Positive Reinforcement

Skinner Systematically Demonstrated Several Things.

1. If something occurs after the response (consequent stimulus) and the behavior increases,

The procedure is called reinforcement, and the thing that caused the increase is called a reinforcer.

Points to Note:

- A stimulus is presented
- Reinforcement is contingent on a response (also Pun)
- Increases the future probability of the response
- The future increase in the response is a critical feature in defining reinforcement

Reinforcement does not Increase Behavior Under All Conditions

- *Must have a temporal relation between*
  - Antecedent Stimuli or Variables
  - Responses
  - Consequences

Antecedent variables become discriminative stimuli (S^D_\text{s})
A response in the presence of this stimulus will be reinforced.

- Thus, the response is more likely to occur in the future in the presence of these stimuli

The Discriminated Operant

- AKA “The Three-term Contingency”

<table>
<thead>
<tr>
<th>S^D_\text{C}</th>
<th>Response</th>
<th>S^R_+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap on faucet is marked with a blue dot or letter “C”</td>
<td>Turn tap on with a blue dot or “C”</td>
<td>Cold water is presented</td>
</tr>
</tbody>
</table>

This term is referred to as “the reinforcer”

Reinforcement Depends on Motivation

- The S^D will only signal the response if the individual is motivated to engage in the response

- Motivating Operations (MOs)
  - Can alter the reinforcing effectiveness of stimuli
  - Thus changes the frequency of responding
  - Changes the frequency of responses reinforced by those stimuli
  - Two types
    - Establishing
    - Abolishing
Two Types

- **Establishing Operations (EO)**
  - Increases the effectiveness of a stimulus as a reinforcer
  - Usually involves decreased access to the stimulus (deprivation)

- **Abolishing Operation (AO)**
  - Decreases the effectiveness of a stimulus as a reinforcer
  - Usually involves having increased access to the stimulus (satiation)

May Not Occur

- Water may be awful
- May act as a stimulator to find other water (Culligan man)

Variables Influencing Positive Reinforcement

- Schedule
- Immediacy / Delay
- Magnitude
- Others

The Four-term Contingency

- The consideration of MOs are important in relation to the three-term contingency

<table>
<thead>
<tr>
<th>EO</th>
<th>S^0</th>
<th>Response</th>
<th>S^R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deprived of water for a long period of time</td>
<td>Tap on faucet marked with a blue dot or letter “C”</td>
<td>Turn tap with a blue dot or “C”</td>
<td>Cold water is presented</td>
</tr>
</tbody>
</table>

Observers only expect to see blue tap-turning behavior when the person “wants” water (i.e., is thirsty)

More Points to note

- Person does not have to be aware that a response is being reinforced for it to increase
- The effect is automatic.
- All behaviors are susceptible to reinforcement
- Key: Must have a temporal relation between the response and the consequence.

Variables Influencing Positive Reinforcement

- Fixed vs. Variable Schedules
- FR-1 Best responding, Fastest Extinction
- VR Highest rates of responding, Greatest resistance to extinction
Immediacy of Reinforcement
- It is critical that the consequence is delivered immediately following the target response
- Longer the delay, poorer the responding
- Small immediate reinforcers have greater power than delayed larger reinforcers – Self-Management issue
- Problems with delay of reinforcers
  - Other behaviors occur during the delay
  - The behavior temporarily closest to the presentation of the reinforcer will be strengthened
  - May not be the one you desire to change

Delayed Reinforcement
- Does not necessarily reinforce the target behavior; rather influences it
- Instructional Control / Rule Following behavior
  - Rule: Is a verbal description of a behavioral contingency
  - Can allow delayed consequences to influence behavior

“How to Suspect Rule-governed Behavior”
- No immediate consequence is apparent
- Response-consequence delay > 30 are longer than seconds
- Large increase in frequency of the behavior occurs following one instance of reinforcement
- No consequence for the behavior exists (including no automatic reinforcement), but rule does

Superstitious Behavior
- Occurs when reinforcement “accidentally” follows a behavior that did not produce the reinforcement
  - Sports players
  - A teacher consoling a child who hurt themself may reinforce crying and / or hurting themself

Automatic Reinforcement
- Reinforcement occurs independent of another person delivering it
- The response, itself, produces the reinforcement
- Examples
  - Wiggling your leg during a boring lecture to stimulate yourself and stay awake
- Note: This does not mean the behaviors are automatic (i.e., “reflexive”); rather that the consequences are delivered automatically

CLASSIFYING REINFORCERS
Reinforcers by Origin

- Primary or Unlearned Reinforcers
  - Function as reinforcers due to heredity / evolution
  - Do not require any learning history to become reinforcers
  - Food, water, oxygen, warmth, sexual stimulation, human touch

Conditioned or Secondary Reinforcers

- Are learned
- Get power from association with primary reinforcers
- Neutral stimuli that begin to function as reinforcers as a result of being paired with other reinforcers (either conditioned or unconditioned)
- Can occur through Classical Conditioning
- Can also condition reinforcers through *verbal analog conditioning*
- Examples: Yellow paper, stickers, tokens
  - Sticker becomes the reinforcer

Generalized Reinforcers

- Are conditioned reinforcers that have been paired with many conditioned and unconditioned reinforcers
- Do not depend on a specific EO to be effective
- Examples: money, points, tokens, others

Reinforcers by Formal Properties

- Edible reinforcers (food)
- Sensory reinforcers (massage, tickles)
- Tangible reinforcers (trinkets, toys)
- Activity reinforcers (playing a game, recess)
- Social reinforcers (physical proximity, social interaction)
  
  *May Differ Across Societies or People*

Identifying Potential Reinforcers

- Is important to identify reinforcers empirically
- Staff, parents, teachers, and even children themselves who report what they *believe* to be reinforcers are often wrong
- Two strategies to use in tandem
  - Stimulus Preference Assessments
  - Reinforcer Assessments

Points to note:

- Preferences change over time
- Evaluate frequently
- Preference assessments do not identify the reinforcing effects
  - Just because people prefer paper towels to hot-air hand dryers in public restrooms doesn’t mean they’ll work to earn paper towels!
Stimulus Preference Assessments

- Identify
  - Stimuli a person prefers
  - Relevant preference values
  - Conditions under which these preferences hold true
- Three Categories
  - Asking about stimulus preferences
  - Observing the target person under free-operant conditions
  - Presenting various stimuli in a series of trial-based observation

Ask the Target Person

- Use Open-ended questions
  - What would you like to work for?
- Asking about specific items
  - How would you like to work for stickers?
- Choice format
  - Would you rather work for things to eat or things to do?
- Rank order format
  - Put these items/activities in order from which you’d like to work for most to which you’d like to work for least.
- Offering Pre-task Choices
  - When you are finished working, you can play with Battleship, checkers, or the computer
- Asking Significant Others
  - Ask caregivers to identify preferred stimuli

Points to Note

- Is relatively uncomplicated
- Problems
  - Verbal reports may not correspond to actual behavior

Free-Operant Observation

- Observing and recording what activities the target person engages in when he/she has unrestricted choice of activities
- No response requirements
- All stimuli available within sight and reach
- Items are never removed
- Can be contrived or naturalistic
- Two types

Contrived Free-Operant Observation

- Just prior to observation, provide learner with noncontingent exposure to each item (for sampling purposes)
- Place all items in view and within reach
- Observe for a set period of time and record the duration of time target person engages with each stimulus item

Naturalistic Free-Operant Observation

- Conducted in everyday environments as unobtrusively as possible (e.g., during recess)
- Observe for a set period of time and record the duration of time target person engages with each stimulus item/activity
### Advantages of Free-Operant Assessments
- Less time consuming than trial-based methods
- Less likely to produce problem behavior because preferred stimuli are never removed.

### Trial-Based Methods
- **General Procedure**
  - Present selected stimuli to children in a series of trials
  - Measure approach (e.g., eye gaze, hand reach), contact (e.g., touch/hold), and/or engagement (e.g., interacting with stimulus)
  - Can categorize as high, medium, and low preference
  - Many variations for procedure

### Single Stimulus Presentation
- Present stimuli, one at a time, in random order and record target person’s reaction to it
- Well suited for individuals who have difficulty selecting among two or more stimuli

### Paired Stimuli Presentation
- Sometimes called “forced-choice” method
- Present two stimuli simultaneously and ask the target person to choose one
- Each stimulus is matched to every other stimulus in the set
- Rank order from high, medium, and low preference

### Multiple Stimulus Presentation
- Extension of the paired-stimuli presentation
- Present an array of 3 or more stimuli together
- Two major variations:
  - With replacement
    - Stimulus selected remains in array in subsequent trials
  - Without replacement
    - Selected stimulus is removed from the array in subsequent trials (takes about half the time to complete the procedure, and it is still fairly accurate)
- Begin trial with: Which one do you want the most?
- Repeat several times

### Guidelines
- Monitor target person’s activities prior to assessment
- Balance cost-benefits of procedures (time to do vs. level of confidence)
- Balance rankings vs. no rankings with shifts of preference
- When time is limited, use fewer stimuli in array
- When possible, combine data from multiple assessment procedures
Reinforcer Assessment
- Is direct, data-based method
- Multiple Options
  - One or more stimuli are presented
  - Contingent on a target response, and
  - Observing whether an increase in responding occurs
- Allows you to verify/confirm whether a stimulus functions as a reinforcer

Concurrent Schedule Reinforcer Assessment
- Pit two stimuli against each other
- Observe which produces the larger increase in responding
- Allows you to determine differences between relative and absolute reinforcement effects

Multiple Schedule Reinforcer Assessment
- Use two or more component schedules of reinforcement for a single response
- Only one component schedule is in effect at a given time
  - An $S^0$ signals the presence of each component schedule and is present while that component is in effect

Progressive-Ratio Schedule Reinforcer Assessment
- Preferences may change when response requirements increase
- Progressive-ratio schedules allows you to assessing stimuli effectiveness as response requirements increase
  - Response requirements are systematically increased over time until responding declines

Some Guidelines for Using Reinforcement
1. Choose reinforcers relevant to current or creatable establishing operations
2. Maintain establishing operations
3. Use high-quality reinforcers of sufficient magnitude
4. Set an easily achieved initial criterion for reinforcement
   - criterion should be less than or equal to best performance during baseline

More Guidelines
5. Explain the contingency and provide prompts to respond
6. Deliver the reinforcer immediately following behavior
7. Reinforce each occurrence of the behavior initially
8. Use direct rather than indirect reinforcement contingencies
9. Gradually increase response-to-reinforcement delay
10. Use varied reinforcers
11. Use contingent praise and attention
12. Shift from contrived to naturally occurring reinforcers
Some Cautions

- Be careful of the schedule you put the person on
- FR vs. VR
- Satiation effects
- Watch for extinction effects. Can increase "bad" behavior
- Use some common sense.

Conclusions

- Is a very powerful technique
- Can usually change all types of behavior