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## Unit 4

Title: Learning & Memory (4 days)

I Objectives: Students should be able to:

1. Define learning and the notion of behavior potentiality
2. Discuss the difference between the associationists' & the nativists' views of knowledge.
3. Discuss Thorndike's Law of Effect
4. Define & discuss classical conditioning
5. Define & discuss the process of extinction
6. Define & discuss operant conditioning
7. Define & discuss the notion of reinforcement
8. Define and discuss cognitive maps and latent learning
9. Discuss the process of observational learning
10. Discuss sensory memory, short term memory, & long term memory
11. Discuss what causes forgetting

II Resources:

1. Lecture sources:
  - A. Carlson, N. E., & Buskist, W. (1997). *Psychology: The Science of Behavior*. Chapters 5 & 8.
  - B. Hock R. R., (1992). *Forty Studies That Changed Psychology*. pp. 64-85 & 117-125.
  - C. Schwartz, B. & Lacey, H. (1982). *Behaviorism, Science, and Human Nature*. New York: Norton.
2. Required reading:
  - A. Carlson & Buskist (chapters 5 & 8)
  - B. Hock, pp. 64-85 & 117-125.
3. LaserPsych - Laser disk (Disk Chapter #20; Frame #00496 & Disk Chapter #24; Frame #09892)
4. Videos:
  - A. Discovering Psychology – Learning, Remembering & Forgetting, Cognitive Processes (32.10)

### III

#### General Outline:

1. Topic: Introduction (Brief Overview)
  - A. Define learning (Objective A)
  - B. Associationists (Objective B)
  - C. Nativists (Objective B)
  
2. Topic: Classical Conditioning
  - A. Ivan Pavlov (Objective D)
  - B. Unconditioned Stimulus & Unconditioned Response (Objective D)
  - C. Conditioned Stimulus & Conditioned Response (Objective D)
  - D. Simultaneous, delayed, trace, & backward conditioning (Objective D)
  - E. Generalization & discrimination (Objective D)
  - F. Higher-order Conditioning (Objective D)
  - G. Sensory Preconditioning (Objective D)
  - H. Extinction (Objective E)
  
3. Topic: Operant Conditioning
  - A. Difference between classical & operant conditioning (Objective E)
  - B. Edward Thorndike (Objective C)
  - C. B. F. Skinner (Objective F)
  - D. Process of Operant Conditioning (Objective F)
  - E. The Nature of Reinforcement (Objective G)
  
4. Topic: Memory
  - A. Sensory Memory (Objective J)
  - B. Short Term Memory (Objective J)
  - C. Long Term Memory (Objective J)
  - D. Forgetting (Objective K)

#### Detailed Outline:

##### Day 1

### IV

#### Topic: Introduction

1. Define learning
  - A. A relatively permanent change in behavior or behavior potentiality that results from experience.
  - B. Learning is inferred from a change in behavior because we cannot observe changes in mental processes.
  - C. Researchers can use brain imaging to observe certain types of changes in brain activity but not directly observe mental processes.
  - D. We do know that learning causes an increase in the number of synapses - Neural plasticity.
  - E. Behavior potentiality means that learning can occur even if the organism demonstrates no behavioral changes at the time learning occurs. (e.g., Phobias)
  
2. Associationists
  - A. Aristotle (350 B.C.) - 3 principles of association - how 1 thought leads to another.

- B. Contiguity - The more closely together (contiguous) in space or time 2 items occur, the more likely will the thought of 1 item lead to the thought of the other. lightning-thunder, table-chair, etc.
- C. Similarity - The thought of 1 concept often leads to the thought of similar concepts. orange-apple, yellow-blue, etc.
- D. Contrast - An item often leads to the thought of its opposite. night-day, girl-boy, etc.
- 3. Empiricists - People are born "Tabula Rasa" (a blank slate) and all knowledge is acquired through experience.
- 4. Nativist
  - A. Immanuel Kant (1781) & others - The basis for all knowledge is innate. Through experience, new concepts are built on these innate concepts.
  - B. Examples of concepts learned through experience does no damage to the Nativists view.
  - C. However, a single example of an innate concept would refute the Empiricists view.
- 5. Hedonists
  - A. People act in ways to increase pleasure and to avoid doing what results in pain.

Day 2

V

Topic: Classical Conditioning

- 1. Ivan Pavlov (1849-1936) - (LaserDisk Frames #498, 511 - 2825)
  - A. Influenced many learning theorists in America - John Watson, Clark Hull, Kenneth Spence.
  - B. Nearly all of the terms and concepts used by modern learning theorists were first identified by Pavlov.
- 2. Unconditioned Stimulus and Unconditioned Response - (LaserDisk Frames #498, 2826 - 2827)
- 3. Conditioned Stimulus and Conditioned Response
- 4. Simultaneous, short & long delayed, trace, & backward conditioning - stimulus box
  - A. Simultaneous - CS and UCS begin at the same time. Conditioned responding is weaker than with short delayed.
  - B. Short delayed - CS begins 1 or 2 seconds before UCS and continues through presentation of UCS.
    - i. Produces strongest & most rapid conditioning. The optimal delay depends on many factors (e.g., who subjects are).
  - C. Long delayed - The onset of CS begins several seconds prior to onset of UCS and continues through presentation of UCS.
    - i. Strength of conditioned responding decreases with length of delay.
  - D. Trace - The CS and UCS are separated by some time interval in which neither stimulus is present.
    - i. The subject must rely on a memory trace of the CS if

- conditioning is to take place.
      - ii. Strength of conditioned responding decreases with length of delay.
    - E. Backward - The CS is presented after the UCS.
      - i. Conditioned responding is markedly lower than with short delayed or simultaneous conditioning even when CS is presented immediately after UCS.
- 5. Generalization & discrimination - (LaserDisk Frames # 2829 - 2832)
  - A. Generalization - The transfer of the effects of conditioning to similar stimuli.
  - B. Discrimination - A subject learns to respond to one stimulus but not to a similar stimulus.
  - C. Phobias - conditioned fears - an excessive and irrational fear of an object, a place, or a situation - closed spaces, open spaces, heights, water, crowds, speaking before groups, taking exams, insects, snakes, dogs, & birds.
  - D. John B. Watson (1920's) (LaserDisk Frames #502, 2836 - 5608) Little Albert - 11 months old - conditioned fear of a white rat which generalized to the "entire furry kingdom."
- 6. Higher-order Conditioning - (LaserDisk Frames # 2833 - 2835)
  - A. Once a CS has been established, it can be used as an UCS to form new associations.
  - B. Tone with food - Tone is a first order CS.
  - C. Light with tone - light is a second order CS.
  - D. Shows that classical conditioning extends beyond direct associations.
- 7. Sensory Preconditioning - Two CS (light & tone) are repeatedly paired prior to presentation of UCS.
  - A. When one of the paired CS (light) is then paired with UCS, both CS (light & tone) will produce CR.
- 8. Extinction - (LaserDisk Frame # 2828)
  - A. The mere passage of time is not enough to cause an organism to "forget" a CR. Repeatedly presenting the CS without the UCS will produce a decrease and eventually the disappearance of the CR.
  - B. Spontaneous Recovery - The reappearance of a CR on subsequent days following the apparent extinction of the CR. (draw graph on board)

Day 3  
VI

Topic: Operant Conditioning

- 1. Difference between classical & operant conditioning (LaserDisk Frames #5616 - 5617)
  - A. Classical conditioning - stimulus pairing - responses are elicited.
    - i. Operant conditioning - consequences and their effect on future behavior. - responses are emitted.
- 2. Edward Thorndike (1874-1949) - (LaserDisk Frame #499)
  - A. The first systematic investigations of the principle of reinforcement.
  - B. Describe the cat in the puzzle box and trial-and-error learning

- (LaserDisk Frames #500 - 501).
  - C. Law of Effect - Responses which are followed by satisfaction will be likely to recur; those which are followed by discomfort will be less likely to recur.
- 3. B. F. Skinner (LaserDisk Frames #503, 5620-9862) -
  - A. primarily responsible for increasing the interest in, and discovered many of the most basic and most important principles of reinforcement.
  - B. Coined the terms operant and operant conditioning.
- 4. Process of Operant Conditioning (LaserDisk Frames #5618-5619)
  - A. Shaping - The process of rewarding behaviors that are increasingly similar to the desired behavior.
  - B. The method used for shaping is the Method of Successive Approximations.
  - C. Stimulus Generalization - When the organism learns to respond to a specific stimulus, it will also respond to similar stimuli - similar to classical conditioning.
  - D. Stimulus Discrimination - The organism learns that reinforcers are related to some stimuli but not to others.
- 5. The Nature of Reinforcement
  - A. Clark Hull (1942) - Reinforcement (reward) is necessary for the learning of all new voluntary behaviors.
  - B. Primary reinforcers - Stimuli which are necessary for the organism's survival - e.g., food.
  - C. Secondary (conditioned) reinforcers - Stimuli that become reinforcing through their association with primary reinforcers - e.g., money
  - D. Positive Reinforcement
    - i. Stimuli whose presentation increase the likelihood of a response.
  - E. Negative Reinforcement
    - i. Stimuli whose termination or removal increase the likelihood of a response.
  - F. Punishment
    - i. Aversive stimuli whose presentation or satisfying stimuli whose removal decreases the likelihood of a response.
    - ii. Punishment works to best to decrease undesired behavior when combined with reinforcement of desired behavior.
  - G. Negative Reinforcement vs Punishment (LaserPsych Frames #9864-9866)
  - H. Schedules of reinforcement (LaserPsych Frame #9870) -
    - i. Rules that state under what conditions a reinforcer will be delivered.
    - ii. Continuous Reinforcement - Every response is

- followed by a reinforcer.
    - iii. Partial or Intermittent Reinforcement - Reinforcement is contingent upon either the passage of time (interval) or number of responses (ratio).
    - iv. Intermittent Schedules can be: fixed ratio, variable ratio, fixed interval, variable ratio.
    - v. Extinction (LaserPsych Frames #9868-9869)
- 6. Alternative learning theories (challenges to radical behaviorism)
  - A. Social Learning - Bandura.
    - i. Learning can occur by observing the consequences of others' behavior.
  - B. Latent learning - Tolman
    - i. Tolman's research suggested a difference between learning and performance.
    - ii. Learning can occur from any experience but reinforcement allows an organism to demonstrate that learning.
    - iii. Remember that our definition of learning included a change in behavior potential.

Day 4  
VII

Topic: Memory

1. Sensory Memory (LaserPsych Frame #9909)
  - A. Connects the present with the most recent past.
  - B. Sensory memories last less than a second.
  - C. Following the presentation of a visual stimulus, a brief memory trace exists called an icon (iconic memory. (LaserPsych Frames #9910-9974)
  - D. Following the presentation of an auditory stimulus, a brief memory trace exists called an echo.
  - E. The function of sensory memory is not unanimously agreed upon. One explanation is to extend the perceived duration of stimuli in order to give our pattern recognition processes time to analyze the information.
2. Short Term Memory (working memory) (LaserPsych Frame #9978)
  - A. Capacity - 7 items + or - 2. Easy to remember 1 phone # but not 2 or 3 (LaserPsych Frames #9979 - 9980)
  - B. Chunking - Dividing a long list of information into smaller, more manageable portions. (LaserPsych Frames #9981 - 9984; word list used by Herbert Simon, 1974)
  - C. Duration - Information can be held in STM indefinitely through maintenance rehearsal, repeating the information over and over to yourself.
  - D. Without rehearsal information in STM decays within 20 seconds.
3. Long Term Memory (LaserPsych Frame #9989)

- A. Cognitive psychologists would attribute any long-term change in behavior to a change in the individual's long-term memory.
  - B. Capacity - No one knows exactly how much information can be stored in long-term memory but it is agreed that it is very large and some feel that it may be unlimited.
  - C. Duration - There is some disagreement as to the duration of memory stored in LTM.
    - i. Some feel that LTM is permanent, lasting a lifetime, and that forgetting is merely retrieval failure.
    - ii. Others feel that when information stored in LTM is forgotten, it is lost forever.
  - D. Information can be moved from STM to LTM through a deep level of processing known as elaborative rehearsal
    - i. forming meaningful associations between information in STM and existing information in LTM
  - E. the distinction between STM and LTM is artificial and the key to the length and type of retention involves the level of processing - the deeper the processing the better the memory of the event).
  - F. Maintenance rehearsal (shallow processing) is not a good method of moving information into LTM (Demonstration - Use penney overhead).
  - G. Reconstructive memory - Elizabeth Loftus "Thanks for the Memories" in 40 studies
    - i. Memories can change with time and are influenced by past history with the event, current expectations, and the nature of the memory inquiry (LaserPsych Frames #10025 - 10026).
4. Factors that affect memory - (Demonstration - read word list: Memory Demo 1)
- A. Primacy effect, Recency effect, Frequency, Distinctiveness, Organization, Reconstruction, Visual imagery.
5. Forgetting
- A. Repression - Freud -forgetting is motivated.
    - i. Repression is an unconscious defense mechanism designed to keep painful memories from reaching the conscious level.
    - ii. These memories eventually come to consciousness in the form of dreams or slips of the tongue.
  - B. Psychogenic Amnesia - a partial or complete loss of memory for a terribly traumatic event.
  - C. Fugue state - Physically fleeing a situation with no memory of the situation or personally identifying information.
    - i. These are extreme examples of ways of forgetting, we all experience milder forms in our day-to-day lives.
  - D. Decay – Ebbinghaus - Memory traces simply weaken over time.
  - E. Interference - Information is lost due to competing memories.
  - F. Proactive interference - The forgetting of new information due to the disruptive effect of previously learned material.

- G. Retroactive interference - The forgetting of previously learned information due to the disruptive effect of new material.
- H. Interference has a greater effect on forgetting than does decay (LaserPsych Frame #10033)

Factors that affect memory -  
Memory Demonstration 1  
Read list once.

bed	quilt	dark	silence
fatigue	clock	snoring	night
toss	tired	night	artichoke
turn	night	rest	dream

- 1 Write down as many words as you can recall.
- 2 Count the number of words - most people recall between 7 & 10 words - the number may be higher in this case due to the fact that most of the words are related and because of the following factors.
- 3 Primacy effect - Most people recalled “bed, “ because it was the first word presented. In general the first bit of information to enter memory has an advantage because people are able to rehearse the item more frequently.
- 4 Recency effect - Nearly everyone remembers, “dream,” because it was the last item presented. In general, the last item presented has an advantage because it is still fresh (less distraction).
- 5 Frequency - The word “night” has an advantage because it was repeated 3 times. As mentioned before, information can be held in STM indefinitely through rehearsal.
- 6 Distinctiveness - “Artichoke” has the advantage of being distinct from the other words.
- 7 Organization - Many people will remember “toss” and “turn” consecutively, due the tendency to organize new material (chunking).
- 8 Reconstruction - Many people remember, “sleep” although it was not on the list. People tend to fill in gaps with items that “ought” to be there. Loftus & others have demonstrated this.

V. Table of Specifications:

Multiple Choice Questions

Topic	Difficulty		
	Low	Moderate	High
Define Learning	1	0	0
Associationists	1	0	0
Nativists	1	0	0
Classical Conditioning	1	3	2
Operant Conditioning	2	4	0
Cognitive Aspects of Learning	1	3	0
Memory	1	3	2
Total	8	13	4
	Factual	Conceptual	Applied
Total	9	13	3

I. Evaluation Items: (25 Multiple Choice Questions)

A. Topic: Introduction

1. Define learning (Question 7)
2. Associationists (Question 1)
3. Nativists (Question 2)

B. Topic: Classical Conditioning

1. Unconditioned Stimulus and Unconditioned Response (Question 11)
2. Conditioned Stimulus and Conditioned Response (Question 5, 11)
3. Simultaneous, delayed, trace, & backward conditioning (Question 12)
4. Generalization & discrimination (Question 19)
5. Higher-order Conditioning (Question 17)

Day 2

A. Topic: Operant Conditioning

1. Difference between classical & operant conditioning (Question 3, 16)
2. Process of Operant Conditioning (Question 4, 13)
3. The Nature of Reinforcement (Question 6, 15)

Day 3

A. Topic: Cognitive Aspects of Learning

1. Cognitive Maps and Latent Learning (Question 9, 10, 14)
2. Observational Learning (Question 18)

Day 4

A. Topic: Memory

1. Sensory Memory (Question 20, 22, 25)
2. Short Term Memory (Question 21, 24)
3. Long Term Memory (Question 21, 24)
4. Forgetting (Question 23)