Learning Processes: Operant Conditioning

Dr. K. A. Korb
University of Jos

Learning Goals

- Principles of operant conditioning
  - Explain examples of Positive Reinforcement, Negative Reinforcement, Positive Punishment, and Negative Punishment
  - Explain reinforcement schedules
- Applications of operant conditioning

Operant Conditioning: B.F. Skinner

Law of effect: Voluntary responses followed by positive outcomes are repeated while those followed by negative outcomes are not

Operant Conditioning: Learn to behave in ways that result in reinforcement
Operant Conditioning

- **Reinforcement**: Increase likelihood of a behavior
  - Positive Reinforcement: Strengthens behavior by presenting a pleasant stimulus
  - Negative Reinforcement: Strengthens behavior by removing an unpleasant stimulus
- **Punishment**: Decrease likelihood of behavior
  - Positive Punishment: Weakens behavior through presentation of unpleasant stimulus
  - Negative Punishment: Weakens behavior through removing a pleasant stimulus

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Operant Conditioning

- **Positive Reinforcement**: Give a sweet to answer a question in class
- **Negative Reinforcement**: Allow a student who earned an A to have a free assignment
- **Positive Punishment**: Children who are late to class have to do frog jumps
- **Negative Punishment**: Remove points for students who cheat

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Operant Conditioning

<table>
<thead>
<tr>
<th>Outcome (Stimulus)</th>
<th>Behavior (Response)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive: Removal</td>
<td>Positive Reinforcement</td>
</tr>
<tr>
<td>Negative: Presentation</td>
<td>Negative Reinforcement</td>
</tr>
</tbody>
</table>

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Operant Conditioning

- Examine the behavior:
  - Will the behavior continue? → Reinforcement
  - Will the behavior stop? → Punishment
- Examine how the environment influences behavior:
  - Does the environment give something? → Positive
  - Does the environment take something away? → Negative
### Operant Conditioning

<table>
<thead>
<tr>
<th>Response</th>
<th>Stimulus</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td>Good grade</td>
<td>Positive Reinforcement</td>
</tr>
<tr>
<td>Homework</td>
<td>Not sweep compound</td>
<td>Negative Reinforcement</td>
</tr>
<tr>
<td>Disrespect Teacher</td>
<td>Sent to headmaster</td>
<td>Positive Punishment</td>
</tr>
<tr>
<td>Cheat on homework</td>
<td>No break-time</td>
<td>Negative Punishment</td>
</tr>
</tbody>
</table>

### Classical Conditioning

- **Involuntary Responses**
- A conditioned stimulus becomes associated with an unconditioned stimulus that results in a conditioned response

- **Operant Conditioning**
- **Voluntary Responses**
- A behavior (response) is followed by a reinforcer or punishment (stimulus) that influences future behavior
Operant Conditioning: Maintaining Behavior

- Reinforcement schedules
  - **Continuous**: Reinforced after every behavior
  - **Fixed Interval**: Reinforced after fixed interval of time
  - **Variable Interval**: Reinforced after average amount of time
  - **Fixed Ratio**: Reinforced after fixed number of responses
  - **Variable Ratio**: Reinforced after average number of responses

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Operant Conditioning: Maintaining Behavior

- Reinforcing Statistics Learning
  - **Fixed Interval**: Test every 3 weeks
  - **Variable Interval**: Test about every 3 weeks
  - **Fixed Ratio**: Reward after every 10 correct problems
  - **Variable Ratio**: Reward after about every 10 correct problems
Applications of Operant Conditioning

- **Shaping**: Procedure in which reinforcements are used to gradually guide an animal or person toward a specific behavior
  - Reward smaller behaviors that lead to a final behavior

- **Military Psychology**: Shaping is used to train animals for dangerous military missions
- **Clinical Psychology**: Reinforcement is used to change undesired behaviors or add more desired behaviors
- **Educational Psychology**: Teaching machine uses a computer that to reinforce learning through feedback
  - Token reinforcement system is used to help students earn rewards for positive behavior

Applications of Operant Conditioning

- **Applied Behavioral Analysis**
  - Collect baseline data on behavior
  - Set behavioral goals
  - Select procedures for changing behavior
    - Reinforced desired behavior
    - Remove reinforcement for unwanted behavior
  - Implement procedures and record results
  - Evaluate progress and revise as necessary

Example of Applied Behavioral Analysis

- **Class Attendance in a Boarding Secondary School**
  - **Baseline Data**: Students attend 50% of classes
  - **Goal**: Students attend 90% of classes
  - **Procedure**: Students will receive a coupon for skipping their assigned duty one day for every 20 classes they attend
  - **Record Results**
  - **Evaluate progress**: Great improvement in attendance
Educational Implications

Punishment

- When strong, immediate, and consistent, punishment stops unwanted behaviors
- HOWEVER:
  - Behavior is restrained, but not necessarily extinguished (completely stopped).
  - Does not replace unwanted behaviors with more positive behaviors
  - Stimuli thought to be punishing may turn out to be rewarding
  - Severe punishment can cause fear, anger, and frustration resulting in retaliation or withdrawal

Operant Conditioning in Behavior Modification

- Strengths
  - Effective for short-term behavior modification
  - Straight-forward and easy to implement
- Criticisms
  - Does not address cognitive processes
  - Behavior ends when reinforcement/punishment ends
  - Can hurt intrinsic motivation (interest and enjoyment in activity)