Learning

Definition: Learning is…

- A change in behavior as a result of experience or practice.
- The acquisition of knowledge.
- Knowledge or skill gained through study, teaching, instruction or experience.
- A process by which behavior is changed, shaped or controlled for a relatively long period of time or permanently.
- The individual process of constructing understanding based on experience from a wide range of sources.
- Learning is not: changes due to growth or maturation

Some First Principles

- Learning is something all humans do
  - Fetuses learn
  - Infants learn
  - Children learn
  - Adults learn
- Learning is not uniquely human – all living things learn
- Learning evolved as an adaptation for promoting survival

What is Learning?

- Learning is a process
- Learning is a product

Process of Learning

- Learning involves the individual
  - Brain
  - Body
- Learning involves others
  - Dyads
  - Groups
  - Organizations
  - Communities
  - Society
- Learning takes place somewhere
  - In physical environment
  - With things and tools
- Learning occurs over time

Products of Learning

- Learning is about ideas and concepts
- Learning is about behaviors and skills
- Learning is about attitudes and values

Definition: Theories are…

- What is a theory?
  - A theory provides a general explanation for observations made over time.
  - A theory explains and predicts behavior.
  - A theory can never be established beyond all doubt.
  - A theory may be modified.
  - Theories seldom have to be thrown out completely if thoroughly tested but sometimes a theory may be widely accepted for a long time and later disproved.

So, how do people learn?

- Easy answer: We don't know for sure.

- Difficult answer: We have multiple theories that provide glimpses of an answer from many different perspectives. These stem from psychologists, philosophers, sociologists, anthropologists, evolutionary biologists, linguists, neuroscientists…

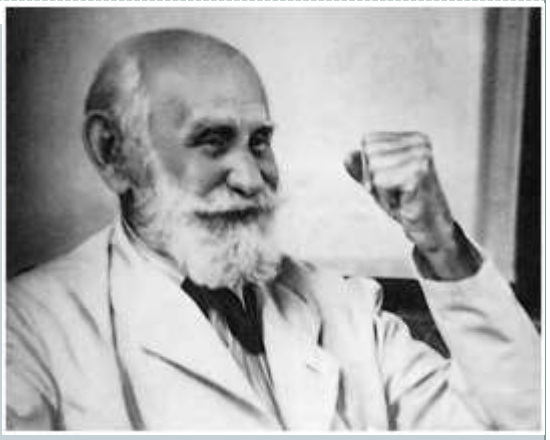
Broad domains of theories

- Behaviorism
- Constructivism
- Sociocultural
- Cognitivism

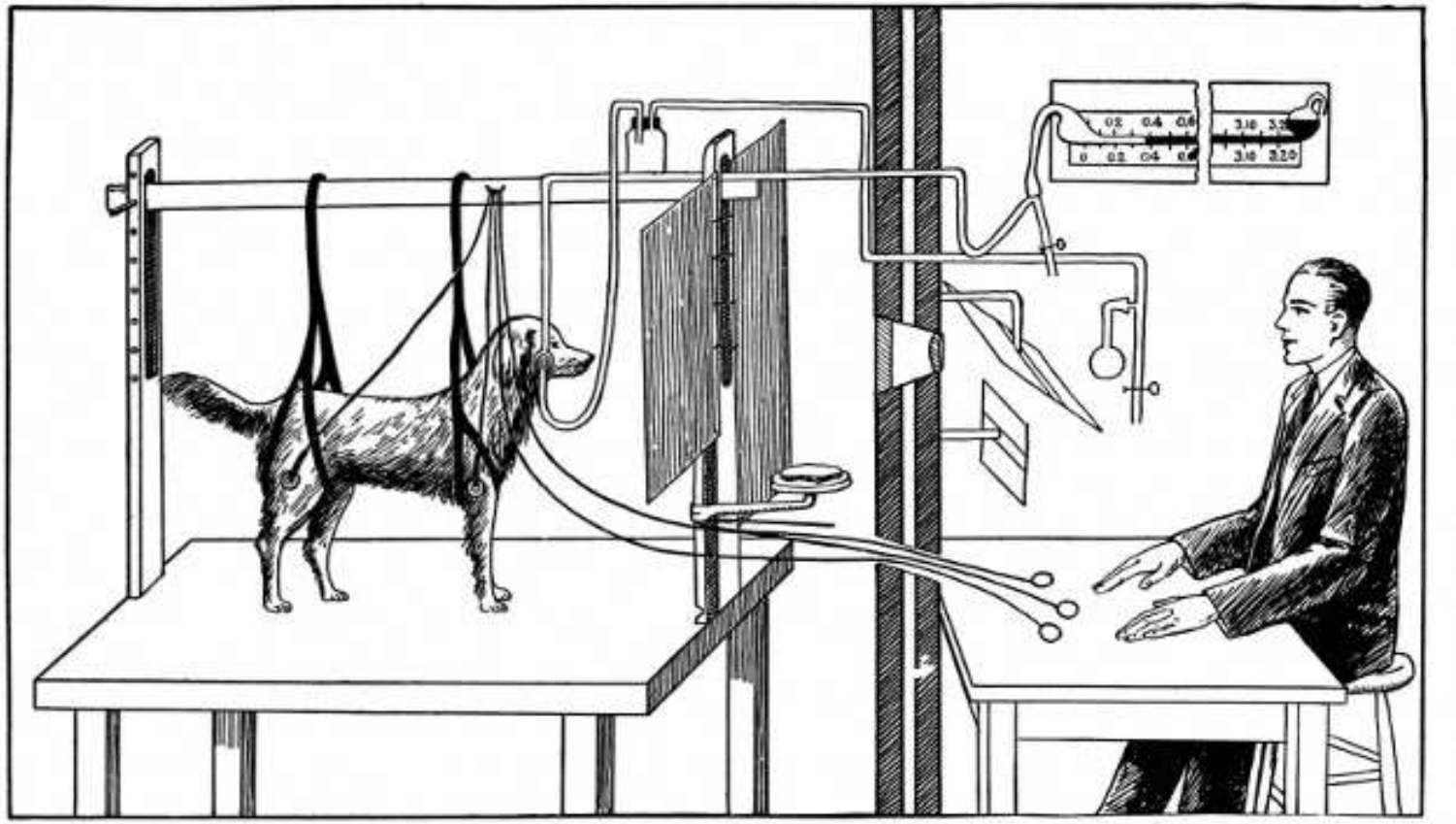
I believe that (the) educational process has two sides—one psychological and one sociological. . . Profound differences in theory are never gratuitous or invented. They grow out of conflicting elements in a genuine problem.

-John Dewey, In Dworkin, M. (1959) *Dewey on Education*

Classical Conditioning

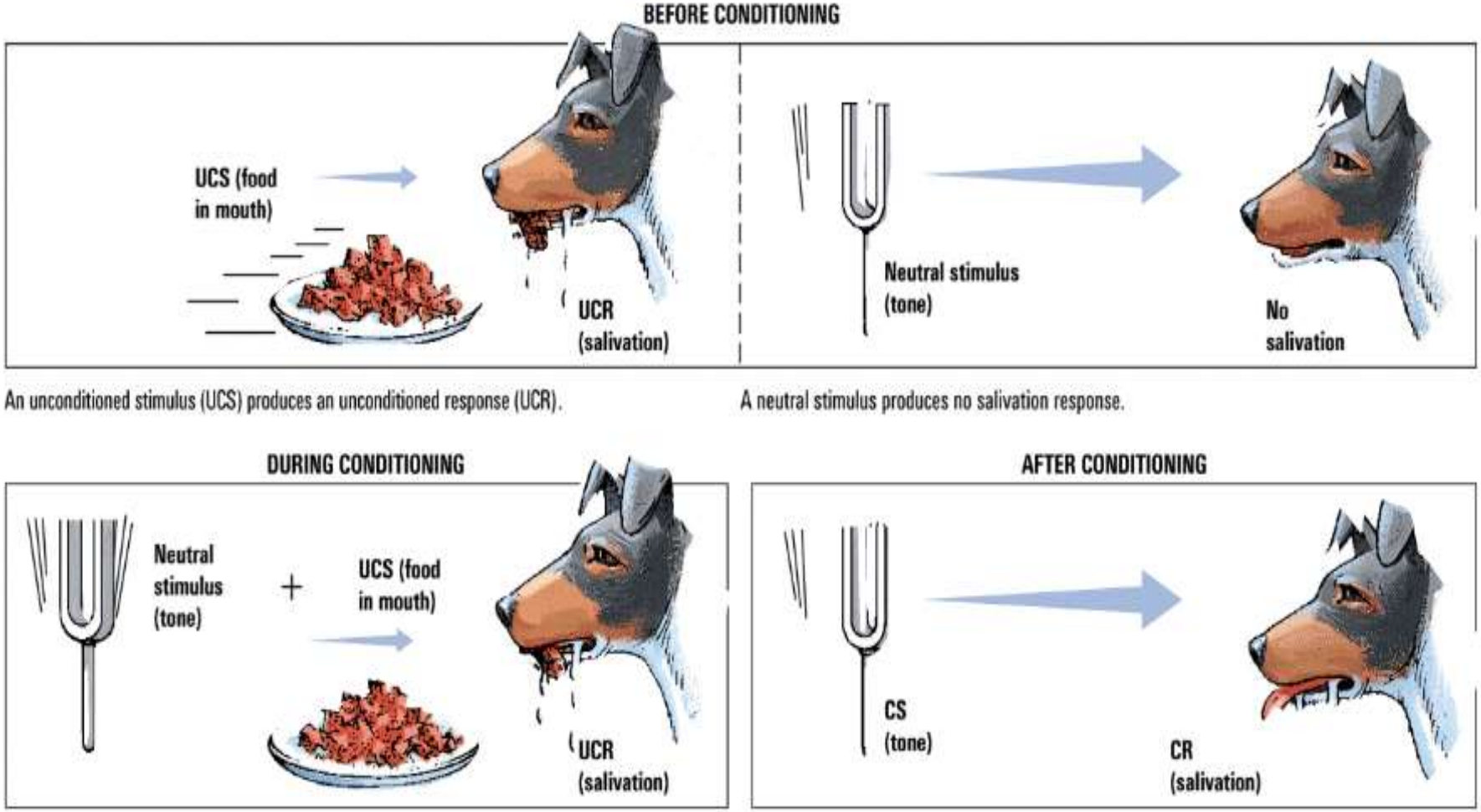


- Ivan Pavlov (1849-1936)
  - Russian physician/ neurophysiologist
  - Nobel Prize in 1904
  - Studied digestive secretions
  - ‘Classical’ early experiments
  - Pavlovian conditioning; respondent conditioning

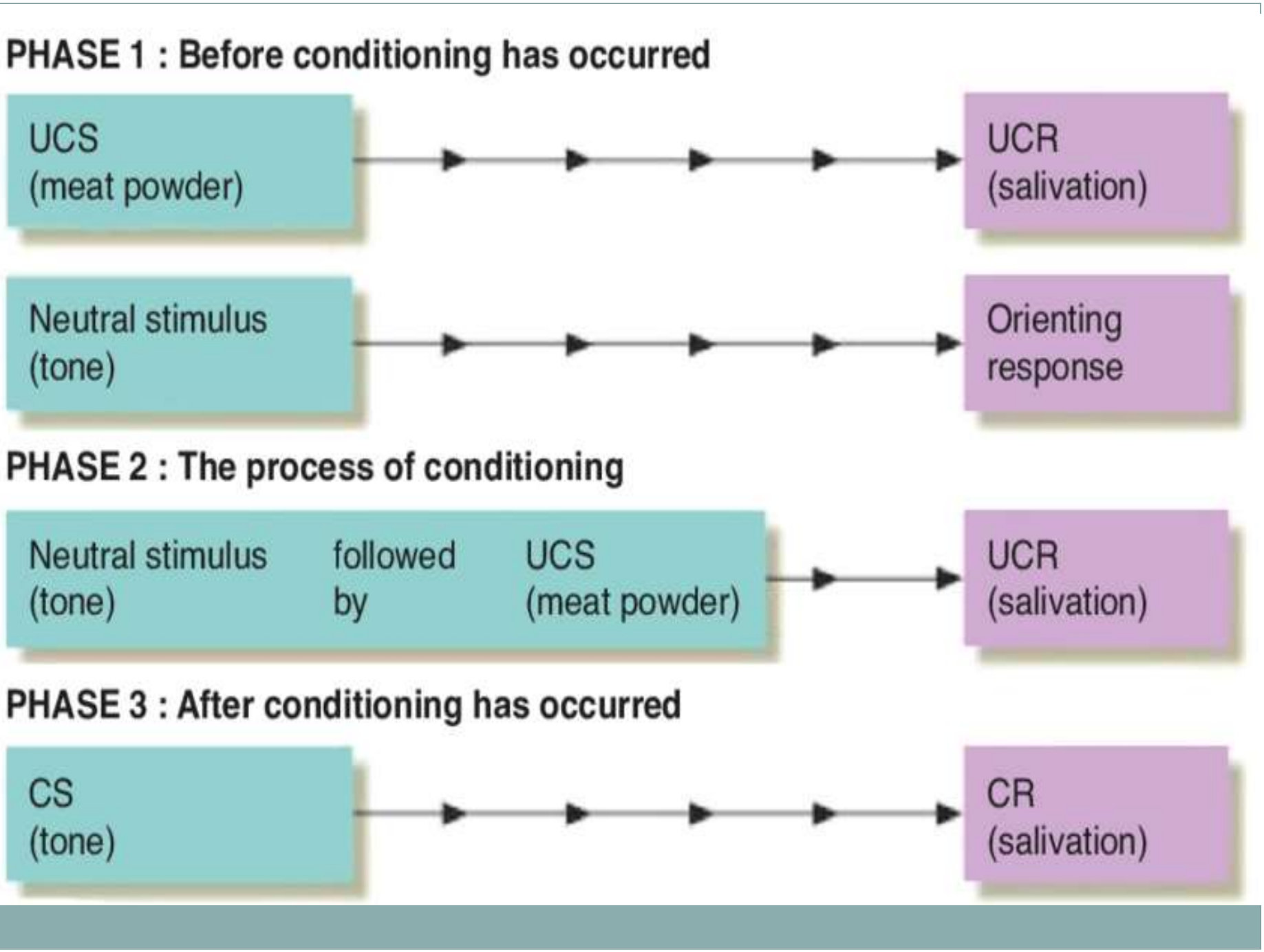


Pavlov’s apparatus for studying the conditioned salivary response

Pavlov's Classical Experiment



- Responses acquired
- Stimulus (Latin word for ‘goad’ or ‘prod’: events that evoke: anything in the environment detected by the senses)
- Conditioned stimulus: neutral stimulus: alerts without specific response
- Unconditioned stimulus: consistently or reliably evokes a response
- Unconditioned response: response reliably follows the US
- Conditioned response: CS-US pair: the CS evokes CR


PHASE 1 : Before conditioning has occurred
UCS (meat powder)
UCR (salivation)
Neutral stimulus (tone)
Orienting response
PHASE 2 : The process of conditioning
Neutral stimulus (tone)
followed by
UCS (meat powder)
UCR (salivation)
PHASE 3 : After conditioning has occurred
CS (tone)
CR (salivation)

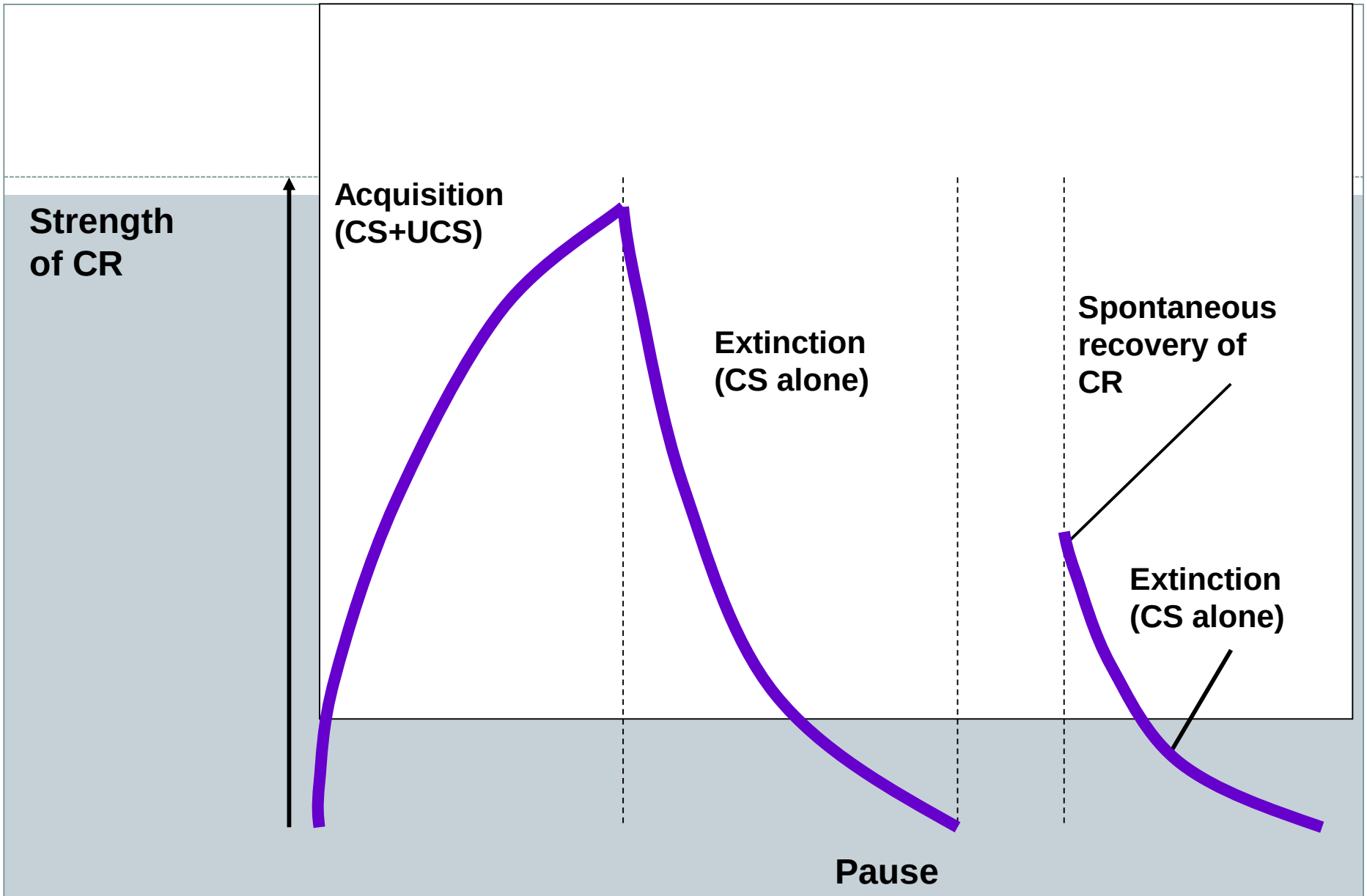
- organism comes to associate two stimuli
- a neutral stimulus that signals an unconditioned stimulus

begins to produce a response that anticipates and prepares for the unconditioned stimulus

- Unconditioned Stimulus (UCS)
  - stimulus that unconditionally--automatically and naturally--triggers a response
- Unconditioned Response (UCR)
  - unlearned, naturally occurring response to the unconditioned stimulus (salivation when food is in the mouth)
- Conditioned Stimulus (CS)
  - originally irrelevant stimulus that, after association with an unconditioned stimulus, comes to trigger a conditioned response
- Conditioned Response (CR)
  - learned response to a previously neutral conditioned stimulus

- Acquisition
  - the initial stage in classical conditioning
  - the phase associating a neutral stimulus with an unconditioned stimulus so that the neutral stimulus comes to elicit a conditioned response
  - in operant conditioning, the strengthening of a reinforced response

- Extinction
  - diminishing of a CR
  - in classical conditioning, when a UCS does not follow a CS
  - in operant conditioning, when a response is no longer reinforced



Course of conditioning (McGeoch & Irion, 1952)

- Spontaneous Recovery
  - reappearance, after a rest period, of an extinguished CR
- Generalization
  - tendency for stimuli similar to CS to elicit similar responses
- Discrimination
  - in classical conditioning, the learned ability to distinguish between a CS and other stimuli that do not signal a UCS

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

Theories about Classical Conditioning

- Stimulus substitution: CS acquires capacity to substitute for the US in evoking a response: association between CS and US so that CS becomes equivalent to the US in eliciting a response
- Two areas of the brain activated: US reflex response
- Disadvantage: CR is not equivalent to the UR

- Information and expectation: CS is a signal for US
- In the presence of CS, US is expected and the learner responds in accord of the expectation
- Novelty of US
- Memory trace: CS consistently present before the US
- Behaviours engaged by the learner in anticipation of a future event (US)

Significance

- Event: CS
- Role of emotional response in humans: CR
- Role in behavior modification and behavior therapy

Operant Conditioning

- Association of a response with its consequence

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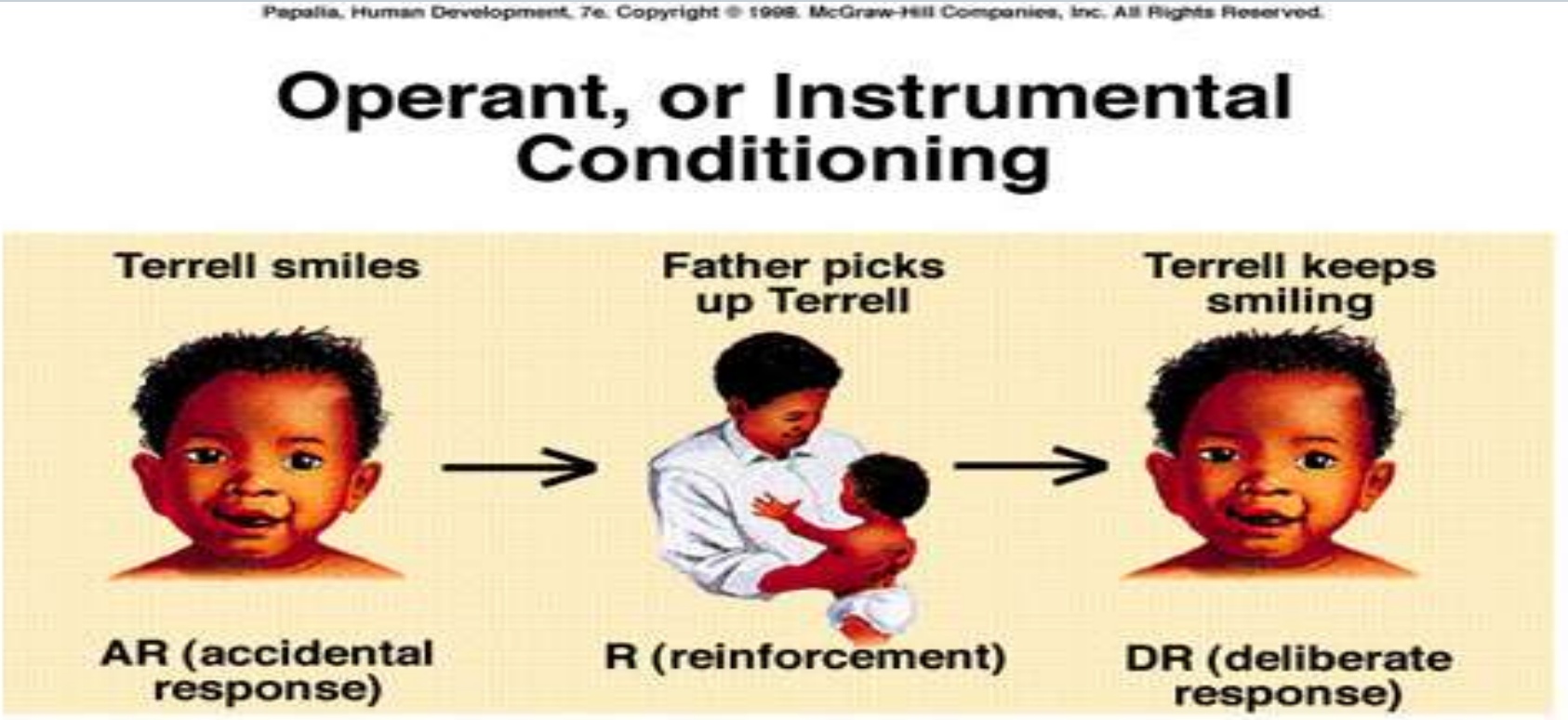

- Instrumental conditioning: some action (behavior) of the learner is instrumental in bringing about a change in the environment that makes the action more/less likely to occur in the future
- Rewards/ punishments/ positive or negative reinforcements
- Operant conditioning: Skinner: when a response operates on the environment, the consequences affect the likelihood of its occurance

Law of Effect

- Thorndike's principle: behaviors followed by favorable consequences become more likely, and behaviors followed by unfavorable consequences become less likely
- Operant Behavior
  - operates (acts) on environment
  - produces consequences
- Respondent Behavior
  - occurs as an automatic response to stimulus
  - behavior learned through classical conditioning

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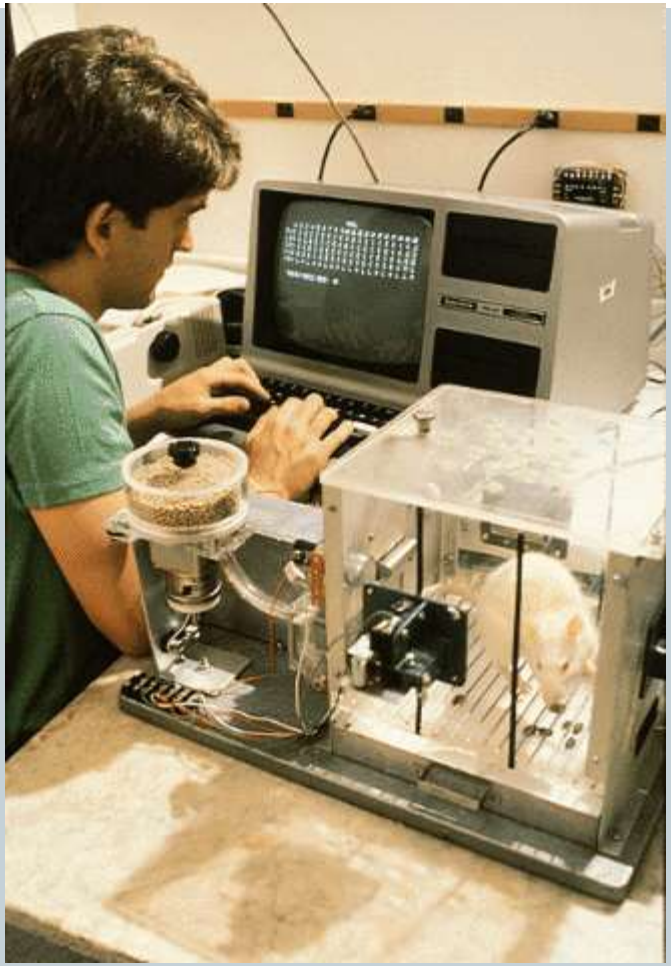
- B.F. Skinner (1904-1990)
  - elaborated Thorndike's Law of Effect
  - developed behavioral technology

Operant Chamber



- Skinner Box
  - chamber with a bar or key that an animal manipulates to obtain a food or water reinforcer
  - contains devices to record responses

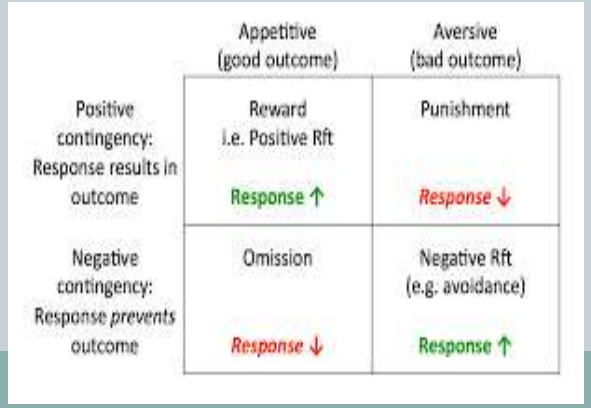
- Reinforcer
  - any event that strengthens the behavior it follows
  - Positive: stimulus/ event which, following a response, increases the likelihood that the response will be made again
  - Negative: stimulus/event which, when its termination is contingent on a response, increases the likelihood of the behavior occurring again
- Shaping
  - operant conditioning procedure in which reinforcers guide behavior toward closer approximations of a desired goal

- Primary Reinforcer
  - innately reinforcing stimulus
  - i.e., satisfies a biological need
- Conditioned Reinforcer
  - stimulus that gains its reinforcing power through its association with primary reinforcer
  - secondary reinforcer

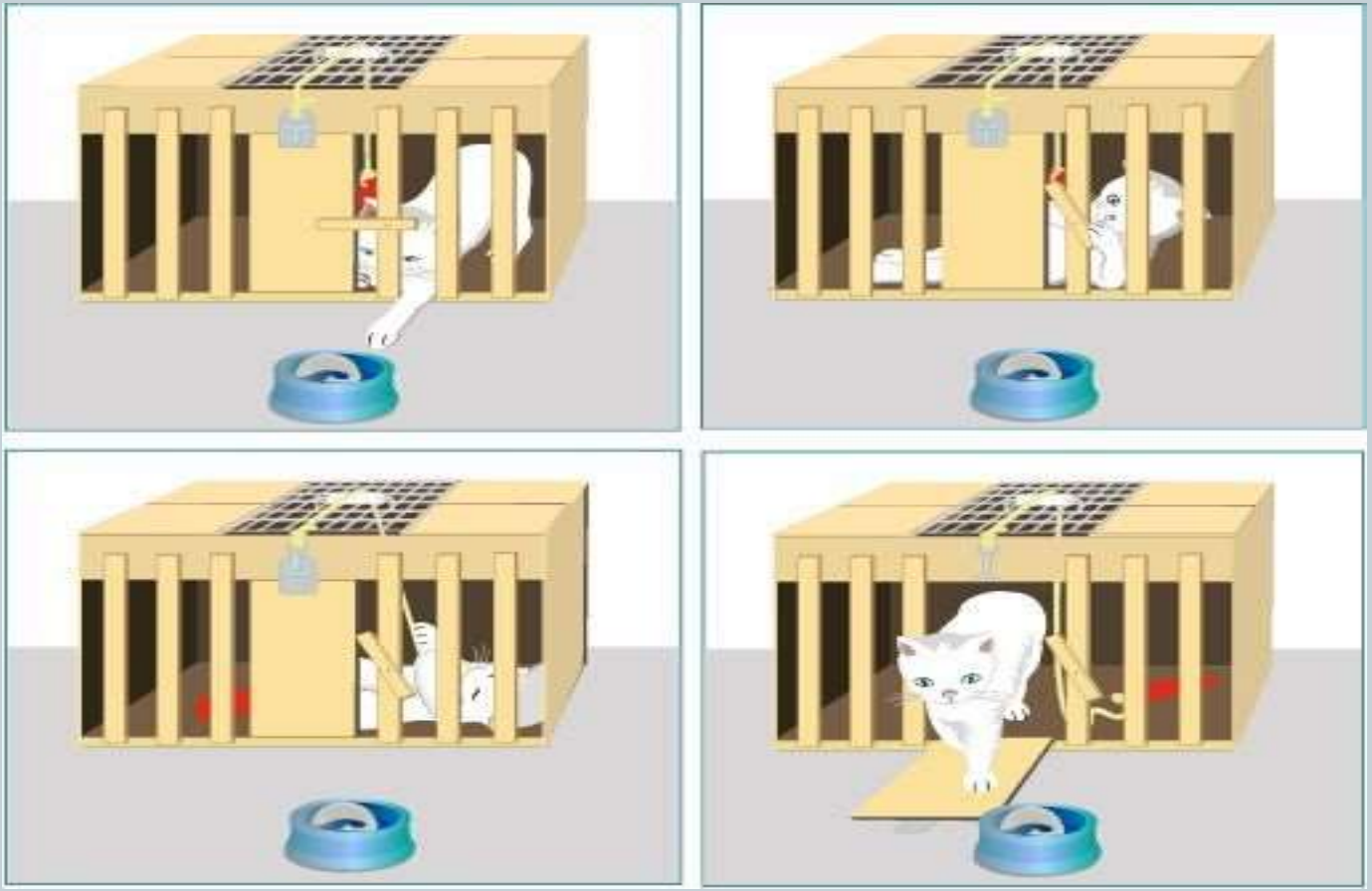
WAYS TO INCREASE BEHAVIOR

Operant Conditioning Term	Description	Example
Positive reinforcement	***Add*** a positive stimulus	a hug, TV on
Negative reinforcement	***Remove*** an aversive stimulus	seat belt turns off buzzer

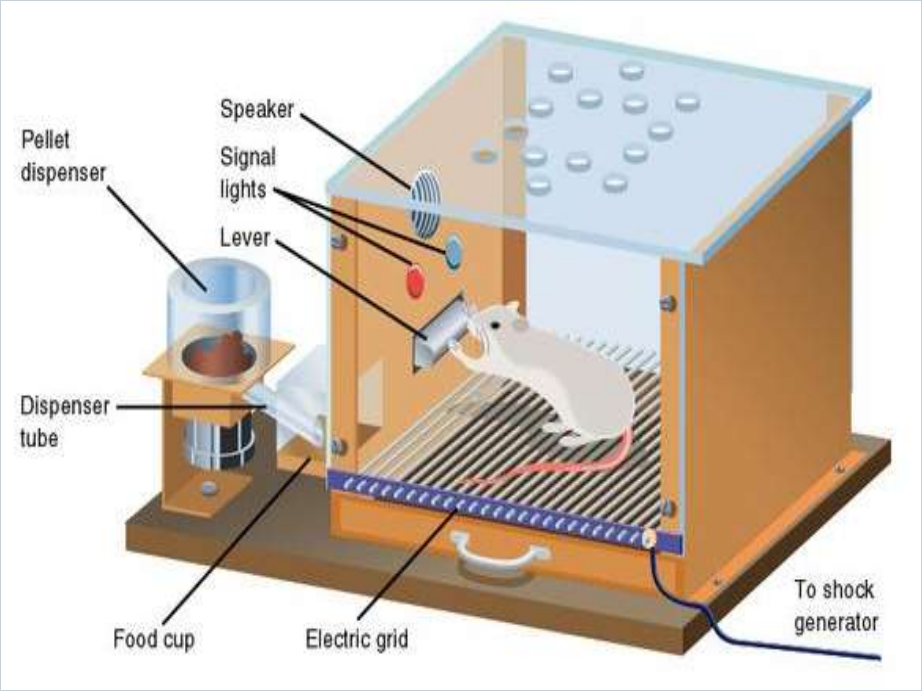
- Punisher: stimulus/event which, when its onset is contingent on a response, decreases the likelihood that the response will occur
- Omission of reinforcement: Omission training: positive reinforcement is withdrawn following a response to decrease the likelihood of a response that led to the removal of the positive reinforcement

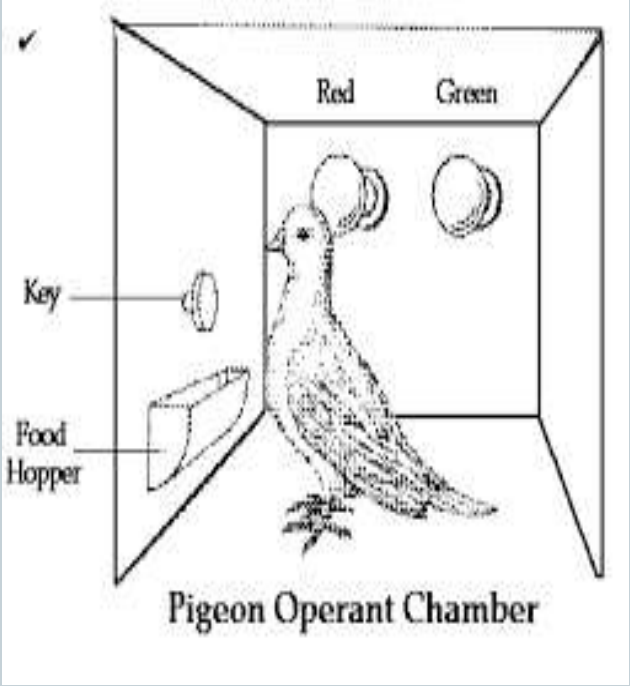


- Thorndike's experiment: Cats in a puzzle box



- Skinner's experiments: Rats and pigeons in an operant chamber





- Shaping behavior with positive reinforcement
- Extinction of positively reinforced response
- Conditioned positive reinforcers
- Stimulus generalization
- Stimulus discrimination
- Negative reinforcement and escape learning
- Avoidance learning

Schedules of reinforcement

- Continuous Reinforcement
  - reinforcing the desired response each time it occurs
- Partial (Intermitent) Reinforcement
  - reinforcing a response only part of the time
  - results in slower acquisition
  - greater resistance to extinction

- Fixed Ratio (FR)
  - reinforces a response only after a specified number of responses
  - faster you respond the more rewards you get
  - different ratios
  - very high rate of responding

- Variable Ratio (VR)
  - reinforces a response after an unpredictable number of responses
  - average ratios
  - like gambling, fishing
  - very hard to extinguish because of unpredictability

- Fixed Interval (FI)
  - reinforces a response only after a specified time has elapsed
  - response occurs more frequently as the anticipated time for reward draws near
- Variable Interval (VI)
  - reinforces a response at unpredictable time intervals
  - produces slow steady responding
  - like pop quiz

Punishment

- Punisher: stimulus/ event which, when its onset is contingent on a response, decreases the likelihood of the response occurring again
- Punishment: use of punishers to stop the behaviours /response from occurring in the future

TYPES OF PUNISHERS

Type	Description	Examples
Positive punish-ment	Administer an aversive stimulus	Spanking; a parking ticket
Negative punish-ment	Withdraw a desirable stimulus	Time-out from privileges such as TV; revoked driver's license

When does punishment work

- Intensity
- Consistency
- Closer the punishment is in time and date to the behavior being punished
- Less effective: strong response tendency; adaptation
- Efficacy: use mild punishment to suppress one behavior along with positive reinforcement for another behaviour

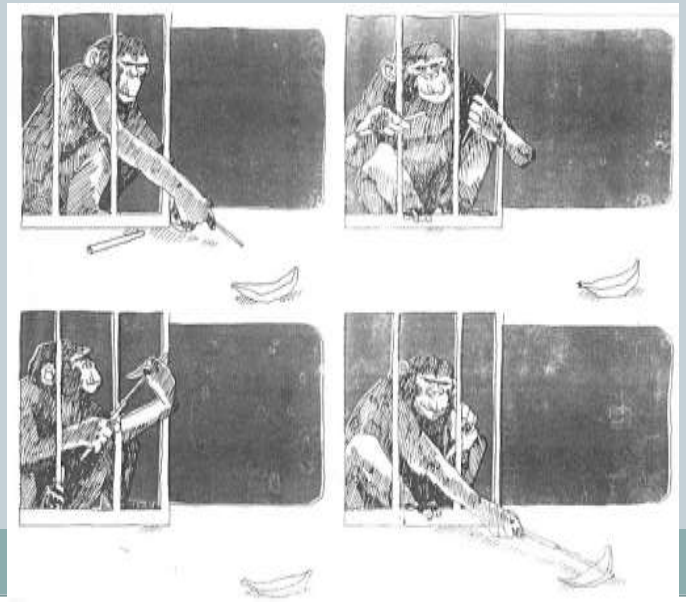
Significance

- Social behaviours
- Therapy
- Business operations: employee productivity and profits
- Programmed learning
- Education: personalized system of instruction

Cognitive Learning

- Cognition: processing of information about the environment that is received through the senses
- Cognitive processing: selection of information; alteration of information, elaboration in thought;, storage of information in memory; retrieval of stored information
- Cognitive Map
  - mental representation of the layout of one's environment
- Latent Learning
  - learning that occurs, but is not apparent until there is an incentive to demonstrate it

- Insight learning: a period following a problem where no progress is made and then the solution suddenly occurs (‘aha moment’)
- Imitation: model behavior on that of someone else



Cognition and operant conditioning

- Overjustification Effect
  - the effect of promising a reward for doing what one already likes to do
  - the person may now see the reward, rather than intrinsic interest, as the motivation for performing the task
- Intrinsic Motivation
  - Desire to perform a behavior for its own sake and to be effective
- Extrinsic Motivation
  - Desire to perform a behavior due to promised rewards or threats of punishments

TABLE 8.2 COMPARISON OF CLASSICAL AND OPERANT CONDITIONING

	Classical Conditioning	Operant Conditioning
Response	Involuntary, automatic	"Voluntary," operates on environment
Acquisition	Associating events; CS announces UCS.	Associating response with a consequence (reinforcer or punisher).
Extinction	CR decreases when CS is repeatedly presented alone.	Responding decreases when reinforcement stops.
Cognitive processes	Subjects develop expectation that CS signals the arrival of UCS.	Subjects 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.

- Observational Learning
  - learning by observing others
- Modeling
  - process of observing and imitating a specific behavior
- Prosocial Behavior
  - positive, constructive, helpful behavior
  - opposite of antisocial behavior

- Also called: **Social Learning Theory**
- Different take on learning:

  We not only learn through direct experience, but also by observing and imitating others (through modeling).
  - Not simple, automatic, requires attention & sometimes motivation

- 1. **Bandura** - Bobo Doll Studies.
  - Learned how to aggress (modeled behavior).
  - Inhibitions were lowered (thought of new ways to aggress).
- 2. **Vicarious Learning**: learning by watching others with NO reinforcement.

Influence of TV and media on behavior:

APA's Conclusion: There is a causal link between watching aggressive acts on TV and being aggressive IN SOME CHILDREN.

TV/Media – not the ONLY cause of aggressive behavior.

The learner and learning

- Prepared behaviours and species typical defence reactions
- Unprepared behaviours: learned with a moderate amount of difficulty
- Contraprepared behaviours: learned with great difficulty if at all learned