

Operant Conditioning Instrumental Learning



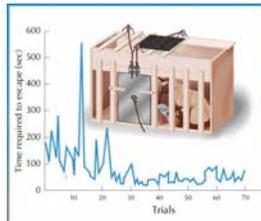
- Procedure by which the frequency of an existing behavior is changed or a new behavior is acquired as a result of the occurrence of events made contingent on the behavior
- Consequence that follows response influences how animal will behave in the future
 - Operant – behavior operates on environment
 - Instrumental – behavior instrumental in producing consequences

Classical & Operant Conditioning

- | | |
|--------------------------------|--------------------------------|
| <i>Classical</i> | <i>Operant</i> |
| • Acquisition | • Acquisition |
| • Extinction | • Extinction |
| • Spontaneous Recovery | • Spontaneous Recovery |
| • Stimulus Generalization | • Stimulus Generalization |
| • Stimulus Associations | • Reinforcement |
| • Based on reflexive behaviors | • Based on voluntary behaviors |

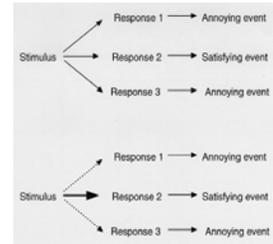
Thorndike

- Puzzle Box
- Trial-and-error learning
 - “Starting then with its store of instinctive impulses, the cat hits upon the successful movement, and gradually associates it with the sense-impression of the interior of the box until the connection is perfect, so that it performs the act as soon as confronted with the sense-impression.” (1911)



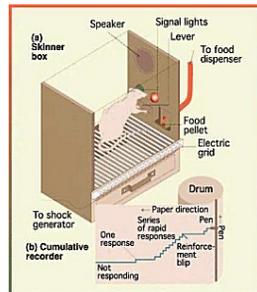
Thorndike's Laws of Learning

- Law of Exercise
 - Use of response strengthens connections to stimuli controlling it; disuse weakens it
- Law of Readiness
 - When an organism is ready to act, it is pleasing to do so and annoying not to do so
- Law of Effect
 - Actions that produce pleasure are likely to be reproduced
 - Actions that produce pain are less likely to be reproduced



Instrumental Learning

- Instrumental Learning
- Reinforcement
- Operant Behaviors
- Skinner Box



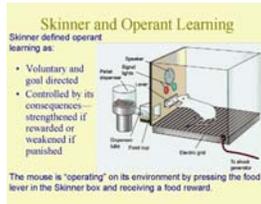
Superstitious Behavior

- Skinner
 - 8 Pigeons
 - Grain presented every 15 minutes
- Results
 - 6 of 8 developed clearly defined behaviors
 - turned in circles
 - bobbed head up and down
 - brushing movements toward floor as if pecking
 - raised head toward one of the corners
 - two swung head side to side
- Other Examples
 - Athletes
 - Gamblers

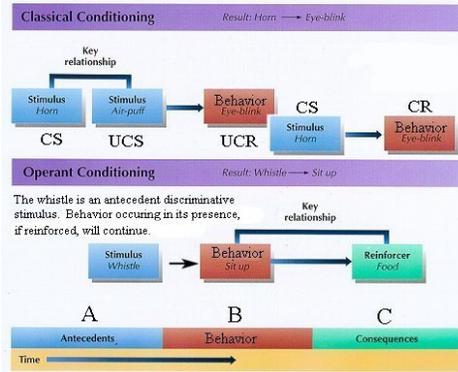


3 Components

- Discriminative Stimulus
- Response
- Events following Response (reinforcer)
- Example
 - Green Light
 - Lever Press
 - Food Pellet



Stimulus and response (behavior) in classical and operant conditioning



Terminology

	Increased Behavior Results	Decreased Behavior Results
Pleasant Stimulus	Added Positive Reinforcement	Subtracted Response Cost
Aversive Stimulus	Subtracted Negative Reinforcement	Added Punishment

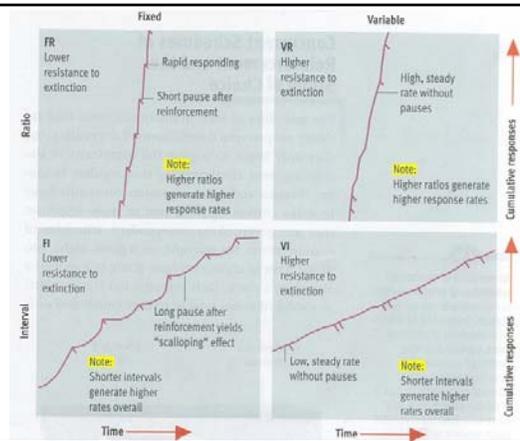
Reinforcement Schedules

- Fixed Ratio
 - Reinforcement occurs after a particular number of responses
 - Every 10 10:1
- Variable Ratio
 - Reinforcement occurs on average after a particular number of responses
 - 3,4,5,3,5,4
- Fixed Interval
 - Reinforcement occurs after a particular amount of time
 - Every 10 minutes
- Variable Interval
 - Reinforcement occurs after a variable amount of time
 - 3 minutes, 5 minutes, 3 minutes, 10 minutes

Real-life Examples



Reinforcement schedules in everyday life. Complex human behaviors are regulated by schedules of reinforcement. Piecework in factories is reinforced on a fixed-ratio schedule. Playing a slot machine is based on variable-ratio reinforcement. Watching the clock at work is rewarded on a fixed-interval basis (the arrival of quitting time is the reinforcer). Surfers waiting for a big wave are rewarded on a variable-interval basis. (Top left, © Julian Cotton/International Stock; top right, © David Falconer/Folio, Inc.; bottom left, © David Woods/The Stock Market; bottom right, © Big Photo/PhotoBank)



Shaping



- Reward animal for closer and closer approximations to the desired behavior
- Main way of training animals to do tricks

Which Events are Reinforcing?

- Primary Reinforcers
- Secondary Reinforcers
- Probability Difference (Premack)

	Eat If-play	Play If-eat
Players	steady	Ate More!
Eaters	Played More!	steady

Contiguity or Contingency?

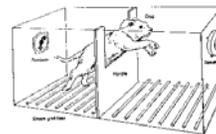
Spot

- Periodically shocked
- Can terminate shock by pressing lever with his nose

Lassie

- Periodically shocked
- Has no control over shocks, but when Spot's shock is terminated, so is Lassie's

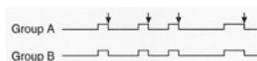
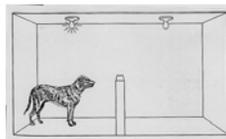
Learned Helplessness



- Animals must learn to jump barrier to avoid shock
- Results
 - Spot learns, Lassie yelps but eventually becomes passive and accepts shocks
- Contingency
 - Spot learns his actions matter
 - Lassie learned that it was helpless
- Contiguity
 - Spot learned to press lever
 - Lassie learned to act passively

Maier (1970)

- Phase 1:
 - Spot learns to stand still to avoid shock
 - Lassie gives up
- Phase 2: jumping barrier stops shock
- Results
 - Spot learns to jump the barrier
 - Lassie remains passive
- Spot learned the contingency between behavior and consequences

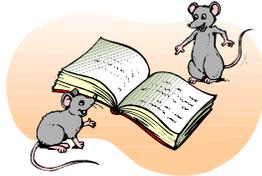


Early Flawed Assumptions

- Equipotentiality
 - All stimuli have equal potential for association with one another
 - Association determined by stimulus pairings
- Universality
 - “Pigeon, rat, monkey, which is which? It doesn't matter.” B.F. Skinner (1961)
- No internal representations
 - Associations learned

Garcia Effect

- Are all stimuli equally associable?
- Radiation vs. Shock on Taste Aversion vs. Tone Aversion
 - Light/sound paired w/
 - Shock
 - X-Rays
 - Sweet water paired w/
 - Shock
 - X-Rays



Garcia & Koelling

Shock		X-Rays	
<i>Saccharine</i>	<i>Light/Sound</i>	<i>Saccharine</i>	<i>Light/Sound</i>
<u>Taste</u>	<u>Pairing</u>	<u>Taste</u>	<u>Pairing</u>
(no effect)	aversion	aversion	(no effect)

Against Universality

- Rats acquire aversion to taste but not sight of food
- Quail acquire aversion to sight but not taste of food



Representations



- “Latent” learning
- Lashley’s flood

Cognitive Maps

- Tolman’s research suggests need for intervening variables
- S [int. var.] R
- Path 1 shortest
- A blocked, take 2
- B blocked, now what?

