Operant Conditioning:
Strategies for Changing Behavior

ANTECEDENTS OF BEHAVIOR

Setting events

S^D vs. S^-

S^D = Stimulus condition which indicates the response ***will*** be reinforced

S^- = Stimulus condition which indicates the response ***will not*** be reinforced

Differential reinforcement = *reinforcing a response in the presence of one stimulus* (S^D) *and not reinforcing the same response in the presence of another stimulus* (S^-).

Stimulus control = *the response is likely to occur in the presence of* S^D*, but is unlikely to occur in the presence of* S^- .

Stimulus *discrimination* *(which results from differential reinforcement) = responds differently under different stimulus conditions.*

Stimulus control examples:

Door bell ringing→ opening door

Smell and appearance of food→ eat or don't eat (because likely consequence is illness)

Mother vs. Father→ making "iffy" requests (one more likely to say yes than other)

Home vs. School→ many behaviors

Boss vs. Co-workers→ many behaviors

Expensive restaurant vs. fast-food restaurant vs. eating at home→ table manners

PRINCIPLES FOR DEVELOPING BEHAVIOR

A.AShaping—goal behavior achieved by reinforcing successive approximations, rather than reinforcing the final response

Examples: language acquisition—reinforce "mama" and "dada"

Requires reinforcing behaviors already in the repertoire that resemble the final goal

As a given approximation is performed consistently, criterion for reinforcement is altered slightly in the direction of the final goal

A1. Chaining—

Used for teaching a sequence of responses

based on effect of S^D to increase likelihood of behavior

a.aS^D sets the occasion for behavior

a.bIncreases the probability that a previously reinforced behavior will occur

a.cEach step in the chain serves a an S^D for the next step

a.dEach step in the chain serves as a conditioned reinforcer to the preceding step, conditioned from the final reinforcer.

Forward—start at beginning of chain (often similar to shaping)

Backward—start near end of chain (More frequent chaining technique)

Participatory exercise—shaping and backwards chaining.

A2. Prompting

Prompts are events that help initiate a response
Allow response to occur and be reinforced
Examples:

a.aPhysical guidance

a.bInstruction

a.cPointing

a.dPlanned visual cues

a.eModeling

Serve as an S^D for reinforcement available through response—may become aversive if consequence is aversive

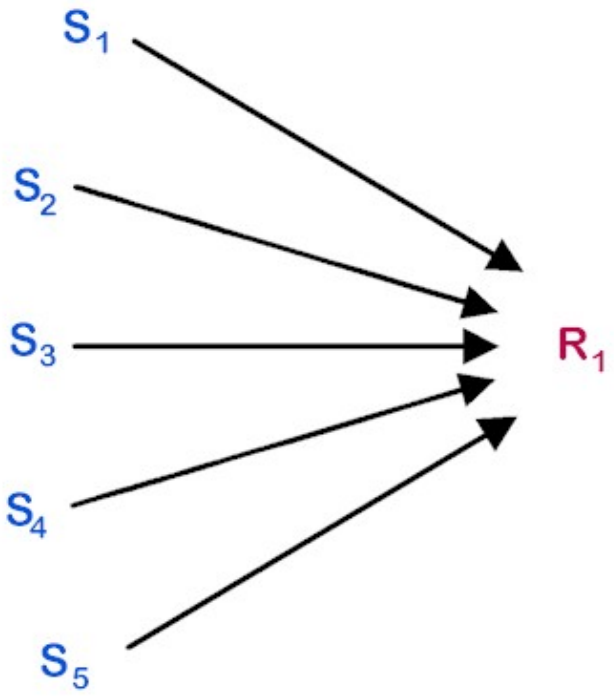
A3. Fading

Gradual removal of a prompt
Provide prompt less frequently
Provide prompt at a lower level of intensity
Modify prompt to be more like naturally occurring cues
If fading is too quick, rate of responding will drop

GENERALIZATION

1. Stimulus generalization

Stimulus generalization = *generalization or transfer of a response to situations other than those in which training takes place*



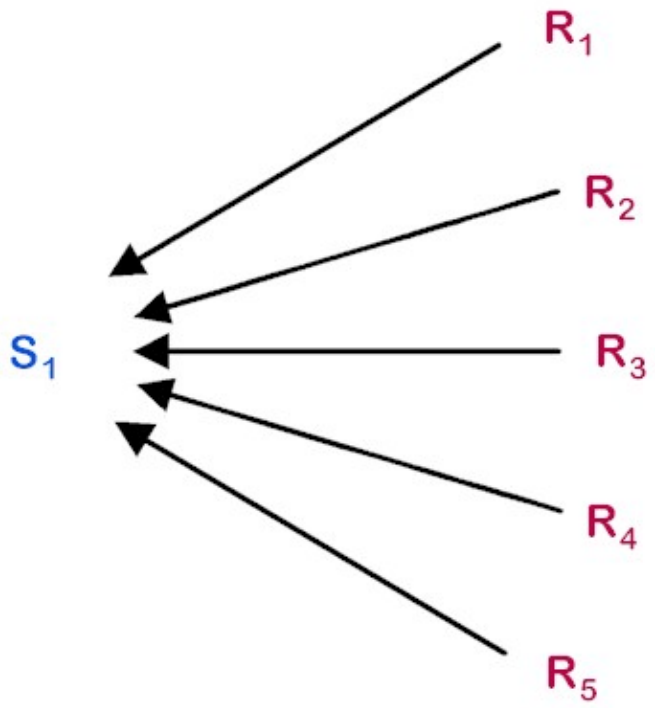
1. Opposite of Discrimination

a. discrimination, the response fails to generalize across situations
b. when response generalizes across situations, individual fails to discriminate in performance of the response across conditions

2. Stimulus generalization is easier the greater the similarity among the various stimuli.
3. Across stimuli, some behaviors may generalize while others do not
4. Generalization may be partial, as indicated by differing probabilities for the behavior under two similar sets of conditions
5. Stimulus generalization is very important in most situations for socially valid treatment—behavior must occur in situations beyond the original training situation

B1. Response generalization

Response generalization = *reinforcement of a response increases the probability of other responses which are similar*



Similar responses occur in response to the same stimulus conditions.

Sometimes what is identified as response generalization is in fact the direct action of reinforcement on similar behaviors.

Response covariation-cluster of dissimilar behaviors change together

a.aSome behaviors tend to come together in "packages" for reasons that are not fully understood.

APPLICATION OF REINFORCEMENT

1Requirements for effectiveness

A1. Contingent application of consequences

reinforcer **consistently** presented ***only*** contingent on the target behavior(s)

When troubleshooting, explore inconsistent delivery and non-contingent delivery of reinforcer

A2. Delay of reinforcement

Increased delay = decreased effectiveness of reinforcer

May reinforce other responses that have intevened between target behavior and delivery of reinforcer

Immediate reinforcement is strongest

Immediate reinforcement is especially important when initially establishing behavior

After behavior is well established, desirable to shift to delayed reinforcement, so that behavior will not depend entirely on immediate consequences.

A3. Magnitude or amount of the reinforcer

Obviously, greater amount or magnitude of reinforcer is somewhat related to frequency of response. (Pay $10 for a one page book review, people will occasionally choose to do one. Pay $10,000, people will turn them out one after another)

However, limits to this relationship:

A4. Subject to satiation effects

Satiation is strongest in primary reinforcers, e.g., food water, sex

Secondary reinforcers are not immune to satiation

A5. Influenced by deprivation

No incentive to work if already practically unlimited supply

Plenty of things are in somewhat limited supply, and resulting mild deprivation is sufficient to enable reinforcement

Quality or type of reinforcer

a.aNot usually physically specifiable

a.bUsually determined by client preference

a.cCan look at frequently chosen behaviors

a.dSome reinforcer types known to be generally stronger than others (e.g., tokens/money, vs. praise)

a.eSchedule of reinforcement (see below)

A.AContingency contracts

Contract specifies the relationship between behaviors and their consequences
Specifies reinforcers desired by the client
Specifies the behavior desired by intervening parties
Five ideal elements (Stuart, 1971):

what each part expects to gain

stipulated behaviors are observable/verifiable

specific sanctions for failure to meet terms of contract are agreed upon in advance

a bonus clause that reinforces consistent compliance with terms of contract

a means of monitoring the rate of positive reinforcement given and received—provides information about impending reinforcement, provides constant feedback, cues praise as additional reinforcer

B1. Advantages of contingency contracts

1. Performance may be better if clients allowed to have some input
2. Acceptability of program higher when active participation permitted
3. Contingencies less likely to be aversive, since negotiated; less motivation to attempt escape
4. Flexible, terms can be renegotiated, both in terms of response requirements and reinforcers
5. Makes the contingencies explicit, potentially increasing the effectiveness of reinforcement
6. Provides structure when maladaptive relationships between parties may he exerting negative influence on behavioral or emotional functioning

B2. Reinforcement Techniques to reduce undesirable behavior

DRO= Differential Reinforcement of Other behavior
DRI= Differential Reinforcement of Incompatible behavior
DRA= Differential Reinforcement of Alternative Behavior
DRE= Differential Reinforcement of functionally Equivalent behavior
DRL= Differential Reinforcement of Low rates of responding

More detail on these below

A.ANegative reinforcement

Behavior strengthened by negative reinforcement when it results in escape or avoidance of an aversive event
In humans, most avoidance behavior acquired without direct experience.
Verbal cues are discriminative stimuli for consequences to be avoided.
Not necessary to be hit by a car to learn behaviors to avoid this as a pedestrian
(Do sometimes see people in cars who seem to need some direct experience of the negative reinforcer, however)
Many people can be persuaded to avoid a hurricane without actually experiencing one
Not widely used in applied settings because:

requires an ongoing aversive event that can be terminated quickly and reliably

usually productive to try a variety of positive reinforcers first

aversive events often produce side effects: escape, avoidance of those administering contingencies, aggression, etc.

often difficult to administer—requires very careful monitoring of behavior, sometimes even special equipment

(dental examples)

Most important aspect of negative reinforcement in applied settings is its natural and/or unrecognized occurrence.
Present in many situations and may contribute to uncooperative, inappropriate or deviant behavior.
Whether an event is a negative reinforcer (or a positive reinforcer) is an empirical matter and can't be guessed from what seems intuitive.
Has been used in alcoholism, overeating and sexual deviance (with ETOH, disulfuram [Antabuse]).

SCHEDULES OF REINFORCEMENT

Schedule of reinforcement = *the rule denoting how many or which specific responses will be reinforced.*

A.AContinuous

Every instance of the target response is reinforced
During acquisition, results in the highest rate of the target response (barring satiation)
Extinguishes much more quickly than behaviors that were intermittently reinforced (drink machine vs. slot machine example)
Rule: *For behaviors developed with continuous reinforcement, extinction is rapid. Conversely, resistance to extinction is greater if very few responses are reinforced than if many responses are reinforced—i.e., if reinforcement is "thin."*
During acquisition/development of a behavior, often advisable to use continuous or almost continuous ("generous") schedule.

A.AIntermittent

Advantages of intermittent reinforcement

1. greater resistance to extinction
2. efficient use of available reinforcers
3. satiation less likely
4. less time to administer than continuous

2. Ratio—Based on number of responses delivered

a.aFixed (FR)

b. Same requirements every time

Fixed ratio = requires a fixed number of responses each time before a response is reinforced.

Notation: FR: N

a.aFR:1 = continuous reinforcement

a.bFR:10 = every 10th response is reainforced

Characteristics of responding to FR schedule:

a.apost-reinforcement pause

a.brapid rise in response rate from end of pause to completion of next ratio increment.

Performance on FR differs depending on whether ratios are large or small

a.alarger ratios produce longer post-reinforcement pause

a.bat end of pause, rapid acceleration of responding

1. Variable (VR)

Requirements differ from time to time

On <u>average</u> a certain number of responses are required for reinforcement, but...

...the required number varies unpredictably from occasion to occasion.

Notation—VR:N

a.aVR:5 = on average, every 5th response is reinforced (maybe 2nd one time, 8th the next)

a.bThere is no VR:1 (since this would = FR:1)

Characteristics of responding to VR

a.aResponding consistently high

a.bLittle or no post-reinforcement pause (since next reinforcer may be just around the corner)

a.cMore resistant to extinction than FR

a.dBefore reinforcement is withdrawn, making the ratio very *thin* maximizes resistance to extinction

Examples: fishing and **[the classic:]** slot machines

Interval—based on amount of time that passes

a.aFixed (FI)

Same requirements every time

Fixed interval = reinforces the first response which occurs after an invariant time interval.

Only one response need occur after the interval has elapsed to be reinforced.

Notation: FI: [time]

a.aFI:1 = first response after 1 minute has passed is reinforced

a.bFR:10 sec. = first response after 10 seconds have elapsed is reinforced

Characteristics of responding to FI schedule:

a.a**Pronounced** post-reinforcement pause—scalloped pattern

a.bLong pause does not delay reinforcement (as the pause does in FR), unless the pause is longer than the interval.

a.cLess consistent rates of responding than FR

a.dExample, checking for mail (x1 per day, once found bx stops for almost 24 hrs.)

a.eVariable (VI)

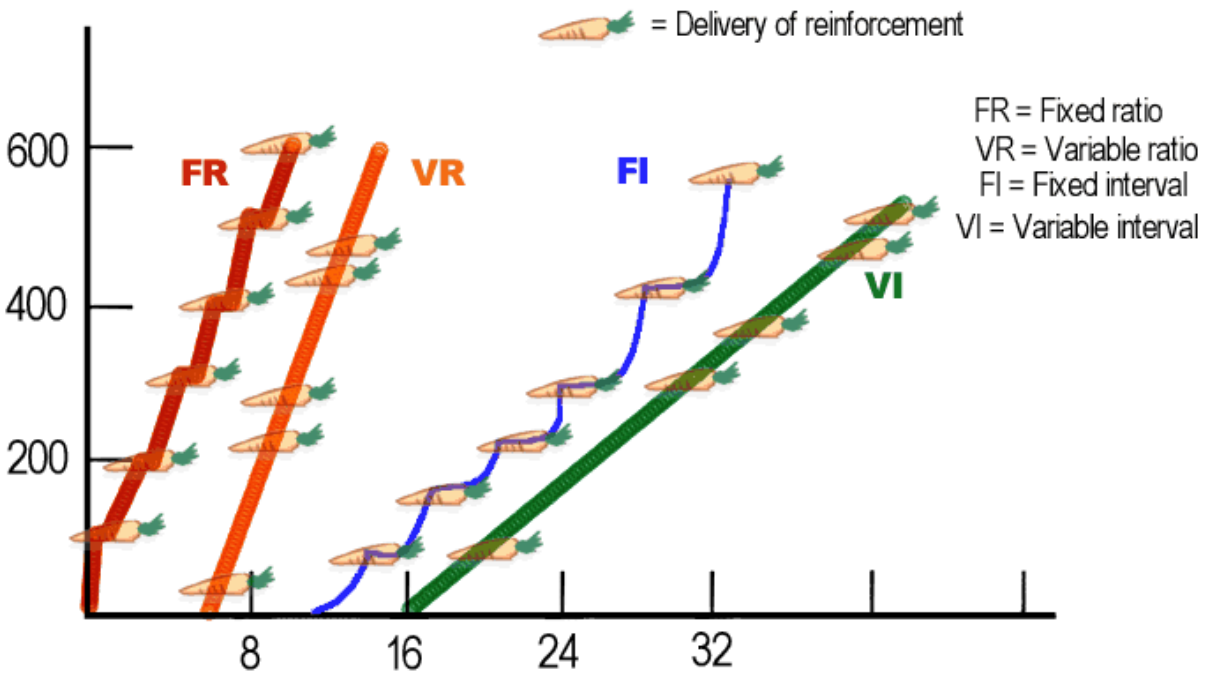
Variable Interval specifies average length of the intervals required for reinforcement

Notation—VI:10 denotes that, on average, 10 minutes must elapse before a response is reinforced

Example: Pop quizzes and studying behavior

Rate or responding tends to be higher under VI than under FI

Variable timer praise



A.AExtinction—More later, but:

Distinct schedule of reinforcement—response receives **no** reinforcement.

Effect of extinction on behaviors learned on other schedules is one of the primary parameters in evaluating those schedules.

Punishment

Punishment = *presentation or removal of events that reduces the frequency of a response.*

Note that painful events don't necessarily reduce the frequency of behaviors they were intended to punish and therefore may not be "punishers" at all in the technical sense used in behavior modification.

A. Types of punishment

1. Two categories parallel reinforcements

a.aPrimary

Inherently aversive events.

Unlearned

Examples:

a. electric shock

b. intense physical assault

c. bright light

d. loud noise

e. excessive heat

f. excessive cold

b. *Secondary*

acquire their aversive properties by being paired with previously aversive events

**Examples: "No!", frowns, bills

can also be associated with the absence of reinforcement— S can be a punisher

2. Presentation of aversive events

a. Verbal statements

a1. Examples: reprimands, warnings, disapproval, saying"no", threats

a2. Have occasionally been used in research to successfully suppress behavior

a3. However, effects have been very inconsistent: