Instrumental Conditioning: Theoretical Issues

EXP 4404

Explanations based on Stimulus Characteristics

- Hull's Drive Reduction Theory
  - *Drive*
    - *motivational state created by a biological deprivation*
    - *food deprivation Y hunger drive*
  - *Primary reinforcers reduce drive state because these stimuli reduce the biological deprivation*
    - *food makes an animal less hungry*
- Problems
  - *some stimuli are reinforcing without reducing biological need states*
    - *saccharine, access to visual stimulation*

Nature of Reinforcement

- Primary Reinforcers
  - *operates like an unconditioned stimulus*
  - *food, water, sexual stimulation, etc.*
- Secondary Reinforcers / Conditioned Reinforcers
  - *events that acquire their reinforcing qualities through classical conditioning*
  - *money, tokens, praise, saccharine*

Explanations based on Stimulus Characteristics

- Optimal Arousal Theory
  - *proposes an ideal baseline for arousal*
  - *e.g., an optimal level of food intake, water intake, etc.*
- Events are reinforcing if they move the organism in the direction of the optimal level
  - *food is reinforcing if animal is food-deprived*
  - *but food will not be reinforcing (and might be punishing) if it moves the animal to a level of food intake that exceeds the baseline level*

Why are events reinforcing?

- Explanations based on stimulus characteristics
- Explanations based on response characteristics
- What is reinforcing?
  - *Food? (stimulus characteristics)*
  - *Eating food? (response characteristics)*

Response-Based Explanations

- Reinforcement occurs because an event allows the organism to make a reinforcing response
  - *food enables the animal to engage in eating behavior*
  - *the size of the consummatory response determines the magnitude of reinforcement associated with the event*
- Premack Principle
- Response Disequilibrium Hypothesis

Premack Principle

- Any response can serve as a reinforcer
  - *response does not have to be consummatory*
  - *preferred responses will serve as reinforcers for less preferred responses*
- Pinball/Candy Experiment
  - *observed frequency of pinball playing and candy eating for a group of children*
  - *children who spent more time eating candy would play more pinball to gain access to candy*
  - *children who preferred to play pinball would eat more candy to gain access to pinball*

Response Disequilibrium

Conditions for reinforcement are defined by the following conditions:

- Target Response is the behavior we want to increase
- Contingent Response is the behavior we use as a reinforcer
  - *RT/RC is the ratio of Target Response frequency to Contingent Response frequency demanded by the situation*
  - *BT/BC is the ratio of the Target Response to the Reinforcer (Contingent) during baseline*
- Reinforcement will occur whenever RT/RC > BT/BC

Burger King Experiment

Welsh, Bernstein, & Luthans (1992)

- determined criteria for good job performance at each BK workstation
- each employee identified his/her favorite workstation
- recorded baseline level of performance at each station for each employee
- employees were allowed to work at their favorite workstation if their performance at another station exceeded their baseline performance
  - *as in Premack's study, employees increased performance to gain access to the preferred activity*

What Role is Played by Reinforcement?

- Are reinforcers the mechanism required for learning an association between a particular stimulus and performing a particular response?
  - *Do reinforcers "stamp in" S-R associations?*
- Does the reinforcer simply motivate an organism to perform behaviors that are learned through other mechanisms?
- Is the reinforcer a part of what is learned?
  - *Learning is an association of S-R-Rf*

Response-Disequilibrium Hypothesis

- Premack noted that hierarchies of response preferences were not stable
  - *response deprivation might move a behavior to a more preferred level in the hierarchy*
  - *response satiation might move a behavior to a less preferred level in the hierarchy*
- The response-disequilibrium hypothesis proposes that the reinforcing qualities of a stimulus or response might change across situations
  - *reinforcing qualities are situation-specific*

Thorndike-Hull Hypothesis

- What is learned: Stimulus - Response association
- Reinforcement serves to strengthen the S-R connection
- Is reinforcement necessary for learning to occur?
  - *Latent Learning Experiment* (Tolman & Honzik, 1930)
  - *Reinforcement Contrast Effects* (Crespi, 1942)
  - *Findings suggest that learning can occur without reinforcement*

Spence-Hull Hypothesis

- Also argues that instrumental conditioning entails learning S-R associations
- Proposed that reinforcers simply *motivate* the organism to produce the behavior
  - *incentive motivation - r_g - the motivational state created by the characteristics of stimuli*
    - *hunger motivates via biological need (food)*
    - *incentive motivation operates via stimulus characteristics (the look & aroma of a hot fudge brownie)*
  - *problem: no evidence of conditioned goal-related responses during instrumental conditioning*

Current View of Extinction Learning

- Generalization-Decrement Hypothesis & Sequential Theory (Capaldi)
  - *different context effects of extinction trials limit generalization of the instrumental response*
  - *memory for patterns of reinforced & nonreinforced trials plays a role in the extinction process*

Response-Outcome Theories

Mackintosh (1974)

- Propose that Instrumental Conditioning involves learning an association between a stimulus, a response, *and* a reinforcer
- S - R - Rf
- Behaviors are controlled by (expected) consequences, not by the stimuli that preceed the behavior
- Supporting evidence:
  - *rats trained to bar-press for sucrose pellets*
  - *devalue reinforcer: sucrose paired with nausea (to create a taste aversion)*
  - *test on bar-pressing & now rats no longer work for sucrose pellets*

Punishment

- Does punishment temporarily suppress targeted behavior or does punishment permanently suppress targeted behavior?
  - *Mild punishment produces temporary suppression only*
  - *Severe punishment produces lasting suppression*
- Are the effects specific to the punished behavior?
  - *Estes (1944) argued that punishment suppressed all behavior*
  - *More recent research indicates that punishment might be response-specific*

Theories of Extinction

What happens during extinction?

- Emphasis on explaining why partial reinforcement makes extinction difficult
- Frustration Theory (Amsel, 1958)
  - *Animals respond emotionally to the experience of an extinction trial*
  - *responses triggered by emotional resonse eventually crowd out the original learned response*
- Descrimination Hypothesis (Mowrer & Jones, 1965)
  - *Extinction depends on learning that the rules governing reinforcement have changed*

Should punishment be used to control behavior?

- Punishers elicit a variety of emotional reactions that we would rather not have associated with a situation (e.g., fear of parents, anger toward parents)
- Punishment can trigger aggressive behavior, which is not a desired outcome
- Punishment can lead to avoidance learning (e.g., avoid parent or school where punishment is delivered)
- Legal and ethical constraints on the use of punishment - concerns over abuse