



Chapter 7

Learning

Learning



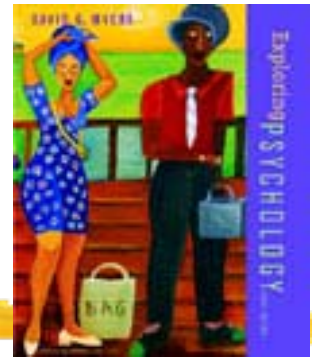
- Learning
 - relatively permanent change in an organism's behavior due to experience

Association



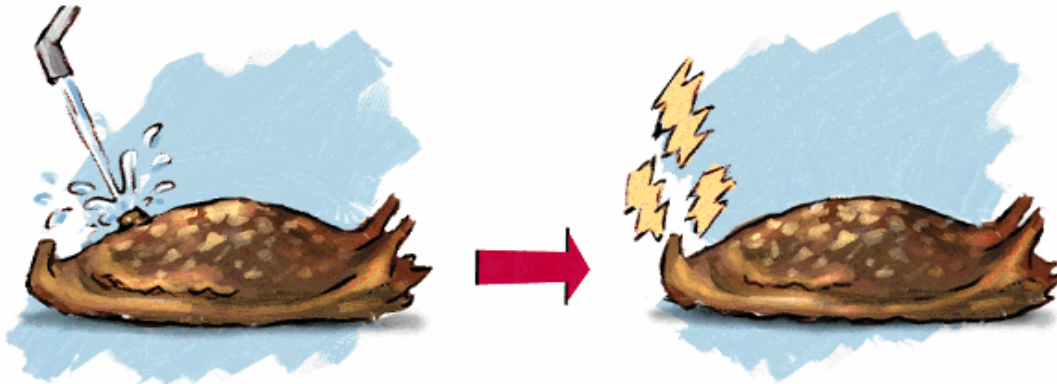
- We learn by association
 - Our minds naturally connect events that occur in sequence
 - Aristotle 2000 years ago
 - John Locke and David Hume 200 years ago
- Associative Learning
 - learning that two events occur together
 - two stimuli
 - a response and its consequences

Association



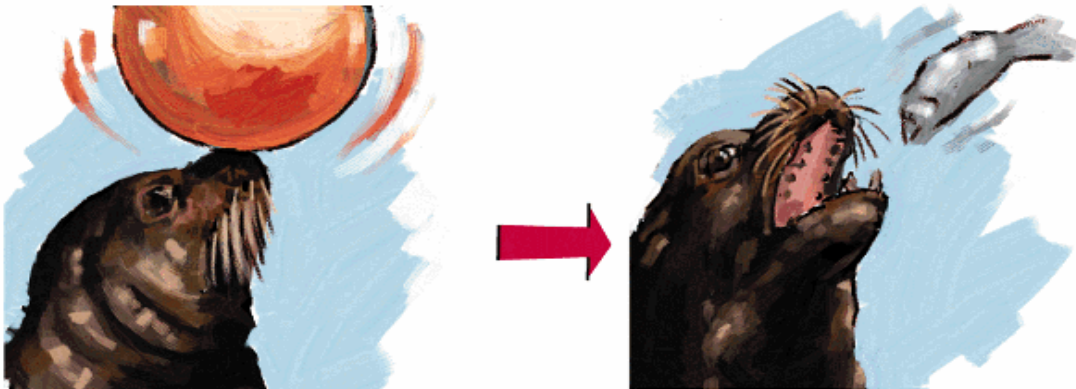
Event 1

Event 2



Sea snail associates splash with a tail shock

- Learning to associate two events

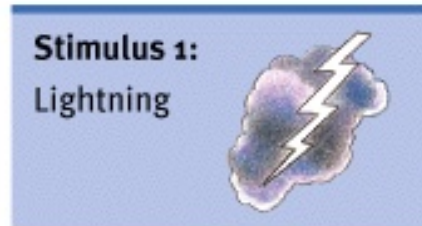


Seal learns to expect a snack for its showy antics

Classical or Pavlovian Conditioning



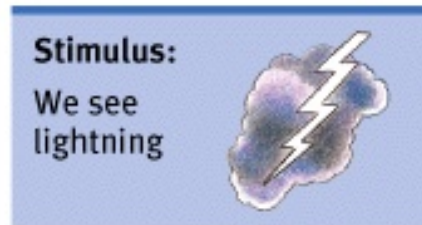
Two related events:



+

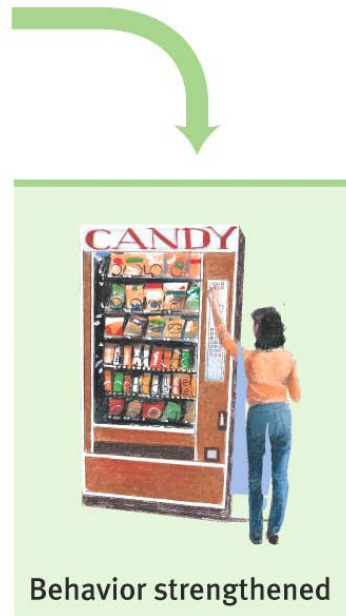
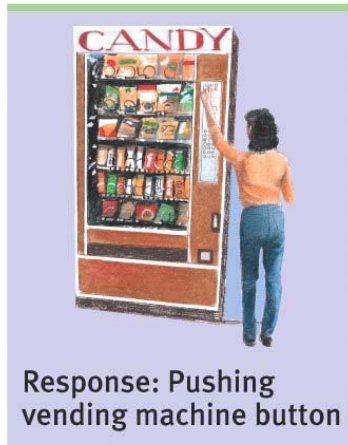


Result after repetition:



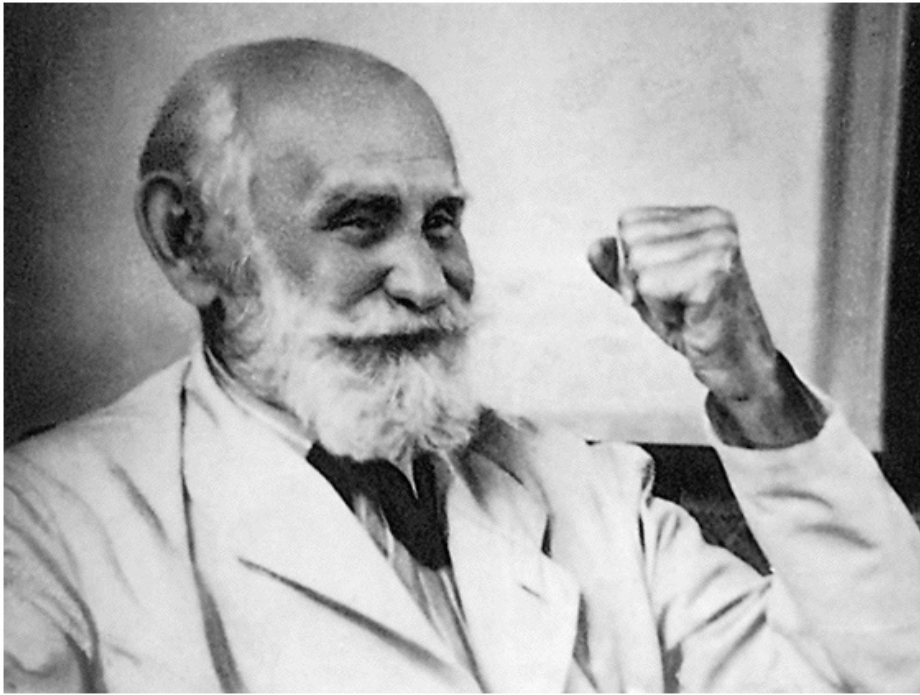
- We learn to associate two stimuli

Operant Conditioning



- We learn to associate a response and its consequence

Classical Conditioning

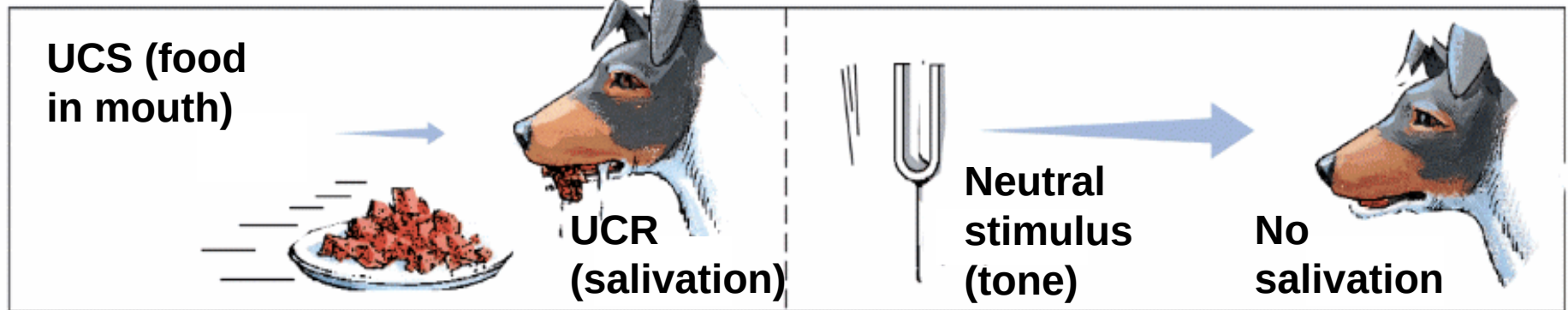


- **Ivan Pavlov**
 - 1849-1936
 - Russian physician/ neurophysiologist
 - Nobel Prize in 1904
 - studied digestive secretions

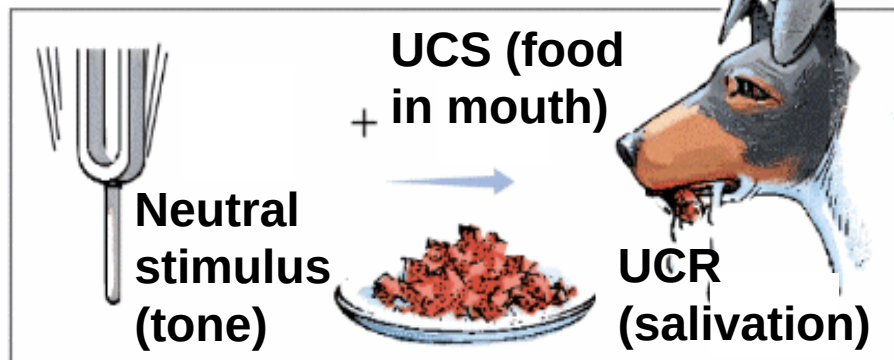
Pavlov's Classic Experiment



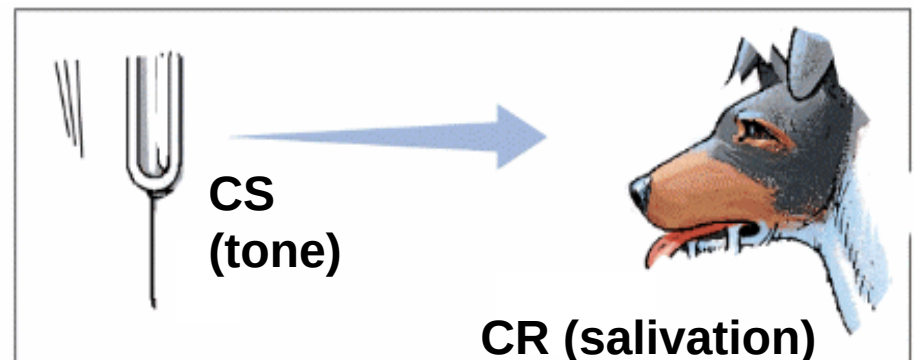
Before Conditioning



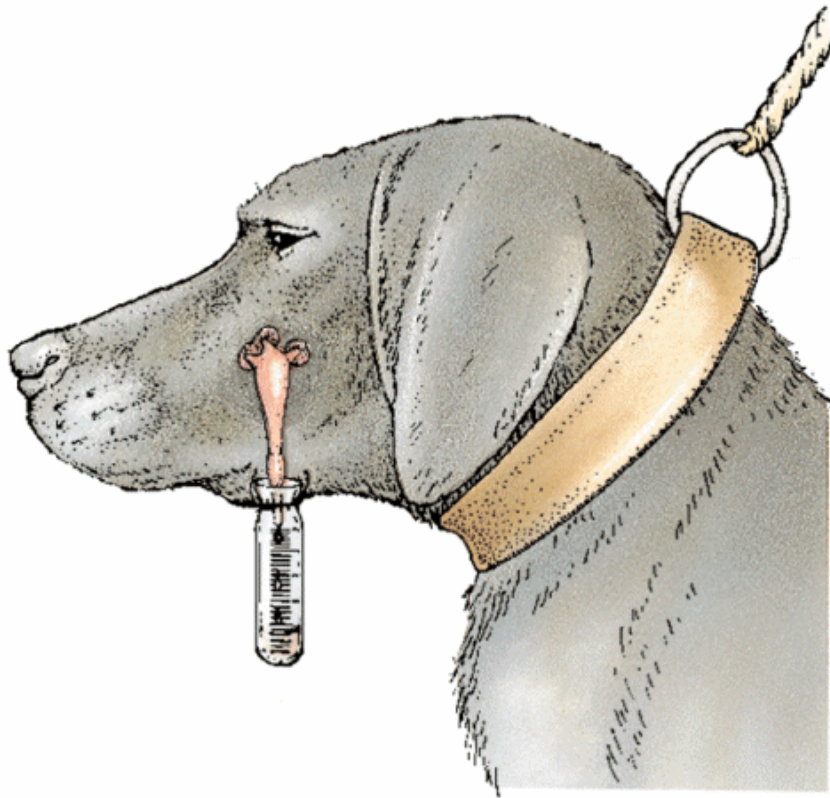
During Conditioning



After Conditioning



Classical Conditioning



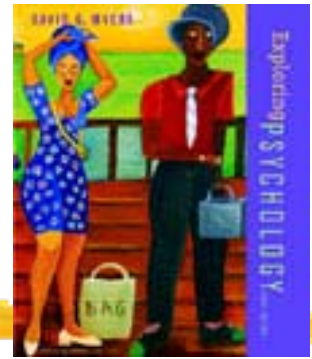
- Pavlov's device for recording salivation

Classical Conditioning



- Classical Conditioning
 - 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

Behaviorism



- John B. Watson
 - viewed psychology as objective science
 - generally agreed-upon consensus today
 - recommended study of behavior without reference to unobservable mental processes
 - not universally accepted by all schools of thought today

Classical Conditioning



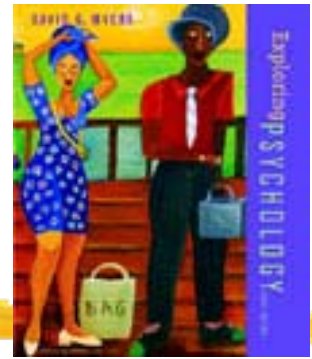
- Unconditioned Stimulus (UCS)
 - stimulus that unconditionally--automatically and naturally--triggers a response
- Unconditioned Response (UCR)
 - unlearned, naturally occurring response to the unconditioned stimulus
 - salivation when food is in the mouth

Classical Conditioning



- **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

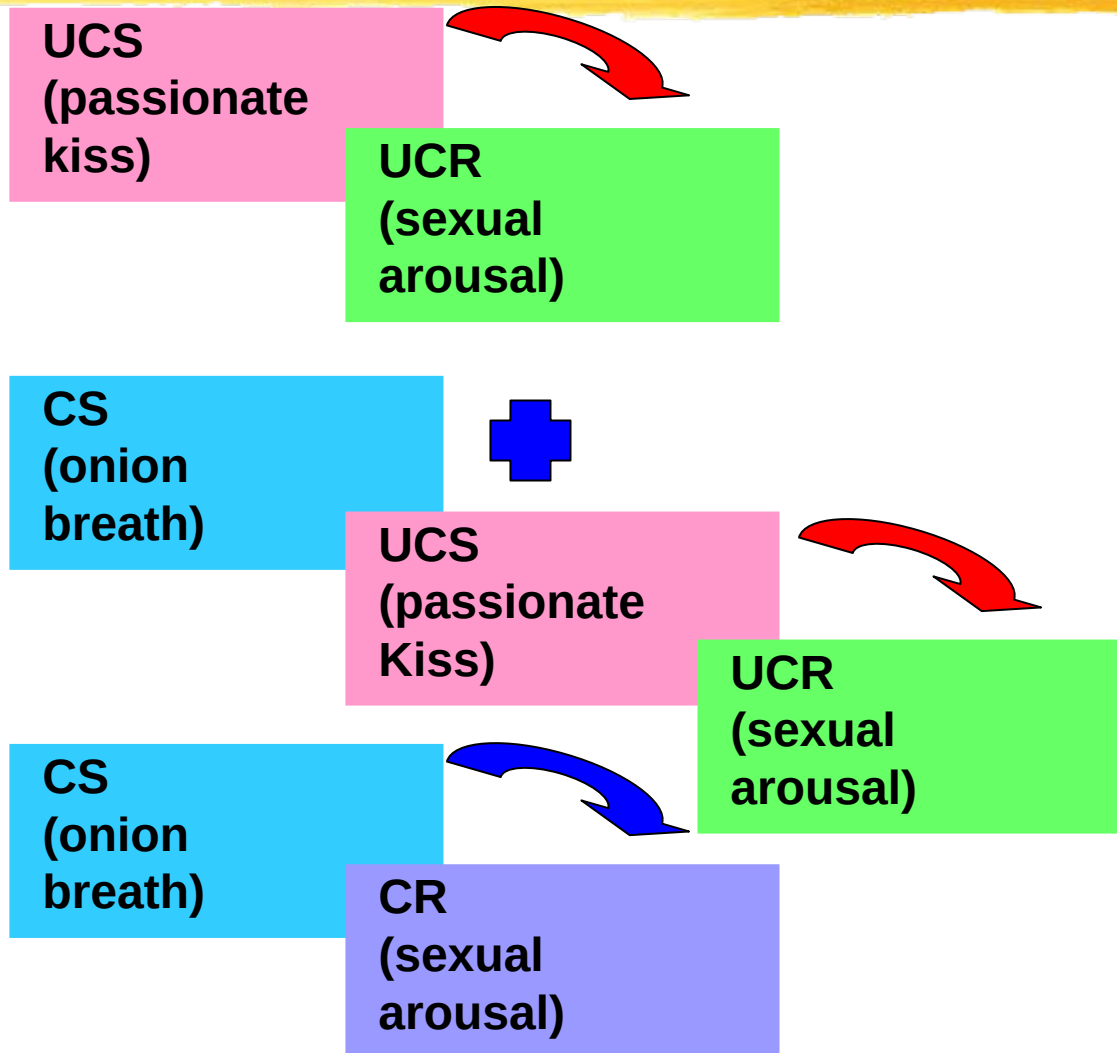
Classical Conditioning



■ 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

Classical Conditioning

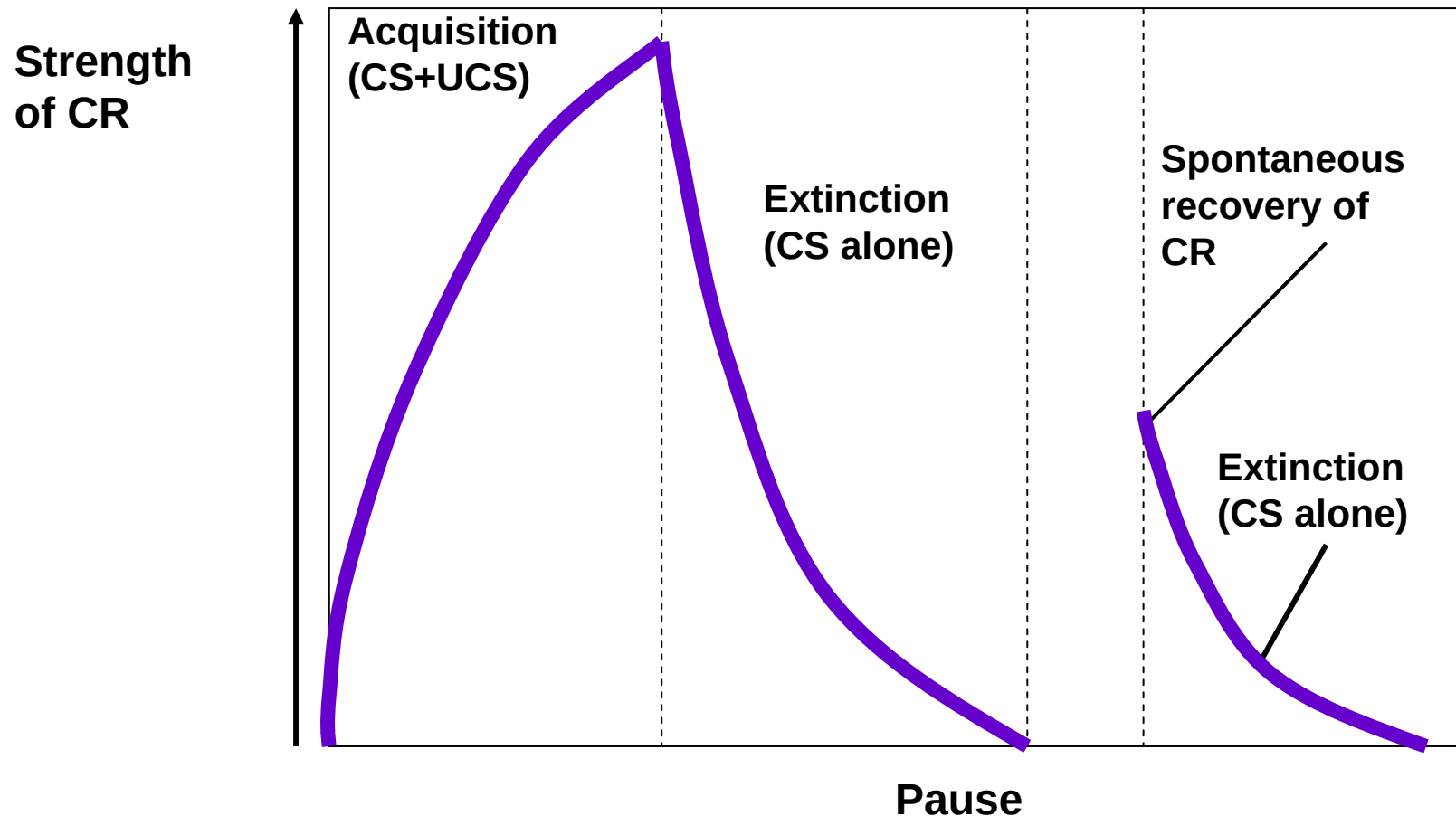


Classical Conditioning



- 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

Classical Conditioning



Classical Conditioning



- Spontaneous Recovery
 - reappearance, after a rest period, of an extinguished CR
- Generalization
 - tendency for stimuli similar to CS to elicit similar responses

Classical Conditioning

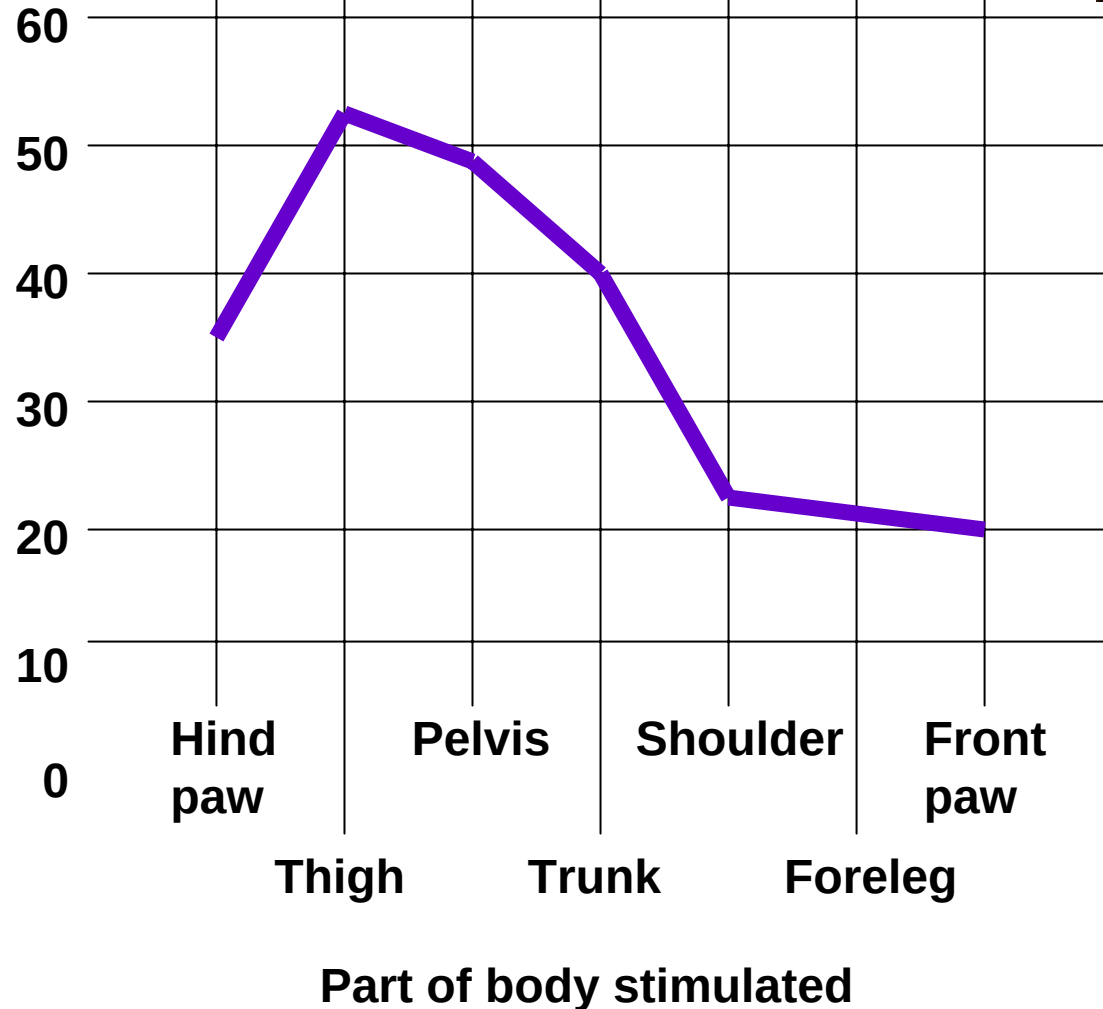


- Discrimination
 - in classical conditioning, the learned ability to distinguish between a CS and other stimuli that do not signal a UCS

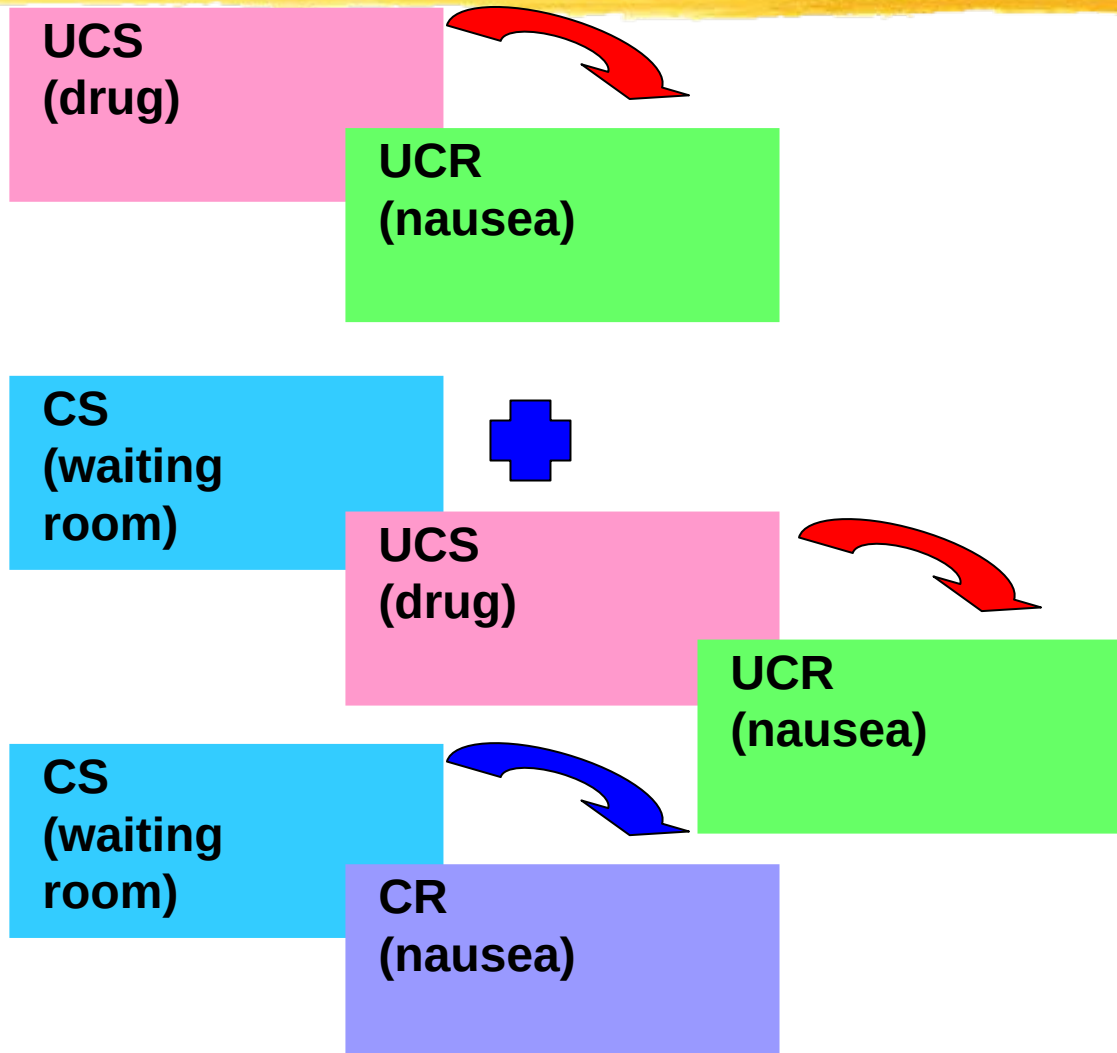
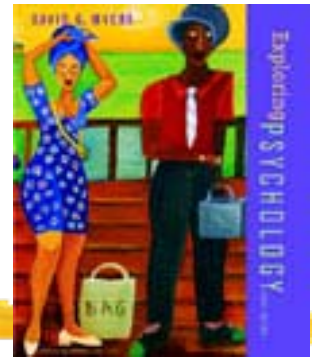
Generalization



Drops of saliva
in 30 seconds



Nausea Conditioning in Cancer Patients



Classical Conditioning



UCS
(loud noise)



UCR
(fear)

CS
(rat)



UCS
(loud noise)



UCR
(fear)



CS
(rat)



CR
(fear)



Stimulus similar
to rat (such as
rabbit)



Conditioned fear
(generalization)



Operant Conditioning



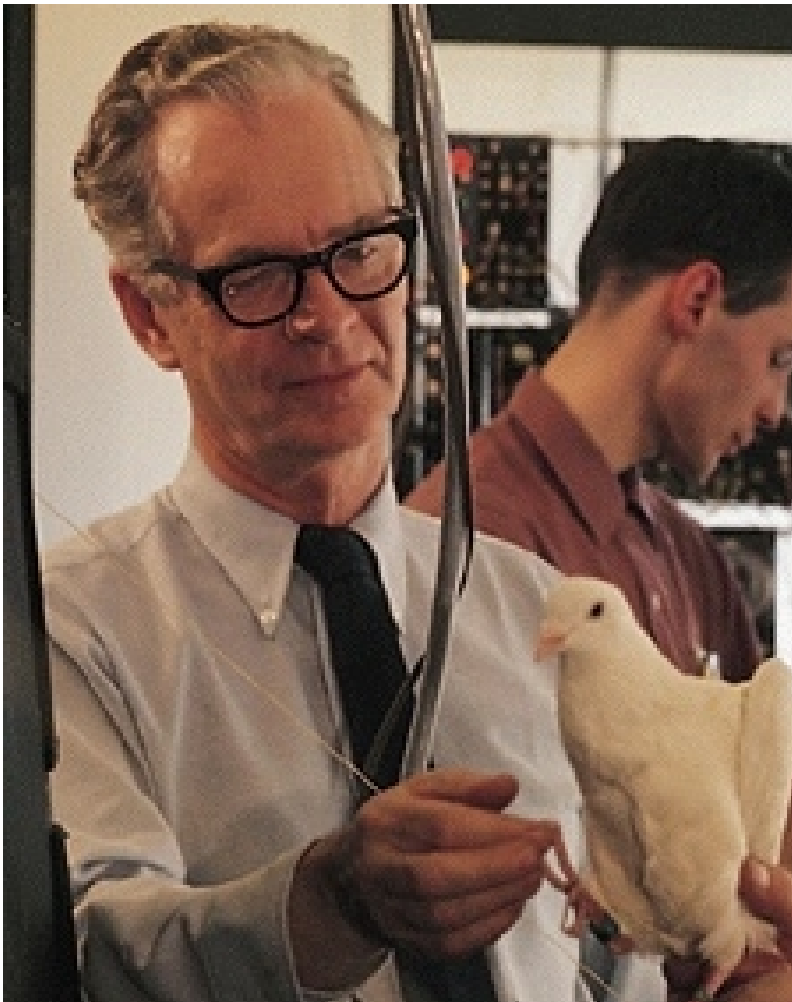
- Operant Conditioning
 - type of learning in which behavior is strengthened if followed by reinforcement or diminished if followed by punishment
- Law of Effect
 - Thorndike's principle that behaviors followed by favorable consequences become more likely, and behaviors followed by unfavorable consequences become less likely

Operant Conditioning



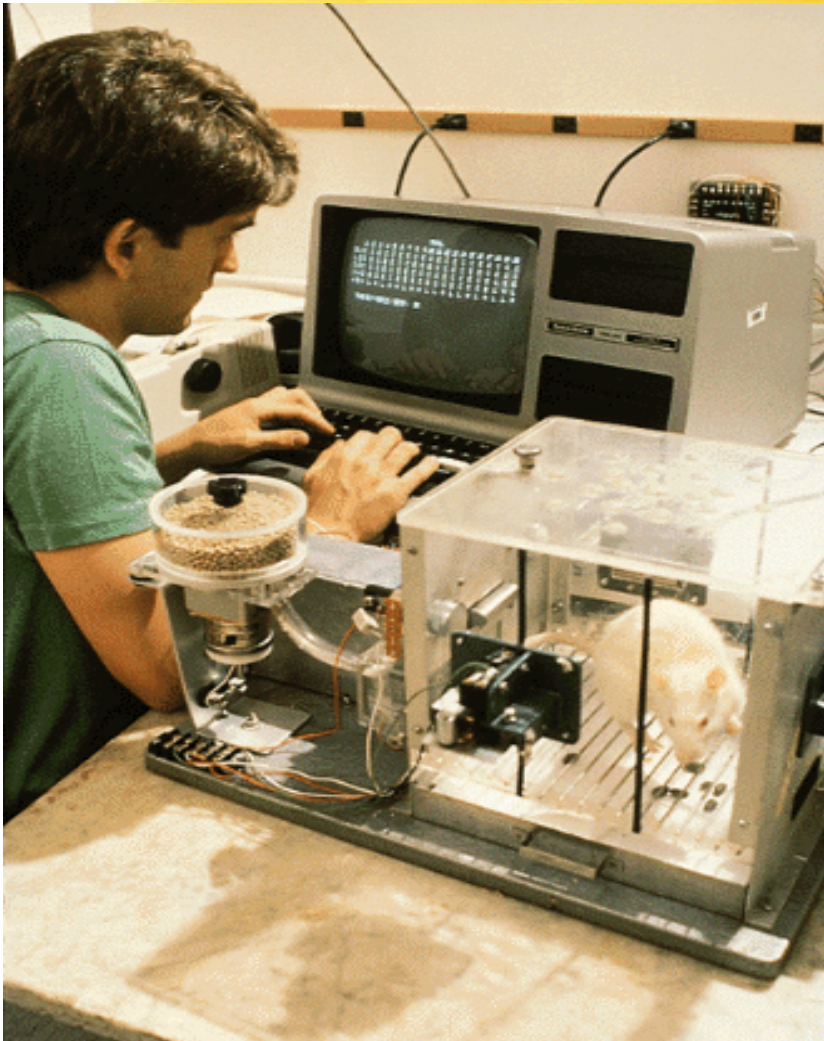
- Operant Behavior
 - operates (acts) on environment
 - produces consequences
- Respondent Behavior
 - occurs as an automatic response to stimulus
 - behavior learned through classical conditioning

Operant Conditioning



- 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

Operant Conditioning



- Reinforcer
 - any event that strengthens the behavior it follows
- Shaping
 - operant conditioning procedure in which reinforcers guide behavior toward closer approximations of a desired goal

Operant Conditioning



WAYS TO INCREASE BEHAVIOR

Operant Conditioning Term

Description

Example

Positive
reinforce-
ment

Add a
positive
stimulus

a hug,
TV on

Negative
reinforce-
ment

Remove an
aversive
stimulus

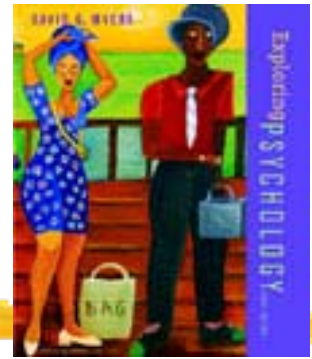
seat belt
turns
off
buzzer

Principles of Reinforcement



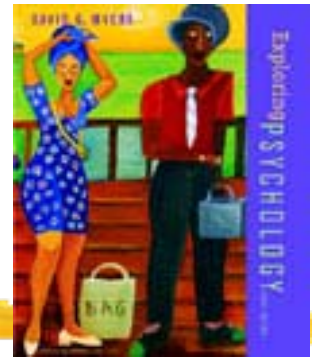
- Primary Reinforcer
 - innately reinforcing stimulus
 - i.e., satisfies a biological need
- Conditioned Reinforcer
 - stimulus that gains its reinforcing power through its association with primary reinforcer
 - secondary reinforcer

Schedules of Reinforcement



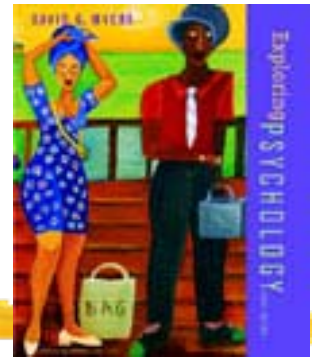
- Continuous Reinforcement
 - reinforcing the desired response each time it occurs
- Partial (Intermittent) Reinforcement
 - reinforcing a response only part of the time
 - results in slower acquisition
 - greater resistance to extinction

Schedules of Reinforcement



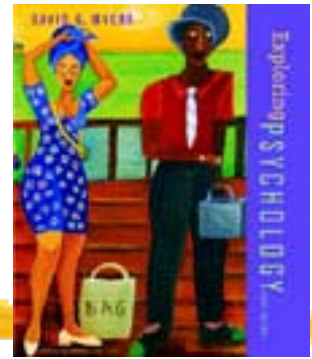
- Fixed Ratio (FR)
 - reinforces a response only after a specified number of responses
 - faster you respond the more rewards you get
 - different ratios
 - very high rate of responding
 - like piecework pay

Schedules of Reinforcement



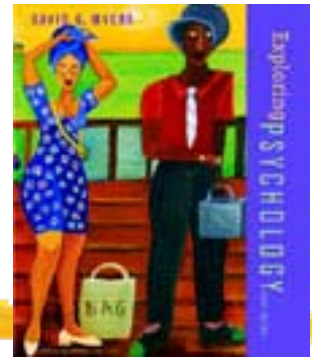
- Variable Ratio (VR)
 - reinforces a response after an unpredictable number of responses
 - average ratios
 - like gambling, fishing
 - very hard to extinguish because of unpredictability

Schedules of Reinforcement



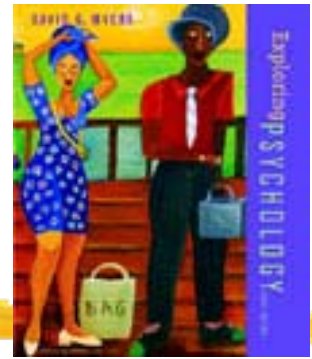
- Fixed Interval (FI)
 - reinforces a response only after a specified time has elapsed
 - response occurs more frequently as the anticipated time for reward draws near

Schedules of Reinforcement

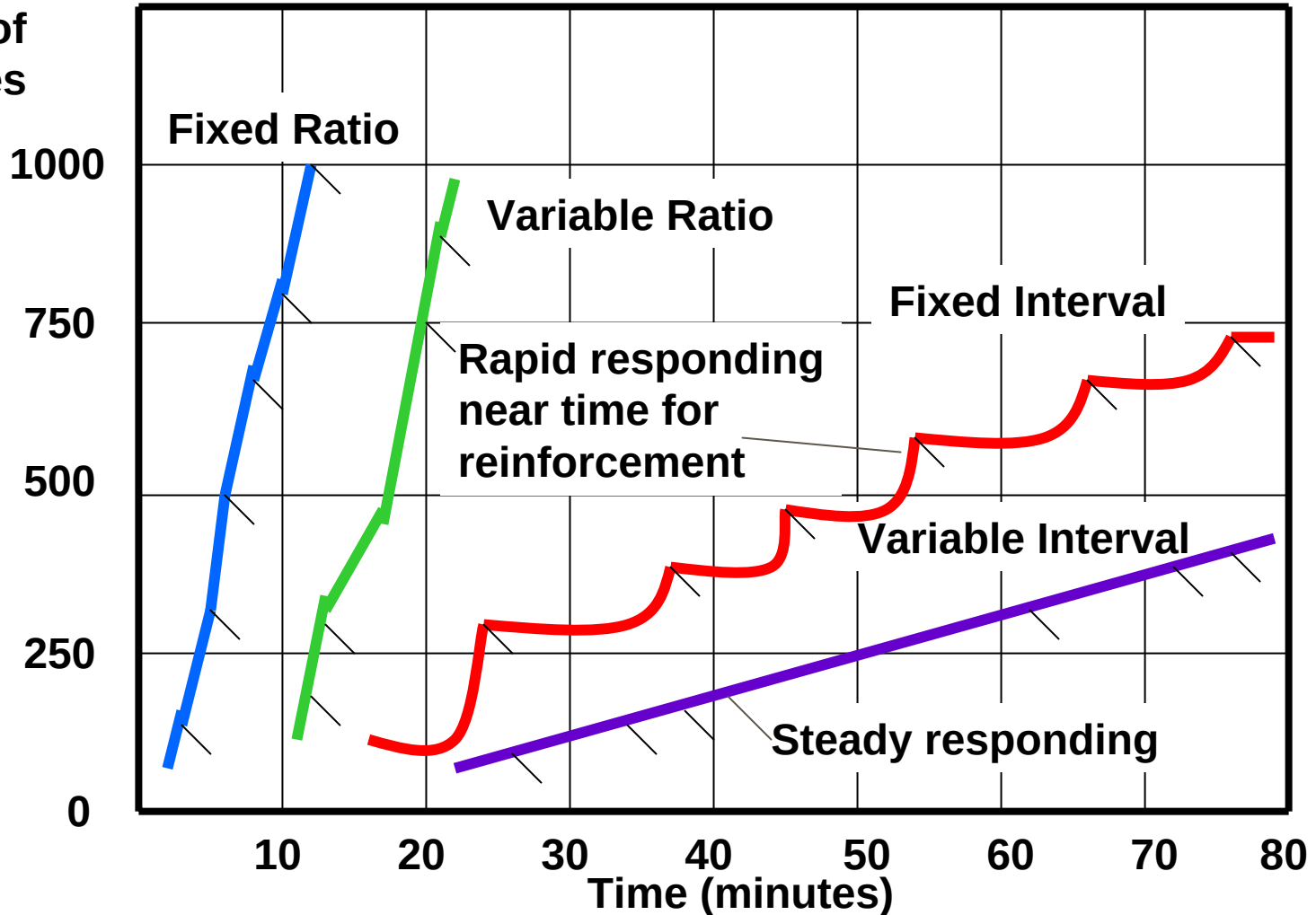


- Variable Interval (VI)
 - reinforces a response at unpredictable time intervals
 - produces slow steady responding
 - like pop quiz

Schedules of Reinforcement



Number of
responses



Punishment



- Punishment
 - aversive event that decreases the behavior that it follows
 - powerful controller of unwanted behavior

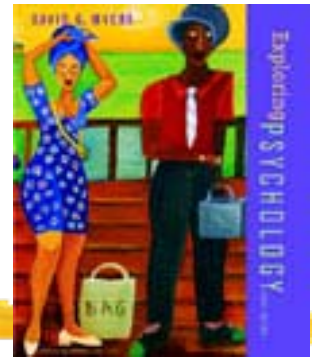
Punishment



TYPES OF PUNISHERS

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

Cognition and Operant Conditioning



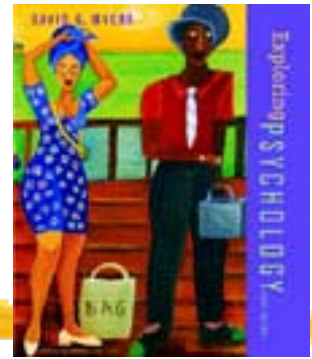
- Cognitive Map

- mental representation of the layout of one's environment
- Example: after exploring a maze, rats act as if they have learned a cognitive map of it

- Latent Learning

- learning that occurs, but is not apparent until there is an incentive to demonstrate it

Cognition and Operant Conditioning



- 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

Operant vs. Classical Conditioning



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



- Observational Learning
 - learning by observing others
- Modeling
 - process of observing and imitating a specific behavior

Observational Learning

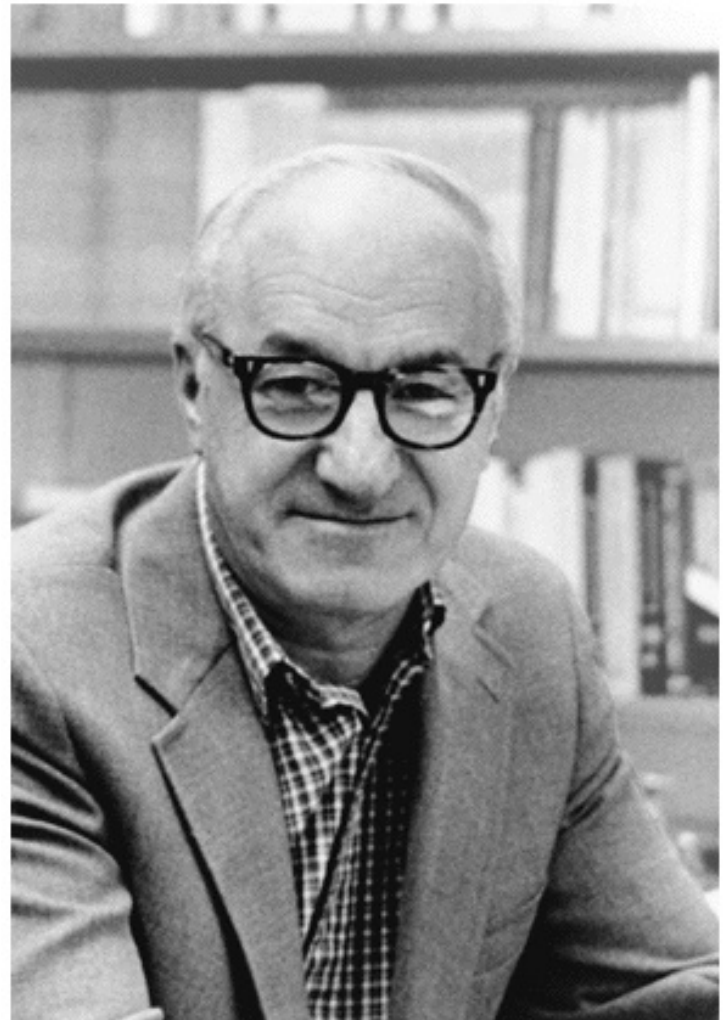


- Mirror Neurons
 - frontal lobe neurons that fire when performing certain actions or when observing another doing so
 - may enable imitation, language learning, and empathy

Observational Learning



- Alfred Bandura's Experiments
 - Bobo doll
 - we look and we learn



Observational Learning

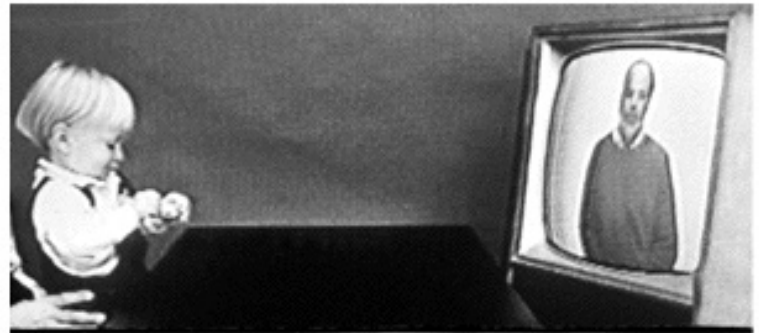


- Prosocial Behavior
 - positive, constructive, helpful behavior
 - opposite of antisocial behavior

Observational Learning



- This 14-month-old boy is imitating behavior he has seen on TV



Television and Observational Learning

