Memory and Cognition

Exam 2 Review

Influence Without Awareness

- **Subliminal Semantic Priming**
  - Late-attention filter model
- **Subliminal Mere Exposure**
  - Mere exposure effect - The more often you see or hear something, the more you like it.
  - Flash random shapes for 1ms. They liked the images they've seen before, despite never of seen the images. It must have effected their behavior.
- **Subliminal Stroop Effect**
  - If you have to identify an ink color, it is much more difficult if what you're reading is the color not that the ink is of.
  - Flash red (20,s) -> backwards masking (400ms) -> color patch (open ended period of time)
- **Subliminal Scents**
  - We evaluate people every day; researchers had them sniff three scents. They were presented to subjects either just below or just above their detection levels. They had to look at a face and then evaluate it. They found that the odors effected people only when it was presented subliminally (unaware of the smell). Those who could detect the smell were not affected.
- **Blindsight**
  - Those who are blind can locate and object and reach for it at a level greater than chance. This only applies to those who suffer damage to their visual cortex, which makes them lose the ability to see despite working eyes. While the primary vision cortex is destroyed, your eyes are still potentially connected to other parts of the brain.
- **Memory during Anesthesia**
  - Patients who were told under anesthesia to pull their earlobe during the postoperative interview later pulled their earlobe at a higher rate than those who weren't said to do anything. Positive statements during anesthesia help people recover faster.
- **Subliminal Ads**
  - Subliminal advertising does **not** work. Only on a short-term basis for simple judgments and actions do subliminal sayings work.
- **Backmasking in music**
  - If music is played backwards it may have satanic or drug behavior. This does not affect you. Top-down processing is in use; someone would have to actively construct the lyrics for it to work.

Short Term Memory

- **Chunking**
  - The ability to chunk data is "domain specific" which means it is based on their knowledge of a specific area.
  - S.F. took two years of practice and was able to remember up to 80 random numbers. He used running times to remember so much.
- **Capacity**
  - Short-term memory has a smaller capacity than sensory memory and LTM. Normally 7 +/- 2 letters/numbers
- **Duration**
  - STM is limited in how long it can be held, roughly 15 seconds.
  - Rehearsal
    - You can rehearse information to keep it in your STM **or** rehearse it to move to LTM
  - Incidental Learning
    - You do not have to actively rehearse everything to move it into your LTM
  - **Brown-Peterson Technique**
    - An attempt to measure how long information will stay in STM if rehearsal is prevented.
    - **Rehearsal Prevention Task (Distractor)**
      - Give them a number and have them count backwards from 3 for a period of time. Rapid decay without rehearsal happens within 15 seconds.
- **Decay vs. Interference**
  - **Theories of Forgetting**
    - Decay – If information is not used then it fades away over time
    - Interference – Forgetting is a direct result of more learning. The more similar the items, the more likely there will be interference.
  - **Brown-Peterson Technique suggests that forgetting is caused by decay.**
    - They say this because under interference the two items need to be closely related and numbers and letters aren't related.
  - Other studies suggesting forgetting is caused by interference
    - Waugh & Norman
      - If the counting backwards had interfered with your memory, the more numbers produced the more interference. If decay is occurring, then a longer time delay would result in more forgetting.
      - Subjects were given 12 digits, the difference is that one group got 1 digit per second and the other group got 4 digits per second.
      - There was no difference between group A and B. Time had absolutely no impact on forgetting, what was more important were the number of intervening item.
    - Keppel & Underwood

- Subjects forgot in the Brown-Peterson technique only after the first trial. Anything you do to prevent rehearsal is going to introduce some amount of interference.

❖ **Retrieval from STM**
- ➢ **Sternberg Paradigm**
  - Subjects were presented with a small series of digits that they were asked to hold in their memory. As they were storing the digits they were given a series of questions and had to decide if the number asked was in their memory set.
- ➢ **Parallel Search**
  - Every item in your memory set is available at the same time.
- ➢ **Serial Search**
  - You search one at a time; you cannot search the items simultaneously. The more items in your memory the longer it should take.
- ➢ **Serial Exhaustive Search**
  - Every single item must be searched before you give a response. This is what we as humans use.
- ➢ **Serial self-terminating search**
  - Once you find the answer you stop searching.

❖ Types of Mental Representations (Codes)
- ➢ **Auditory Codes**
  - **Errors in Recall**
    - Iconic Memory (Visual Perception)
    - Echoic Memory (Auditory Perception)
    - STM (Presented Visually)
      - ♦ Despite being given a C visually, we convert it into a sound based code.
    - Phonological Similarity
      - ♦ It is harder to learn a list of words when they sound alike.
- ➢ **Semantic Codes (Meaning)**
  - Wickens – Release from proactive interference
    - Subjects were given 3 words, count backwards from 100 by 3's. The 3 words came from the same category on every trial (animals, plants, etc). Over a number of trials the performance decreased, trial 1 interfered with trial 2, etc.
    - Refers to the fact that older information can interfere with new information. If you change to something that's not in the same category, they're essentially released from proactive interference.
- ➢ **Visual Codes**
  - Mental Rotation
    - Are objects the same shape?
- ➢ **What happens to deaf individuals?**
  - They will recode information into ASL. If they're given something visual, they'll rehearse it with ASL. Their mistake will be used on the physical nature of the hand gesture.

❖ Working Memory

- Atkinson-Shiffer isn't the only way people view memory. People view it as a workspace for rehearsing, making decisions, problem solving, etc.
- An individual had a head injury from an accident, his digit span was nearly zero but **could** form new memories but used a pair associate learning task. He was able to learn the association between word pairs.
- Focus is on the function on storage bed of information. System that holds onto information for other cognitive work. Decision making problem solving, etc.
- **Components of Working Memory**
  - **Central Executive**
    - Performs all the higher level tasks – controlling, decision-making, planning future actions, language comprehension, reasoning, retrieval of information from LTM
  - **Phonological Loop**
    - Phonological Store – Responsible for translating visual information into a speech based code.
    - Articulatory Loop - Information can be stored here as long as information can be rehearsed at a fast rate (2 seconds)
  - **Visuo-spatial sketch pad**
    - Holds onto the visual image

❖ Basic Findings

- **Dual Task Technique**
  - **Primary** – Visual memory span task or letter span task
  - **Secondary** – Mental addition or visual imagery
  - **Memory Span Task** – Which filled in box changes? Letter span A row of letters
  - Can you do these tasks together or will there be an issue? These tasks rely on working memory, if neither tasks interfere with each other, we can assume one task then relies on the visuo-spatial sketchpad and the other on the phonological loop. If they do interfere then we will see problems.
- **Word-length effect**
  - Shorter words are easier to remember than longer words. Shorter words have fewer characters to rehearse so it can be done faster. Chinese speakers have larger digit spans than English speakers do.

❖ Application of Working Memory

- Working memory is tested by how many words you can remember as long as you are correct.

Long Term Memory

- Once something has entered your LTM, it is there forever. Momentarily forgetting is possible but the information never leaves.

❖ Types of LTM

- **Declarative – Memories which can be consciously recalled.**
  - **Episodic** – Memory for personal experiences. Specific experiences in your life. Examples: What you had for dinner, 18th birthday, etc. All experiments are episodic.
  - **Semantic** – Language, facts, etc.
- **Nondeclarative**
  - **Procedural** – Skill memory.
  - **Priming**
- **Example:**
  - While playing golf you must use your semantic memory to know the rules and episodic to know where you hit the ball and keep score. Procedural memory helps you actually hit the ball. In an Alzheimer's patient semantic memory is fine but episodic is not.

❖ **Techniques for Studying LTM**

- **Recall**
  - **Free Recall** – Essays, fill in the blank, short answer, etc.
  - **Serial Recall** – The items must be recalled in the correct order or presentation
  - **Cued Recall**
- **Recognition**
  - Given a series of options or choices you must chose which one is correct. Multiple choice, etc. Typically recognition is easier than recall.
- **Paired Associate Learning** – Pairing a pin with a debit card
- **Incidental vs. Intentional Learning**
  - **Incidental Learning -** You do not have to actively rehearse everything to move it into your LTM
  - **Intentional Learning** – You learn schoolwork since you know you're going to be tested.

❖ Encoding in LTM

- Levels of Processing
  - If you see "CAT" you can process it auditory (C-A-T) or semantically (Fat Cat) or Visually (Seeing a fat cat in your head)
- Orienting Task
  - Function of orienting task is to control cognitive processes at encoding.
  - Shallow vs. Deep Processing
    - Shallow –
    - Deep – Deeper the processing is, the better your memory will be.
- Type types of Rehearsal
  - **Maintenance Rehearsal** – Simple role memorization. Just rehearses it in the STM.
  - **Elaborative Rehearsal** – Additional new analyses of a stimulus is required. By relating it to yourself, you are much more likely to understand it and move it into LTM.

❖ **Evidence for Levels of Procesisng**

- Craik and Watkins

- Individuals are told to remember just the "G" words - Garden, half, book, cat, gift, table, and girl. You can rehearse garden for 3x as long (since 3 words are between garden and gift) than gift. If all you're doing is reading through your notes, without actively thinking about it, it will not help you.

- Hyde and Jenkins – Incidental vs. Intentional
  - Study
    - **Shallow Processing** – Does the word contain e or g?
    - **Deep Processing** – Pleasantness rating.
      - Half of the subjects were given intentional learning instructions. They were told you would have to remember the words. The other half was not. You can make a conscious effort to study for an exam; intention to learn does not help if you're not encoding the meaning.
- **Organization**
  - **Material-induced organization**
    - **Clustering during input**
      - A – Cat, dog, lion, elephant, chair, table, desk, lamp, skirt, pants, coats, socks
      - B- cat, socks, chair, skirt, dog, pants, table, coat, lion, desk, elephant, lamp
    - **Clustering during recall**
      - Study -> black, table, stop, white, chair, go
      - Free recall -> black, white, stop, go, table, chair. As long as it's free recall you're more likely to remember.
  - **Subjective Organization**
    - Organization developed by the subject for organizing or structuring a list of items. Even if an unrelated list of words, it can be organized. Imagine being given a multiple test of the exact same list. You're going to be tested on the consistency of which you recall the order of the words; they become more and more consistent. You'd recall "dog apple lawyer brush" showing you're clustering the words.
- **Distinctiveness**
  - **Von Restorff Effect** – Any unique feature will aid memory. Sometimes shallow processing can lead to better retention, but only if it's distinctive.
  - **Orthographic Distinction** – Abnormal better or spelling combination.
  - Faces that are unusual or unique are easier to remember. Some say the primacy effect is due to distinctiveness (since the first few words on the list are distinctive). It is better to work on organizational structure and distinctiveness at the same time.
  - Word pairs are better remembered if you focus on the differences when they're the same (beer-wine) and better if you look at the similarities for (beer-dog) word pairs.
- **Item Specific vs. Relational Processing**
  - **Item Specific** – encoding each item individually

        - **Relational Processing** – You are focusing on the relationship between items. Organization uses relational processing
    - **Self-reference effect** – Anything relatable to you you're more likely to remember.
        - **Orienting Task**
            - **Shallow** – Does "able" rhyme with "table"?
            - **Deep** – Does "intelligent" mean the same thing as "smart"?
            - **Self-reference** – Does "immature" describe you?
        - If you compare deep vs. shallow orienting, you're more likely to remember intelligent than able. The items that describe you are more likely to be remembered than deep orienting.
        - Shallow < deep < self-reference
    - **Generation Effect**
        - Fast-S___ (Generate)
        - Fast-Slow (Read)
        - Results: Read (Generate)
    - **Massed vs. Distributed Practice**
        - Space out your studying. If you do mass studying you get a false perception of overconfidence. The more in which you process/think about the material the better off your memory will be.
    - **Implications for Education**
        - Cramming might be OK for the test but long term you will not know it for the final.
    - **Overlearning** – Continuous rehearsal, even after you've mastered the information.
- Types of Mental Representations (Codes)
    - **Semantics**
    - **Imagery**
        - **Advantage of visual information** – Easier for us to remember images than words.
        - **Mental Travel** – You form a mental map
        - **Geocentric View of the World** – Size of an image effects how you see it.
        - **Dual-Code Hypothesis (Paivio, 1969)**
            - **Abstract vs. Concrete Words**
                - We know that concrete words are easier to remember than abstract words. Any word has two potential codes, a verbal or visual code. Simply two codes are better than one, the word "Cat" can be coded verbally or visually. The word knowledge can only be encoded verbally.
        - **Eidetic Images (Photographic Memory)**
            - Eidetic imagery is in a small percentage of children, not adults. These children's lost their ability around puberty. Children will say "the bottle is yellow" instead of "the bottle was yellow" if they have photogenic memory. They tend to see the image externally instead of how normal people view it internally.

- **Retrieval from LTM**
  - **Availability** – The information represented in memory
  - **Accessibility** – The information that is available *and* can be retrieved at a specific time/place.
  - **Overlearning -** increases the chances of being able to retrieve the information when needed. When you forget something you are *not* losing it, rather just losing where it's at in LTM. Inability to retrieve information
- **Retrieval Cues**
  - **Importance of Retrieval Cues**
    - **Procedure** -> Given 48 words from 12 categories
    - **Free recall** -> 40%
    - **Cued Recall** -> 62% (Animal, sport, furniture)
  - There is far too much information than what could be retrieved at any one given point in time. Photos are simply retrieval cues for your own memories.
  - **What makes a cue effective?**
    - **Associate Strength**
      - According to associate strength, a cue is effective, if it frequently occurs with that item in the past.
      - Study
        - Strong Cue (Dog-Collar) vs. Weak Cue (Black-Collar)
      - There are sometimes when a weaker cue is better, but it depends on what happens during the study.
      - The effectiveness of the cue depends wholly on the cues present in the study. A cue will be considered "Effective" if presented when you first learned the material. If the same cue is presented in the study the test will be enhanced.
- **Encoding Specificity**
  - **Tulving & Thompson (1973)**
    - **Paired Associate Learning**
      - Glue-CHAIR
      - Bath-NEED
      - They were told to specifically focus on the second word because they knew their memory of the second word would be tested.
    - **Free Association**
      - Table – Dinner, desk, study, lamp
      - Want – Food, desire, now, money
    - **Recognition Test**
      - Circle words produced in step 2 that were presented from step 1 (chair or need)
      - 24% found that they had said the same word and recognized that
    - **Cued Recall of Step 1**
      - Glue-____
      - Bath-____
- **Context Dependent Memory**
  - **Scuba Divers**

        - We will remember more if we can return to the same context in which we learned something.
    - **Rooms**
        - Subjects were presented with 80 words in a distinctive basement. The very next day they were split into two groups, one in the basement and one not. Those who were tested in the same basement remembered more than the other group.
    - **Odors**
        - They pumped in the smell of chocolate. When the smell was present when they learned something, when they were tested with the smell of chocolate present, they had improved retrieval. The more distinctive the odor, the stronger the effect.
    - **Music**
        - They retrieved more when the music matched.
- **State of Mind**
    - **Alcohol**
        - If you study drunk and are tested sober you'll do worse than if you were tested drunk.
    - **Marijuana**
        - If you learn something under the influence of marijuana you'll remember it better when under marijuana compared to not at all.
    - **Mood**
        - If you are happy and take the test happy you'll do better than if you were sad and tested happy
    - **All of these were stronger for free recall.**
- **Mood and Memory**
    - **Mood Congruent Memory**
        - We do not manipulate the study, come in as is. The participants in the study were in a neutral mood. Participants were made either happy or sad. Happy participants remembered more positive words; sad participants remembered more negative words.
        - Clinical depression can be a cyclical disease, because they're sad so they think about sad things, which make you sad, and now you'll only think of sad things, and the cycle continues.
- **Retrieval Inhibition**
    - According to retrieval inhibition, the act of recalling part of the information makes it harder for you to remember everything else.
    - **Repeated Practice**
        - If you only practice some of the material, then it makes it harder to remember everything else. It causes impeding memories to be inhibited.
    - **Part-Set Cuing**
        - **Study**
            - List of 40 words (10 categories, 4 words from each)
        - **Test**
            - A: Free recall

    - B: 1 Category
    - C: 2 Categories
    - D: 4 Categories
    - E: 7 Categories
- Everybody, no matter which group they were in, had to remember as many of the 40 words as they could. The main question of interest was how likely they were to remember the cues from non-cued categories. They didn't care about the number of words overall, rather how likely you are to remember items from non-cued categories. The more categories cued, the less likely they were to remember non-cued categories. If a policeman only asks you in an investigation parts about a crime scene, it'll make you less likely to remember the other details.

Definitions
Subliminal Information – Information given to you so quickly or faintly to hit your threshold.
Supraliminal Information – Information given to you that hits your threshold.
Dysexecutive Syndrome – Damage to the frontal lobe where people lose some central executive functions that help them control their thought processes. These individuals may show preservations and distraction.
Simple Span – Measures the required time to do one simple task – remembering something for a brief period of time then reporting it back.
Episodic memory improves if people use organization.

Random Notes:
Information can be stored in STM acoustically, semantically, and visually.