Unit 1 Notes: Learning

Learning

- a relatively permanent change in behavior due to practice and experience

- learning:
  - is not always observed but can be hidden (*latent learning*)
  - is not always consistent
  - indicates a tendency to respond, not necessarily a specific response
  - depends on a variety of environmental and physiological factors
  - can be unintentional (*incidental learning*)

Conditioning

- the acquisition of fairly defined patterns of behavior to a well-defined stimuli

- there are two types of conditioning:
  - *classical conditioning* (as known as Pavlovian conditioning)
  - *operant conditioning* (also known as instrumental conditioning)

Classical Conditioning

- attributed to Ivan Pavlov
- occurs when an organism learns to transfer a response from one stimulus to another unlearned stimulus

Basic Elements

- *unconditioned stimulus* (UCS) : a stimulus that invariably causes an organism to respond
- *unconditioned response* (UCR) : a response or reaction to an unconditioned stimulus
- *conditioned stimulus* (CS) : a previously neutral stimulus that, when paired to the UCS, elicits a desired response in an organism when presented alone
- *conditioned response* (CR) : a response or reaction to a conditioned stimulus

(insert diagram of classical conditioning elements here)

Pavlov's Experiment

- in Pavlov's classic experiment, dogs would naturally salivate (UCR) to the presentation of food (UCS)
- by pairing the presentation of food with the sound of a bell (CS), the sounding of the bell alone would elicit salivation (CR) in the dog

(insert diagram of Pavlov's experiment here)

Temporal Relationship

- the temporal relationship between the UCS and CS is important
- there are three possible relationships:
  - *forward pairing* :when the CS is presented before the UCS--this is the most effective method
  - *backward pairing* :when the CS is presented after the UCS
  - *simultaneous pairing* :when the CS is presented at the same time as the UCS

Other Theorists and Applications

- Watson and Rayner
  - Little Albert was conditioned to fear the appearance of a white rat (CS) by pairing it with a loud noise (UCS)
  - the response in both cases was to become fearful and cry
  - Watson and Rayner's experiments help to show how classical conditioning can be at play with phobias

(insert diagram of Watson's experiment here)

- Wolpe and Rachman
  - something frightening (a loud noise) is paired with a previously neutral stimuli (a white rat) and, after that, that stimulus (white rat) becomes the focal point for a phobia

- M.E.P. Seligman
  - believes in *preparedness*, that objects or situations toward which an individual develops a phobia are "related to the survival of the human species through the long course of evolution"
  - objects or situations that do not relate to survival are not as likely to develop into a phobia, which Seligman calls *contrapreparedness*

- Wolpe
  - *desensitization therapy*--uses classical conditioning to help the phobic individual by gradually lessening their fears of objects or events by associating them slowly with more positive or neutral thoughts and behaviors

- Mary Cover Jones
  - used a form of this therapy by treating a child to no longer be afraid of white rat
  - placed a rat in a cage in the same room as the child but fed him candy while the cage was moved closer and closer
  - ultimately, the child replaced his fear of the rat with positive feelings associated with candy

Factors in Conditioning

- *interstimulus interval:* the time between the presentation of the UCS and the CS
  - if this is too long or too short an amount of time it can interfere with conditioning
- *intermittent pairing:* an inconsistency in the presentation of the UCS and the CS
  - this will reduce the rate and acquisition of the conditioned response
- *behavioral definition:* a clear definition of a behavior that is to be observed and/or changed through conditioning
- *habituation:* an organism's adaptation to surrounding stimuli so that is no longer a distraction
- *extinction:* a gradual reduction in the association between the UCS and the CS, typically because they are no longer paired together to a point where the UCS and CS are no longer associated with one another
- *rest period:* when the CS is not presented with the UCS for a period of time
- *spontaneous recovery:* the instant re-association after the passage of time of the UCS and CS because of the pairing of the UCS with the CS
- *reconditioning:* occurs when the UCS and CS are again paired after extinction
- *stimulus generalization:* the response to a different but similar stimulus
- *stimulus discrimination:* the response to only a specific stimulus and not to other similar stimuli
- *response generalization*: responding in a different way but that is similar to the original response
- *sensory preconditioning*: two neutral stimuli are paired (e.g. a light and a black square) and both are paired with an UCS (e.g. food); after the initial pairing, only one of the stimuli (e.g. light) is paired with the UCS, eliciting a CR; the non-paired stimuli (e.g. black square) will still, however, elicit a CR

Higher Order Conditioning

- *higher order conditioning* (or *second-order conditioning*)
  - involves using a CS as an UCS to further condition the organism
  - in Pavlov's experiment, he used the bell as an UCS to train his dogs to salivate to the sight of a black square (the new CS)

(insert diagram of higher order conditioning in Pavlov's experiment here)

Operant Conditioning

- Edward Lee Thorndike
  - *Law of Effect*
  - behaviors eliciting a pleasant effect will be "stamped in" and behaviors eliciting an unpleasant effect will be "stamped out"

- B.F. Skinner
  - *operant (or instrumental) conditioning* whereby behavior increases when a reinforcer is presented and decreases when a punishment is carried out
  - Skinner's classic experiment--a rat presses a bar in a "Skinner box" which delivers a food pellet (positive reinforcement), thereby reinforcing subsequent bar-pressing behavior.

Types of Reinforcers

- *positive reinforcer:* any event whose presence *increases* the likelihood of a behavior reoccurring
- *negative reinforcer:* any event whose reduction or elimination *increases* the likelihood of a behavior reoccurring
- *punishment:* any event whose presence *decreases* the likelihood of a behavior reoccurring
- *primary reinforcer:* one that is rewarding in and of itself; food and water are good examples of primary reinforcers
- *secondary reinforcer:* only has value because it is associated with a primary reinforcer; money is the most common example because it only has value because it can be traded for something the individual wants or needs.

Principles of Effectiveness

- Four principals which increase the effectiveness of a reinforcer:
  - *Principle of Size:* the larger the reinforcement, the more likely behavior will occur
  - *Principle of Immediacy*: the more immediate the reinforcement, the more likely behavior will occur
  - *Principle of Contingency:* a reinforcer becomes more effective when it is only achieved by the desired behavior
  - *Principle of Satiation*: a more an organism is deprived of a reinforcer, the more effective it becomes

Ratio and Interval Schedules of Reinforcement

- Schedules of reinforcement involve two main types:
  - *ratio schedules*--focus on a desired behavior being performed in order to receive reinforcement (e.g. having your dog roll over and giving it a treat for the behavior)
  - *interval schedules*--not concerned with the amount of desired behavior but reinforce the organism after a certain time interval (e.g. paychecks)

Four Schedules of Reinforcement

- There are four main schedules of reinforcement:
  - *fixed ratio*--the correspondence of behavior to reinforcement is always the same
  - *variable ratio*--the correspondence of behavior to reinforcement varies
  - *fixed interval*--the time period between reinforcement is always the same
  - *variable interval*--the time period between reinforcement varies
- it is best to start with a fixed ratio schedule of reinforcement (1:1) because the subject tends to catch on quickly (called *continuous reinforcement*)
- after the behavior has been instilled, move to a variable ratio or variable interval schedule (the *partial reinforcement effect* states that behavior will still occur even in the absence of consistent rewards)

Factors in Conditioning

- *acquisition:* an increase in the response rate of an organism following reinforcement
- *learning curve:* a graphic representation of the rate of learning

- *shaping*: molding behavior through the use of reinforcement
- *chaining*: linking shaped behaviors together as steps in a more complex behavior
  - *forward chaining:* starting with the first step toward a desired behavior, and successively adding and reinforcing steps toward the ultimate goal
  - *backward chaining:* starting with the ultimate goal and reinforcing behavior as you add steps working backwards to the first step
- *differential reinforcement:* in shaping when an undesirable behavior is replaced by a desirable one
- *total task presentation:* when a subject succeeds at a complete series of responses for a task
- *reward and omission training:* the use of positive and negative reinforcement (respectively) in behavior modification
- *gradient of reinforcement:* the gradual ineffectiveness of a reinforcer that results with an increased delay in reinforcement following a behavior
- *extinction:* gradual reduction in behavior because of the absence of reinforcement or punishment to a condition in which a reinforced behavior is no longer present
- *spontaneous recovery:* the instant re-emergence of a behavior because of the re-initiation of reinforcement or punishment
- *tokens:* a special class of secondary reinforcers that can be accumulated and exchanged at a later date for other reinforcers
- *superstitious behavior:* the development of a superstition because the behavior or object is thought to elicit a positive reinforcer (e.g. wearing your "lucky" sweater on a test day)
- *learned helplessness:* failing to take steps to avoid a punishment because of unavoidable prior expose to the punishment

Escape Conditioning

- *escape conditioning:* occurs when an organism learns that a response will *stop* an unpleasant stimulus
- *avoidance conditioning*: when an organism learns that a response will *prompt* an unpleasant stimulus
  - *active avoidance:* when an organism must *demonstrate* a specific response in order to avoid an aversive stimulus
  - *passive avoidance:* when an organism must *not respond* in order to avoid an aversive stimulus

Learned Taste Aversions

- *learned taste aversions*: animals and humans are biologically prepared to make certain connections more easily than others
- for example, if you ingest an unusual food or drink and then become nauseous, you will develop an aversion to it
- learned taste aversions promote powerful avoidance responses based on a single stimulus-response pairing with the pairing typically occurring up to 24 hours prior to the association

- John Garcia's classic experiment entailed putting rats into two groups
- Group A was fed sweet water and Group B was unsweetened water accompanied by flashing lights and noise (i.e. bright-noisy water)
- half the rats in Groups A and B were given an electric shock when they drank, the other half ingested a drug that would make them feel nauseous

(insert diagram of Garcia's experiment on taste aversions here)

- results of classical conditioning would suggest rats in all groups would develop a learned taste aversion to their water--this was *not* the case
- rats in Group A that drank the sweet water and received the shock, and rats in Group B that drank bright-noisy water and ingested the nauseating drug did not show any signs of conditioning
  - the shock for rats in Group A didn't have any connection to the water and the lights/noise for rats in Group B had no connection to the nausea
- rats in Group A that drank the sweet water and received the nausea-inducing drug did show a learned taste aversion--ingesting something and then feeling sick made sense
- rats in Group B that drank the bright-noisy water and received the shock showed an aversion as well--both were environmentally linked
- this is known as *preparedness* (or *the Garcia effect*)

Cognitive Learning

- classical and operant conditioning rely on observable behavior
- *cognitive learning* focuses on an organism's mental processes in learning, including basic knowledge and understanding as well as beliefs and ideas, that *cannot* be observed
- an organism's mental understanding may not be reflected in a behavior
- learning that is not immediately demonstrated by behavior is Edward Tolman's concept of *latent learning*

- Tolman disagreed with Thorndike on two main points:
  - Tolman thought the Law of Effect neglected an organism's inner drives and goals that directed its behavior
  - Tolman believed that learning occurred even before a behavior is carried out

Factors in Cognitive Learning

- *cognitive map:* learned mental image of a spatial environment that can be called on to solve problems when stimuli in the environment change
- *insight:* learning that occurs rapidly when an organism understands all of the ingredients of a problem at once
- *set*: the ability to become increasing more effective in learning and problem solving
- *biofeedback (*or *self-control):* an organism's ability to regulate bodily functions because of information that is given about the current state of those functions

Contingency Theory

- Robert Rescorla (1988) - relation between the UCS and CS
  - called into question the fundamental association of Pavlov's UCS and CS
  - asserted that for learning to take place, the mere causal combination of the UCS with the CS would not lead to an association
  - the significant factor is that the CS must provide the organism with information that the UCS is likely to occur (the are *contingent* on one another)
  - moved the concept of association in classical conditioning from a *casual combination* of elements to an understanding of the *relation* of these elements
  - this is the definition of contingency theory, that the UCS must be contingent on the CS

- Leon Kamin (1969) - blocking
  - called into question the concept of higher order conditioning by determining the concept of blocking
  - *blocking* prevents an organism from responding to a second stimulus when both the first and second stimulus occur simultaneously
  - noise (CS) was paired with an electric shock (UCS) to elicit a reaction in rats
  - a light (a second CS) was simultaneously paired with the noise in an attempt to transfer the reaction in the rats from the noise to the light
  - found that the presence of just the light did not elicit a reaction in the rats; their conditioning to the noise blocked their subsequent conditioning to the light

- Overmier and Seligman (1967) - conditioned helplessness
  - discovered the concept of *conditioned helplessness*
  - this is when apathy and passivity occurs when one's behavior has no effect on reward and punishment
  - college students who face a series of unsolvable problems may give up part way through the testing situation, even though later problems may be solvable

Social Learning Theory

- Albert Bandura is most known for *social learning theory*
- an individual can learn through *modeling* and observation without firsthand experience
- *observational* or *vicarious learning* involves learning through observing other people's behavior

- For social learning to take place, the individual must
  1. a subject must observe and pay attention to the behavior to be modeled *(attention process)*
  2. remember the modeled behavior *(retention process)*
  3. convert the modeled behavior into action *(reproduction process)*

- it is possible to possible to pay attention and remember a modeled behavior but have no reason to convert the behavior into action
- learning can take place without actual behavior
- the motivation of the learner is important

- if someone has great success in modeling behavior, they will tend to display that behavior more often
- if they are punished for the modeling, they will not likely display that behavior again
- this is the *motivational process* is social learning.

Biological Factors

- researchers have found certain biological constraints on learning
- animals will not perform certain behaviors that go against their natural inclinations
- this tendency for animals to forgo rewards to pursue their typical patterns of behavior is called *instinctual drift*

- Eric Kandel studied neural activity in aplysia (sea snails)
- when the gills of aplysia were touched, they automatically withdrew their gills
- when the aplysia learned that this stimulation was harmless, they stopped
- *habituation*--when an organism adjusts to changes in stimulation or environmental conditions
- Kandel demonstrated that, as a result of habituation, aplysia would release reduced amounts of neurotransmitters in the brain related to the gill-withdrawal reflex

- Keller and Marion Breland attempted an experiment in which a raccoon would be conditioned to pick up coins and deposit them in a piggy bank
- the raccoon could be conditioned to pick up a single coin and deposit it but only after it rubbed the coin against the bank, clutched it and then dropped it in the bank
- attempts to condition the raccoon to pick up two coins failed
- the behavior the raccoon exhibited was consistent with its inborn tendencies to, when catching crayfish, rubbing the crayfish, dipping it in the water and removing its shell
- the raccoon in the Brelands' experiment was reverting to *instinctual drift*--reverting back to basic species-specific behaviors

- research has indicated many factors regarding biology and its effect on human learning
- facts about the brain
  - 80% of the brain is composed of fat
  - no two brains are identical--brain size and weight can vary as much as 40%
  - each person's brain develops at its own rate

Determinants in Learning

- some students are morning learners while others are afternoon learners.
  - understanding when you are the most efficient and can concentrate the best can help you determine the optimum times to learn and do your homework
- learning most optimally takes place in cycles or pulses, where information is presented very succinctly and then the focus of learning diffuses
  - it is best, then, to study for shorter periods and take more breaks between studying
- colors affect mental alertness
  - sky blue is the most calming color, releasing some 11 neurotransmitters in the body to suppress appetite, lower body temperature and reduce perspiration.
  - brighter colors stimulate nervous or aggressive behavior

- peppermint, cinnamon, basil, rosemary and lemon are all aromas that may make a learner more mentally alert
- most information we take in (90%) is visual.

Body Physiology and Learning

- dehydration may be the cause of students who can't seem to concentrate, are bored or are drowsy
  - proper intake of fluids throughout the day aid in learning behavior.
- proper nutrition is essential to learning
  - protein is best for alertness and mental processing because it includes a natural source of tyrosine
  - we all tend to crave carbohydrates in the late afternoon and evening as our bodies attempt to store up nutrients for sleep
  - men tend to want to combine these carbohydrates with protein
  - women tend to want to mix their carbohydrates with fat
  - it is better to eat smaller more frequent meals as too much time between eating can affect mental alertness and concentration
- proper sleep is important to learning
  - losing as little as two hours of sleep a night can result in lowered concentration and memory recall ability
- research indicates that we breath through only one nostril at a time for about three hours
  - our bodies begin the gradual shift from one nostril to the others so that we encounter about 16 ninety-minute cycles where dominance shifts from the left to the right hemisphere and then back again
  - these cycles correspond with the release of certain hormones in our blood system that affect our concentration.
  - students may want to study a variety of activities for shorter periods of time to exploit their hemispheric strengths during these cycles