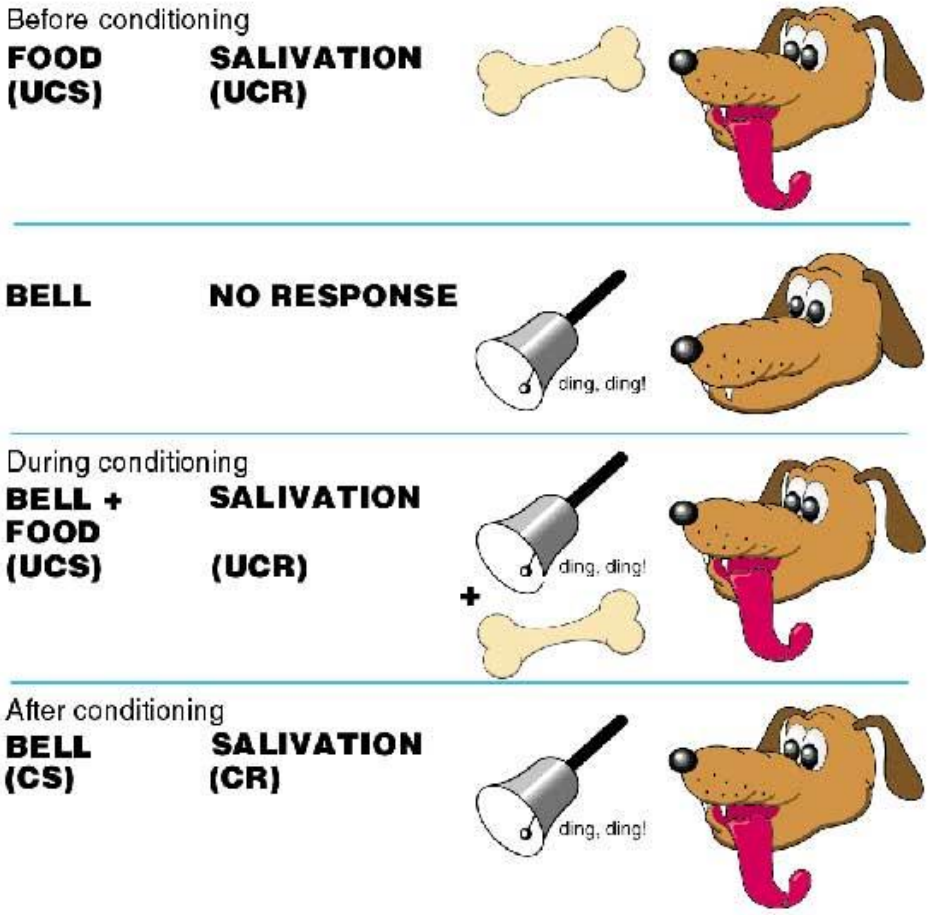
+ (Association formed / Pairing Made)

CS  CR

Learned S-R

Key Psychologists

- Ivan Pavlov
  Russian physiologist known primarily for his work in classical conditioning.



Classical Conditioning

Billy is eight months old. Before testing, Billy showed no fear of animals, but he did show fear (eyes open, heart beat change) when a person banged hammer against large steel bar behind him. They then put a white rat in front of him. Whenever he reached for rat, they banged the hammer. Now he is afraid of all furry white toy and even Santa Claus

US –

UR -

NS -

CS –

CR –

Classical Conditioning

Unlearned S-R (Relationship)

US  UR

+ (Association formed / Pairing Made)

CS  CR

Learned S-R

Answer

UCS: Loud Noises

UCR: Fear

NS: Animals

CS: Animals

UR: Fear

Roxanne loved the band Franz Ferdinand , but one time when she listened to the song “Dashboard”, it was so loud that she popped an eardrum. Thankfully, she made a complete recovery, but now when she hears any music by Franz Ferdinand, her ears start to hurt.

UCS –

UCR –

NS –

CS –

CR –

Classical Conditioning

Unlearned S-R (Relationship)

US  UR

+ (Association formed / Pairing Made)

CS  CR

Learned S-R

Answer

UCS: Loud music

UCR: ears hurting

NS: Music by Franz Ferdinand

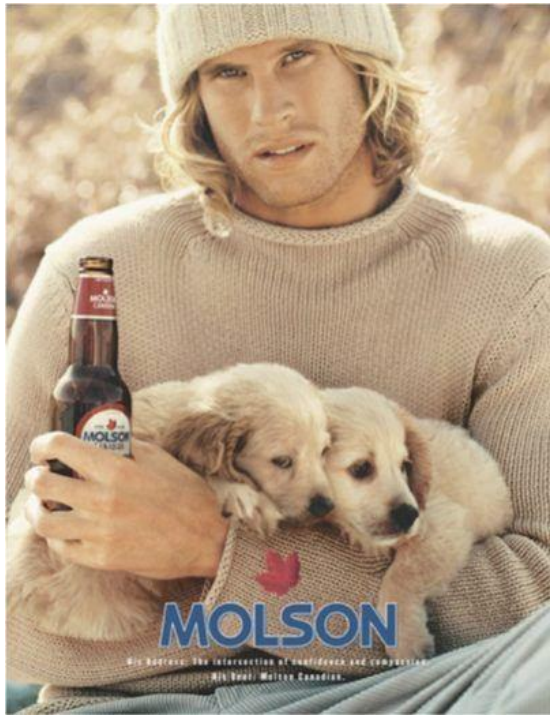
CS: Music by Franz Ferdinand

CR: ears hurting

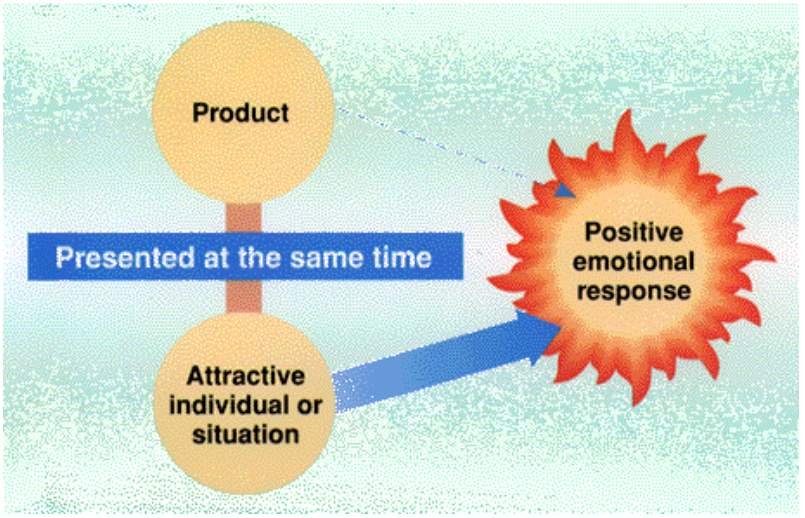
Examples of Classical Conditioning

Phobias!

Examples of Classical Conditioning



Advertisement!



Advertisers pair their product with sexual imagery hoping that the product will become a 'promising stimulus' for sexual arousal. Hopefully this connection makes you grab their product off the self .

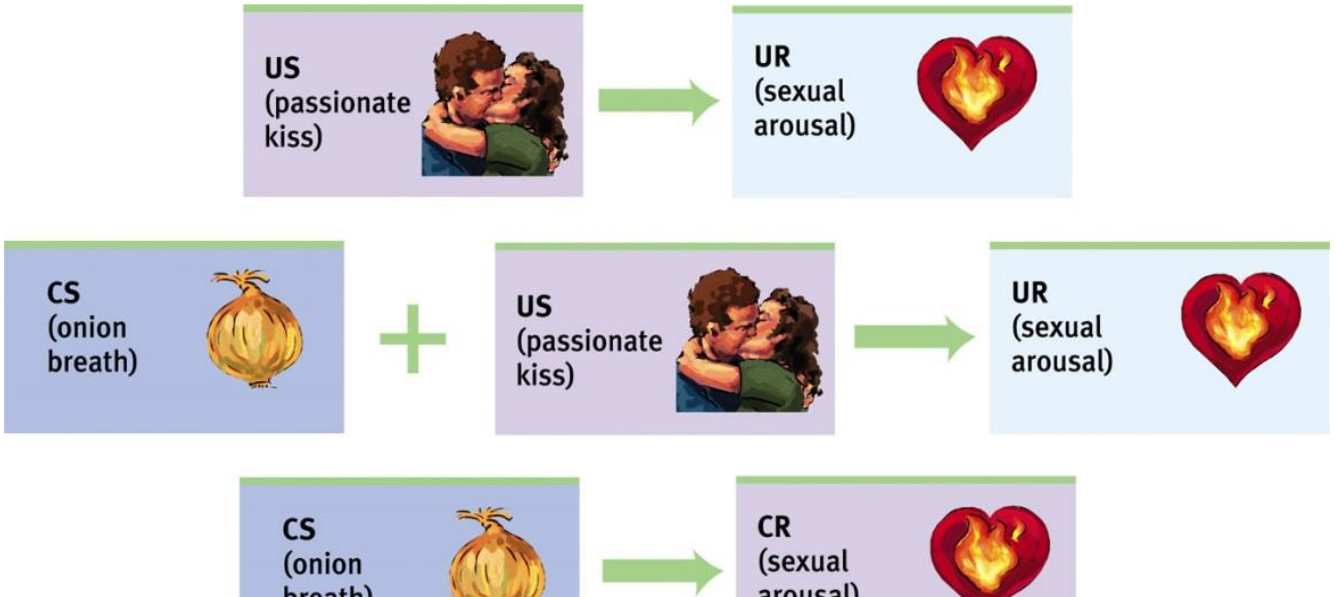
Acquisition

Acquisition is the initial stage in classical conditioning in which an association between a neutral stimulus and an unconditioned stimulus takes place.

- When an animal respond to the CS without a presentation of the US
- When a bowl/bell makes a dog drool without food
- Acquired new behavior

Acquisition

1. In most cases, for conditioning to occur, the neutral stimulus needs to come before the unconditioned stimulus.
2. The time in between the two stimuli should be about half a second. (immediate)
3. Pairing/association must happen repeatedly



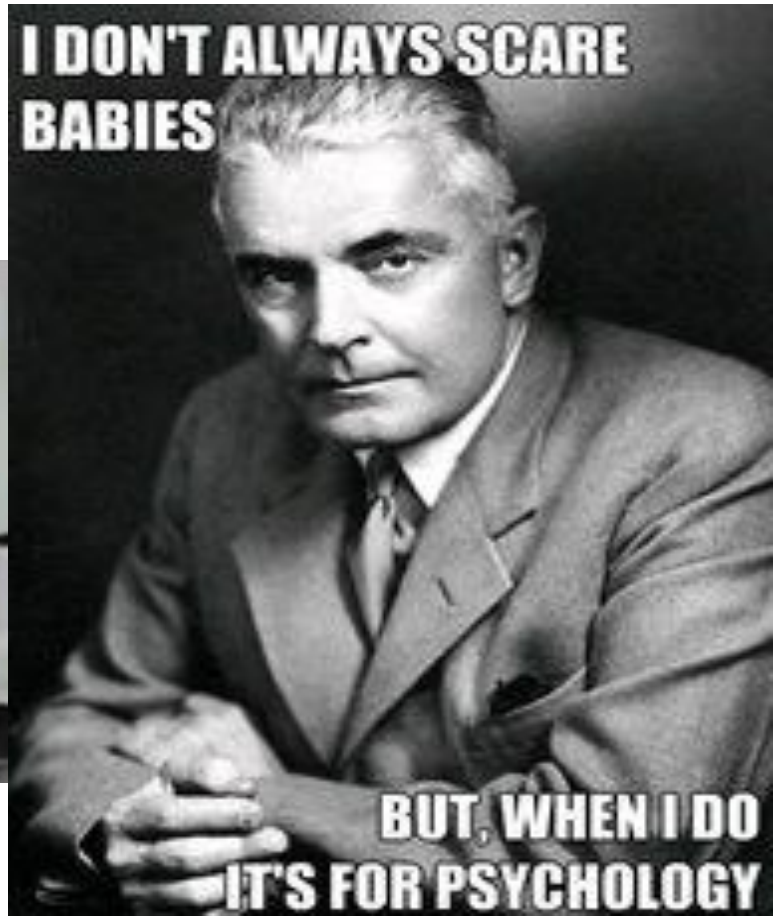
- Extinction – Gradual weakening and eventual disappearance of CR
  - If stimulus fades away so will the behavior

- Spontaneous Recovery – Previously learned behavior is occurring again. Extinguished CR reappears after a period of training
  - Non-recognized factors

- Second order or High order Conditioning
  - When a newly acquired CS is used as a US in order to condition a response to a new stimuli
  - In the example of Pavlov's experiment, the bell is used to train dogs to bark

Key Psychologists

- John B. Watson



https://www.youtube.com/watch?v=FMnhyGozLyE

Classical Conditioning

- John B. Watson (Little Albert Experiment)
- Baby "Albert" – 8 months old
- Rat – behavior showed no indication of fe
- Associated with a loud noise
- Every time Albert saw a rat or anything fuzzy his behavior indicated he was afraid

Classical Conditioning

Unlearned S-R (Relationship)

US  UR

+ (Association formed / Pairing Made)

CS  CR

Learned S-R

Classical Conditioning

Unlearned S-R (Relationship)

Loud Sound — Fear

US → UR

+ (Association formed / Pairing Made)

Rat — Fear

CS → CR

Learned S-R

Classical Conditioning

- Stimulus Generalization
  - Applied learning to similar things to what was associated
  - Example: little Albert became afraid of Rats, Rabbits, Anything fuzzy, dog, Santa Clause — anything fuzzy
- Stimulus Discrimination
  - Does not apply learning to similar things
  - Specific

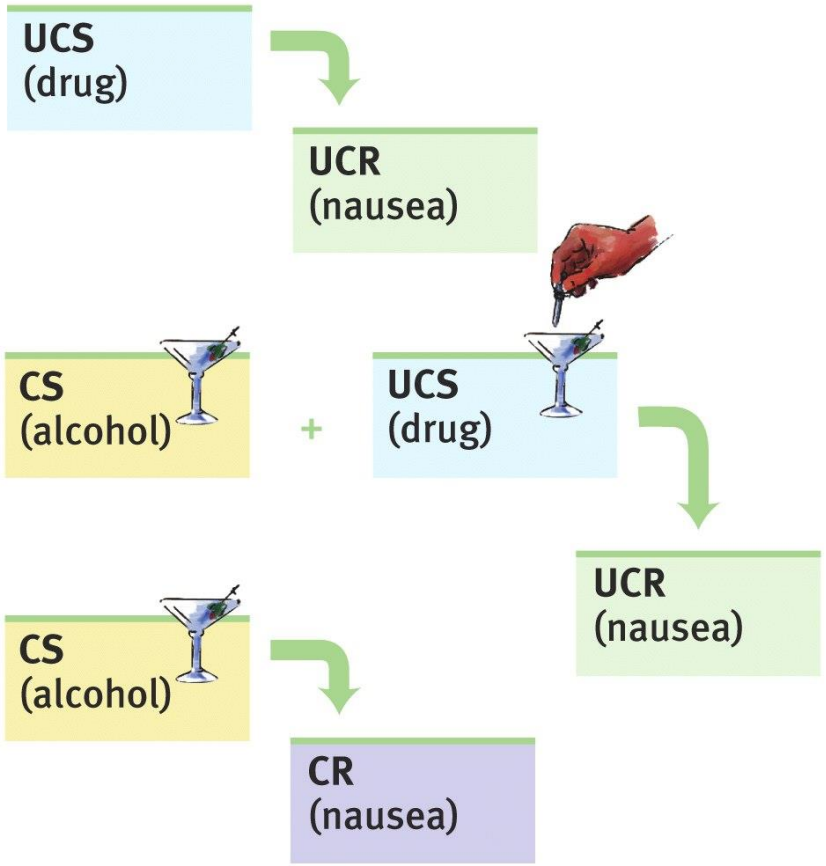
Other Methods

- Trace Conditioning – The presentation of the CS, followed by a short break, followed by the presentation of the U.S.
- Simultaneous Conditioning – CS and US are presented at the same time.
- Delay Conditioning – CS is presented until the US begins
- Forward Conditioning – CS is presented before the US
- Backward Conditioning – US is presented first and is followed by the CS. (Very ineffective)

Applications of Classical Conditioning

Aversive Conditioning

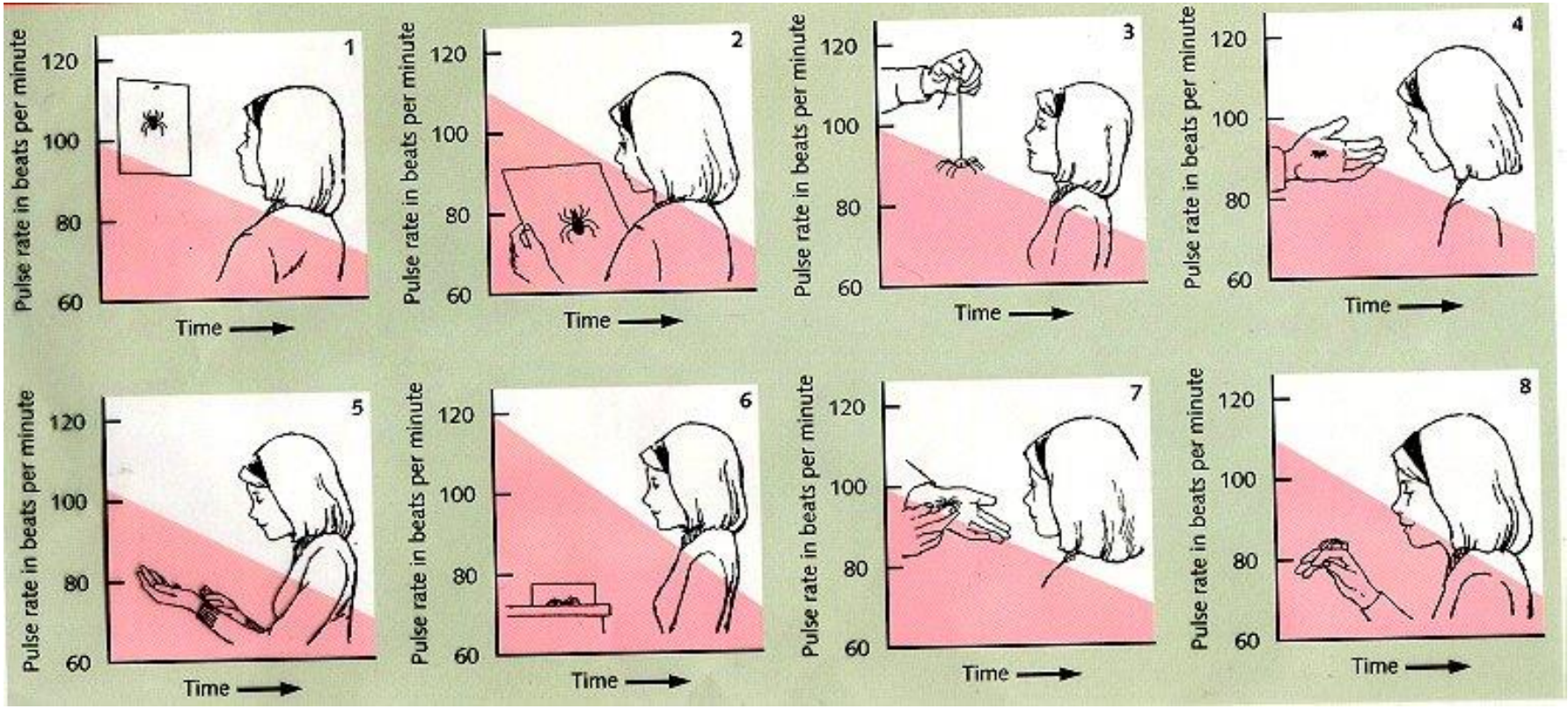
A type of counterconditioning that associates an unpleasant state with an unwanted behavior. With this technique, temporary conditioned aversion to alcohol has been reported.



Applications of Classical Conditioning

- Systematic Desensitization (Flooding/Exposure Therapy)
- This is a form of treatment or therapy for phobias, fears, and aversions that people have. The premise is to reduce a person's anxiety responses through gradual exposure to the anxiety provoking stimulus.

Systematic Decenitization



Biological &Cognitive Aspects

Contiguity model

- Pavlov and Watson believed pairing of the neutral stimulus (that would later become CS) and UCS occurred due to time.
- Neutral Stimulus must come immediately after the UCS.
- Its about timing!

Cognitive Processes

Early behaviorists believed that learned behaviors of various animals could be reduced to mindless mechanisms.

However, later behaviorists suggested that animals learn the **predictability** of a stimulus, meaning they learn *expectancy* or *awareness* of a stimulus (Rescorla, 1988).

Robert Resccorla's Contingency Model

- Animals can learn the predictability of an event
- If you feed a pigeon at noon, every day. The pigeon will expect that behavior.
- The more predictable an associate, the stronger the condition
- Its about cognition/ expectancy !

Biological Predispositions

Pavlov and Watson believed that laws of learning were similar for all animals. Therefore, a pigeon and a person do not differ in their learning.

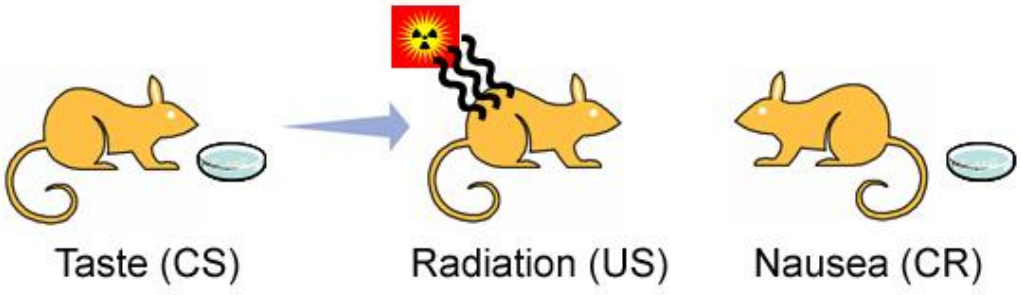
However, behaviorists later suggested that learning is constrained by an animal's biology.

Each species' predispositions prepare it to learn the associations that enhance its survival.

Garcia Effect

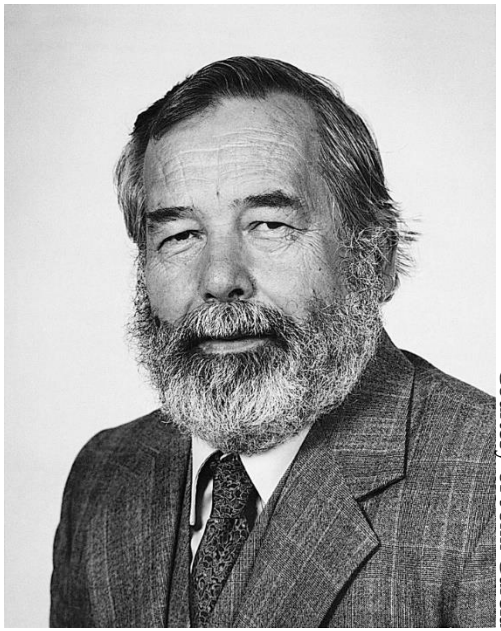
- John Garcia
- Conditioned taste aversion is rapidly achieved by a single pairing of an illness such as nausea with eating a specific food
- Needs to happen once! Because we are biologically wired to avoid dangerous foods

Biological Predispositions



- A biologically adaptive CS (taste) led to conditioning; Taste Aversion
  - Even if the timing was delayed

- However, conditioning did not occur with other stimuli (light or sound).
  - Stimuli that had no biological function



Courtesy of John Garcia

John Garcia

There are more chances of you learning to be more afraid of poisonous bugs than flowers

Biological Predisposition

- Preparedness means that through evolution, animals are biologically predisposed to easily learn behaviors related to survival

Biological Predisposition

Biological constraints predispose organisms to learn associations that are naturally adaptive.

Breland and Breland (1961) showed that animals responses/ behaviors drift towards their biologically predisposed instinctive behaviors.

Instinctive Drift

https://www.youtube.com/watch?v=Av-DqY1wLN8

Marian Breland Bailey

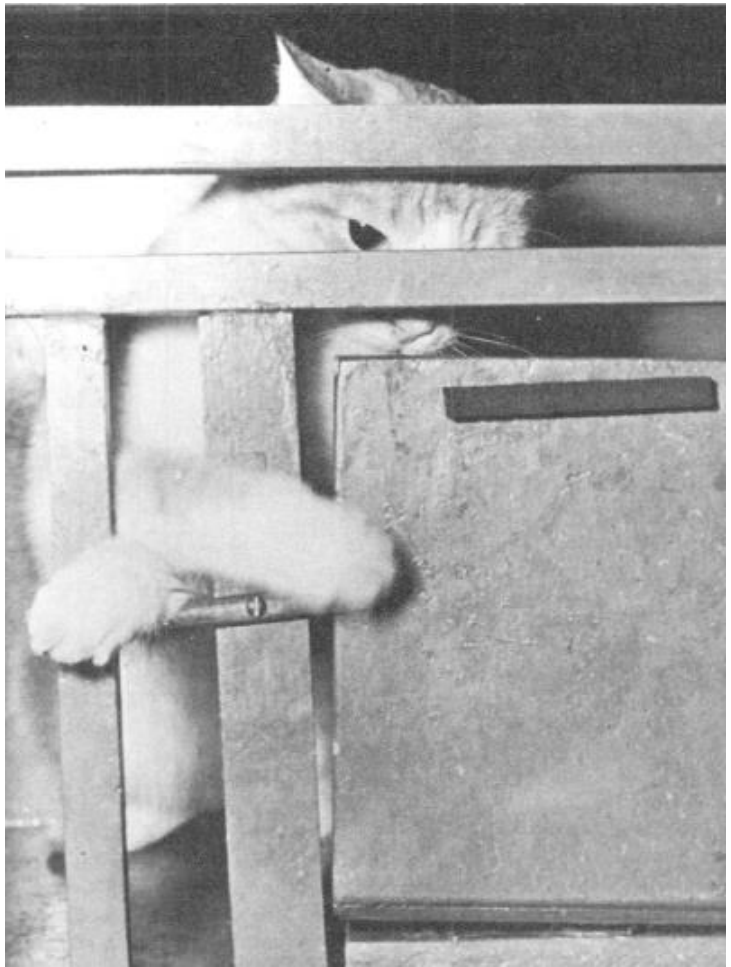
Photo: Bob Bailey

II. Operant Conditioning

Operant Conditioning

- The type of learning in which behaviors are emitted to earn rewards or avoid punishments
- In operant conditioning the participant operates on the environment to gain something desired or avoid something unpleasant.

Edward L. Thorndike

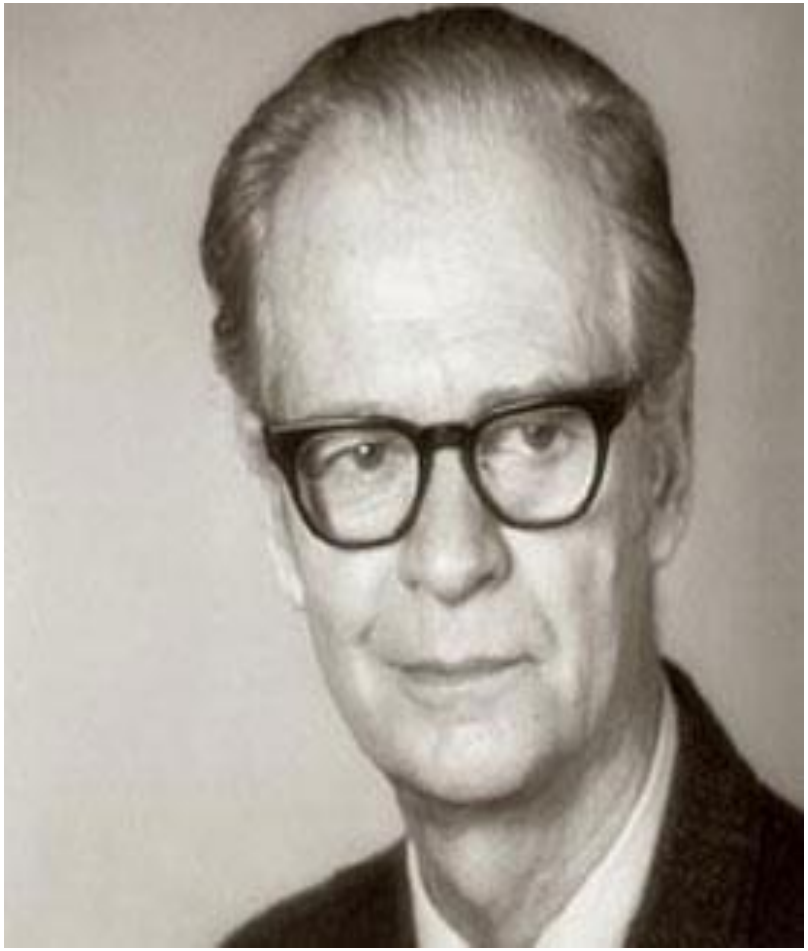


- Animals placed in puzzle boxes
- String pulled, latch released, animal jumps out and receives food
- Learning by random trial and error
- **Law of Effect**

Law of Effect

- Responses that produce a satisfying effect in a particular situation become more likely to occur again in that situation
- Discomforting effect become less likely to occur

B.F. Skinner

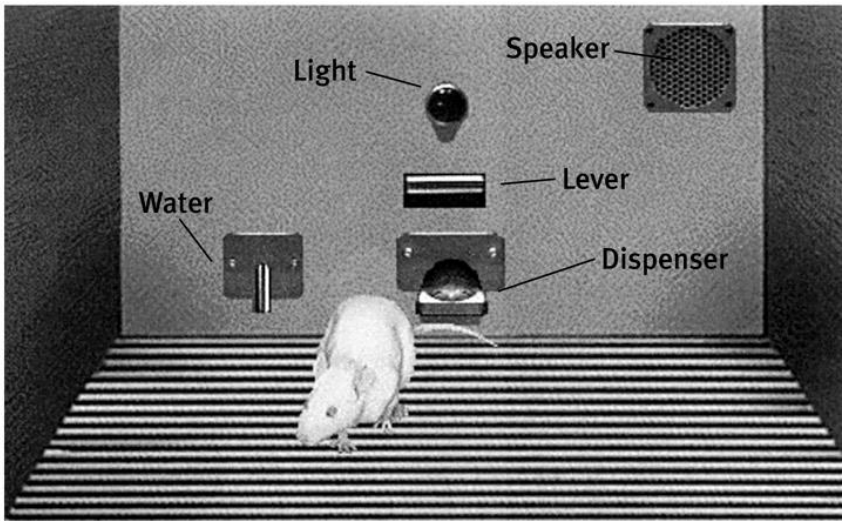


- Father of Modern Behaviorism
- Operant Conditioning

Operant Chamber

Using Thorndike's law of effect as a starting point, Skinner developed the Operant chamber, or the Skinner box, to study operant conditioning.

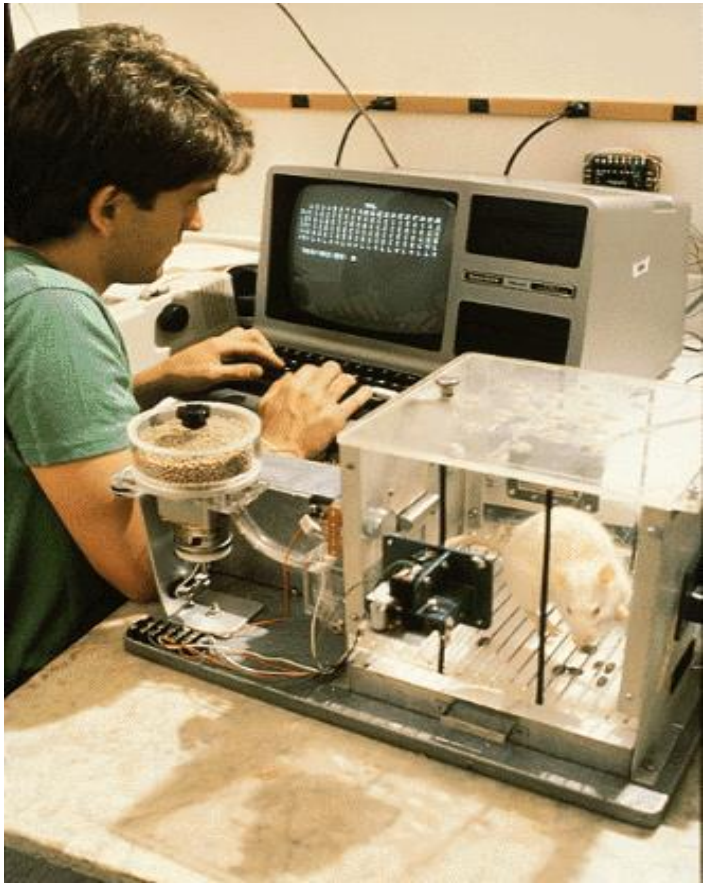
Walter Dawn/ Photo Researchers, Inc.



From *The Essentials of Conditioning and Learning*, 3rd Edition by Michael P. Domjan, 2005. Used with permission by Thomson Learning, Wadsworth Division

Operant Chamber

The operant chamber, or Skinner box, comes with a bar or key that an animal manipulates to obtain a reinforcer like food or water. The bar or key is connected to devices that record the animal's response.



Shaping

Shaping is the operant conditioning procedure in which reinforcers guide behavior towards the desired target behavior through successive approximations.

Khamis Ramadhan/ Panapress/ Getty Images

Fred Bavendam/ Peter Arnold, Inc.

A rat shaped to sniff mines. A manatee shaped to discriminate objects of different shapes, colors and sizes.

Chaining

- Chaining breaks a task down into small steps and then teaches each step within the sequence by itself.
- For example, a child learning to wash her hands independently may start with learning to (1) turn on the faucet. Once this skill is learned, the next step may be (2) rinsing hands. (3)Then putting soap. (4)rinse (5) Dry.

Elements of Operant Conditioning

- The reinforcements and punishments must follow **immediately** and applied **consistently** for conditioning to occur.
- Reinforcer
  - A stimulus or event that follows a behavior and makes that behavior more likely to occur again
- Punisher
  - A stimulus or event that follows a behavior and makes that behavior less likely to occur again

Types of Reinforcement

- Positive reinforcer (+)
  - Adds something rewarding following a behavior, making that behavior *more* likely to occur again
  - Giving a dog a treat for fetching a ball is an example
- Negative reinforcer (-)
  - Removes something unpleasant that was already in the environment following a behavior, making that behavior *more* likely to occur again
  - Taking an aspirin to relieve a headache is an example

Types of Punishments

- Positive Punisher (+)
  - Adds something *aversive* following a behavior, making that behavior *less* likely to occur again
- Negative Punisher (-)
  - Removes something pleasant that was already in the environment following a behavior, making that behavior *less* likely to occur again

	Positive (Adding Stimulus)	Negative (Removing Stimulus)
Reinforcement	Adding Pleasant Consequence Examples: 	Removing Aversive Stimuli Examples: 
Punishment	Adding Aversive Stimuli Examples:	Removing Pleasant Stimuli Examples:

- Annoying buzzing noise stops when you fasten seatbelt
- Getting yelled at by your mom because you got a bad grade
- After breaking a cup, Dad takes the boy's toy away
- Getting a bonus at work for all the hard work you have been doing

Primary & Secondary Reinforcers

1. Primary Reinforcer: An innately reinforcing stimulus like food or drink.

2. Conditioned Reinforcer: A learned reinforcer that gets its reinforcing power through association with the primary reinforcer.

Immediate & Delayed Reinforcers

1. Immediate Reinforcer: A reinforcer that occurs instantly after a behavior. A rat gets a food pellet for a bar press.

2. Delayed Reinforcer: A reinforcer that is delayed in time for a certain behavior. A paycheck that comes at the end of a week.

We may be inclined to engage in small immediate reinforcers (watching TV) rather than large delayed reinforcers (getting an A in a course) which require consistent study.

Punishment

An aversive event that decreases the behavior it follows.

WAYS TO DECREASE BEHAVIOR

Type of Punisher	Description	Possible Examples
Positive punishment	Administer an aversive stimulus	Spanking; a parking ticket
Negative punishment	Withdraw a desirable stimulus	Time-out from privileges (such as time with friends); revoked driver's license

Punishment

- Goal of punishment is to decrease the occurrence of a behavior
- Effective punishment
  - Should occur as soon as possible after the behavior
  - Should be sufficient, i.e., strong enough
  - Should be certain, occurring every time the behavior does
  - Should be consistent

Punishment

Although there may be some justification for occasional punishment (Larzelaere & Baumrind, 2002), it usually leads to negative effects.

1. Results in unwanted fears.
2. Conveys no information to the organism.
3. Justifies pain to others.
4. Causes unwanted behaviors to reappear in its absence.
5. Causes aggression towards the agent.
6. Causes one unwanted behavior to appear in place of another.

Premack Principle

- A more probable/ reliable behavior can be used as a reinforcer for a less reliable behavior.
  - If you eat all your vegetables (less reliable) you can have ice cream for dessert (reliable).
  - If you clean your room (less reliable) you get to play video games (reliable).

Scheduled Reinforcements

- **Continuous R.S. --** Every instance behavior is reinforced
- **Partial/Intermitten R.S.** – only part of the time
- **Ratio** – reinforcement is based on # of behaviors
- **Interval**– based on passage of time
- **Variables** (Varies / Changeable) – uncertain # of times / behavior
- **Fixed** – certain # if times / behavior

Types of Operant Conditioning

- **Escape Conditioning** – when an animal learns in order to terminate an ongoing aversive stimuli by escaping

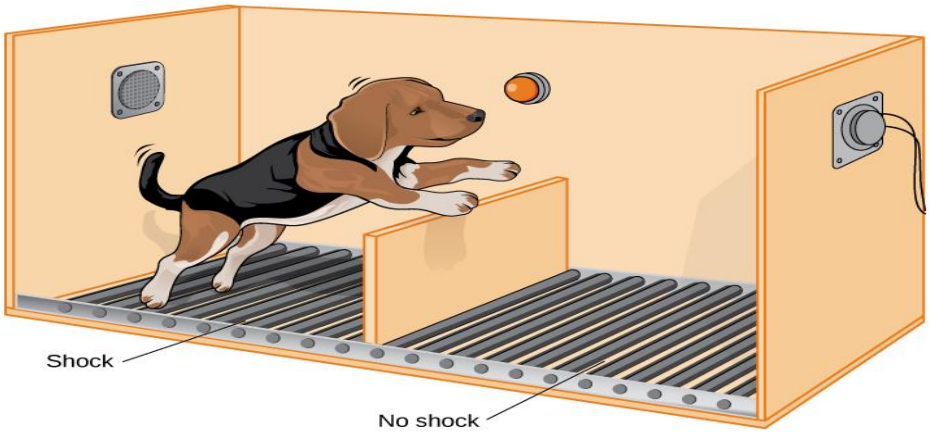
- **Avoidance Conditioning** – Organism learns to avoid (prevent) unpleasant or punishing stimuli by learning appropriate anticipatory response

Operant Conditioning Strategy

- **Behavior Contracting**
- **Token Economy** – An artificial economy based on tokens. Tokens can be used to purchase reinforces.

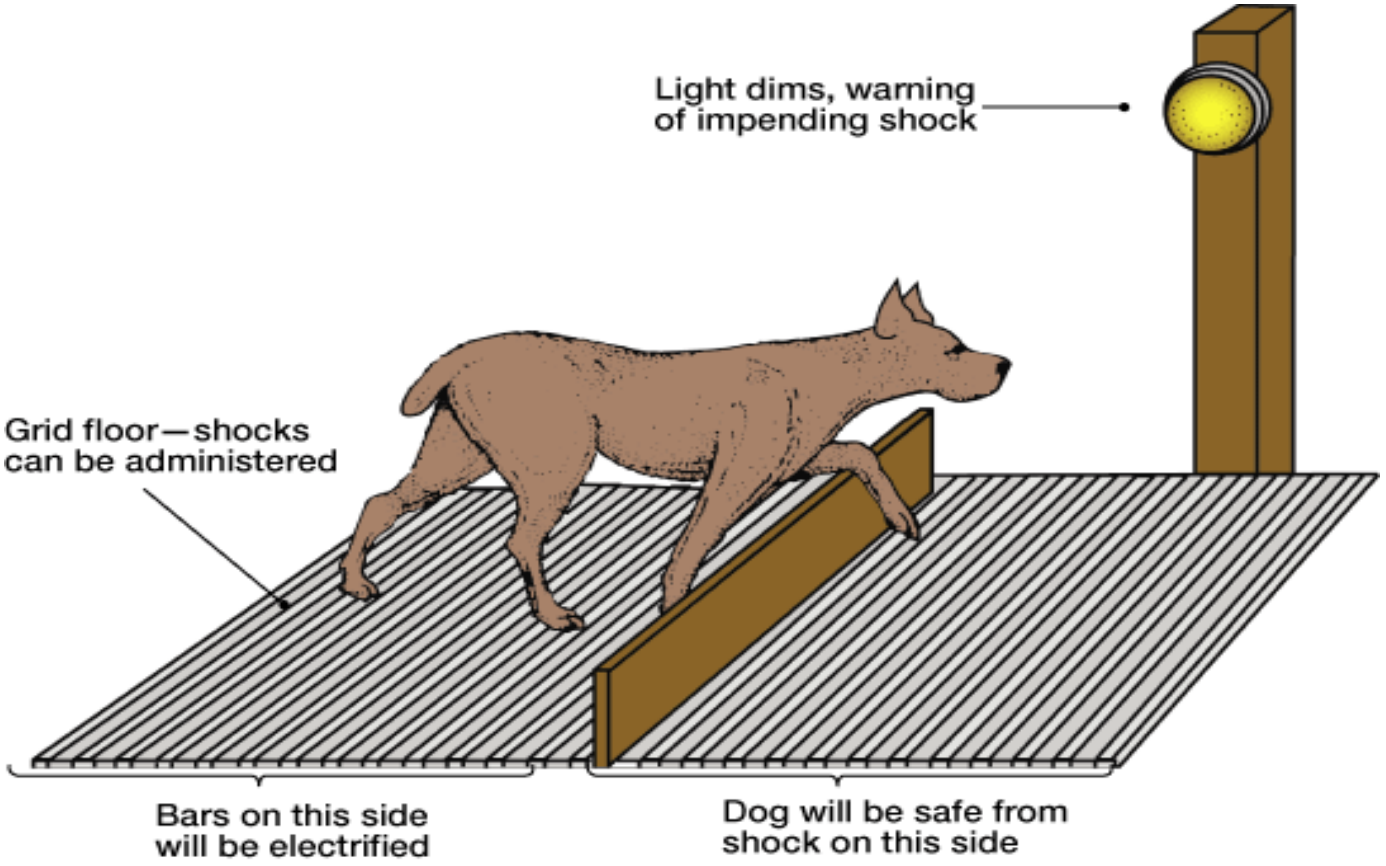
Seligman's Learned Helplessness Theory

- Seligman would ring a bell and then give a light shock to a dog. After a number of times, the dog reacted to the shock even before it happened: as soon as the dog heard the bell, he reacted as though he'd already been shocked.



- Seligman put each dog into a large crate that was divided down the middle with a low fence. The dog could see and jump over the fence if necessary. The floor on one side of the fence was electrified, but not on the other side of the fence. Seligman put the dog on the electrified side and administered a light shock. He expected the dog to jump to the non-shocking side of the fence.
- Instead, the dogs lay down. It was as though they'd learned from the first part of the experiment that there was nothing they could do to avoid the shocks, so they gave up in the second part of the experiment.

Learned Helplessness

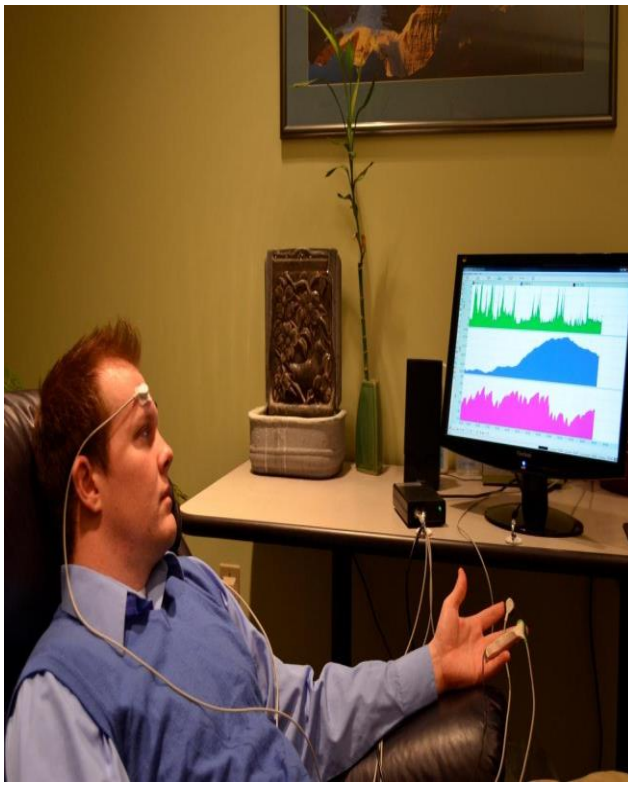


Consequences of Operant Conditioning: Learned Helplessness

- Learned Helplessness occurs when consistent effort fails to bring rewards.
- Repeated attempts at success leads to failure =Possible model for depression in humans
- https://www.youtube.com/watch?v=87Vuqvp2V7w

Behavioral Change Using Biofeedback

- Biofeedback is an operant technique that teaches people to gain voluntary control over bodily processes like heart rate and blood pressure
- It can be used to help with anxiety disorders
- When used to control brain activity it is called neurofeedback



III. Bandura and Observational Learning

http://www.youtube.com/watch?v=dmBqwWlJg8U

Observational/Social/Vicarious Learning

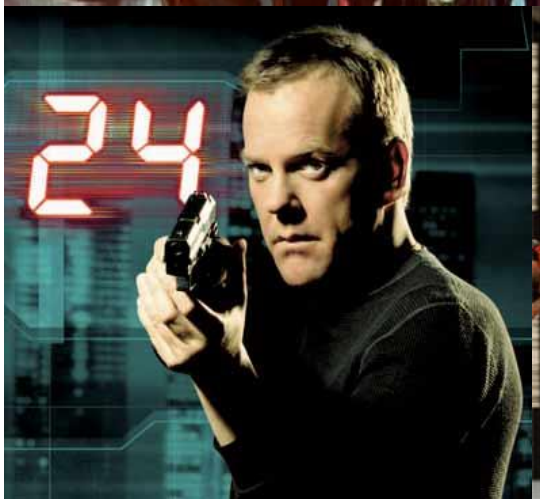
- Observational Learning/ Vicarious Learning
  - Learning by observing Others
- Prosocial
  - Postive behavior
- Antisocial
  - Negative and harmful behavior

Bandura's Bobo Doll

- Albert Bandura
- "Children See, Children do."
- Adults (**Models**) acted out violent actions towards a doll
- Children who watched the models **imitated** the violent behavior
- **Modeling** – The process of observing and imitating specific behavior
  - Observation → imitation

Desensitization

- Video Games
- TV Shows
- Movies
- Sports
- Pornography

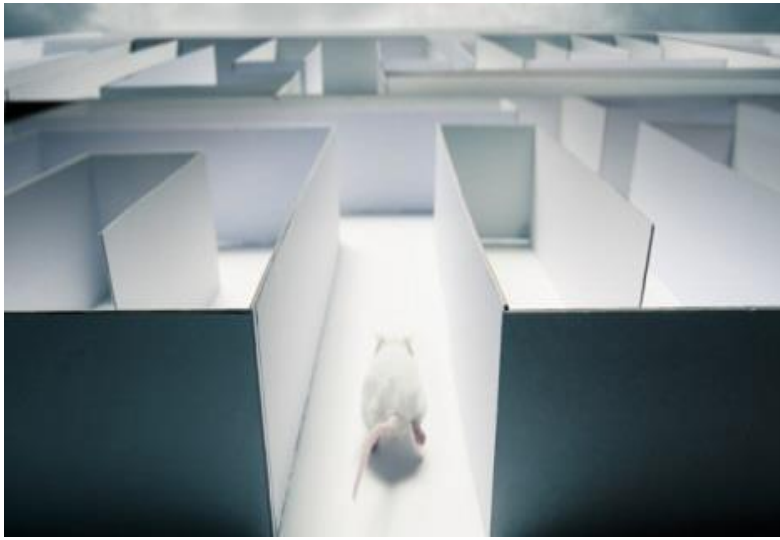


Mirror Neurons

- Neurons located in the frontal lobe
- Fires when observing another
- Brains mirroring of another's actions may enable imitation and empathy
- Biological aspect of observational learning

Latent Learning

- Latent (hidden) Learning is learning that occurs in the absence of rewards.
- Cognitive Map – Mental Representation/picture
- Edward Toleman
- Rats in a maze will still learn their surroundings – even without reward or punishment



Toleman's Experiment

Group 1: Always got reward when finishing the maze

Group 2: Never got reward

Group 3: First half did not get reward

Performance of the rats improved dramatically when group three started receiving reward

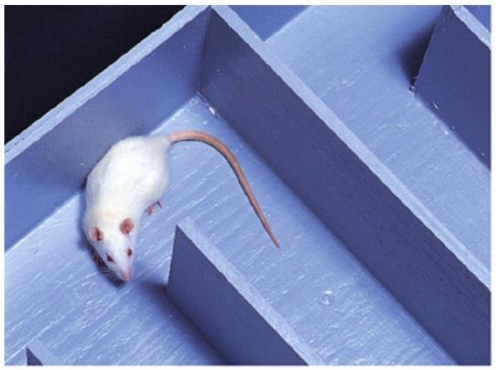
Conclusion: group three rats must have learned! They improved because they had incentives

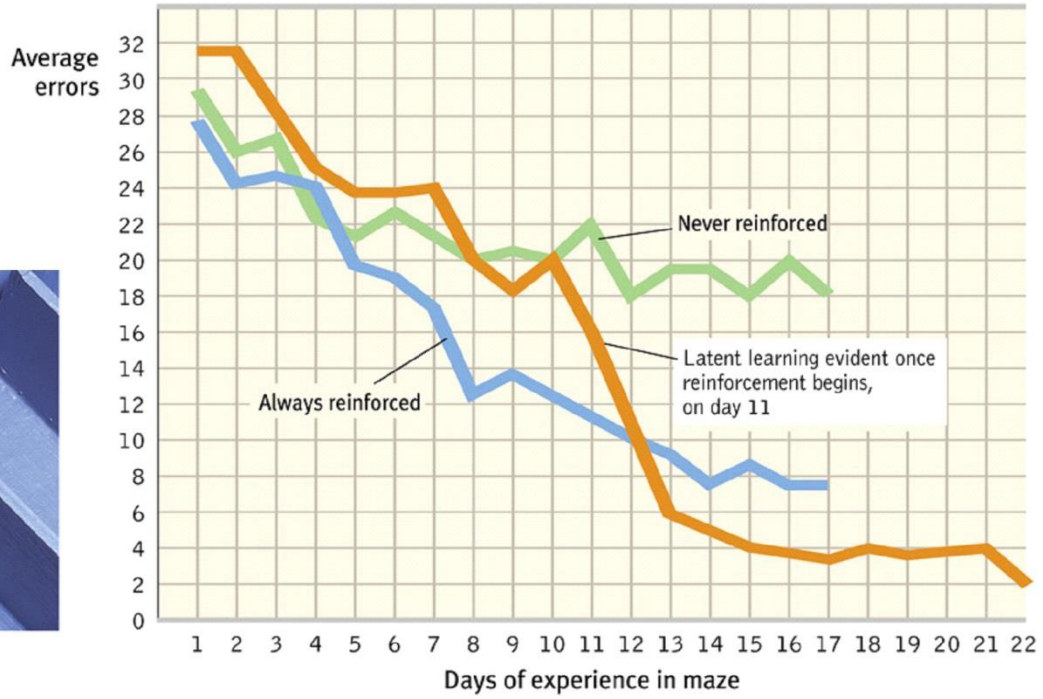
Cognition & Operant Conditioning

Evidence of cognitive processes during operant learning comes from rats during a maze exploration in which they navigate the maze without an obvious reward. Rats seem to develop cognitive maps, or mental representations, of the layout of the maze (environment).

Latent Learning

Such cognitive maps are based on latent learning, which becomes apparent when an incentive is given (Tolman & Honzik, 1930).





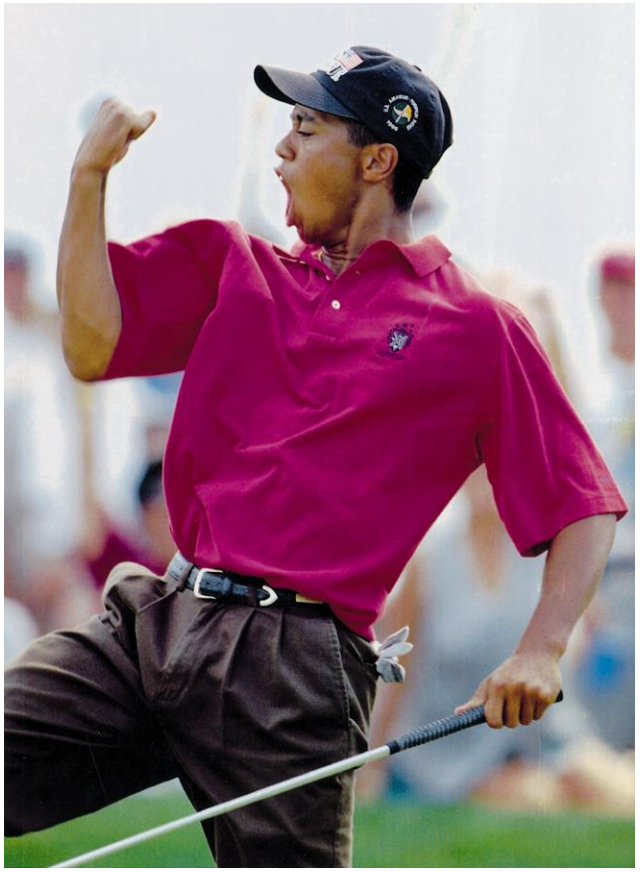
Insight Learning

- Sudden appearance of an answer or solution to a problem
- Wolfgang Kohler exposed chimpanzees to new learning tasks
- “AHA” moment!
- https://www.youtube.com/watch?v=FwDhYUlbxiQ

Motivation

Intrinsic Motivation:
The desire to perform a behavior for its own sake.

Extrinsic Motivation:
The desire to perform a behavior due to promised rewards or threats of punishments.



Over justification Effect

- When an expected external extrinsic incentive such as money or prizes decreases a person's intrinsic motivation.
- An artist may lose his or her passion for art, when he or she is employed.

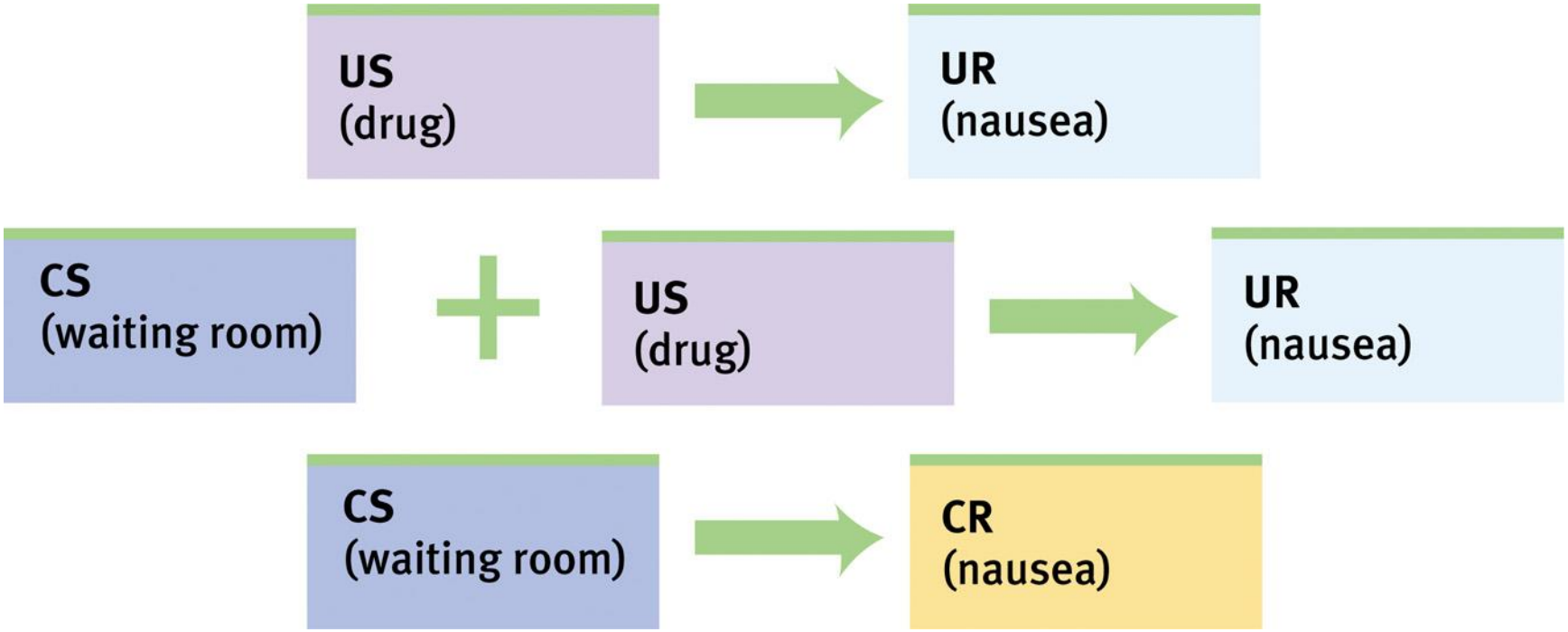
Skinner's Legacy

Skinner argued that behaviors were shaped by external influences instead of inner thoughts and feelings. Critics argued that Skinner dehumanized people by neglecting their free will.

Falk/ Photo Researchers, Inc.

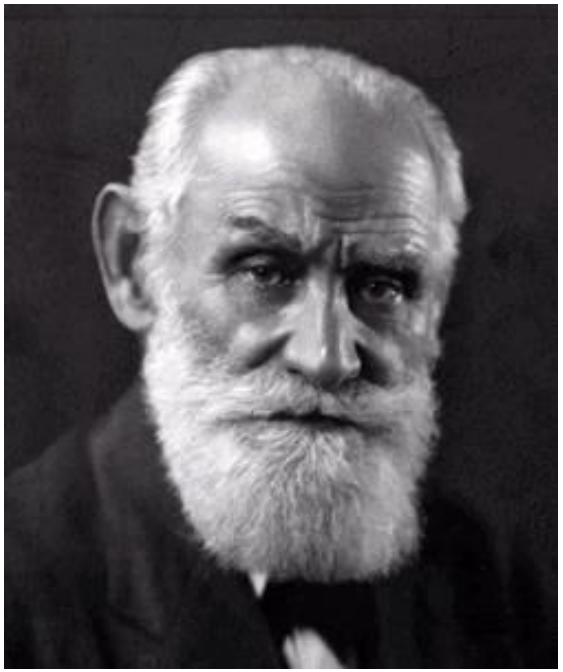
Biological Predispositions

Even humans can develop classically to conditioned nausea.



Pavlov's Legacy

Pavlov's greatest contribution to psychology is isolating elementary behaviors from more complex ones through objective scientific procedures.



Ivan Pavlov
(1849-1936)

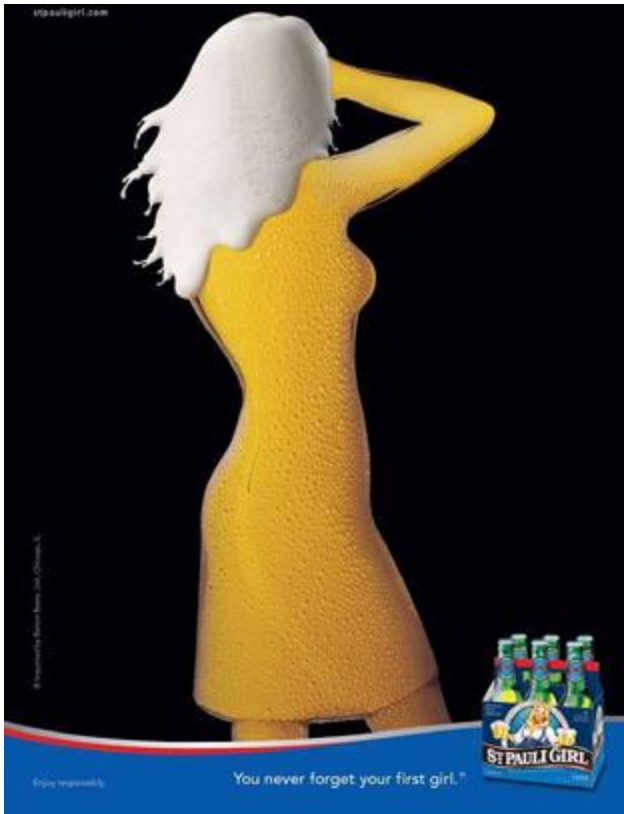
V. APPLICATIONS

Applications of Classical Conditioning

1. Alcoholics may be conditioned (aversively) by reversing their positive-associations with alcohol.
2. Through classical conditioning, a drug (plus its taste) that affects the immune response may cause the taste of the drug to invoke the immune response.

Applications of Classical Conditioning

3. Many beer ads prominently feature attractive young women wearing bikinis. The young women (Unconditioned Stimulus) naturally elicit a favorable, mildly aroused feeling (Unconditioned Response) in most men. The beer is simply associated with this effect.
4. The same thing applies with the jingles and music that accompany many advertisements.



Applications of Operant Conditioning

Skinner introduced the concept of teaching machines that shape learning in small steps and provide reinforcements for correct rewards.

LWA-JDL/ Corbis

In School

Applications of Operant Conditioning

Reinforcement principles can enhance athletic performance.

In Sports

Applications of Operant Conditioning

Reinforcers affect productivity. Many companies now allow employees to share profits and participate in company ownership.

At work

COMPARISON OF CLASSICAL AND OPERANT CONDITIONING

	Classical Conditioning	Operant Conditioning
Response	Involuntary, automatic.	Voluntary, operates on environment.
Acquisition	Associating events; CS announces US.	Associating response with a consequence (reinforcer or punisher).
Extinction	CR decreases when CS is repeatedly presented alone.	Responding decreases when reinforcement stops.
Cognitive processes	Organisms develop expectation that CS signals the arrival of US.	Organisms develop expectation that a response will be reinforced or punished; they also exhibit latent learning, without reinforcement.
Biological predispositions	Natural predispositions constrain what stimuli and responses can easily be associated.	Organisms best learn behaviors similar to their natural behaviors; unnatural behaviors instinctively drift back toward natural ones.