Operant Conditioning

EDS 248

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Classical vs. Operant Conditioning
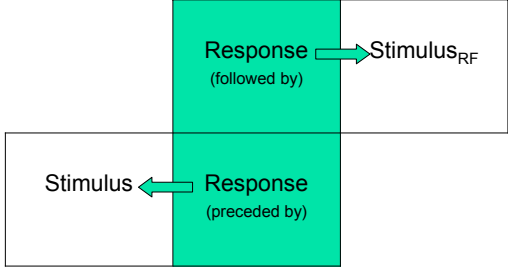
Operant conditioning (R ▶ S_{RF})
- A **voluntary** response (R) is **followed by** a reinforcing stimulus (S_{RF})
- As a result, the response is more likely to be displayed.
- A reinforcer is **ANY** stimulus that increases the frequency of a behavior.
- To be a reinforcer stimuli must immediately follow the response and must be perceived as contingent upon the response.

Classical conditioning (S ▶ R)
- An **involuntary** response (UCR) is **preceded by** a stimuli (UCS), or
- A stimulus (UCS) automatically triggers an involuntary response (UCR).
- A neutral stimulus (NS) associated with UCS automatically triggers a conditioned response.
- The NS becomes a conditioned stimulus (CS).

Classical vs. Operant Conditioning

Response ⟹ Stimulus_RF
(followed by)

Stimulus ⟸ Response
(preceded by)

Independent Study Activity

- **A teacher reported that she had been giving her students points on the chalkboard whenever their group was the most quiet and attentive. Eventually, her students learned to become quiet and attentive whenever the teacher approached the chalkboard. What type of conditioning is at work here? What is the role of the teacher by the chalkboard?**

Independent Study Activity

- Even though there is a S ▶ R connection between the teacher standing by the chalkboard and students becoming quiet and attentive, this stimulus is an **antecedent (or discriminative) stimulus** (not a CS).
- This S ▶ R connection is an example of **stimulus control** in operant conditioning.
  - *In operant conditioning, the antecedent stimulus **does not directly elicit the response**, as it does in classical conditioning. Instead, the stimulus sets the occasion for a response to be reinforced. When an antecedent stimulus influences the likelihood that a response will occur, we call that stimulus a **discriminative stimulus** ... and say that the response is under **stimulus control** (Ormrod, 1999, pp. 56-57, emphasis added).*

Independent Study Activity

- The teacher by the chalkboard does not directly elicit an involuntary response.
- Rather, a voluntary response (being quite and attentive) is strengthened by a reinforcing stimulus.
- The teacher by the chalkboard (S+) is a **cue**, a signal, or a signpost telling students that if they behave (R) in a certain way, a specific consequence is likely to follow (S_{RF}).
- [**(S+) R ▶ S_{RF}**]

Discriminative **Stimulus (S+)**	**Response (R)**	*Reinforcing* **Stimulus (S_{RF})**
Antecedent	*Behavior*	*Consequence*
Teacher by the chalkboard	Being quiet and attentive	Points on chalkboard

Independent Study Activity

- Teacher by the chalkboard is an antecedent telling students if they are quiet and attentive there is a probability that they will earn points on board.
- This type of stimulus is **a cue** or a reminder, **not an** (or involuntary) **automatic trigger**.
- Also, note that similar stimuli (e.g., teacher standing anywhere in the classroom) may also cue (S+) behavior (R).
- This is known as **stimulus generalization**. The more similar the stimulus is (e.g., teacher standing close to the chalkboard vs. standing away from the chalkboard or sitting at her desk) the more likely it is to generalize (**generalization gradient**).

Independent Study Activity

- Conversely, students can learn that a certain response may be reinforced in one situation (S+), but not in another (S-).
- For example, students may learn that they only are reinforced (R) when the teacher is out of her seat (S+) and not when she is sitting at her desk (S-). In other words, in the presence of certain stimuli (S-, teacher at desk), the behavior is not reinforced.
- This is known as **stimulus discrimination**: [(S-) R ▸ (nothing)].

Independent Study Activity

- However, classical conditioning may be playing a role here.
- The teacher by the chalkboard, because of its association with a reward, may begin to elicit a conditioned response (a happy feeling).
- This "feeling" may help to remind children to behave in a certain way.
- It may help to make the antecedent a more powerful (or automatic) behavioral cue.

Independent Study Activity

Stimulus	Response	Stimulus	Response
Antecedent	*Behavior*	*Consequence*	
Teacher by the chalkboard	Being quiet and attentive	Reward	Pleasure

NS	▸	UCS	▸	UCR
▾				▾
CS	▸		▸	CR

Behavioral Explanations for PTSD

Type of Reaction	Symptoms		
	Re-experience	*Avoidance and Numbing*	*Increased Arousal*
Somatic	• Reactivity to reminders (e.g., sweating, rapid heart beat, nausea, dizziness, dry mouth, difficulty breathing)	• Sensory numbing	• Abdominal distress • Hot flashes or chills • Frequent urination • Trouble swallowing
Behavioral	• Insomnia • Increased activity • Aggression • Act as if trauma were recurring	• Avoidance of trauma reminders (e.g., activities, locations, conversations, people, things) • Decrease interest in significant activities • social withdrawal	• Insomnia • Exaggerated startle
Cognitive	• Intrusive recall • Flashbacks • Trauma nightmares.	• Amnesia	• Poor concentration • Hypervigilance
Emotional	• Psychological distress with exposure to reminders (e.g., anxiety, anger, guilt, shame, hopelessness)	• Emotional numbing	• Irritability • Outburst of anger

Behavioral Explanations for PTSD

Re-experiencing

NS	+	UCS	=	UCR
e.g., a setting		a trauma		acute distress
NS>CS			=	CR
e.g., a setting				acute distress

Behavioral Explanations for PTSD

Avoidance

Voluntary Response	=	Reinforcing Stimuli
Escape/Avoidance	=	Negative Reinforcement

Arousal

NS	+	UCS		=	UCR
e.g., a setting		a trauma			fight or flight
NS>CS				=	CR
e.g., a setting					acute distress

Basic Concepts in Operant Conditioning

Concept	Definition
Free Operant Level	Natural level of behavior. Individual "natural levels of behavior" are very different. Important to determine because (a) defines the need for intervention and (b) can be used to assess intervention effectiveness.
Terminal Behavior	Desired frequency of a behavior at the end of a planned reinforcement.

Basic Concepts in Operant Conditioning

Concept	Definition
Extinction	Reinforcing stimulus no longer follows a response. $[(R \neq S_{RF})$ (not CS $\neq$ CR)]
Superstitious Behavior	People try to figure out what they can to obtain desirable outcomes and may become superstitious if contingencies are not clearly specified
Shaping	Procedure used when the free operant level of a behavior is very low (or absent). Involves reinforcing successive approximations of the desired behavior (requires task analysis).

Types of Punishers & Reinforcers

Reinforcers	Increase the frequency of behavior
Primary	Primary satisfy basic physical needs.
Secondary	Secondary become reinforcing via learned associations (classical conditioning) with primary reinforcers.
Punishers	Decrease the frequency of behavior
Punishment I	PI (or positive punishment) = presentation of an aversive.
Punishment II	PII (or negative punishment) = removal of a pleasant stimulus

Types of Punishers & Reinforcers

Positive Reinforcement	Obtaining desirable stimuli.
Negative Reinforcement	Escape - terminating an aversive stimuli Avoidance - learning to stay away from an aversive stimuli

Types of Punishers & Reinforcers

	Primary Automatic reinforcers	Secondary Learned reinforcers
Positive Obtaining desired stimuli	•Physical pleasure	•Money
Negative Escape/avoid undesired stimuli	•Physical pain	•School

Factors Affecting Reinforcement Effectiveness

- Timing of reinforcement

- Magnitude and appeal

- Consistency

Types of Reinforcement Schedules

"Continuous reinforcement is clearly the most effective way of *teaching a new response*. Once the terminal behavior has been reached, however, … intermittent reinforcement schedules – ratio, interval, and differential – can be beneficial both in *preventing extinction* … and in controlling the frequency and pattern of that response" (Ormrod, 1999, p.56).

Types of Reinforcement Schedules

Schedule	Description
Ratio	*Reinforcement given after a specified number of responses.*
Fixed Ratio	Specifies a consistent number of responses before reinforcement is offered.
Variable Ratio	Specifies a changing number of responses before reinforcement is offered.
Interval	*Reinforcement given after the first response emitted after a certain time period has elapsed.*
Fixed Interval	Reinforcement given after the first response emitted after a fixed time period has elapsed.
Variable Interval	Reinforcement given after the first response emitted after a time period has elapsed. The time period changes.

Types of Reinforcement Schedules

Schedule	Description
Differential	*Reinforcement following a specified number of responses within a specified time period.*
DRH	Frequent responses within a specific time period required for reinforcement.
DRL	Waiting before responding, for a specific time period, required for reinforcement.
DRO	Performing anything but the specified response for a specific time period.

Eliminating Undesired Behaviors

Extinguishing Responses	Removal of the reinforcer.
Reinforcing Other Behaviors	Reinforcement for **not** displaying a behavior/response.
Reinforcing Incompatible Behaviors	Reinforcement for displaying a behavior that is incompatible with the target behavior.

When these prove ineffective a form of punishment will need to be considered.

Explaining the Failure of a Reinforcement System

1. The "reinforcer" is not reinforcing.
2. Reinforcement is inconsistent.
3. The response (new behavior or behavioral change) is not worthwhile.
4. Shaping takes place too rapidly.

Contingency Contracts

"An agreement between a student and a teacher that specifies certain expectations for the student (the terminal behavior) and the consequences of the student's meeting those expectations (the reinforcer)."

"The contact should specify the desired behavior of the student and the consequence (reinforcer) that will be contingent on that behavior."

"Early contracts should require small tasks that a student can accomplish within a short period of time."

"A criterion for judging the quality of the desired behavior should be specified."

(Ormrod, 1999, pp. 80-81)

Punishment Options

1. Time out
2. Response cost
3. Verbal Reprimand
4. Restitution and
5. Overcorrection

Next Week

1. Operant Conditioning
2. Functional Behavioral Assessment
3. Re-read chapter 5
4. Writing Prompt
   - When it is and is not appropriate to use reinforcers in the classroom.