Extinction

- The failure of a response to product a reinforcer causes the response to decrease until the organism no longer emits the response.

- When Reinforcers are no longer provided, the behavior stops

Diagram of Extinction

EO
Deprived of water for a long period of time and person has history of reinforcement for getting water when turning the "C" tap

S^D
Tap on faucet marked with blue dot or letter "C"

Response
Turn tap with blue dot or "C"

S^R+
Cold water withheld

Let's assume the tap is broken or the water has been turned off to the tap.

Properties

- Provides zero probability of reinforcement
- Effectiveness is dependent primarily on identification of reinforcing consequences and consistent application of the procedure
- Extinction does not require the application of aversive stimuli to decrease behavior.
- Extinction does not prevent occurrences of a problem behavior.
  - May increase them for a time.
  - The environment is changed so that the problem behavior will no longer produce the maintaining consequences.

Forms of Extinction

- Procedural forms
  - Involve “ignoring” the problem behavior.
  - Often are ineffective
  - When matched to the behavioral function, the intervention is usually effective.

- Functional forms
  - Involve withholding maintaining reinforcers.

Misuses of the Term “Extinction”

- 1) Using extinction to refer to any decrease in behavior
- 2) Confusing forgetting and extinction
- 3) Confusing response blocking and sensory extinction
- 4) Confusing non-contingent reinforcement and extinction
Using Extinction to Refer to any Behavior Decrease

- Some use the term extinction when referring to any decrease response performance, regardless of what produced the behavior change.

- Labeling any reduction in behavior that reaches a zero rate of occurrence as extinction is a common misuse of the term.

Confusing Forgetting and Extinction

- In forgetting, a behavior is weakened by the passage of time during which the individual does not have an opportunity to emit the behavior.

- In extinction, behavior is weakened because it does not produce reinforcement.

Confusing Response Blocking and Extinction

- Response blocking is not an extinction procedure
- Response blocking prevents the occurrence of the target behavior
- With all extinction procedures the individual can emit the problem behavior.

Confusing Non-contingent Reinforcement and Extinction

- Noncontingent reinforcement (NCR) does not withhold the reinforcers that maintain the problem behavior.

- Extinction diminishes behavior by changing consequence stimuli; NCR diminishes behavior by changing antecedent stimuli.

Extinction Procedures

- Extinction of Behavior Maintained by Positive Reinforcement
- Behaviors maintained by positive reinforcement are placed on extinction when those behaviors do not produce the reinforcer.

- Extinction of Behavior Maintained by Negative Reinforcement
- Behaviors maintained by negative reinforcement are placed on extinction (escape extinction) when those behaviors do not produce a removal of the aversive stimulus
- The individual cannot escape from the aversive situation.
Extinction Procedures
- Extinction of Behavior Maintained by Automatic Reinforcement
  - Behaviors maintained by automatic reinforcement are placed on extinction by masking or removing the sensory consequence (sensory extinction).

Extinction Procedures
- Extinction of Behavior Maintained by Automatic Reinforcement
  - Not a recommended treatment option for problem behavior, even self-stimulatory behaviors that are maintained by social consequences or negative reinforcement.

Extinction Effects
- Extinction effects have not been documented clearly in applied settings.
  - Practitioners should view all of the following comments on the extinction effects tentatively when the relate to behavioral interventions or applied research.

Extinction Effects
- Gradual Decrease in Frequency and Amplitude
  - Extinction produces a gradual reduction in behavior.
  - However, when reinforcement is removed abruptly, numerous unreinforced responses can follow.

Extinction Effects
- Gradual Decrease in Frequency and Amplitude
  - Often difficult for teachers and parents to apply because of the initial increase in frequency and magnitude and the gradual decrease in behavior.

Extinction Effects
- Extinction Burst
  - An immediate increase in the frequency of the response after the removal of the positive, negative, or automatic reinforcement.
  - "an increase in responding during any of the first three treatment sessions above that observed during all of the last five baseline sessions or all of baseline." (Lerman, Iwata, & Wallace, 1999)
**Extinction Burst**

- Problem behaviors can worsen during extinction before they show improvement.
- Extinction bursts usually suggest that the reinforcer(s) maintaining the problem behavior was successfully identified, indicating that there is a good chance of an effective intervention.

**Spontaneous Recovery**

- The behavior that diminished during the extinction process recurs even though the behavior does not produce reinforcement.
- Short-lived and limited if the extinction procedure remains in effect.

**Resistance to Extinction**

- Continued responding during the extinction process.
- Behavior that continues to occur during extinction is said to have better resistance to extinction than behavior that diminishes more quickly.
Variables Affecting Resistance to Extinction

Three tentative Statements
- Relates to continuous and intermittent reinforcement:
  - A) Intermittent reinforcement may produce behavior with greater resistance to extinction than the resistance produced by continuous reinforcement
  - B) Some intermittent schedules may produce more resistant than others
  - C) To a degree, the thinner the intermittent schedule of reinforcement is the greater the resistance to extinction will be.

Establishing Operations
- "Resistance to extinction is greater when extinction is carried out under high motivation than under low." (Keller & Schoenfeld, 1950/1995, p.875)

Number, Magnitude, and Quality of Reinforcement
- The number of times a behavior produces reinforcement may influence resistance to extinction.
  - A behavior with a long history of reinforcement may have more resistance to extinction than a behavior with a shorter history of reinforcement

Number of Previous Extinction Trials
- Successive applications of conditioning and extinction may influence the resistance to extinction.

Response Effort
- The effort required for a response apparently influences its resistance to extinction.
  - A response requiring great effort diminishes more quickly during extinction than a response requiring less effort.
10 Guidelines for Application of Extinction

- Withholding all reinforcers maintaining the problem behavior
- Withholding reinforcement consistently
- Combining extinction with other procedures
- Using instructions
- Planning for extinction-produced aggression
- Increasing the number of extinction trials
- Including significant others in extinction
- Guarding against unintentional extinction
- Maintaining extinction-decreased behavior
- When not to use extinction

Withholding all Reinforcers

- First step in using extinction effectively is to identify and withhold all possible sources of reinforcement that maintain the target behavior

Withholding Reinforcement Consistently

- All behavior change procedures require consistent application, but consistency is essential for extinction.
- Consistency is the single most difficult aspect in using extinction.

Combining Extinction with Other Procedures

- The effectiveness of extinction may increase when it is combined with other procedures.
- Differential reinforcement and antecedent procedures hold promise for reducing extinction effects such as bursting and aggression.

Using Instructions

- Behaviors sometime diminish more quickly during extinction when teachers describe the extinction procedure to students.

Plan for Extinction-Produced Aggression

- Behaviors that occurred infrequently in the past will sometimes become prominent during extinction by replacing the problem behaviors.
  - Frequently, these side effect replacement behaviors are aggressive (Lerman et al., 1999)
Increasing the Number of Extinction Trials
- An extinction trial occurs each time the behavior does not produce reinforcement.
- Whenever possible, applied behavior analysts should increase the number of extinction trials for the problem behaviors.

Including Significant Others
- It is important that other persons in the environment not reinforce undesirable behavior.
- All individuals in contact with the learner must apply the same extinction procedure for effective treatment.

Guarding Against Unintentional Extinction
- Desirable behaviors are often unintentionally placed on extinction.
- It is common practice to give the most attention to problems the squeaky wheel gets the grease and to ignore situations that are going smoothly.

Maintaining Extinction-Decreased Behavior
- Applied behavior analysts leave the extinction procedure in effect permanently for maintaining the extinction-diminished behavior.

When Not to Use Extinction
- Imitation
  - Extinction can be inappropriate if the behavior placed on extinction are likely to be imitated by others.
- Extreme Behaviors
  - Some behaviors are so harmful to self or others or so destructive to property that they must be controlled with the most rapid and humane procedure available.
  - Extinction as a singular intervention is not recommended in such situations.

Conclusions
- Is a very effective technique
- Can be used within a variety of contexts
- Can be used for a variety of behaviors