

Interaction of Classical and Operant Conditioning



EXP 4404

What Reinforces Responses in the 2-Way Shuttle Task?

- ⊞ Escape behavior is clearly reinforced by the termination of shock
 - ◆ *negative reinforcement (shock termination)*
- ⊞ Once the avoidance response is learned, no shock is delivered
 - ◆ *negative reinforcement does not occur because the shock is never turned on*

Phenomena that Suggest a Relation between Classical and Operant Conditioning

- ⊞ Avoidance Learning
- ⊞ Instinctive Drift
- ⊞ Observing Responses
- ⊞ Autoshaping
- ⊞ Sign Tracking

Mowrer's Two-Factor Theory of Avoidance

- ⊞ Classically conditioned fear responses to stimuli in the avoidance training situation
 - ◆ *CS - turning off the light*
 - ◆ *US - delivery of shock -- UR - fear & pain*
 - ◆ *CR - fear associated with the shock*
- ⊞ Instrumental conditioning of the avoidance response
 - ◆ *initial training consists of escape training (from shock)*
 - ◆ *later training consists of escape training (from conditioned fear associated with training stimuli)*
 - *Why doesn't the fear response (and avoidance) extinguish?*

Avoidance Learning

- ⊞ Two-Way Shuttle
 - ◆ *Overhead light is turned off*
 - ◆ *10 sec delay*
 - ◆ *shock is delivered to darkened compartment after 10 sec*
 - *leap to lighted compartment after shock is turned on will allow the dog to escape the shock*
 - *leap to lighted compartment during the 10 sec delay will allow the dog to avoid the shock*
- ⊞ What reinforces the avoidance behavior?

Relevant Evidence for Two-Factor Theory

- ⊞ Faster acquisition of avoidance when the response terminates *both* the shock and the signal (CS)
- ⊞ Classically conditioning fear of a tone (apart from the avoidance training) will enhance avoidance response when the tone is added to the avoidance procedure
- ⊞ Classically conditioned safety signals (CSs that are never paired with shock) inhibit avoidance behavior

Sidman Avoidance

- ⊗ No external signal is given to indicate that shock will be delivered
- ⊗ Animal must make a response every 30 sec to avoid shock
- ⊗ Passage of time acts as only signal for impending shock
 - ♦ *some evidence that animals have an appreciation for the passage of time*

Observing Responses

Wyckoff

- ⊗ Operant Conditioning on a Mixed Schedule with a White Illuminated Key Light
 - ♦ *half of the trials: 2 sec of FI 30 sec*
 - ♦ *half of the trials: 2 sec of EXT*

Herrnstein & Hineline (1966) Experiment

- ⊗ Like Sidman avoidance, no external signal is given to indicate that shock is imminent
- ⊗ Unlike Sidman avoidance, animals are *unable* to completely escape or avoid shock
 - ♦ *Mixed (unsignalled) schedule*
 - ♦ *2 sec interval where $p(\text{shock}) = .3$ if no response is made*
 - ♦ *2 sec interval where $p(\text{shock}) = .1$ if a response is made*
- ⊗ What is the reinforcer?
 - ♦ *Reduction in the rate of shock delivery*
 - ♦ *Rats learn avoidance under these conditions, but how?*
 - ♦ *Need internal representations of relative shock rates*

Introduce a Treadle Apparatus to the Response Chamber

- ⊗ No Information Condition: press on treadle changes the key light to either red or green
 - *Red Key Light : Mixed 2 sec FI 30 sec 2 sec EXT*
 - *Green Key Light : Mixed 2 sec FI 30 sec 2 sec EXT*
 - ♦ *Same schedule for both the Red and the Green lights*
- ⊗ Information Condition: press on treadle changes the key light to either red or green
 - *Red Key Light : 2 sec FI 30 sec*
 - *Green Key Light : 2 sec EXT*
 - ♦ *Color change in key light gives information about which schedule is in operation*

Animal Misbehavior Breland & Breland (1961)

- ⊗ Instinctive Drift
 - ♦ *Intrusion of species-specific behaviors that overwhelms the trained operant responses*
- ⊗ Tokens given as secondary reinforcers also act as discriminative stimuli that signal the operation of a given response-reinforcement contingency
- ⊗ Tokens also elicit species-specific food related behavior (e.g., foraging behavior)

Understanding Observing Responses

- ⊗ Related to foraging in the real world
 - ♦ *animals need to learn about signals that tell them when food is more or less likely to be available*
- ⊗ Information Theory Explanations
 - ♦ *color change reduces uncertainty about which schedule is in effect*
 - ♦ *assumes that uncertainty is aversive*
 - ♦ *so reduction in uncertainty will be negatively reinforcing*
- ⊗ Signals that indicate short versus long delays
 - ♦ *short delay signals will be reinforcing*
 - ♦ *long delay signals (or EXT signals) are not reinforcing*

Autoshaping

- ↻ Rapid alternative to shaping procedures to create an operant response
- ↻ Procedures look like classical conditioning procedures except that the response is a voluntary behavior such as pecking a key
- ↻ Form of the response resembles species-typical feeding responses
 - ◆ *sharp pecks when light is paired with food*
 - ◆ *pressing responses when light is paired with water*
- ↻ Behavior persists even if a response leads to omission of the food/water

Sign Tracking

- ↻ Modification of Autoshaping
- ↻ Key light is now located at a distance from the food hopper
 - ◆ *longer distance makes it more difficult for the bird to get from the key light to the food hopper before the hopper closes (preventing access to the food)*
 - ◆ *responses made to the key light now result in loss of the food*
 - *not all animals show this sign tracking behavior & those that do not show it all the time*

Relation between Classical and Operant Conditioning

- ↻ Difficult to separate Classical and Operant Conditioning
- ↻ Each paradigm includes elements of the other
- ↻ Pavlov's work on salivation
 - ◆ *if dry meat powder in the mouth is aversive, salivation can be thought of as an operant response that is negatively reinforced*
- ↻ autoshaping
 - ◆ *suggests that voluntary behaviors can be acquired through classical conditioning procedures*