

GENERAL PSYCHOLOGY (PSYC 210)
Study Guide: Conditioning and Learning
Clara B. Jones, Ph.D.

What is “learning”? A relatively permanent change in behavior that can be attributed to experience.

There are elementary forms of **non-associative learning** [e.g., **habituation** (a decrease in response as a result of successive exposure to a stimulus); **sensitization** (an increase in response as a result of successive exposure to a stimulus)]. Give examples of these.

--Association (from Aristotle); connectionism

An elementary form of **associative learning** is “**imprinting**” (n.b. Konrad Lorenz). Search “imprinting” on www.google.com. True imprinting assumes that there are “critical periods” (define). Do humans have “critical periods”? Humans are thought to have “sensitive periods” for some traits (e.g., language learning).

Classical conditioning (also, respondent or Pavlovian conditioning)

- Form of learning in which reflex responses (n.b. “reflex arc”; reflexes controlled by spinal cord) or strong emotional responses (autonomic nervous system responses) are associated with new stimuli (S--→ S learning)
- S= stimulus: information; events in the world; any physical energy sensed by an organism
- R= response; a behavior, motor pattern, or action pattern; also, neural impulse or glandular activity
- Classical conditioning: the focus in classical conditioning is on what happens *before* a R (antecedents)
- In classical conditioning, antecedent events become associated with one another. A S that does not produce a R (a “neutral” S called a “conditioned stimulus” or CS) becomes associated with one that does (an “unconditioned stimulus” or US)
- Learn model describing classical conditioning.
- How did Ivan Pavlov demonstrate classical conditioning in his famous experiment? Recall that Pavlov was primarily interested in studying digestion.

Elements of conditioning

- Acquisition: training
- In classical conditioning, conditioned response (CR) must be reinforced or strengthened
- In classical conditioning, conditioned response (CR) is reinforced whenever conditioned stimulus (CS) is followed by, or paired with, an unconditioned stimulus (US)
- US should follow soon after CS (contiguity)

Higher-order conditioning

- In classical conditioning, CS used to reinforce further learning

- In classical conditioning, CS may be strong enough to be used as US

Extinction: If US never follows CS, conditioning will extinguish; thus, classical conditioning can be weakened by removing reinforcement leading to inhibition or suppression of R (i.e., decreased likelihood of R)

- Does the R disappear? How can we test this? Example.

Spontaneous recovery: Occurs when period of rest follows extinction

- Suggests that organism is “prepared” (M.E.P. Seligman) to respond
- Organism “checks out” environment (i.e., adaptive response: Charles Darwin)

Generalization: S similar to CS evoke a similar R

- May be adaptive

Stimulus Discrimination: Learning not to generalize

- Selectivity
- Narrowing R

How much human learning is based on classical conditioning? (e.g., likes and dislikes; phobias)

- Dependence on reflexes
- Dependence upon emotional or “gut” Rs (“flight or fight” Rs)
- Phobias: conditioned emotional Rs [a fear that persists even when no realistic danger exists (e.g., agoraphobia; fear of snakes)]
- Abnormal behavior that can be explained by stimulus generalization (Example)
- How to reverse phobias in therapy? Desensitization: gradually exposing individual to S

Vicarious or secondary conditioning

- Occurs when we observe another person’s emotional responses to a S and, by observation, learn to respond likewise [e.g., horror movies; various likes and dislikes (e.g., food)]
- Antecedent can be someone else’s R (e.g., food preferences)

Rescorla’s contingency theory: learning creates expectancies (“If, then.”) in the world

- Expectancies alter behavior
- For classical conditioning, the CS predicts the US
- Is classical conditioning a “stupid” process? In the cognitive view, the human organism is a “scientist” seeking information about the world.

Classical conditioning and Operant conditioning

- Classical conditioning: involuntary, passive
- Operant conditioning: voluntary, active (organism **operates** on the environment)

Operant (instrumental) conditioning (study textbook and search www.google.com):
“white rat” psychology

- Learning based on the *consequences* of responding. Each time a R is made it may be followed by a **reinforcer or reward** (a S that increases the probability of a R occurring: example?).
- What is Edward B. Thorndike’s “law of effect”? If a response is followed by a pleasurable event, the R is **more** likely to occur again; if a R is followed by an unpleasurable (aversive) event, the R is **less** likely to occur again.
- What is “negative reinforcement”?
- What is “punishment”? All punishment (“aversive stimuli”) decreases the probability of a R occurring: example?
- How does negative reinforcement differ from punishment?
- In operant conditioning, the organism learns to associate Rs with their **consequences** (in classical conditioning, the organism learns to associate Rs with their **antecedents**)
- Acts that are followed by reinforcement tend to be repeated; acts that are followed by punishment tend not to be repeated

How do we acquire operant responses?

- Skinner Box: rat does not acquire a new skill or R but combines and recombines action patterns in individual’s behavioral repertoire
- Reinforcement most effective when it is “response contingent” (i.e., must be given only after desired R)
- Contingent reinforcement also affects performance of Rs
- How do you get rat to press bar in the first place? According to Thorndike, first act occurs by “trial and error”

Shaping: the gradual molding of Rs to a final desired pattern

- Law of successive approximations (reinforcing ever closer matches to desired R)

Operant extinction (e.g., bar pressing would stop if food ceased)

Spontaneous recovery: If we never reinforce individual, R will be suppressed. However, if we again present reinforcement, R will reappear.

Positive Reinforcement vs. Negative Reinforcement

- Positive reinforcement is the application of a pleasurable S (Example)
- Negative reinforcement is the removal of an unpleasant or aversive S (Example)
 - primary reinforcers (natural, biological, “unlearned” as, food, water, sex)
 - secondary reinforcers (learned, as \$\$, praise, grades, attention, approval, success)
 - social reinforcers (attention, approval)

Punishment: unpleasant or aversive S (e.g., spanking, “time out”)

Premack's "Prepotent Principle": any frequent (or, prepotent) R can be used to reinforce an infrequent R (e.g., food can be used as a reward to induce individuals to take out the trash or clean their room)

Delay of reinforcement: reinforcement should occur soon after R

Response chaining: Why do you work hard to receive a delayed R (e.g., a paycheck, a diploma)?

- Can anticipate future reward
- Reinforced partially [partial (intermittent) reinforcement more effective than continuous reinforcement]: **Skinner's five "schedules of reinforcement" (continuous, fixed interval, variable interval, fixed ratio, variable ratio)**
- Single reinforcer can maintain long chain or Rs

Two-factor learning: combination of classical conditioning and operant conditioning

Applied learning

- "Token economy": secondary reinforcers can be exchanged for primary reinforcers [used in education and other institutions (e.g., prisons, mental institutions)]
- Generalized reinforcers (e.g., \$\$): \$\$ may acquire not only primary reinforcers but may have its own reinforcement/reward value (e.g., prestige)
- "Superstitious" behavior: habits of some athletes before throwing a foul shot or before batting; nervous "tics" (abnormal behavior)
- Punishment: How effective is it?
 - punishment is generally *aversive*, thus, via classical conditioning, people and situations associated with punishment also become aversive
 - punishment also leads to escape and avoidance
 - punishment may also lead to aggression (the "frustration/aggression" hypothesis)
- Possibly most effective method of behavioral control is to reward alternative Rs
- The three methods of controlling simple behavior are: (1) reinforcement; (2) non-reinforcement or extinction; and, (3) punishment

Applied learning, continued: educational applications

- Learning is based on information
- Information= meaningful units of stimulation (e.g., electromagnetic energy); thus, learning not simply mechanical
- Cognitive maps: expectancies
- Learning as information-processing: learning creates *expectancies* about events in the world (e.g., Robert Rescorla's contingency theory)
- Feedback (as in computer-based learning): information about what effect a R had; also called "knowledge of results"; increased feedback almost always improves learning and performance
- Learning aids: feedback is most effective when it is frequent, immediate, and detailed

- Programmed instruction: teaches students in a format requiring precise answers about information as it is presented (computer-assisted instruction: CAI)
- CAI: students work at individual computer terminals
- CAI allows students to freely make mistakes and to learn from mistakes

Cognitive learning: Beyond conditioning

- Is all learning just a connection between S & R?
- Cognitive learning refers to understanding, problem-solving, knowing, anticipating, or other higher mental processes (e.g., memory, thinking, language)
- Cognitive maps: an internal representation of spatial relationships (n.b. the hippocampus and spatial memory)
- How do we navigate the world?

Latent learning: learning that occurs, apparently, without reinforcement

- Is curiosity reinforcing and adaptive?
- Is there a “motive” to explore?
- Latent learning may lead to “discovery learning” (application in “alternative education”)

Social or Observational learning (Albert Bandura: see text)

- Three rules: (1) pay attention and remember; (2) reproduce what was modeled; and, (3) is model rewarded?
- Modeling: a component of social learning
 - any process in which information is imparted by example, before direct practice is allowed
 - What would happen if you had to experience everything you learned or if you learned only by verbal instruction (didactic learning/teaching)?
- Imitation: not all observed models are imitated
 - attractive, rewarded, admired, high-status models are likely to be imitated