

Learning 3

Instrumental Learning Neural Basis of Learning

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Identify which of the following activities is NOT one to which operant conditioning can be usefully applied.

- A. Training animals
- B. Treatment of autism
- C. Computer game design
- D. Child rearing
- E. A-D are ALL possible applications of operant conditioning

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Shaping

- **Shaping** The process of eliciting a desired response by rewarding behaviors that are increasingly similar to that response.
- Example: [Video showing shaping of a dog](#)

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The trainer in the video repeatedly said "yes" to the dog. What role does this play?

- A. Probably no role, dogs don't understand language
- B. Primary reinforcer
- C. Conditioned reinforcer

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Reinforcement

Reinforcement: a consequence that causes the "learner" to produce a behavior (operant) with greater frequency

- **Positive Reinforcement**
consequence *increases* what the learner wants
 - Allowance contingent on completing weekly chores
 - "A" on a well written paper
 - A wife gives her husband a kiss for doing something thoughtful
- **Negative Reinforcement**
consequence *reduces* what the learner does *not* want
 - Roommate cleans kitchen to stop being nagged about it
 - Using seatbelt to stop the "dinging" noise in your car
 - Parent starts using timeouts to control unwanted behaviors

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Contrasting Positive and Negative Reinforcement

- Scenario Parent and Child in Grocery store.
 - Child asks for a candy bar and parent says "no".
 - Child begins to have a tantrum: Screaming and kicking.
 - Everyone else in the lines looks disapprovingly at the Parent.
 - Parent gives in and buys the kid a candy bar.
 - Kid stops screaming.
 - Other people stop looking and go back to their business.
- Identify two instances of reinforcement in this scenario

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Punishments

Punishment: a consequence that causes the "learner" to reduce the target behavior (operant)

- **Positive Punishment**
consequence that is *more* of something the learner does *not* want
 - Speeding driver receives a ticket from the police
 - When student's phone rings in class, the teacher does a dance
 - Bitter tasting chemical used to stop biting nails
- **Negative Punishment**
consequence that is *less* of something the learner wants
 - Owner turns back after the eager dog jumps up on him
 - Time outs for bad behavior
 - Points taken off for a late assignment
 - Losing license after a DUI

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Summary: Types of Instrumental Conditioning

T teacher
(Experimenter/Parent)

Two types of Goal
for the L learner
(Child/Animal)

T has two ways to bring about the goal for L's behavior

Positive

Negative

T wants L to produce
operant **MORE** often
Reinforcement

T Provides/Increases
a consequence L
desires

T Removes/Decreases
a consequence L finds
aversive

T wants L to produce
operant **LESS** often
Punishment

T Provides/Increases
a consequence L finds
aversive

T Removes/Decreases
a consequence L
desires

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Which of the following is an example of *Negative Reinforcement*?

- A. The police issuing tickets to speeders.
- B. The use of seatbelt alarms to get drivers and passengers in a car to buckle their seat belts.
- C. A wife giving her husband a kiss for doing a chore without being asked.
- D. A dog owner turning away after the dog has jumped up on her.

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Operant Conditioning can make Responses More Immune to Stress

- Pilots practicing in flight simulators
- Schools and offices practice fire drills
- Goal: Strengthen appropriate response
 - So if the trained-for, stressful situation occurs,
 - even though frightened,
 - we are more likely to successfully complete the steps that have been conditioned
- What is the reinforcement?

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Using Operant Conditioning to Treat Autism: Applied Behavior Analysis

- Basic life skills are broken down and isolated into thousands of drills
 - Shaping
- Trained therapists work with patients up to 40 hours a week to instill these skills using rewards (and sometimes) punishments
- Before 1987, autism was considered a lifelong sentence of isolation
- Treatment is truly successful for less than half of children with severe autism
- ABA treatment for autism has become big business in CA
 - Over 75 companies offering ABA therapy
 - They took about \$200 million dollars a year (most paid by the state)
 - ABA costs \$50,000 or more per year for a single child

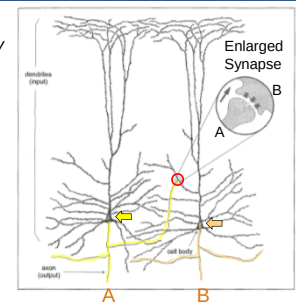
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Neural Basis of Learning

- All learning happens because of *synaptic plasticity*
- Information flows across the synaptic interface in one direction
 - From the axon of the presynaptic neuron
 - To the dendrite of the postsynaptic neuron
 - Presynaptic neuron releases a neurotransmitter detected by a receptor in the postsynaptic neuron



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Neural Messaging

- Two synapse types
 - Excitatory synapse: activity *increases* the probability that the postsynaptic neuron will respond
 - Inhibitory synapse: activity *decreases* the probability that the postsynaptic neuron will respond
- The behavior of a neuron is determined by the net sum of what thousands of presynaptic neurons are encouraging it to do through its synapses.

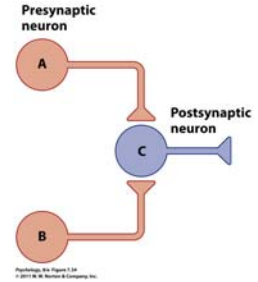
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Synaptic Plasticity

- Synapses can become stronger or weaker with experience
 - Primary mechanism: *Long-term potentiation*
 - *Hebb's rule*: the synaptic strength between two neurons increases when they are active at roughly the same time



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How does Hebb's Rule Happen?

- NMDA receptor
 - Molecule found in synapses
 - Detects when the presynaptic and postsynaptic neurons are both active
- It works as a "gate"
 - Opening this gate starts a chain of biochemical events that leads to long-term potentiation (LTP) of the synapse

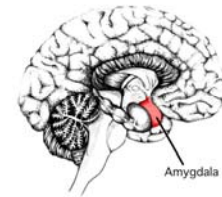
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Neural Basis of Fear

- Amygdala
 - Plays central role in fear conditioning
- Rats, before conditioning
 - Do not freeze in response to an auditory tone
 - There is little or no response in cells of the amygdala
- After auditory fear conditioning
 - Freezing behavior
 - Amygdala activity



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Looking Ahead

- Learning Chapter Test Wednesday
- For Monday
 - No new assignment
 - Go over Review Questions
 - Bring ones that are problems to Discussion
- Coffee at Phoenix Grill?



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