Learning Part II

Will press lever for food
Overview

• Habituation

• Classical conditioning

• Instrumental/operant conditioning

• Observational learning
Thorndike and Law of Effect

- Classical Conditioning considers only involuntary reflexes. How are voluntary responses learned?

- Thorndike proposed the Law of Effect
  - If a response (behavior) is not rewarded, it will be weakened
  - If a response (behavior) is rewarded, it will be strengthened
Video: Thorndike’s puzzle box (~2 min.)

(for a copy of this video, see: http://www.youtube.com/watch?v=BDujDOLre-8)
Thorndike’s results: gradual learning

Learning curves demonstrate that learning is gradual and incremental. There is no evidence that the cats have a sudden insight into the problem’s solution.
Instrumental Learning

**FIRST TRIAL**
- R 1 (bite at the bars)
- R 2 (jump up and down)
- R 3 (meow)
- etc.

**Tendency to perform**

**LATER TRIAL**
- R 1 (bite at the bars)
- R 2 (jump up and down)
- R 3 (meow)
- etc.

**Tendency to perform**

- R correct (pull at string) ——— Reward
Operant Conditioning

Skinner developed the operant chamber ("Skinner box") with a bar or key that an animal manipulates to obtain a food or water reinforcer.
Video: examples of operant conditioning (~1 min.)
In Classical Conditioning, a response is **elicited** by the US and CS.

The response is **involuntary** and has no effect on the external environment.

The association is between the CS and US.

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In Operant Conditioning, a response is **emitted**.

The response is **voluntary** and is referred to as an **operant**, behavior that brings about some change in one’s environment.

The association is between the response and the reinforcement.
Video: discrimination in operant conditioning and schedules of reinforcement (~3 min)

http://www.youtube.com/watch?v=I_ctJqjIrHA
Types of Reinforcement Schedules

• **Interval schedules:**
  – **Fixed Interval**: Reinforcer is only available only after some fixed time after the last reward.
  – **Variable Interval**: Same as fixed interval, except that the time between available reinforcers is varied.

• **Ratio schedules:**
  – **Fixed Ratio**: Reinforcer is presented after a fixed number of responses.
  – **Variable Ratio**: The number of responses needed for a reinforcer varies.
What kind of reinforcement schedule?

- Spanking a child if you have to ask him to clean his room three times
- Getting a raise every two years
- Playing a lottery game
- Your boss checks your work periodically but you do not know when she might come in next time

**Fixed ratio**

**Fixed interval**

**Variable ratio**

**Variable interval**
Shaping: A desired behavior, even if complex, can be obtained with an operant training method known as successive approximations.
Explaining Superstitious Behavior

• In one experiment, Skinner (1948) delivered food every 15 seconds to pigeons in a Skinner box
  – Result: some birds engaged in odd idiosyncratic behavior, pecking aimlessly in a corner or walking in circles
  – Pigeons might have learned an accidental correlation – they just accidentally associated a random behavior to the delivery of food

• Could this explain superstitious behavior in humans?
Contingency in Operant Conditioning

Reward only appears to work if the animal has some **apparent control** over when the reward is delivered.

[Why are slot machines effective if people do not have much control over reward?]
Contingency and learned helplessness

If a dog is first given shocks that it cannot control, it will take no action to escape shocks presented in a new situation where escape is possible. The phenomenon has been described as *learned helplessness*.

(Seligman, 1975)
What make reinforcers?

• Primary reinforcers
  – meet primary needs: food, water, warmth

• Secondary reinforcers
  – money, tokens, grades

• Social reinforcers
  – Hugs, smiles, words of approval, even attention
  – Chimpanzees, in studies like that of Butler (1954) will press a bar to get a glimpse of the experimenter.

• Sometimes, there appears to be no reinforcer and behavior might be driven by intrinsic motivation
Video: an example of learned behavior -- temper tantrums (~1.5 min.)

http://www.youtube.com/watch?v=KpSfThUv_pc
Problems for Behaviorist Theories

• Learning without reinforcement
  – mental representation

• Biological predispositions
  – one-trial learning
  – limitations on stimulus-response associations

• Observational learning
Edward C. Tolman
1886-1959
Cognitive Behaviorist

Findings imply that the rats learned a cognitive map of the maze without any external reward: latent learning.
More evidence for cognitive maps

Rats quickly mastered task (A)

Rats were placed in new maze (B) where main straightway was blocked. Amazingly, they don’t choose 9 or 10 (a generalization strategy) but 5, which is in the direction where the food was previously.

(A) Train

(B) Test

FOOD

START

START
Biological Predispositions

• Do the laws of learning of classical and operant conditioning really apply *equally well to all types of animals and all types of stimuli*?

• Species specific learning:
  – Birds easily associate illness with visual cues (e.g., color of food), but not with taste
  – Rats easily associate illness with taste, but not with visual cues
Specificity of Taste Aversion  
(Garcia & Koelling, 1966)
Implications

• The behaviorists held that general laws of learning shape the behavior of all animals, regardless of a particular creature's evolutionary history or biological makeup

• Garcia's findings suggest that animals are "biased learning machines" designed by evolutionary forces to forge meaningful links between some stimuli but not others
Observational Learning

• Many animals can learn simply by example, without direct reinforcement
  • vicarious conditioning
  • imitation

• Observation learning can occur after one exposure

• Imitation can be a source of undesired behaviors (Bobo Doll experiment) as well as a source of new skills.
Video: Bobo Doll Experiment
(Bandura, 1969; ~2 min)

See also this article:

For a similar video see: http://www.youtube.com/watch?v=hHHdovKHDNU&feature=related
Negative observational learning

• Evidence that exposure to media violence is associated with aggressive behavior in children
  – Challenge is to distinguish between correlation and causation