The Psychology of Learning, 2
Psychologists discover how to reliably elicit changes in behavior through experience

- Classical conditioning
  - Pavlov
- Operant conditioning
  - Law of Effect: Thorndike
  - Power of a stimulus to evoke a response is strengthened when the response is followed by a reward and weakened when it is not followed by a re
Psychologists discover how to reliably elicit changes in behavior through experience

- Classical conditioning
  - Pavlov

- Operant conditioning
  - Law of Effect: Thorndike
  - Skinner: Methods of operant conditioning
Operant conditioning
Contiguity and frequency in operant conditioning

• Behavior (response) precedes reward: Contiguity
  – Dog whops cupboard door
  – Gets treat

• Happens often: Frequency

• Learning occurs
  – Dog ruins cupboard door with repeated whopping
Partial and Full Reinforcement

• Law, psychology, and Wilbur the English Bulldog
  – Psychologist: Intermittent reinforcement yields stronger learning
  – Lawyer: but it’s a CONTRACT!
    • 100% reinforcement is better
  – Who’s right?
Partial Reinforcement Effect

- Responses acquired under intermittent reinforcement are more difficult to extinguish than those acquired with continuous reinforcement.
Are contiguity and frequency all that matter?

• Contiguity and frequency: The original laws of association
  – A+B yields association
  – A+B, A+B, A+B, A+B ..... strengthen association

• Contiguity and frequency instantiated in procedures of operant and classical conditioning
  – CS + US
    • CS + US, CS + US, CS + US, CS + US.....
  – Response + Reinforcement
    • Rsp + Rf, Rsp + Rf, Rsp + Rf, Rsp + Rf, Rsp + Rf.....
Are contiguity and frequency all that matter?

• No

• The role of contingency in learning
  – One event predicts another with greater than chance probability
Contingency in classical conditioning

• Training: tones, then shocks
  – Group 1: Random pairing
Contingency in classical conditioning

- Training: tones, then shocks
  - Group 1: Random pairing
Contingency in classical conditioning

• Training: tones, then shocks
  – Group 1: Random pairing
  – Group 2: Contingent pairing
Contingency in classical conditioning

- Training: tones, then shocks
  - Group 1: Random pairing
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Contingency in classical conditioning

• Training: tones, then shocks
  – Group 1: Random pairing
  – Group 2: Contingent pairing
• Testing: tones then shocks in shuttle box
Results

The graph shows the mean number of responses per 5-second period for two conditions: CS has predictive power and CS has no predictive power. The x-axis represents successive 5-second periods, with pre-CS and post-CS periods indicated by arrows. The y-axis represents the mean number of responses per 5-second period, ranging from 0 to 1.4. The red line indicates the condition where the CS has predictive power, showing a significant increase in response during the post-CS period. The blue line indicates the condition where the CS has no predictive power, showing a more stable response pattern without a significant increase in the post-CS period.
Contiguity and frequency alone are not enough

• For classical conditioning, conditioned stimulus must reliably predict the unconditioned stimulus

• For operant conditioning, behavior must reliably predict the reward (the reinforcement)
When contingency is present

- When I do this, that happens…
- When I don’t do this, nothing happens
- Happy babies in control!
When behavior and consequences are not contingent

• Whatever I do has nothing to do with that...

• Unhappy babies without control
• There is joy in mastery
• Without mastery, there is despair